INTRODUCTION

Compliance

Safety of Information Technology Equipment
MASTERseries is safety certified by an independent laboratory and is compliant with the following safety standards:

- UL60950, 3rd Edition / CSA C22.2 No. 60950
- EN60950

FCC Requirements, Part 15
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Rules. These limits are designed to provide reasonable protection against harmful interference when equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user’s own expense.

NOTE: Changes or modifications to any unit not expressly approved by the party responsible for compliance may cause damage to the equipment and could void your authority to operate the equipment.
**FCC Requirements, Part 68**

The following instructions are provided to ensure compliance with the Federal Communications Commission (FCC) Rules, Part 68.

1. This equipment complies with Part 68 of the FCC rules and the requirements adopted by the America's Carriers Telecommunication Association Administrative Council for Terminal Attachments (ACTA). On the rear of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

2. This equipment uses the following standard jack types for network connection:

<table>
<thead>
<tr>
<th>Port ID</th>
<th>REN/SOC</th>
<th>FIC</th>
<th>USOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 ports (1-8)</td>
<td>6.0N</td>
<td>04DU9-BN</td>
<td>RJ-48C</td>
</tr>
<tr>
<td>(1-16)</td>
<td></td>
<td>04DU9-DN</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>04DU9-1KN</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>04DU9-1SN</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>04DU9-1ZN</td>
<td></td>
</tr>
</tbody>
</table>

3. This equipment is designed to be connected to the telephone network or premises wiring using cabling that complies with the requirements of FCC Part 68 rules.

4. In the unlikely event that this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

5. The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

6. This equipment must not be used on party lines. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

7. Repair service and warranty information can be obtained from:

   Carrier Access Corporation  
   5395 Pearl Parkway  
   Boulder, CO 80301-2490  
   (800) 786-9929 or (303) 442-5455

   If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

8. All repairs should be performed by Carrier Access or an authorized agent. It is the responsibility of the users requiring service to report the need for service to Carrier Access or an authorized agent.
9. Data Equipment:

For permissive, programmable and (or) fixed loss loop operation data equipment, in addition to the general requirements for all equipment, information must be provided explaining which jack is associated with each operation.

- Permissive, use RJ-11C
- Programmable, use RJ-41S and RJ-45S
- Fixed Loss Loop, use RJ-41S

Refer to ATIS Technical Report No. 5 for details on these connectors.

For Private (Leased) Line (Analog Data Format) equipment, the type JM8 jack is required. Refer to ATIS Technical Report No. 5 for details on this connector. For Private (Leased) Line (Digital Format) equipment, in addition to the general requirements for all equipment, certain digital connections require that an encoded analog content and billing protection affidavit be provided to the telephone company. Customer instructions must contain information on the preparation and submission of the affidavit.
Introduction

**Industry Canada ICES-003**

**English**
This class A digital apparatus complies with Canadian ICES-003.

**French**
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

**Industry Canada CS-03**

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telephone company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure, for their own protection, that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected. This precaution may be particularly important in rural areas.

**CAUTION!** USERS SHOULD NOT ATTEMPT TO MAKE SUCH CONNECTIONS THEMSELVES, BUT SHOULD CONTACT THE APPROPRIATE ELECTRIC INSPECTION AUTHORITY, OR ELECTRICIAN, AS APPROPRIATE.
Safety Information

CAUTION! ALWAYS USE CAUTION WHEN INSTALLING TELEPHONE LINES. READ THE CAUTIONS BELOW FOR DETAILS ON SAFETY GUIDELINES TO PREVENT INJURY.

- Never touch uninsulated telephone wires and terminals unless the telephone line has been disconnected at the Network Interface (NI) as voltage potentials as high as 300 VAC may be present across the transmit and receive pairs.
- Only use No. 26 AWG or larger telecommunication line cord, to reduce the risk of fire.
- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Refer to the installation section of this manual for a safe and proper installation procedure. All wiring external to this equipment should follow the current provision of the National Electrical Code.

Notices

This manual contains important information and warnings that must be followed to ensure safe operation of the equipment.

DANGER! A DANGER NOTICE INDICATES THE PRESENCE OF A HAZARD THAT CAN OR WILL CAUSE DEATH OR SEVERE PERSONAL INJURY IF THE HAZARD IS NOT AVOIDED.

CAUTION! A CAUTION NOTICE INDICATES THE POSSIBILITY OF INTERRUPTING NETWORK SERVICE IF THE HAZARD IS NOT AVOIDED.

WARNING! A WARNING NOTICE INDICATES THE POSSIBILITY OF EQUIPMENT DAMAGE IF THE HAZARD IS NOT AVOIDED.

NOTE: A Note indicates information to help you understand how to perform a procedure or how the system works. Notes should be read before performing the required action.
Electrostatic Discharge (ESD) Precautions

ESD can damage processors, circuit cards, and other electronic components. Always observe the following precautions before installing a system component.

1. Do not remove a component from its protective packaging until you are ready to install it.
2. Wear a wrist grounding strap and attach it to a metal part of the system unit before handling components. If a wrist strap is not available, maintain contact with the system unit throughout any procedure requiring ESD protection.

**WARNING!** Integrated circuits (ICs) are extremely susceptible to electrostatic discharge. Unless you are a qualified service technician who uses tools and techniques that conform to accepted industry practices, do not handle ICs.

The ESD warning label appears on packages and storage bags that contain static-sensitive products and components.
Warranty

Carrier Access warrants to BUYER that Product Hardware will be free from substantial defect in material and workmanship under normal use in accordance with its Documentation and given proper installation and maintenance for period of two years from the date of shipment by Carrier Access.

Carrier Access warrants that the Licensed Software, when used as permitted under its License Terms and in accordance with the instructions and configurations described in the Documentation (including use on Carrier Access product or a computer hardware and operating system platform supported by Carrier Access), will operate substantially as described in the Documentation for a period of ninety (90) days after date of shipment of the Licensed Software to BUYER.

This warranty shall not apply to Products or Software that have been either resold or transferred from BUYER to any other party. Any such transfer voids the above warranty and related licenses. Carrier Access offers expanded product care beyond what is covered by the warranty through different support plans. The plans are designed to maximize network availability through advance replacement for defective equipment. Please contact your Carrier Access representative for support program details.

Warranty Procedure

BUYER must promptly notify Carrier Access of any defect in the Product or Software and comply with Carrier Access' return/repair policy and procedures. Carrier Access or its agent will have the right to inspect the Product or workmanship on BUYER's premises. With respect to a warranty defect in Product hardware reported to Carrier Access by BUYER during the warranty period, Carrier Access, as its sole obligation and BUYER's exclusive remedy for any breach of warranty, will use commercially reasonable efforts, at its option, to:

a. repair, replace, or service at its factory or on the BUYER's premises the Product, or component therein, or workmanship found to be defective so that the Product hardware operates substantially in accordance with Carrier Access Documentation; or
b. credit BUYER for the Product in accordance with Carrier Access's depreciation policy.

With respect to a warranty defect in the Licensed Software reported to Carrier Access by BUYER during the 90-day software warranty period, Carrier Access, at its own expense and as its sole obligation and BUYER's exclusive remedy for any breach of the software warranty, will use commercially reasonable efforts to, at its option,

a. correct any reproducible error in the Licensed Software, or
b. replace the defective Licensed Software, as follows: Should a Severity 1 or 2 warranty defect with the Software occur during the 90-day warranty period, Carrier Access will provide, in its sole determination, either
   1. software to resolve the defect to be downloaded into the affected units by the BUYER or
   2. a documented workaround to address the issue.

Severity 1 issues are failures of the Licensed Software to comply with the Carrier Access software specifications and that completely or severely affect the Carrier Access Product and its traffic or service capacity, or maintenance or monitoring capabilities.

Severity 2 issues are failures of the Licensed Software to comply with the Carrier Access software specifications and that result in a major degradation of the Carrier Access Product so as to impact its system or service performance, or significant impairments to network operator control or effectiveness. Should a Severity 3 warranty defect with the Licensed Software occur during the 90-day warranty period, Carrier Access will provide assistance to Buyer to determine if a solution or workaround will be provided in a subsequent software release following the reported issue.

Severity 3 issues are defined as failures of the Licensed Software to comply with the Carrier Access software specifications but that do not significantly impair the function or service of the Carrier Access Product or the system.

Determination of Severity 1, 2 or 3 shall be made solely by Carrier Access following receipt of the reported problem. Refurbished material may be used to repair or replace the Product. BUYER shall bear the risk of loss for Products or Software returned to Carrier Access for repair, replacement, or service, and the same must be shipped pre-paid by BUYER.
Requests for warranty services and troubleshooting must be made to, and will be provided by, the Carrier Access Customer Support Center via telephone during the warranty period and during normal business hours. Normal business hours for Carrier Access Customer Support Center are 7:00 a.m. to 6:00 p.m. Mountain Standard Time, Monday through Friday, excluding weekends and standard Carrier Access recognized holidays.

**Limitation of Warranty & Limitation of Remedies**

Correction of defects by repair, replacement, or service will be at Carrier Access's option and constitute Carrier Access' sole obligation and BUYER's sole and exclusive remedy under the limited warranty. Any such error correction or replacement provided to BUYER does not extend the original warranty period for hardware or software, respectively. Carrier Access assumes no warranty or other liability with respect to defects in the Product or Software caused by:

- a. modification, repair, storage, installation, operation, or maintenance of the Product or Software by anyone other than Carrier Access or its agent, or as authorized and in accordance with the Carrier Access Documentation;
- b. the negligent, unlawful or other improper use or storage of the Product or Software, including its use with incompatible equipment or software;
- c. fire, explosion, power failures, acts of God, or any other cause beyond Carrier Access' reasonable control;
- d. handling or transportation after title of the Product passes to BUYER.

Other manufacturer's equipment or software purchased by Carrier Access and resold to BUYER will be limited to that manufacturer's warranty. Carrier Access assumes no warranty liability for other manufacturer's equipment or software furnished by BUYER.

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THE WARRANTIES IN THIS AGREEMENT REPLACE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF CARRIER ACCESS, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT AND/OR ANY IMPLIED WARRANTIES ARISING OUT OF COURSE OF PERFORMANCE OR COURSE OF DEALING. ALL OTHER WARRANTIES ARE DISCLAIMED AND EXCLUDED BY CARRIER ACCESS.

THE REMEDIES CONTAINED IN THIS AGREEMENT WILL BE THE SOLE AND EXCLUSIVE REMEDIES WHETHER IN CONTRACT, TORT, OR OTHERWISE, AND CARRIER ACCESS WILL NOT BE LIABLE FOR INJURIES OR DAMAGES TO PERSONS OR PROPERTY RESULTING FROM ANY CAUSE WHATSOEVER, WITH THE EXCEPTION OF INJURIES OR DAMAGES CAUSED BY THE GROSS NEGLIGENCE OF CARRIER ACCESS. THIS LIMITATION APPLIES TO ALL SERVICES, SOFTWARE, AND PRODUCTS DURING AND AFTER THE WARRANTY PERIOD. IN NO EVENT WILL CARRIER ACCESS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF DATA, OR COMMERCIAL LOSSES EVEN IF CARRIER ACCESS HAS BEEN ADVISED THEREOF.

No agent, BUYER, or representative is authorized to make any warranties on behalf of Carrier Access or to assume for Carrier Access any other liability in connection with any of Carrier Access's Products, software, or services.

The foregoing summarizes Carrier Access' entire product and software warranties, which are subject to change without notice.

**Warranty Product Returns**

Before returning any equipment to Carrier Access Corporation, first contact the distributor or dealer from which you purchased the product.

A Return Material Authorization (RMA) number is required for all equipment returned to Carrier Access Corporation. Call Carrier Access Corporation Customer Support at (800) 786-9929 or (303) 442-5455 for RMA number, repair/warranty information and shipping instructions. Be prepared to provide the following information:

- Carrier Access Corporation serial number(s) from the system chassis or circuit card(s)
- Name of distributor or dealer from which you purchased the product
- Description of defect
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Glossary

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- What’s New in Release 6.0/6.01
- Benefits
- Applications
- Application Modules
- Network Management
- Technical Specifications
Overview

The MASTERseries FLEXmaster line from Carrier Access is your solution for T1 backhaul and access networking needs. The MASTERseries FLEXmaster modules minimize the total cost of backhaul networks by reducing leased circuit costs as well as maintenance costs of the network. The MASTERseries’ highly reliable architecture, superior lightning protection, and Automatic Protection Switching features allow you to maximize billed minutes and substantially improve service quality. In addition, the flexible MASTERseries platform also supports rapid deployment of new sites and services, making it a complete solution for cell and hub site networking for wireless carriers.

In the narrowband Radio Access Network (RAN), MASTERseries grooms remote cell site traffic onto full T1 circuits for the most efficient networking. Automatic Protection Switching can provide protection for critical traffic. Point-to-point and drop-and-insert topologies are deployed quickly and easily. MASTERseries remote management and BERT reduce the need for technicians to visit distant sites to diagnose and correct trouble conditions.

IP Access

MASTERseries with FLEXmaster modules uses the backhaul network to provide LAN access from cell sites and other remote locations for technicians. Network operators can eliminate external routers, and management effort by using MASTERseries. In fact, one of our customers estimates that they will save over $100,000 a year in one service area alone since implementing this remote management solution!
To form a complete backhaul solution, the MASTERseries can be combined with Carrier Access’ BROADway broadband platform and element management system at the Mobile Switching Center.

The MASTERseries platform uses a passive mid-plane architecture for superior flexibility. Each module consists of a front-mounted processing FLEXengine and a rear mounted interface adapter module. Different application modules add specific capabilities, such as TDM, ATM inverse multiplexing, or DS3 ATM access which are available across the full system. Operators have the ability to mix and match various modules to create systems fully tailored to their needs.

With 2-slot, or 8-slot enclosures, MASTERseries products use less physical space than the majority of solutions in the industry. A single FLEXmaster8 T1 module supports up to eight T1s of cross-connect, two Ethernet ports, and one V.35 data port. A rack mountable dual slot 1RU system supports up to 2 FLEXmaster modules and the eight slot supports up to four FLEXmaster modules. In a full eight-slot enclosure configuration, only a 3RU space is required to support up to 32 T1 circuits!

MASTERseries modules are designed around a DS0-granular cross-connect fabric. Each type of application module adds to this capability with T1 ports, data ports, and specialized functions such as TDM, IP routing, and ATM. When installed in a multi-slot chassis, the FLEXmaster modules work together to provide an integrated system.

The distributed MASTERseries switching capability of the FLEXmaster modules is interconnected over two high-speed buses. The TDM communications bus allows any-to-any connection of network traffic between modules. The inter-module Packet Bus, along with the distributed intelligence of the modules, eliminates the need for a dedicated control module in any shelf.
What’s New in Release 6.0/6.01

MASTERseries release 6.01 provides several new features

**Embedded GUI**
User-friendly, web-based GUI. Provides intuitive menus and display. For details about the GUI see Chapter 18, Getting Started with the GUI.

**New Modules**
FLEXmaster8A Module TDM and ATM. These modules provide:
- LAN extension in the form of a 6-port hub
FLEXmaster16 Module TDM and ATM. These modules provide:
- LAN extension in the form of a 6-port hub
- 16 port T1 capacity

**OSPF Support**
- OSPF (Open Shortest Path First) routing support for the FLEXmaster integrated Router. OSPF is a link-state routing protocol used by large IP networks to dynamically share information in the routing table among routers.

**Frame-Relay Support**
- This features provides the ability for setting up in-band management access over a T1 port with the FLEXmaster integrated Router utilizing Frame Relay.
- Support up to 16 Frame Relay links with maximum of up to 32 DLCIs total across all FR links.

**Increased Security**
- Previous releases allowed password free connection to the TUI. Now users must log in to the CLI.
- The TUI can now be set with a session timeout.
Benefits

- 1/0 grooming reduces link costs
- Integrated IP router for LAN interconnection
- High port density and small footprint conserve valuable space
- Environmental hardening and lightning protection enhance reliability
- Extensive test capabilities reduce operations costs

Applications

- Cell Site T1 termination (CSU, DSU/CSU)
- T1 IAD (voice, data, LAN interconnection)
- Access IP router for LAN interconnection
- Increase T1 link capacity
- T1 aggregation and grooming
- ATM Access Concentrator
**Application Modules**

The application modules consist of the following components:

- An engine
- An engine faceplate adapter strip
- An adapter module
- An adapter module adapter strip

**Engine**

The engine is the front part of the Module, with name label, faceplate and LEDs, and is installed in the front of the chassis.

**Adapter Module**

The adapter module is the back portion of the module and incorporates the port and link interfaces. This component is installed in the back of the chassis, directly behind the associated engine.

**Installing Modules/Adapters**

- When installing in a new chassis, ensure that modules are fully seated in their slots. If the PST LED is flashing on more than one module, power down the chassis, reseat modules in their slots, and reapply power to the chassis.

**Hot-Swapping a Module/Adapter**

- To swap an adapter module, replace it with one that has the same part number. The part number label can be seen on the inside bottom corner of the module.

- All application modules are hot-swappable. After hot swapping a module, there can be up to a one minute delay before the master module reports the slave module as active or removed. After a module has been configured, if it is moved to a different slot or shelf, the configuration will be defaulted to a new configuration. If the module is moved back before doing a commit, (see Saving Configurations on page 5-29), the original configuration will be restored. If the module remains in the new location, a new configuration can be entered or a saved configuration can be downloaded.

**Application Modules**

MASTERseries supports the following Application Modules:

**FLEXmaster8 TDM Module**

The FLEXmaster8 TDM Module provides 8 T1 ports, 16 T1 mid-plane module-to-module cross-connect, V.35 port, integrated IP Router with 2 10/100 Ethernet ports.

**FLEXmaster8 ATM Module**

The FLEXmaster8 ATM Module provides 8 T1 ATM-IMA ports with IWF and CES capability, 16 T1 mid-plane module-to-module cross-connect, V.35 port and 2 10/100 Bridged Ethernet ports.
**FLEXmasterDS3c-3 Module**

The FLEXmasterDS3c-3 module provides 3 DS3c ATM ports, and 16 T1 mid-plane module-to-module cross-connect. The FLEXmasterDS3c-3 ATM Module supports ATM-IMA with IWF and CES capability, 16 T1 mid-plane module-to-module cross-connect, and 2 10/100 Bridged Ethernet ports.

**FLEXmaster8A Module - TDM and ATM Versions**

The FLEXmaster8A TDM Module provides 8 T1 ports, one V.35 port, Integrated router with 2 Ethernet 10/100 Ports, a new 8 T1 Adapter Module.

**FLEXmaster16 Module - TDM and ATM Versions**

The FLEXmaster16 TDM Module provides 16 T1 ports, one V.35 port, Integrated router with 2 Ethernet 10/100 Ports, a new 16 T1 Adapter Module.

**HUBmaster**

The HUBmaster Module provides a 5 port 10/100 Ethernet hub.

---

**Network Management**

**OMC Companion**

MASTERseries 6.01 is supported by OMC Companion 2.0.

**MASTERview**

MASTERview is a web based network management platform that offers solutions for the management of networks and its devices from a web browser with a user-friendly interface. The MASTERview platform provides a rich set of applications that allow you to discover network topologies, configure devices, customize the platform, support databases, monitor network events, and so forth, using a standard Java enabled web browser. It also includes advanced functions such as sending e-mails, paging, or faxing messages on the occurrence of pre-specified alarm events. With the Carrier Access MASTERview network management platform, you only need a web browser to monitor your network from anywhere, within an intranet or internet. For more information, refer to the MASTERview Installation Manual and *Product Application Note, 05-0015, Viewing FLEXmaster using MASTERview.*
Technical Specifications

Physical

2 Slot Enclosure
- Dimensions: 1.75 in (1 RU) (H) x 19 in (W) x 10.2 in (D)
  4.45 cm (H) x 48.26 cm (W) x 25.9 cm (D)
- Weight: 19 lbs (8.62 kg) fully loaded
- Rack mount: 19- or 23-inch

8 Slot Enclosure
- Dimensions: 5.25 in (3 RU) (H) x 19 in (W) x 10.2 in (D)
  13.34 cm (H) x 48.26 cm (W) x 25.9 cm (D)
- Weight: 30 lbs (13.61 kg) fully loaded
- Rack mount: 19- or 23-inch

Components
- Front-loading engine module, includes RS-232 craft and 10/100 Ethernet ports
- Rear-loading interface adapter module. Adapters and connectors vary by module type.

Platform Features
- Two different shelf configurations
- 1 Rack Unit (RU) dual slot enclosure
- 3 RU eight slot enclosure
- Integral 1/0 Digital Cross-connect Switch (DCS)
- IP-based management channel concentration
- Support for up to 32 full or fractional T1/E1 links
- Web based GUI, SNMP, Telnet and Menu support
- Environmentally hardened (-40 °C to 65 °C) with self-healing lightning protection
- Hot swappable application modules and power modules
- Wide Range 24/-48 VDC power
- Optional power redundancy
Capacities
- 2 Slot Enclosure
  - 2 Power Modules
  - 2 Interface Adapters
  - Up to 2 FLEXmaster Application Modules
- 8 Slot Enclosure
  - 2 Power Modules
  - Maximum 4 Application Modules
  - Up to two application modules - must be installed where there are open slots on either side of the FLEXmaster module to conform to environmental specifications.

Diagnostics
- Loopback Types: Bi-directional, Fractional DS0/E0, Line, Local, Payload, Equipment, Dataport (local or remote), Remote in-band/out-of-band, fixed or timed options
- BERT: All ones, all zeros, alternating, 2 24-1, MARKS, SPACES, 511, 2047, 2^15-1, QRSS.

Performance Monitoring
- Data Storage: Last 24 hours of data in 15 minute increments, 48 and 72 hour summaries
- Monitors: All network interfaces
- Reports: Based on TR54016 and T1.403 (T1); interface statistics

Rear Chassis Interfaces
- 2 Interface Adapters (2-slot chassis)
- Up to 4 Interface Adapters (8-slot chassis)

Service Modules Supported
- FLEXmaster8 TDM Application Module
- FLEXmaster8 ATM Application Module
- FLEXmaster16 TDM Application Module
- FLEXmaster16 ATM Application Module
- FLEXmaster8A TDM Application Module
- FLEXmaster8A ATM Application Module
- FLEXmasterDS3c-3 ATM Application Module

T1 Interfaces: FLEXmaster8
- Line Rate: 1.544 Mb/s (T1)
- Framing: SF/ESF per TR54016/TR62411
- Interface: AMI or B8ZS
- Connector: Female 8 pin RJ48C
- Timing: Internal or External from any network port
LED Indicators: YEL/TEST, OOF/LOS, SYNC, AIS, MINOR

Signaling: Clear channel, bundled or robbed bit

**T1 Interfaces: FLEXmaster16**

- Line rate: 1.544 Mbps ±50 bps
- Framing: SF/ESF
- Coding: AMI or B8ZS for T1
- Timing: Internal or external from T1 port
- Line interface: T1-CSU
- Receive sensitive (DS-1): 0 to -22 dB @ 772KHz ALBO
- Output level (DS-1): selectable at 0 to -22dB
- Jitter: meets AT&T Pub. TR-62411, G.832

**Data Interfaces**

- Date Rate: N x 56/64 kb/s, N=1-24 (T1)
- Interface: DCE Synchronous CCITT V.35
- Connector: Female 25-pin DB connector
- LED Indicators: RxD, TxD

**DS3c Interfaces: FLEXmasterDS3c-3**

- Rear Access SMB DS3 connectors
- Compliant with ATM Forum DS3 Physical Layer Interface af-phy-0054.000
- TX/RX 75-ohm SMB Connectors
- Line rate: 44.736 Mbps
- Line code: B3ZS
- Framing format: M23 and C-bit parity
- Transmit Impedance: 75 ohms, 5% resistive, unbalanced
- Transmit Jitter Attenuation: Meets ANSI T1.102
- Transmit Amplitude: Meets ANSI T1.102 pulse mask with 0.36 to 0.85 Vp
- Transmit Length (cable) 500 ft. to cross connect
- Receive Sensitivity: -10 dB w/r DSX-3 120 mVp to 900 mVp input range with automatic gain control circuit

**IP Routing**

- Dual Ethernet Interfaces: 10/100Mb per IEEE 802.3
- LAN Protocols: TCP/IP
- WAN Protocols: PPP
- DHCP: Server, relay agent, and client
Introduction
Technical Specifications

- RIP, RIPv2, static routing
- Supports WAN un-numbered IP interface
- Security: PAP, CHAP, NAT/NAPT, rules-based firewall
- Ping, Trace Route

**External Alarm**
- Form "C" relay contact closure
- Major/Minor

**Management**
- SNMP: DS1 MIB and MIB II via PPP, Private MIB
- Remote Access: In band via DS0, Telnet supported
- VT100: RS232 port, 4800-19,200 bps;
- RJ-45 connector, external modem supported
- Password control: three levels of access
- Web Browser GUI

**Power**
VDC: 2 slot and 8 slot: +/- 20 to 65 VDC

**Regulatory Approvals**

**USA**
- UL60950-1
- FCC Part 15, Class A
- FCC Part 68 and TIA-968-A

**Canada**
- CSA 60950-1
- ICES-003 Class A
- CS-03

**Environment**
- Operating temperature range: -40 °F to 149 °F (-40 °C to 65 °C)
- Storage temperature range: -40 °F to 158 °F (-40 °C to 70 °C)
- Cooling method is by free air convection (rack mounting requires 5 RU minimum above and below each unit)
- Maximum operating altitude: 10,000 ft (3,048 m)
- Minimum operating altitude: 197 ft (60 m) below sea level
- Maximum non-operating altitude: 40,000 ft (12,192 m)
- Relative humidity (non-condensing) range: 0% to 95%
CHAPTER 2

2-Slot Chassis Installation

In this Chapter

- Overview
- Unpacking
- 2-Slot Chassis
- Supported Configurations
- Chassis Installation
  - Rack Mount Installation
  - Power Supply Installation
  - Application Module Installation
  - DC Power
- Power Configurations
- Fan Assemblies
  - Fan Replacement
Overview

This chapter contains a description of the MASTERseries 2-slot chassis and detailed installation instructions.

Unpacking

WARNING! OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC DEVICES.

1. Inspect containers for damage during shipment. Report any damage to the freight carrier for possible insurance claims.
2. Compare packing list with office records. Report any discrepancies to the office.
3. Open shipping containers, being careful not to damage contents.
4. Inspect contents and report any damage.
5. If equipment must be returned for any reason, carefully repack equipment in the original shipping container with original packing materials if possible.
6. If equipment is to be installed later, replace equipment in the original shipping container and store in a safe place until you are ready to install it.
2-Slot Chassis

The 2-slot chassis provides:
- Two power supply slots for redundant power
- Two application module slots

Dimensions:
- 1.75 in (H) x 19 in (W) x 10.2 in (D)
- Maximum depth of the shelf, including cables, is 12 inches

Rack Mounting:
- 19- or 23-inch rack

**NOTE:** Blank faceplates must be installed on each empty slot to be in compliance with product emission standards.
## Supported Configurations

The following table represents the configurations supported by the 2-slot chassis with double fan or with triple fan.

<table>
<thead>
<tr>
<th>2-Slot Chassis (2 Fan)</th>
<th>2-Slot Chassis (3 Fan)</th>
<th>FM16 TDM</th>
<th>FM16 ATM</th>
<th>FM8A TDM</th>
<th>FM8A ATM</th>
<th>FM8 TDM</th>
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<th>Total Number of Modules</th>
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For information about configurations supported by the 8-slot chassis, see *Supported Configurations* on page 3-4.
Chassis Installation

Installation of the 2-slot chassis is as follows:

**Rack Mount Installation**

Mounting brackets are installed on the chassis for a 19-inch rack.

1. To rack mount the assembled unit, attach the unit with the brackets to the rack using the screws provided.

2. To install the unit into a 23-inch rack, remove the screws attaching the 19-inch mounting brackets, and replace with the 23-inch mounting brackets, which are shipped with the unit.

3. Ground the unit.

---

**WARNING!** The ground terminal on the power block must be connected to the frame ground to prevent possible damage to the equipment.

---

**Power Supply Installation**

**NOTE:** There are specific power supplies for the 2-slot chassis, they are smaller than the 8-slot to fit the smaller chassis.

To install the first power supply:

1. Remove the blank faceplate from power supply slot 2.
2. Slide the power supply into slot 2.
3. Press firmly to make full contact with the connector in the back of the chassis.
4. Tighten the screws found on the front of the power supply.

For redundant systems, install a second power supply into power supply slot 1 as described in steps 1-4.
Application Module Installation

WARNING!  STATIC PROTECTION IS REQUIRED DURING INSTALLATION. PROPER HANDLING, GROUNDING AND PRECAUTIONARY ESD MEASURES ARE ESSENTIAL WHEN INSTALLING AND SERVICING PARTS OR MODULES.

NOTE: Adapter strips are not intended for the 2-slot chassis and must be removed before installing the application module or the adapter module into the chassis.

1. Loosen screws, and remove the adapter strip from the application module and adapter module.
**Application Module Installation**

- When installing **two** modules in a 2-slot chassis, install the first in slot 1 (first slot from the left).
- When only using **one** module, install it in slot 2. This is to ensure optimal fan performance.

To install an application module:

1. Gently slide the module into the slot and press firmly to make full contact with the midplane connector of the chassis.
2. Be sure that the ID tag on the engine is to the right when inserting into the chassis. The text along the edge (2 SLOT DOWN) should be upright.
3. Secure the application module to the chassis with the screws on the faceplate of the application module. When correctly installed, the application module faceplate will make contact with the chassis.
4. To install a second application module, repeat the process for slot 2.

**Removing an Application Module**

To remove an application module from a 2-slot chassis, remove the two screws that lock the module faceplate to the chassis, then push the ejector handle to the right to disengage the connectors. Slide the module out carefully.

**Adapter Module Installation**

1. Insert the adapter module into the back of the 2-slot chassis (directly behind the application module installed in steps above) and press firmly to make full contact with the midplane connector of the chassis.
   
   The text along the edge should be upright.
2. Secure the adapter module to the chassis, by tightening the screws on the faceplate.
Management Access

1. Insert the NMS cable into the NMS jack on the master module (the module with the blinking PST LED.)
2. Plug the other end of the NMS cable into the COM port of your PC or the port of your VT100 terminal.

**NOTE:** If the master module fails or is removed from an active shelf, then a master toggle will occur and the module in slot number 2 will become the master module (if there is a second module). You must plug the NMS cable into the new master module to manage the shelf unless you are using the Carrier Access network management “Y” cable. A message in the upper left hand corner of the screen will indicate whether the module is master or slave. The new master module will also obtain the configuration of the slave modules.

Ferrite Bead

Add a ferrite bead (part number 010-0365) to the NMS cable of the master module. Install the bead with a single loop.

**Installing the Bead**

1. Open Ferrite bead with the depressions facing up.
2. Wrap the NMS cable around the Ferrite bead.
3. Ensure that two (2) turns are inside on the right half of the Ferrite bead.

4. Leave approximately four (4) to five (5) inches of the RJ-45 cable end protruding from the Ferrite.
5. Snap the ferrite bead shut.
Power Configurations

FLEXmaster modules support the +24/-48 VDC power supplies only. All power supplies are redundant and load sharing. The following table describes the LED states of both power supplies.

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Input</td>
<td>Off</td>
<td>DC input missing or failure</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>DC input present</td>
</tr>
</tbody>
</table>

24/-48 VDC Power Supply

The 2-slot 24/-48 VDC power supply configured for use with the FLEXmaster modules.

<table>
<thead>
<tr>
<th>DC Configuration</th>
<th>Power Supply Wattage</th>
<th>Input Power Feed(s)</th>
<th>Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24/-48VDC (20–70V)</td>
<td>30W</td>
<td>dual</td>
<td>3.15A</td>
</tr>
</tbody>
</table>

Series 6.0 24/-48 VDC Power Supply

Concurrent with MASTERseries 6.0, there is a new power supply. You can easily differentiate it from the other power supply by the small white dot on the faceplate.
**DC Power**

The -48 VDC and +24 VDC power entry modules provide DC power protection and isolation when you attach the leads properly.

Each input has its own return. The labels of the power entries vary based on what version of the chassis you have:

- **FEED A (IN A/RTN A)** operates power supply A
- **FEED B (IN B/RTN B)** operates power supply B

**NOTE:** The recommended wire gauge is 16 to 18 gauge.

**Terminal Block**

Attach the leads to the appropriate terminal using the securing screws on the block to tighten them.

The power terminal block and the alarm terminal block can be removed for easier lead attachment. Pry off the block with a screwdriver and remove it.
2-Slot Chassis Installation
Power Configurations

**Redundant Power Supplies**
If you are using two power supplies, power must be connected to both A and B feeds. Attach the leads to the appropriate terminal as indicated in the following diagram. Secure the leads with screws on the terminal block to tighten them.

**Single Power Feed - Dual Power Supplies**
If you only power the A feed and are using two power supplies, you need to jumper between Input A and Input B and also between Return A and Return B. Make this jumper the same gauge as the feed. Attach the leads to the appropriate terminal as indicated in the following diagram. Secure the leads with screws on the terminal block to tighten them.
NOTE: When a FLEXmaster8 is in the chassis, a ferrite (Fair-Rite P/N 0443164151, or equivalent) must be placed around the DC battery feeds for compliant operation. The beads should be no lower than 3 inches below the power entry panel.

**Alarm Terminal Block**

The following table lists the alarm terminal contacts on the DC-powered chassis.

<table>
<thead>
<tr>
<th>Contact</th>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Alarm</td>
<td>N.C.</td>
<td>Normally Closed</td>
</tr>
<tr>
<td></td>
<td>COM</td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>N.O.</td>
<td>Normally Open</td>
</tr>
<tr>
<td>Minor Alarm</td>
<td>N.C.</td>
<td>Normally Closed</td>
</tr>
<tr>
<td></td>
<td>COM</td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td>N.O.</td>
<td>Normally Open</td>
</tr>
</tbody>
</table>
Alarm Contact

If the alarm contact feature is used, a ferrite (part number 010-0051), with a loop, is required.
**Fan Assemblies**

Two types of fan assemblies are available for the 2-slot chassis. Which one you use depends on your chassis and your modules.

- **Triple fan** - The three-fan assembly is designed for use with the FLEXmaster16 module. It can only be used in chassis shipped with MASTERseries 6.0 or later.
- **Double fan** - The dual-fan assembly is designed for use with a chassis from series 2 or series 3 when FLEXmaster modules are installed. It must be installed with a new power supply and fuses. The double fan supports all configurations supported by MASTERseries 4.x and MASTERseries 5.0, as well as a FLEXmaster16 and a DSC3c. All other configurations require a triple fan. For a detailed description of the upgrade, see *Dual-Fan* on page 2-16.

**Triple Fan**

Starting with MASTERseries release 6.0, 2-slot configurations shipped from the factory will come equipped with a new triple-fan assembly. The three-fan assembly is designed for use with the FLEXmaster16 module.

---

**NOTE:** The triple-fan assembly cannot be installed in chassis deployed with MASTERseries 5.0 or earlier.

- For a list of supported configurations see *Supported Configurations* on page 2-4.
- In case you ever need to replace a triple fan, consult *Fan Replacement* on page 2-22.
Dual-Fan

If you are installing a FLEXmaster module in a chassis from series 2 or series 3, you must install a new power supply, fuses and dual fan unit before operating it, due to the heat generated by the FLEXmaster. The Dual Fan Upgrade Kit contains:

- Dual fan unit
- 24/-48 VDC Power Supply
  - DC Configuration: +24/-48VDC (20–70V)
  - Power Supply Wattage: 30W
  - Input Power Feed(s): dual
- Fuses
  - 3.15A, 5mm x20mm
- Labels

**NOTE:** Part number 8682UD1-AA includes one power supply. Part number 8682UD2-AA includes two power supplies.
**Hardware Upgrade Procedure**

The following procedure describes how to install the dual fan unit, replace the power supply, replace the fuses and apply new regulatory labels.

**NOTE:** The fan is installed in the center support bracket between module 2 and power supply 2.

**CAUTION!** EXERCISE CAUTION WHEN INSTALLING OR REMOVING THE FAN MODULE.

1. Remove the right-hand screw from module 2.
2. Remove both screws from power supply 2.

![Diagram of 2-Slot Chassis Installation](image-url)
3. Slide out power supply 2.
4. Hold fan module at an angle and insert into power supply slot.

5. Engage the fan module into the bottom channel of the center support bracket and rotate to vertical.
6. The fan module will snap into place. The fan module should rest flush with the center support bracket face.
7. Insert the right screw into the faceplate of module 2. The screw should pass through the tab on the front of the module.

8. Slide the power supply from the kit halfway into the slot. Before fully seating the power supply, twist the fan module power cable clockwise, and plug into the power supply.

9. Continue to slide the power supply into the slot until fully seated.
10. Install the power supply retaining screws.

11. If you are using two power supplies, replace power supply 1.

**Replacing the fuses**

The fuses are found on the rear of the power supply.

1. To replace a fuse, insert a flat screwdriver into the horizontal slot on the front of the cap and turn a quarter turn counterclockwise. The cap will pop off with the fuse inside.
2. Replace the old fuse with the fuse provided in the kit and reinsert the fuse and cap into the fuse assembly.

**Applying the new labels**

1. Apply the new labels to the rear of the power supply, over the existing ones. These labels are required for compliance.

**Powering the system**

1. Apply power to the unit.
2. Verify that the fans are functioning properly.
Fan Replacement

The following are instructions for fan replacement on the MASTERseries 2-slot unit. These describe how to replace existing dual-fan or a triple-fan assemblies.

CAUTION! EXERCISE CAUTION WHEN REMOVING THE POWER SUPPLY WHICH POWERS THE FAN UNIT. THE POWER CABLE IS SHORT AND COULD BE DAMAGED IF PULLED OUT WITH EXCESSIVE FORCE.

1. Remove the right-hand screw from the module and both screws from power supply 2.
2. Pull out the power supply **slowly**.
   Disconnect the fan power cable, and remove the power supply.

3. Insert a small flat screwdriver into the slot indicated and pry the top part of the fan module towards the power supply slot.
4. Rotate the fan module into the power supply slot.

5. Remove the fan module.

6. Replace the fan. See steps 4-10, starting on page 2-18.

7. Replace the power supply.

8. Replace the retaining screws.
CHAPTER 3

8-Slot Chassis Installation

In this Chapter
- Overview
- Unpacking
- 8-Slot Chassis
  - Rack Mount Installation
  - Power Supply Installation
  - Application Module Installation
  - DC Power Supply
- Supported Configurations
- Chassis Installation
- Power Configurations
Overview

This chapter contains a description of the MASTERseries 8-slot chassis and detailed installation instructions.

Unpacking

**WARNING! OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC DEVICES.**

1. Inspect containers for damage during shipment. Report any damage to the freight carrier for possible insurance claims.
2. Compare packing list with office records. Report any discrepancies to the office.
3. Open shipping containers, being careful not to damage contents.
4. Inspect contents and report any damage.
5. If equipment must be returned for any reason, carefully repack equipment in the original shipping container with original packing materials if possible.
6. If equipment is to be installed later, replace equipment in the original shipping container and store in a safe place until you are ready to install it.
**8-Slot Chassis**

The 8-slot chassis provides:

- Two power supply slots for redundant power
- Eight application module slots

Dimensions:

- 5.2 in. (H) x 10.2 in. (D) x 19 in. (W)
- Maximum depth of the shelf, including cables, is 12 inches

Rack Mounting:

- 19- or 23-inch rack

---

**NOTE:** Blank faceplates must be installed on each open slot to be in compliance with product emission standards.

---

**Supported Modules**

- FLEXmaster8 Router/TDM and FLEXmaster8 ATM
- FLEXmaster DS3c-3
- FLEXmaster 8A TDM and ATM
- FLEXmaster16 TDM and ATM
- HUBmaster
**Power Consumption**

FLEXmaster modules use more power than series 3 modules. As a result, you can install no more than four FLEXmaster modules in an 8-slot chassis (supported configurations are listed in the table below).

- To distribute the heat, install modules in alternating slots as shown in the figure below.
- Do not install an engine in slot 8 next to the power supplies.
- HUBmasters can be installed in the even-numbered slots.

![Install modules in alternating slots](image)

**Supported Configurations**

The following table represents the configurations supported by the 8-slot chassis.

<table>
<thead>
<tr>
<th>FM16 TDM</th>
<th>FM16 ATM</th>
<th>FM8A TDM</th>
<th>FM8A ATM</th>
<th>FM8 TDM</th>
<th>FM8 ATM</th>
<th>DS3c</th>
<th>Total Number of Modules</th>
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</table>

3-4 MASTERseries - Release 6.01
Chassis Installation

Installation of the 8-slot chassis is as follows:

Rack Mount Installation

Mounting brackets are installed on the chassis for a 19-inch rack.

1. To rack mount the assembled unit, attach the unit with the brackets to the rack using the screws provided.

2. To install the unit into a 23-inch rack, remove the screws attaching the mounting brackets, replace the bracket and reattach with screws.
3. Ground the unit.
   a. Connect ground wire (16 - 18 gauge) from the ground terminal to earth ground.
   b. Connect the chassis ground screw to earth ground.
      The chassis ground screw is the raised green screw on the side of the chassis. When
      mid-mounting the chassis, you can replace this screw with a flat-head screw, if needed.

   WARNING! THE GROUND TERMINAL ON THE POWER BLOCK MUST BE CONNECTED TO
   EARTH GROUND TO PREVENT POSSIBLE DAMAGE TO THE EQUIPMENT. THE CHASSIS GROUND
   SCREW MUST ALSO BE CONNECTED TO THE EARTH GROUND

---

**Power Supply Installation**

**NOTE:** There are specific power supplies for the 8-slot chassis, they are larger than the
2-slot power supplies to fit the larger chassis.

1. Remove the blank faceplate from power supply slot 1 (far right slot of the chassis).
2. Slide the first power supply into power supply slot 1.
3. Press firmly to make full contact with the connector in the back of the chassis.
4. Tighten the screws found on the front of the power supply.
5. Install a second power supply (for redundancy) into power supply slot 2, as in steps 1-4.
Application Module Installation

WARNING! STATIC PROTECTION IS REQUIRED DURING INSTALLATION. PROPER HANDLING, GROUNDING AND PRECAUTIONARY ESD MEASURES ARE ESSENTIAL WHEN INSTALLING AND SERVICING PARTS OR MODULES.

NOTE: To be compliant with EMI, an adapter strip must be installed on the engine and adapter module in an 8-slot chassis. Typically, adapter strips are shipped attached to the engine and adapter module. Perform the following procedure to install the adapter strip.

**Adapter Strip Installation on Engine**

1. Slide the adapter strip under the screw heads until snug as shown in the following figure. Spacers below the screw heads allow enough space to install the adapter strip without loosening the screws.

   ![Adapter Strip Installation on Engine](image)

2. Tighten the screws to hold the adapter strip in place.
Adapter Strip Installation on Adapter Module

1. Slide the adapter strip under the screw heads until snug as shown in the diagram. Spacers below the screw heads allow enough space to install the adapter strip without loosening the screws.

2. If the screws have been driven tight to the panel, loosen them enough to allow the slotted end of the adapter strip to fit under the screw heads.
Installing an Application Module

When installing the first module into the chassis, it is recommended to install it into slot 1 (first slot from the left).

1. Gently slide the application module into slot 1 and press firmly to make full contact with the midplane connector of the chassis.

Master Module - The master module configures the rest of the modules (slaves). When installing modules into the 8-slot chassis, insert a module, and when this module has completed its initialization (link LEDs show active - green), then install additional modules, if needed.

2. Secure the application module to the chassis, with the screws on the faceplate of the module. When correctly installed, the application module faceplate will make contact with the chassis.

3. To install additional modules, repeat the process above for the remaining slots.
8-Slot Chassis Installation
Chassis Installation

Removing an Application Module
To remove an application module from an 8-slot chassis, remove the two screws that lock the module faceplate to the 8-slot chassis, then lift up on the ejector handle (labeled with the module name) to disengage the connectors. Slide the module out carefully.

Adapter Module Installation
1. Insert the adapter module into the back of the 8-slot chassis (directly behind the application module installed using the application module installation procedure) and press firmly to make full contact with the midplane connector of the chassis.
2. Secure the adapter module to the chassis, using the screws on the faceplate.

Management Access
1. Insert the NMS cable into the NMS jack on the master module (the module with the blinking PST LED).
2. Plug the other end of the NMS cable into the COM port of your PC or the port of your VT100 terminal.

NOTE: If the master module fails or is removed from an active shelf, then a master toggle will occur and the module in slot number 3 will become the master module (if there is a second module). You must plug the NMS cable into the new master module to manage the shelf unless you are using the Carrier Access network management “Y” cable. A message in the upper left hand corner of the screen will indicate whether the module is master or slave. The new master module will also obtain the configuration of the slave modules.

3. Apply power to the chassis. It will take approximately 70 seconds before the module LEDs are lit and the module(s) are fully operational. When ready, the master module PST LED will be green and flashing.
Ferrite Bead
Add a ferrite bead (part number 010-0365) to the NMS cable of the master module. Install the bead with a single loop.

Installing the Bead
1. Open Ferrite bead with the depressions facing up.
2. Wrap the NMS cable around the Ferrite bead.
3. Ensure that two (2) turns are inside on the right half of the Ferrite bead.
4. Leave approximately four (4) to Five (5) inches of the RJ-45 cable end protruding from the Ferrite.
5. Snap the ferrite bead shut.
8-Slot Chassis Installation
Power Configurations

Power Configurations

The 8-slot chassis is available as a DC powered unit. The following table lists the possible chassis power configurations (alarm contacts are standard). The wide-ranging DC power supply is used for both -48 and +24 VDC applications.

NOTE: All power supplies are redundant and load sharing.

<table>
<thead>
<tr>
<th>DC Configurations</th>
<th>Power Supply Wattage</th>
<th>Input Power Feed(s)</th>
<th>Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>±20 to 60 VDC</td>
<td>75W</td>
<td>Dual</td>
<td>5A, 250 V</td>
</tr>
</tbody>
</table>

DC Power Supply

The wide-ranging DC power supply is used for both -48 and +24 VDC applications. All power supplies can be used in a redundant system.

- The power entry modules provide DC power protection and isolation when you attach the leads properly.
- Each input has its own return.
- The recommended wire gauge is 16 to 18 gauge.
- The power terminal block and the alarm terminal block should be removed for easier lead attachment. Pry off the block with a screwdriver and remove it.

+24/-48 DC Power Supply

NOTE: If you are using two power supplies, the input power must be connected to both A and B feeds. If you only power the A feed and are using two power supplies, you will need to jumper between input A and input B and also between return A and return B. Make this jumper the same gauge as the feed.
**Terminal Block**

Attach the leads to the appropriate terminal using the securing screws on the block to tighten them.

The power terminal block and the alarm terminal block can be removed for easier lead attachment. Pry off the block with a screwdriver and remove it.

**Dual Power Feed - Dual Power Supplies**

Attach the leads to the appropriate terminal as indicated in the following diagram. Secure the leads with screws on the terminal block to tighten them.
**Single Power Feed - Dual Power Supplies**

Attach the leads to the appropriate terminal as indicated in the following diagram. Secure the leads with screws on the terminal block to tighten them.

**WARNING!** THE TERMINAL on the power block MUST BE CONNECTED TO THE EARTH GROUND TO PREVENT POSSIBLE DAMAGE TO THE EQUIPMENT.

**Alarm Terminal Block**

The following table describes the alarm contacts on the DC-powered chassis.

<table>
<thead>
<tr>
<th>Contact</th>
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<td>N.O.</td>
<td>Normally Open</td>
</tr>
</tbody>
</table>
Alarm Contact

If the alarm contact feature is used, a ferrite (part number 010-0051), with a loop, is required.
8-Slot Chassis Installation

Power Configurations
CHAPTER 4

Getting Started

In this Chapter

- Logging in to the MASTERSeries
- Accessing the Text User Interface
- Navigating the Screens
- Interface Identifiers
- Menus
  - Main Menu
  - Alarms Menu
  - Diag Menu
  - Port Menu
  - Setup Menu
  - Flex Menu
Logging in to the MASTERseries

The following sections describes how the steps required to log in to the MASTERseries.

- Physical Connection
- Port Setup
- Logging In

**Physical Connection**

1. Insert the NMS cable into the NMS jack on the master module (the module with the blinking PST LED.)
2. Plug the other end of the NMS cable into the COM port of your PC or the port of your VT100 terminal.

**Port Setup**

The MASTERseries software screens are viewable through a VT100 terminal or through a PC using a VT100 terminal emulation software application (for example, HyperTerminal). The following table describes the parameters needed to configure a system using a VT100 terminal or emulation software:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
</tr>
<tr>
<td>Terminal Type</td>
<td>VT100</td>
</tr>
<tr>
<td>ANSI Setup</td>
<td>ANSI page length=25, Strip ANSI from capture file</td>
</tr>
<tr>
<td>VT100 Setup</td>
<td>Send DEL for backspace, Cursor visible</td>
</tr>
<tr>
<td>Column Width</td>
<td>80 Columns</td>
</tr>
<tr>
<td>Baud Rate</td>
<td>4800, 9600 (default), 19200</td>
</tr>
</tbody>
</table>

**NOTE:** The first time you bring up the system, you must connect using a 9600 baud rate.
HyperTerminal Users

Carrier Access recommends modifying the following settings.

1. Select File > Properties from the menu bar.
2. Select the Settings tab.

3. Click the ASCII Setup button.

4. Set the Line delay to 50 milliseconds and the Character delay to 5 milliseconds.

5. Click OK.
Procomm Users
If you are unsure of the baud rate set on a module, connect to that module at 19200 baud and press the R key. If there is no response, use 9600 baud using the same approach. If there is a baud rate mismatch between Procomm and the master module, the master module could reboot. To prevent this:
1. Go to Options > Data Options > Setup Files...
2. Select the Data tab.
3. Select Terminal Options.
4. Set the Enquiry Type field to OFF.
Other versions of Procomm might require you to navigate to the Enquiry Type field differently. Consult your Procomm manual for more information.

Additional Settings
Hardware flow control: Off
XON/XOFF flow control: Off
Use DTR (for hang-up): Off
Monitor DCD (carrier): Off
Exit on hang-up: Off
Logging In

After connecting with your VT Terminal Emulation software, press enter, and the Login prompt appears.

Default Login: admin
Default Password: nms

At this point you can issue commands through the Command Line Interface (CLI) or launch the Text User Interface (TUI).

- For information about how to change the password, see passwd on page 11-14
- For details about the CLI, see Chapter 11, CLI Commands.
- For more information about the TUI, see the next page.

Login Notifications

You may see one of the following messages immediately upon logging in:

Unable to open userid file
Problem reading userid file

The admin user can still log in. You can correct this situation by adding, modifying, or deleting users. For information about these commands, see adduser on page 11-29, moduser on page 11-32, deluser on page 11-31.
**Getting Started**

**Accessing the Text User Interface**

MASTERseries uses a Text User Interface (TUI), which is a character-based display. To access the TUI from the CLI, issue one of the following commands:

```
/# cd tui ; tui
```
or

```
/# /tui/tui
```

The main screen appears when you launch the TUI. The following diagram describes the fields on the main Carrier Access MASTERseries screen. Screens may look different depending on the configuration, the modules installed, and the software version.

The first screen displayed is the Alarms screen. This screen lists each unit installed in the chassis and the current status of each link, port, management channel, and power supply. An alarm status summary and a listing of any slot currently in alarm is listed at the bottom of every screen. To refresh the alarm screen, press R. For more information about the alarms screen, see *Alarms Screen* on page 16-2.
Exiting the TUI

To exit the TUI session, press Q for Quit.

Navigating the Screens

Navigation through the screens is as follows:

- Select screens using the associated hot keys. Hot keys are the capitalized letters in menu names. Example: the hot key for the **Alarms** screen is **A**, the hot key for **sTat** is **T**.
- Scroll through screens using the up and down arrow keys. (The arrow keys may have to be set for terminal use in your communications software.)

<table>
<thead>
<tr>
<th>Action</th>
<th>Hot Keys</th>
<th>How this is represented in this manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a menu</td>
<td>S = Setup</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T = Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter</td>
<td></td>
</tr>
<tr>
<td>Cycle through selections</td>
<td>N = Next</td>
<td>N/P cyclical field</td>
</tr>
<tr>
<td></td>
<td>P = Previous</td>
<td></td>
</tr>
<tr>
<td>Accept selection</td>
<td>Enter</td>
<td>enter</td>
</tr>
<tr>
<td>Exit a menu, Save Settings</td>
<td>ESC</td>
<td>ESC</td>
</tr>
<tr>
<td>Navigate through a screen</td>
<td>Up Arrow ↑</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Down Arrow ↓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Left Arrow ←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right Arrow →</td>
<td></td>
</tr>
<tr>
<td>Refresh display</td>
<td>R = Refresh</td>
<td></td>
</tr>
</tbody>
</table>

Interface Identifiers

For a detailed explanation of the interface identifiers used in the MASTERseries, see *Interface Identifiers* on page 11-5.
Getting Started

Menus

The following sections describe the menus.

Main Menu

The main menu appears as shown in the following figure. The main menu displays when you first connect to the MASTERseries. To return to the main menu, press ESC to exit each submenu.

The following table contains a description of each of the menus in the main menu:

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarms</td>
<td>Displays a summary of alarms. Provides alarm-related submenus (see Alarms Menu on page 4-9).</td>
</tr>
<tr>
<td>sTat</td>
<td>Displays the detailed status of the links and ports for each module individually.</td>
</tr>
<tr>
<td>Diag</td>
<td>Provides submenus for diagnosing links and ports. Other submenus: warm reset, master toggle and software upgrade. (see Diag Menu on page 4-10)</td>
</tr>
<tr>
<td>pOrt</td>
<td>Port and management port configuration (see Port Menu on page 4-10).</td>
</tr>
<tr>
<td>Link</td>
<td>Specifies link parameters.</td>
</tr>
<tr>
<td>timeslot</td>
<td>Configures names, data codes and signaling bit patterns to individual timeslots.</td>
</tr>
<tr>
<td>clk</td>
<td>Specifies the clock source.</td>
</tr>
<tr>
<td>Connect</td>
<td>Configures the internal timeslot connections for the link interfaces available.</td>
</tr>
<tr>
<td>coMmit</td>
<td>Saves, activates and error checks configurations.</td>
</tr>
<tr>
<td>aPs</td>
<td>Configures how the system responds to link failures.</td>
</tr>
<tr>
<td>Setup</td>
<td>Provides multiple submenus. See Setup Menu on page 4-11</td>
</tr>
<tr>
<td>Flex</td>
<td>Provides the ATM functions.</td>
</tr>
<tr>
<td>Quit</td>
<td>Exits the TUI and returns to the CLI.</td>
</tr>
</tbody>
</table>
**Alarms Menu**

Select **Alarms** and press enter to open the Alarms submenu. As with other screen and menus, type the hotkey (capitalized letter) to access the selected screen/menu.

The Alarms menu items are described below. The table is arranged alphabetically.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>acO</td>
<td>Alarms &gt; acO</td>
<td>Configures the operation of the external alarm contact closures at the rear of the chassis.</td>
</tr>
<tr>
<td>Alarms</td>
<td>Alarms</td>
<td>Displays an alarm summary for the unit.</td>
</tr>
<tr>
<td>Datacodes</td>
<td>Alarms &gt; trunK &gt;</td>
<td>Defines the data patterns transmitted in place of normal data, on bypass connections, when a link is in alarm.</td>
</tr>
<tr>
<td></td>
<td>Datacodes</td>
<td></td>
</tr>
<tr>
<td>Definitions</td>
<td>Alarms &gt; Performance</td>
<td>Displays definitions of performance monitoring error messages.</td>
</tr>
<tr>
<td></td>
<td>&gt; Definitions</td>
<td></td>
</tr>
<tr>
<td>Ds3log</td>
<td>Alarms &gt; Ds3log</td>
<td>Displays a history of alarms for each DS3 link</td>
</tr>
<tr>
<td>Linklog</td>
<td>Alarms &gt; Linklog</td>
<td>Displays a record of minor alarms for each link.</td>
</tr>
<tr>
<td>Local_stats</td>
<td>Alarms &gt; Performance</td>
<td>Displays performance monitoring statistics for links with performance monitoring enabled.</td>
</tr>
<tr>
<td></td>
<td>&gt; Local_stats</td>
<td></td>
</tr>
<tr>
<td>Show_remote</td>
<td>Alarms &gt; Performance</td>
<td>Displays the performance monitoring statistics for the far end of a link that has been configured for T1_ESF framing and the</td>
</tr>
<tr>
<td>stats</td>
<td>&gt; reMote_stats</td>
<td>performance monitoring protocol set to AT&amp;T_54016 or T1_403.</td>
</tr>
<tr>
<td></td>
<td>&gt; Show_remote_stats</td>
<td></td>
</tr>
<tr>
<td>Signaling</td>
<td>Alarms &gt; trunK &gt;</td>
<td>Defines the ABCD/abcd signaling patterns transmitted in place of normal signaling when a link is in alarm.</td>
</tr>
<tr>
<td></td>
<td>Signaling</td>
<td></td>
</tr>
<tr>
<td>Syslog</td>
<td>Alarms &gt; Syslog</td>
<td>Displays a history of system events, including configuration changes and error conditions.</td>
</tr>
<tr>
<td>trHold</td>
<td>Alarms &gt; trHold</td>
<td>Configures the links which signal an alarm when the threshold of unavailable/errored seconds is exceeded for links that have performance monitoring enabled.</td>
</tr>
</tbody>
</table>
**Diag Menu**

Select **Diag** and press enter to open the Diag submenu. As with other screen and menus, type the hotkey (capitalized letter) to access the selected screen/menu.

The Diag menu items are described below. The table is arranged alphabetically.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carddiag</td>
<td>Diag &gt; Carddiag</td>
<td>not currently supported.</td>
</tr>
<tr>
<td>Linkdiag</td>
<td>Diag &gt; Linkdiag</td>
<td>Provides loopback and BERT diagnostic tools for links.</td>
</tr>
<tr>
<td>masterToggle</td>
<td>Diag &gt; masterToggle</td>
<td>Toggle from the current master module to the next lowest number in the chassis.</td>
</tr>
<tr>
<td>Portdiag</td>
<td>Diag &gt; Portdiag</td>
<td>Controls the diagnostic loopback and BERT functions of ports.</td>
</tr>
<tr>
<td>Upgrade</td>
<td>Diag &gt; Upgrade</td>
<td>Upgrade the software running on the selected module</td>
</tr>
<tr>
<td>Warmreset</td>
<td>Diag &gt; Warmreset</td>
<td>Resets the selected module.</td>
</tr>
</tbody>
</table>

**Port Menu**

Select **Port** and press enter to open the Port sub-menu. As with other screen and menus, type the hotkey (capitalized letter) to access the selected screen/menu.

The Port menu items are described below. The table is arranged alphabetically.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dacs</td>
<td>pOrt &gt; Dacs</td>
<td>Configures port parameters</td>
</tr>
</tbody>
</table>
## Setup Menu

Select **Setup** and press enter to open the Setup sub-menu. As with other screen and menus, type the hotkey (capitalized letter) to access the selected screen/menu.

The Setup menu items are described below. The table is arranged alphabetically.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abcd</td>
<td>Setup &gt; Abcd</td>
<td>Defines ABCD idle signaling bit patterns</td>
</tr>
<tr>
<td>cOnfig</td>
<td>Setup &gt; cOnfig</td>
<td>Changes the configuration currently being edited.</td>
</tr>
<tr>
<td>Consol</td>
<td>Setup &gt; Consol</td>
<td>Sets the communication parameters for the NMS port.</td>
</tr>
<tr>
<td>Maint</td>
<td>Setup &gt; Maint</td>
<td>For use by Customer Support.</td>
</tr>
<tr>
<td>moDe</td>
<td>Setup &gt; moDe</td>
<td>Not supported in this release.</td>
</tr>
<tr>
<td>Passwds</td>
<td>Setup &gt; Passwds</td>
<td>Use to define Superuser, Maintenance, and Telnet passwords.</td>
</tr>
<tr>
<td>receivE</td>
<td>Setup &gt; receivE</td>
<td>Downloads configuration files or program files from a PC to the system directory memory on the module. Used for upgrades.</td>
</tr>
<tr>
<td>saveL</td>
<td>Setup &gt; saveL</td>
<td>Saves the system and links logs to the system directory.</td>
</tr>
<tr>
<td>Send</td>
<td>Setup &gt; Send</td>
<td>Saves a copy of the chassis configuration file to the system directory.</td>
</tr>
<tr>
<td>Sysname</td>
<td>Setup &gt; Sysname</td>
<td>Creates a custom system name, which appears on the second line of all TUI screens.</td>
</tr>
<tr>
<td>Time</td>
<td>Setup &gt; Time</td>
<td>Sets the date and time</td>
</tr>
<tr>
<td>Vers</td>
<td>Setup &gt; Vers</td>
<td>Displays the software version running on the installed modules.</td>
</tr>
<tr>
<td>Xfer</td>
<td>Setup &gt; Xfer</td>
<td>Transfers program files from the master module to a slave module installed in the same chassis.</td>
</tr>
</tbody>
</table>
**Flex Menu**

Select **Flex** and press enter to open the Flex sub-menu. As with other screen and menus, type the hotkey (capitalized letter) to access the selected screen/menu.

**NOTE:** The Flex menu is available only when ATM modules are installed, that is a FLEXmaster8 Module with ATM or a FLEXmasterDS3c-3 ATM Module.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge</td>
<td>Flex &gt; Bridge</td>
<td>PVC (permanent virtual circuit) bridge configuration.</td>
</tr>
<tr>
<td>cEs</td>
<td>Flex &gt; cEs</td>
<td>Circuit Emulation Service (CES) configuration.</td>
</tr>
<tr>
<td>Ima</td>
<td>Flex &gt; Ima</td>
<td>IMA (Inverse multiplexing over ATM) configuration.</td>
</tr>
<tr>
<td>Oam</td>
<td>Flex &gt; Oam</td>
<td>OAM (operations and maintenance) configuration. This includes alarm indication signal (AIS) and remote defect indication (RDI) fault management (FM) support, and performance monitoring (PM) for F5 ATM flows.</td>
</tr>
<tr>
<td>Stats</td>
<td>Flex &gt; Stats</td>
<td>Displays detailed statistics for ATM entities.</td>
</tr>
<tr>
<td>sWitch</td>
<td>Flex &gt; sWitch</td>
<td>VC cross-connect configuration.</td>
</tr>
<tr>
<td>Td</td>
<td>Flex &gt; Td</td>
<td>Traffic Descriptor Configuration.</td>
</tr>
<tr>
<td>Uni</td>
<td>Flex &gt; Uni</td>
<td>Configuring ATM-specific parameters on ATM links, including cell-scrambling and port speed.</td>
</tr>
<tr>
<td>Vc</td>
<td>Flex &gt; Vc</td>
<td>Virtual circuit configuration.</td>
</tr>
<tr>
<td>vP</td>
<td>Flex &gt; vP</td>
<td>Virtual Path Configuration.</td>
</tr>
</tbody>
</table>

The Flex menu items are described below. The table is arranged alphabetically.
CHAPTER 5

TUI Configuration

In this Chapter

- Recommended Configuration Sequence
- Accessing MASTERseries
- Setting the Date and Time
- Understanding Configurations
- Setting Link Parameters
- Configuring System Timing
- Configuring Port Parameters
- Configuring the Msrv Port
- Defining ABCD/abcd Signaling Patterns
- Defining Data Patterns
- Configuring Internal Timeslot Connections
- Configuring Data Code and Signaling Bit Patterns
- Creating Full Duplex Cross Connects
- Configuring APS for Link Failures
- Managing Passwords
- Saving Configurations
- Configuring Threshold Alarms
- Configuring the Idle Signaling Patterns
- Configuring Telnet Access
- Setting the System Name
Recommended Configuration Sequence

MASTERseries modules should be configured in the order presented in this chapter. Below are links to the subsections, in the recommended order.

1. Accessing MASTERseries
2. Setting the Date and Time
3. Understanding Configurations
4. Setting Link Parameters
5. Configuring System Timing
6. Configuring Port Parameters
7. Configuring the Msrv Port
8. Defining ABCD/abcd Signaling Patterns
9. Defining Data Patterns
10. Configuring Internal Timeslot Connections
11. Configuring Data Code and Signaling Bit Patterns
12. Creating Full Duplex Cross Connects
13. Configuring APS for Link Failures

You can also perform these configuration steps using the web-based GUI as described in Chapter 19, GUI Configuration.

For information about configuring ATM functionality, see Chapter 13, ATM Interworking Software.
Accessing MASTERseries

NOTE: For information about connecting to the MASTERseries, see Physical Connection on page 4-2.

Use the console screen to set the communication parameters for the NMS port on the master module in the chassis. This port is used with the network management cable for local access from a PC or VT terminal to the MASTERseries module.

It is recommended that you use the default settings as shown here:

```
Rate  : 9600
Mgmt  : Console
Data  : 8
Stop  : 1
Parity: Disable
```

To set the Console settings, follow these steps. Descriptions of the fields are in the table on the next page.

1. To enter the console screen, press enter.
2. Type your password and press enter. If the password is not entered correctly, read-only access is provided (see more about passwords in the following table).
3. In the Rate field, cycle through the rates using the N/P keys (press N to display the next selection, P the previous). Press enter to select and move to the next field.
4. In the Management field, select PPP or Console using the N/P keys. Press enter to select and move to the next field.
5. Data, Stop and Parity are fixed values and cannot be edited.
6. To exit this screen, press ESC. The Save prompt will appear. Press Y or N to save or cancel your changes.
The following table describes the fields on the Console screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Password</strong></td>
<td>This is a 12-character, editable field with superuser access only. The default password for all screens is blank (no password is required). Press enter to bypass the password field.</td>
</tr>
<tr>
<td><strong>Rate</strong></td>
<td>4800 bps&lt;br&gt;9600 bps (default)&lt;br&gt;19200 bps&lt;br&gt; If the Rate option is improperly set, the MASTERseries will not be accessible. The boot-up screen and the Carrier Access copyright screen are defaulted to 9600 baud. If the console speed is set to a baud rate other than 9600 and the unit is power cycled, the opening screens will not display, but the menus will.</td>
</tr>
<tr>
<td><strong>Management (Mgmt)</strong></td>
<td><strong>Console</strong> - (default)</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>The number of data bits in a character. This is set at 8.</td>
</tr>
<tr>
<td><strong>Stop</strong></td>
<td>The number of stop bits in a character. This is set at 1.</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td>Parity is disabled.</td>
</tr>
</tbody>
</table>
Setting the Date and Time

Use the **Time** screen to view and change the date and time. The date and time must be set to give accurate time stamping of network events and alarm conditions.

```
01 MASTER
-----------------------
Maint Consol Time sendL
------ EDIT: CFG 4 ------

Day :   30
Month :  Jan
Year  :  2005
Hour  :  13
Minute:  05
```

1. To enter the screen, press enter.
2. In the **Day** field, enter the date in a two-digit format. For example, type **01** for the first of the month, and press enter.
3. In the **Month** field, select the current month using the N/P keys (press N to display the next selection, P the previous) and press enter.
4. In the **Year** field, enter the current year in a four-digit format, and press enter.
5. In the **Hour** field, enter the current time using military time. For example, type **14** to represent 2 p.m. and press enter.
6. In the **Minute** field, type in the current two-digit minute. Press enter.
7. To exit this screen, press ESC. This will prompt you to save any unsaved changes. Press **Y** or **N** to save or cancel your changes.
Understanding Configurations

Use the configuration editor screen to select and edit one of up to sixteen different configurations that are stored in non-volatile memory. Configurations are complete sets of operational parameters that allow you to define how the system functions. When a configuration is selected on this screen, it becomes the configuration currently being edited. It has no impact on which configuration is currently running in the system. The EDIT configuration and the RUN configuration are always displayed in the config status field located below the menu bar.

Editing a Configuration

Use the cOnfig menu to edit a configuration.

1. To enter the screen, type the superuser password and press enter. If the password is not entered correctly, read-only access is provided.

2. Use the N/P keys to select the configuration to edit/use (press N to display the next selection, P the previous). Up to 16 different configurations can be stored in the system at once, CFG 1 through CFG 16.

3. Press enter to exit this screen.
Creating a New Configuration

Create a new configuration to reset the variables in the editor to default values. The EDIT indicator (upper left corner) displays NEW.

After the new configuration is changed, error check and save the changes using the commit screen (see Saving Configurations on page 5-29). This process allows you to assign a configuration number from 1 to 16.

NOTE: Current configuration is NEW

Save to: CFG 1

Save Now:
Setting Link Parameters

Use the Link screen to specify the link parameters for each module installed in the chassis.

Complete the following procedure to specify the parameters for a link. Descriptions for each of the fields are provided in the table below.

1. From the main screen, press L to go to the Link screen.
2. In the No. field use the N/P keys to cycle to the link you want to modify (press N to display the next selection, P the previous). Or type the ID of the link, for example, 2L03. Press enter to move to the Name field.
3. In the Name field type a name for the link. This name can be up to eleven characters in length. Press enter.
4. In the Dest field type a name for the far end of this link. Press enter.
5. Select values for the next three fields (Frame, LBO and Code) using the N/P keys to cycle through the options. Press enter after each entry.
6. Type in a hex value for conditioning on idle links, then enter.

The following table provides descriptions of the link screen fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No (Number)</td>
<td>This is a four character field which represents a link. The first digit indicates the slot number. The second character is L for link, and the third and fourth characters indicate the link number ID.</td>
</tr>
<tr>
<td>Name</td>
<td>This is a user-defined name for the local side of this link. Valid names can be up to eleven characters.</td>
</tr>
<tr>
<td>Dest (Destination)</td>
<td>This is a user-defined name for the destination side of this link. Valid names can be up to eleven characters.</td>
</tr>
<tr>
<td>Frame</td>
<td>This field specifies the link framing format.</td>
</tr>
<tr>
<td></td>
<td><strong>T1 ESF</strong> - Select for extended superframe formats (T1 default)</td>
</tr>
<tr>
<td></td>
<td><strong>T1 D4</strong> - Select for superframe (D4) formats</td>
</tr>
<tr>
<td></td>
<td><strong>T1 ERIC</strong> - Select when connecting to equipment that uses Ericsson-modified D4 framing format. This format does not support signaling.</td>
</tr>
<tr>
<td>LBO (Line Build Out)</td>
<td>This field sets the output attenuation level of the link. (This prevents overdriving and cross-talk on short lines.)</td>
</tr>
<tr>
<td></td>
<td>Possible values for T1: 0dB (default), 7.5dB, 15dB, 22.5dB.</td>
</tr>
<tr>
<td>Code</td>
<td>This field is used to specify the line code to be used.</td>
</tr>
<tr>
<td></td>
<td>Possible values for T1: <strong>B8ZS</strong> (default), <strong>AMI</strong>.</td>
</tr>
</tbody>
</table>
## TUI Configuration

### Setting Link Parameters

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disable</td>
<td>This field enables or disables the alarm reporting features of the selected link. Prior to disabling a link, you should remove any configured traffic including management channels and clock sources associated with that link. <strong>Yes</strong> - Use if the link is not being used and you want to prevent alarms from being reported on the link. <strong>No</strong> - (default) Enables alarm reporting for the specified link.</td>
</tr>
<tr>
<td>IdleCode</td>
<td>This field contains the hexadecimal value for the idle code to be transmitted on each link. Default = 50.</td>
</tr>
<tr>
<td>CrossAIS (Cross Alarm Indication Signal)</td>
<td>This field enables or disables cross AIS functionality for each link. <strong>Yes</strong> - Select this option to allow if you want the incoming Alarm Indication Signal (AIS; blue alarm) to propagate through a fully cross-connected link to which channels are bypassed. <strong>No</strong> - (default) Select this option to disable the Alarm Indication Signal (AIS; blue alarm) to propagate through. CrossAIS cannot be set if any channels are dropped or inserted in a related link. Attempting to save such a configuration will cause an error condition to be recorded in the syslog screen. Do not set crossAIS and APS on the same link.</td>
</tr>
<tr>
<td>LpUpCode (LoopUp Code)</td>
<td>This editable field contains the hex value for the loop up code to be transmitted on each link. Type a hex value for the desired links, then press enter. User defined LoopUp codes may be used to loop up mid-span repeaters. The default LoopUp code is 10 (hex). With test equipment, always remove any leading zeros from the most significant digit. For example, if the loopup code is 70 (binary coded digital equivalent 0111 0000), then enter 1110000 into your test equipment. <strong>NOTE:</strong> Loop codes below 10 don't work. Also, to avoid pattern duplication Carrier Access recommends using only the following codes: 20, 30, 40, 50, 60, 70.</td>
</tr>
<tr>
<td>Protocol</td>
<td>This field sets the Facility Data Link (FDL) protocol and enables performance monitoring statistics for the specified link. This data provides end-to-end error performance statistics that can be used to determine service quality. Use the N/P keys to select a value (press N to display the next selection, P the previous). and press enter. <strong>Off</strong> - No error collection (default). <strong>T1_403</strong> - (T1 ESF only) FDL operates in ANSI T1.403 mode, near end and far end. <strong>ATT_54016</strong> - (T1 ESF only) FDL operates in AT&amp;T 54016 mode near end and far end. <strong>PMON_D4</strong> - (T1 D4 or T1 ERIC only) Provides superframe near end only performance monitoring</td>
</tr>
</tbody>
</table>
Configuring System Timing

Use the clK screen to specify the link(s) to be used as system timing sources. You can configure one primary and one or more secondary external timing sources, or an internally generated timing source. The primary source is the link that is chosen first when scanning for a new clock source. The timing source can be from any link on the master module or any slave module.

Automatic switchover to the first available secondary clock source is initiated upon failure of the primary source. Clock source availability is determined by scanning from the first available link to the last available link in the chassis. If no secondary is available, the clock will fall back to the internal timing source of the module. Automatic restoral to the primary timing source will occur only if the timing source is internal or the current secondary fails.

### Setting the System Clock

1. Use N/P keys to select **Internal** or **External** (press N to display the next selection, P the previous), then press enter.

2. For each enabled link use the N/P keys to select **Pr**, **Se** or **No**.

The following table describes the fields on the system timing configuration screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Clock Mode | **Internal** - (default) The timing source is the internal crystal of the module (±25ppm)  
**External** - The timing source is derived from the network using loop timing |
| Links 1-8 | **No** - (default) Indicates that this link is not a timing source.  
**Pr** - (primary) Indicates which link is the primary timing source for the chassis. You can select only one primary source.  
**Se** - (secondary) This is an alternate timing source that can be used if the primary source fails. There is no limit to the number of secondary timing sources that can be used. A primary source must be selected if the clock mode is set to external to prevent synchronization problems. The system timing source specifications for each of the 16 configuration files should be identical to simplify system administration. |
Configuring Port Parameters

Use the DACS (Digital Access and Crossconnect System) port screen to configure port parameters. DACS allow you to add, drop and/or switch data traffic as necessary across multiple links. The following screen and figure show an example of a DACS connection.

**NOTE:** Only one port per T1 module is supported in MASTERseries 6.01.

<table>
<thead>
<tr>
<th>Port Clock</th>
<th>Type Int’f</th>
<th>Base Rate</th>
<th>Type Port</th>
<th>Link</th>
<th>#TS</th>
<th>CTS</th>
<th>DSR</th>
<th>DCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARD: 1</td>
<td>1P01 Intnl</td>
<td>DACS V.35</td>
<td>Nx64</td>
<td>320 Link</td>
<td>1L03</td>
<td>5</td>
<td>0</td>
<td>Auto Auto Auto</td>
</tr>
</tbody>
</table>

Navigating through the DACS screen

Press the enter key to navigate through the modifiable fields. Use the N/P keys to cycle through the available values.

1. Select internal or external for the selected port using the N/P keys (press N to display the next selection, P the previous). Press enter to continue.
2. Select 56 or 64 kbps as the base rate. Press enter to continue.
3. Select the desired control lead using the N/P keys, Press enter to continue.
4. The CTR, DSR and DSD fields default to auto, but when set to **On** are always active.
5. Press enter to exit the screen, and save your changes. Save your changes via the commit screen. For information about committing changes, see *Saving Configurations* on page 5-29.
The following table describes the fields on the Dacs port screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>Port Identifier</td>
</tr>
<tr>
<td>Clock</td>
<td>This field configures the data port clock sources for each port. Use the N/P keys to cycle through the values. Press N to display the next selection, P the previous. <em>Intnl</em> - (internal) (default) The system supplies a clock synchronized to the network. <em>Extlnl</em> - (external) The clock is supplied by an external CPE device (sometimes called 306 mode in other devices).</td>
</tr>
<tr>
<td>Type</td>
<td>This is a read-only field, which has a fixed value of DACS.</td>
</tr>
<tr>
<td>Interface</td>
<td>This is a read-only field which identifies the interface type as V.35 or RS530.</td>
</tr>
<tr>
<td>Base</td>
<td>Select Nx64 or Nx56, using the N/P keys (press N to display the next selection, P the previous). <em>Nx64</em> - 64 kbps operation (default) <em>Nx56</em> - 56 kbps operation with bit stuffing.</td>
</tr>
<tr>
<td>Rate</td>
<td>This read-only field displays the connection rate, which is equal to the base multiplied by the number of timeslots assigned on the connect screen. (For more information about the Connect screen, see Connect Screen on page 5-19.)</td>
</tr>
<tr>
<td>Path</td>
<td>Type Port Link, by default.</td>
</tr>
<tr>
<td>Link</td>
<td>This read-only field displays the link the time port is dropped to. The user-specified link name is configured in the Name field on the link screen. For more information about the Link screen, see Setting Link Parameters on page 5-8.</td>
</tr>
<tr>
<td>#TS Number of Timeslots</td>
<td>This is a protected field which contains the number of timeslots assigned to the connection.</td>
</tr>
</tbody>
</table>
## TUI Configuration
### Configuring Port Parameters

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Controls       | This field configures the operation of the CTS signaling lead. Use the N/P keys to make a selection. On - Signal is forced high  
|                | Auto - (default) Follows RTS                                                                                                                                                                                   |
| CTS Clear To Send | This field configures the operation of the CTS signaling lead. Use the N/P keys to make a selection. On - Signal is forced high  
|                | Auto - (default) Follows RTS                                                                                                                                                                                   |
| DSR Data Set Ready | This field configures the operation of the DSR signaling lead. Use the N/P keys to make a selection and press enter. On - Signal is forced high  
|                | Auto - (default) Follows DTR                                                                                                                                                                                   |
| DCD Data Carrier Detect | This field configures the operation of the DCD signaling lead. Use the N/P keys to make a selection and press enter. On - Signal is forced high  
|                | Auto - If the link that this port is connected to is in alarm, the DCD is turned off. If the alarm status is green, yellow, or minor the DCD is on. (default)                                                                 |
| Card           | This field lists the modules installed in the chassis.                                                                                                                                                         |
Configuring the Msrv Port

Use the msrv port screen to configure the msrv/management port and the connection rate of the management channel to a remote site. Available msrv ports are displayed on the screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>This field that lists the available management ports.</td>
</tr>
<tr>
<td></td>
<td>1M01, 1M02 - may be of any size from 1 DS0 up to 24 DS0s</td>
</tr>
<tr>
<td></td>
<td>1M03-1M16 - may only be 1 DS0 in size</td>
</tr>
<tr>
<td>Type</td>
<td>This read-only field always indicates MSRV.</td>
</tr>
<tr>
<td>Base</td>
<td>Use the N/P keys to select the speed, and press enter.</td>
</tr>
<tr>
<td></td>
<td>64k - 64 kbps operation (default)</td>
</tr>
<tr>
<td></td>
<td>56K - 56 kbps operation.</td>
</tr>
<tr>
<td>Rate</td>
<td>This is a read-only field. It lists the connection rate and is equal to the</td>
</tr>
<tr>
<td></td>
<td>base multiplied by the number of TS fields that are assigned to this</td>
</tr>
<tr>
<td></td>
<td>management port on the connect screen. (For more information about the</td>
</tr>
<tr>
<td></td>
<td>connect screen, see Connect Screen on page 5-19.)</td>
</tr>
<tr>
<td>Type</td>
<td>Use the N/P keys to select the destination of the management link. The</td>
</tr>
<tr>
<td></td>
<td>default is Idle.</td>
</tr>
<tr>
<td></td>
<td>Port - Selecting Port moves you to the port ID field.</td>
</tr>
<tr>
<td>Path</td>
<td>Identifies the link MSrv is assigned to.</td>
</tr>
<tr>
<td>ID</td>
<td>This read-only field contains the link ID that this management port is</td>
</tr>
<tr>
<td></td>
<td>connected to and the user-supplied link name which is configured on the</td>
</tr>
<tr>
<td></td>
<td>link screen.</td>
</tr>
<tr>
<td>Timeslot</td>
<td>This read-only field contains the timeslot number of this management</td>
</tr>
<tr>
<td></td>
<td>connection. It is configured on the connect screen.</td>
</tr>
</tbody>
</table>

The following table describes the fields on the msrv port screen:

<table>
<thead>
<tr>
<th>Port</th>
<th>Base</th>
<th>Rate</th>
<th>ID</th>
<th>Link-Name</th>
<th>TimeSlot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1M01</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
<tr>
<td>1M02</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
<tr>
<td>1M03</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
<tr>
<td>1M04</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
<tr>
<td>1M05</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
<tr>
<td>1M06</td>
<td>MSRV</td>
<td>64k</td>
<td>0k</td>
<td>Idle</td>
<td></td>
</tr>
</tbody>
</table>
Connecting an MSRV Port to V.35 Port

Any V.35 port on any card can be connected to Msrv ports on the Master module and terminated as PPP connections on the router. Also, any V.35 port on any card can be connected to any Msrv port on any ATM module, either a DS3 or a Flex8-ATM module.

To connect an Msrv to V35 port:

1. Go to the Msrv screen (pOrt >Msrv).
   The V.35 port and the msrv port must be idle.
2. Change the Type to Port, using the N/P keys. Select a V.35 port from the list and press enter.
   If the V.35 port is already in use, the path field will read Link. To change this you must first go to the connect screen and disconnect the link.
Defining ABCD/abcd Signaling Patterns

NOTE: This feature is not supported in release 6.01.

Use the Trunk Conditioning Signaling screen to define the ABCD/abcd signaling patterns that will be transmitted in place of normal signaling when a link is in alarm. The ABCD signaling pattern is transmitted when the link first enters the alarm state. After the first 2.5-second interval, the abcd signaling pattern is transmitted until the alarm state clears.

The following table describes the fields on the Trunk Conditioning Signaling screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>This is a 12 character field. Type your password (superuser access is required) and press enter. If you do not enter your password correctly, read-only access is provided.</td>
</tr>
<tr>
<td>Signaling</td>
<td><strong>Trunk Conditioning Signaling Patterns &lt;in form ABCD/abcd&gt;</strong> - This field allows you to configure up to nine signaling patterns. The patterns defined here can be assigned to each time slot configured for robbed bit or CAS signaling of each link using the ABCD/abcd field on the connect screen. (CASD2 and robbed signaling are only supported link to link).</td>
</tr>
<tr>
<td>Save</td>
<td>When you have completed entering the above listed fields, press ESC. You are prompted to save your changes. Type Y to save your changes or N to exit without saving.</td>
</tr>
</tbody>
</table>
Defining Data Patterns

Use the Trunk Conditioning Datacodes screen to define the data patterns that will be transmitted in place of normal data on bypass connections when a link is in alarm.

The following table describes the fields on the Trunk Conditioning Datacodes screen. This area is only editable when Datacodes is selected from the menu.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>This is a 12 position editable field. Type your password (superuser access is required) and press enter. If the password is not entered correctly, read-only access is provided.</td>
</tr>
<tr>
<td>Datacodes</td>
<td><strong>Trunk Conditioning Datacodes (in 8 bit binary)</strong> - The datacodes defined here can be assigned to each timeslot configured for bypass using the Datacode field on the connect screen. For more information about the Connect screen, see Connect Screen on page 5-19.</td>
</tr>
<tr>
<td>Save</td>
<td>When you have completed entering the above listed fields, press ESC. You are prompted to save your changes. Type Y to save your changes or N to exit without saving.</td>
</tr>
</tbody>
</table>
Configuring Internal Timeslot Connections

Use the Connect Screen to configure the internal timeslot connections for the link interfaces. A link can be:

- Connected to other links
- Connected to physical ports
- Connected to logical management ports
- Left idle

**Link Descriptions**

<table>
<thead>
<tr>
<th>Simple Description</th>
<th>Name</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link connected to another link</td>
<td>Bypass</td>
<td>This kind of link connects the current timeslot to another timeslot on another link.</td>
</tr>
<tr>
<td>Physical Port</td>
<td>Drop</td>
<td>This configures the system to connect the current timeslot to a data port interface (E, F, G, or H) that is specified in the drop column.</td>
</tr>
<tr>
<td>Logical Management port</td>
<td>MSrv</td>
<td>This kind of link connects the current timeslot to a logical management port interface (M1- M16). This kind of link configures the specified timeslot to provide remote management connectivity. Note: this behaves differently from previous releases. After assigning an MSrv to a DS0, the interface must be stacked. (For more information about interface stacking see Interface Stacking on page 12-3.)</td>
</tr>
<tr>
<td>Management Channel</td>
<td>MSrv</td>
<td>Enables a T1 link to function as an ATM link.</td>
</tr>
<tr>
<td>Idle</td>
<td>Idle</td>
<td>In this kind of link, the timeslot is unassigned, that is, not connected to a port or a link. Configuring the timeslot as idle will cause the system to transmit PCM idle code and signaling bit idle code for the appropriate link. *</td>
</tr>
</tbody>
</table>

* PCM idle code is configured using the IdleCode field in the Link screen (for more information about the Link screen, see Setting Link Parameters on page 5-8) and signaling bit idle code is configured using the Idle ABCD field on the Connect screen.
**Connect Screen**

Use the Connect Screen to configure the internal timeslot connections for the link interfaces. The operation of the connect screen differs depending on the type of unit and link that is being configured.

The following table describes the fields at the top of the Connect screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (No)</td>
<td>Number (No) is a cyclical field that lists the slot and link ID of link interfaces that connect directly to the TSI subsystem for modules installed in the chassis. These are the links that require internal system connectivity and configuration. When you have displayed the desired link to configure, press enter.</td>
</tr>
<tr>
<td>Name</td>
<td>This read-only field contains the user-supplied name of the link. The user-supplied name is configured on the Link screen (for more information about the Link screen see Setting Link Parameters on page 5-8).</td>
</tr>
<tr>
<td>Frame</td>
<td>This read-only field contains the frame type of the link that was configured in the Link screen.</td>
</tr>
<tr>
<td>Destination</td>
<td>This read-only field contains the user-supplied name of the destination link. The user-supplied destination name is configured in the link screen.</td>
</tr>
</tbody>
</table>
The following table describes the fields on the lower portion of the Connect screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS</td>
<td>Displays the DS0 timeslots in the specified link. Use the keyboard to select a timeslot.</td>
</tr>
<tr>
<td>Type</td>
<td>This field configures the connection type. Use the N/P keys to cycle through the values. Possible values: Idle, Drop, Bpss, Voic and MSrv.</td>
</tr>
<tr>
<td>Idle Signaling ABCD</td>
<td>Configures the idle signaling to be transmitted on the specified timeslot. The values available depend on the ABCD signaling patterns defined on the ABCD screen (for more information about the ABCD screen, see Defining ABCD/abcd Signaling Patterns on page 5-16). Use the N/P keys to cycle through the values an press enter to select.</td>
</tr>
<tr>
<td>DROP</td>
<td>The fields in this column identify the destination port that will be connected to the link and timeslot. Note that once a link ID/timeslot number combination (for example, link 1L/Timeslot 01) on the midplane synbus has been used, it cannot be used for another connection or a Syslog error message will indicate a resource conflict.</td>
</tr>
<tr>
<td>BYPASS</td>
<td>The fields in this column are used to identify the destination link and timeslot that will be connected to the link and timeslot currently being configured.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TS</th>
<th>Type</th>
<th>Sig</th>
<th>ABCD</th>
<th>Port</th>
<th>Type</th>
<th>Rate</th>
<th>Link</th>
<th>TS</th>
<th>ConName</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Idle</td>
<td>Clr</td>
<td>1101</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>02</td>
<td>Idle</td>
<td>Clr</td>
<td>1101</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Creating Connections

The following tables provide details for creating each kind of link.

Bypass

The following table describes how to fill in the fields for a bypass connection.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeslot</td>
<td>Select timeslot using up/down arrows, or by typing in the desired timeslot number (using two digits).</td>
</tr>
<tr>
<td>Type</td>
<td>Select Bpss using the N key, then enter.</td>
</tr>
<tr>
<td>Signaling</td>
<td>Displays the signaling type for the DS0.</td>
</tr>
<tr>
<td>IDLE ABCD</td>
<td>Select an ABCD bit pattern. The codes available are set in the Setup &gt; ABCD screen. See Defining ABCD/abcd Signaling Patterns on page 5-16 for more information.</td>
</tr>
<tr>
<td>Link</td>
<td>Type in the link ID or use the N/P keys to select the destination link, then enter.</td>
</tr>
<tr>
<td>Timeslot</td>
<td>Type in a two digit number (for example, 01) for the destination timeslot, then press enter.</td>
</tr>
<tr>
<td>ConName</td>
<td>Use this field to name the bypass. Connection names can be up to 7 characters.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeslot</td>
<td>Select timeslot using up/down arrows or by typing in the desired time slot number (using two digits).</td>
</tr>
<tr>
<td>Type</td>
<td>Select Drop by using N key, then enter.</td>
</tr>
<tr>
<td>Destination</td>
<td>Select the destination port using the N key. The Type and Rate fields are automatically populated. <em>The more timeslots added to a port, the higher the port rate becomes.</em></td>
</tr>
</tbody>
</table>
### Creating Management Connections

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeslot</td>
<td>Select timeslot using up/down arrows or by typing in the desired time slot number (using two digits).</td>
</tr>
<tr>
<td>Type</td>
<td>Select <strong>MSrv</strong>, using the N/P keys, then enter.</td>
</tr>
</tbody>
</table>

**NOTE:** Only one drop is allowed on a management port

### Copying Timeslots in the Connect Screen

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Timeslot | 1. Select the timeslot you want to copy.  
2. Press the C key and type the number of the last timeslot to be copied.  
For example, to copy timeslots up to timeslot 24, type C24.  
All timeslots in between the selected timeslot and the destination timeslot will be allocated the same as the original, incrementing the destination timeslot by one. |
Configuring Data Code and Signaling Bit Patterns

Use the Timeslot screen to configure the data code and signaling bit patterns that the system will automatically send when the specified link is in an alarm state.

The following table describes the fields at the top of the Timeslot screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (No)</td>
<td>Use this field to select a link. Use the N/P keys to move through the selections, or type the link identifier.</td>
</tr>
<tr>
<td>Name</td>
<td>This read-only field contains the user-supplied name of the link. The user-supplied name is configured on the Link screen (for more information about the Link screen see Setting Link Parameters on page 5-8).</td>
</tr>
<tr>
<td>Frame</td>
<td>This read-only field contains the frame type of the link that was configured in the Link screen.</td>
</tr>
<tr>
<td>Destination</td>
<td>This read-only field contains the user-supplied name of the destination link. The user-supplied destination name is configured in the link screen.</td>
</tr>
</tbody>
</table>
The following table describes the fields on the lower portion of the timeslot screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS</td>
<td>Timeslot identifier.</td>
</tr>
<tr>
<td>Name</td>
<td>Displays Timeslot name - established in connect screen. For more information about the connect screen, see Connect Screen on page 5-19.</td>
</tr>
<tr>
<td>DataCode</td>
<td>This field configures the trunk conditioning data patterns to be transmitted on the specified timeslot when the link is in an alarm state. The available trunk conditioning patterns depend on those in the trunk conditioning datacodes screen. Use the N/P keys to cycle through the selections, and press enter. If No_TC parameter is selected then a default 7E (hex) datacode will be sent.</td>
</tr>
<tr>
<td>ABCD/abcd</td>
<td>This field configures the trunk conditioning signaling bits to be transmitted on the specified timeslot when the link is in an alarm state. The available ABCD/abcd trunk conditioning signaling bit patterns depend on the selections in the trunk conditioning signaling bits screen. Use the N/P keys to cycle through the selections, and press enter. If No_TC is selected then the incoming signaling bit pattern will be frozen during alarm states. After configuring the ABCD/abcd field, you must press enter. To return to the Link No. field, press ESC once. To return to the main menu, press ESC twice.</td>
</tr>
</tbody>
</table>
**Creating Full Duplex Cross Connects**

This feature makes full duplex connections by automatically making the reverse connection for each half duplex bypass connection specified in the connect screen. The full duplex connections are made when you escape from the connect screen and the connections will overwrite or idle any previous connections on the destination timeslot. The following figure shows a typical screen.

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
------------------------------ your sysname here ------------------------------
Alarms sTat Diag pOrt Link tImeslot cIk Connect coMmit aPs Setup Help
----- EDIT: NEW             ----------------------------------------------- RUN: CFG 1 -------
No: 1L01                  T1 DS1_LINK
Name:                    Destination:
Frame: T1 ESF

<table>
<thead>
<tr>
<th>TS</th>
<th>Type</th>
<th>Sig</th>
<th>ABCD</th>
<th>Port</th>
<th>Type</th>
<th>Rate</th>
<th>Link</th>
<th>TS</th>
<th>ConName</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Bpss</td>
<td>Clr</td>
<td>1101</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1L03</td>
<td>01</td>
<td>LA</td>
</tr>
<tr>
<td>02</td>
<td>Bpss</td>
<td>Clr</td>
<td>1101</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1L04</td>
<td>02</td>
<td>NewYork</td>
</tr>
<tr>
<td>03</td>
<td>Idle</td>
<td>Clr</td>
<td>1101</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

**Configuring APS for Link Failures**

Use the Automatic Protection Switching (APS) screen to configure how MASTERseries responds to link failures. For example, you can configure MASTERseries to switch to an alternate link when another link fails (red, blue/AIS or yellow alarm). If a link fails or degrades below the user-defined thresholds, APS can automatically re-route and/or vary link or channel parameters. When the failed link has been restored to service, the APS feature can be configured to automatically return to the original configuration or remain on the switched configuration.

APS configurations cannot be nested (that is APS cannot protect against simultaneous multiple failures). However, when an APS condition clears, the module scans links for alarms starting with link 1L01. If an alarm condition is found on another link configured for APS, then an APS switch will be performed for that particular link.

APS will NOT switch configurations if a link is already in alarm when it is configured for APS, no switch will occur when the configuration is committed. An APS switch only occurs on the “transition” of a link from the green state to the red alarm status.
### TUI Configuration

#### Configuring APS for Link Failures

The following table describes the fields on the APS screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN:CFG 16/1</td>
<td>Line four of the screen always displays the currently running configuration (for example, <strong>RUN: CFG 1</strong>). When an APS switch occurs, the display changes to show [currently running CFG]/[previously running CFG]. Example: <strong>RUN: CFG 16/1</strong> indicates that an APS switch has occurred. The configuration now running is 16, and the configuration that was running before the APS was config 1).</td>
</tr>
<tr>
<td>Card</td>
<td>This is a read-only field that lists the available slots in the chassis.</td>
</tr>
<tr>
<td>Link</td>
<td>This read-only field displays the link identifier.</td>
</tr>
<tr>
<td>Config (Configuration)</td>
<td>This field lists the available configurations. From this list select the configuration to be used in the event of a link failure. <strong>NO APS</strong> - (default) Select NO APS (default) for no APS protection, then enter. <strong>CFG 1</strong> through <strong>CFG 16</strong> - In the event of a link failure, perform an automatic protection switch to the specified configuration. The system will not APS if you select the same configuration for APS as your running configuration. Use the N/P keys to select a configuration, then enter.</td>
</tr>
<tr>
<td>Ret (Return)</td>
<td>Select <strong>Yes</strong> to return to the original configuration when the link has been returned to normal. Then press enter. Select <strong>No</strong> to remain in APS configuration.</td>
</tr>
</tbody>
</table>

If APS is set for a link on the master module and the master module fails, then a master toggle will take priority over APS. The new master will take over and continue to run the current configuration.
The following figure shows a typical APS application.

**Normal Operation**—Network Link 1 carrying traffic to Port E and Link 4; Link 3 carrying traffic to Link 2

**LINK 1 Fails**—Port E switches to Link 2 and reduces traffic to Link 4; Reduces traffic to Link 3

**LINK 2 Fails**—Maintain Port E, Reduce traffic to Link 4; Reduce traffic to Link 3
Managing Passwords

Use the passwords screen to manage the Superuser and Maintenance passwords. You can define the passwords now or you can wait until later in the configuration process. If you assign password protection now you will be prompted for your new passwords many times during the configuration process.

In new modules, the default passwords are set to blank fields (just press enter).

The following table describes the three passwords. Passwords can be up to 12 characters in length.

<table>
<thead>
<tr>
<th>Password</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superuser</td>
<td>Provides access to the status and diagnostic screens and allows you to make configuration changes.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Provides access the diagnostic screens, but does not allow you to make any configuration changes. Note: If the superuser password has been set but the maintenance password is still blank, then no password is needed for Maintenance screens.</td>
</tr>
</tbody>
</table>

To set a password:

1. Press enter to move to the **Password**: field. Type the current password and press enter to move to the **New Pass**: field.
2. To set a new password, at the Y/N prompt press Y, then enter.
3. A prompt appears. Type the new password (up to 12 characters) and press enter.
   
   **Password**:              **New Pass**: <---

4. At the **Confirm**: field, retype the password and press enter.

**NOTE:** If the super user and maintenance passwords have been set, you can type either password to enter maintenance screens.
**Saving Configurations**

Use the Commit screen to:

- Error check configurations
- Save the configurations that you have created
- Activate a particular configuration (make it the running config).

There are 16 pre-named files where you can save your changes: CFG 1 through CFG 16. The default is CFG 1.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>This is a 12 position field (superuser access is required). Type your password and press enter. If the password is not entered correctly, your changes will not be committed or saved.</td>
</tr>
<tr>
<td>Save To</td>
<td>Use the N/P keys to cycle through the configurations. CFG 1 through CFG 16 are valid selections.</td>
</tr>
<tr>
<td>Save Now</td>
<td>Use the N/P keys to cycle through the configurations and press enter to select. Yes - If you want to save the configuration currently being edited. No - If you do not want to save the configuration currently being edited.</td>
</tr>
<tr>
<td>Activate now</td>
<td>Use the N/P keys to cycle through the configurations and press enter to select. Yes - If you want to activate the configuration currently being edited. No - If you do not want to activate the configuration currently being edited.</td>
</tr>
</tbody>
</table>

If a commit fails, you will see the message: Commit failed Please see Syslog for details. You will then see a prompt to cancel configuration changes, answer yes or no to continue. If yes is selected, your edits will revert back to the last saved configuration. If no is selected, an asterisk (*) will appear next to the edit configuration number. This is the edit indicator. The edit indicator is a visual reminder that the running configuration is different from the edit configuration. The system event history (Syslog) screen will indicate the reason for the commit failure. Once a commit has been activated, the asterisk will be removed.
Saving Versus Using Committing

In some configuration screens you are prompted to save your changes when you exit the screen. If you answer yes then your changes are written to memory and the changes take effect immediately. If you answer no then your changes will automatically revert back to the last saved configuration.

MASTERseries also uses a commit screen where you can save and/or activate changes. Changes saved under a commit do not take effect until you activate them. The following options can be chosen:

Save Now: Yes, Activate now: Yes

When saving changes using the Commit screen a series of error checks are completed before the system allows the changes to be saved. If no errors are detected, the changes are activated immediately.

Save Now: No, Activate now: Yes

Changes are checked for errors and then activated without saving to memory. This can be used to test a change before it is saved. The message Activated Table Not Saved will be temporarily displayed in the lower right hand corner of the screen. Remember to save these changes if you want to keep them. If you change configurations or the unit is power cycled before your changes are saved they will be lost.

Save Now: Yes, Activate now: No

Changes are checked for errors and saved to memory without disruption to the running configuration.

Save Now: No, Activate now: No

Edits will revert back to the last saved configuration.

If a configuration is saved and/or activated and it fails the error checking, then the message Cancel changes now n/y? will be displayed. If you answer yes then changes are discarded. If you answer no then you can view the errors in the syslog screen, correct the errors and commit again.

NOTE: The configuration that will run after a power cycle is the last configuration that was saved and activated.

Commit failed Cancel configuration changes now?

If failed message appears, and you would like to start from the last good configuration, select Yes when prompted to cancel changes, then enter. You can view the errors that occurred during the activation on the system event history log screen.
Saving a Copy of a Configuration

Copy an existing configuration into a new one and then make changes as necessary. To make a configuration copy, perform the following steps:

1. Go to the configuration screen.
2. Select the configuration number to be copied.
3. Go back to the commit screen.
4. In the Save to field select the new number for the configuration and press enter.
5. Select Yes at the Save Now prompt and press enter.
6. Select No at the Activate Now prompt and press enter. The copy is now complete.

**NOTE:** Make sure you know which configuration you need to update before saving it. Once saved and/or activated, the system will not allow you to undo your changes. If there are any diagnostic functions running, these will terminate upon activation. After making changes to any of the screens, you must return to this screen and save and/or activate the changes.
Configuring Threshold Alarms

The threshold screen configures which links will signal an alarm when a user-defined threshold is exceeded. A threshold is a specified level of unavailable/errored seconds for links that have performance monitoring enabled.

Performance monitoring is enabled using the Protocol field on the link screen menu. See Setting Link Parameters on page 5-8.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>This field lists the modules installed in the chassis. Use the N/P keys to display the required card and press enter.</td>
</tr>
<tr>
<td>Force Link to RED</td>
<td>Yes - The link will be forced into an alarm state when the conditions configured in the UAS and ES fields (below) are met. This is very effective if APS is being utilized. No - The link will be forced into a minor alarm state when the conditions configured in the UAS and ES fields (below) are met.</td>
</tr>
<tr>
<td>UAS</td>
<td>This field configures whether unavailable seconds (UAS) will generate an alarm. Enable - Triggers an alarm when the UAS threshold is exceeded in a 15 minute sliding window. A minor UAS alarm is generated if Force link to RED is set to no. A major alarm is generated if Force link to RED is set to yes. Disable - (default) UAS levels will not generate an alarm.</td>
</tr>
<tr>
<td>Threshold</td>
<td>This is a three digit editable field. Enter the number of unavailable seconds allowed during a 15 minute sliding window before an alarm is declared for the specified link.</td>
</tr>
</tbody>
</table>

The following table describes the fields on the threshold alarm screen:

<table>
<thead>
<tr>
<th>Card</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force Link to RED</td>
<td>Yes - The link will be forced into an alarm state when the conditions configured in the UAS and ES fields (below) are met. This is very effective if APS is being utilized. No - The link will be forced into a minor alarm state when the conditions configured in the UAS and ES fields (below) are met.</td>
</tr>
<tr>
<td>UAS</td>
<td>This field configures whether unavailable seconds (UAS) will generate an alarm. Enable - Triggers an alarm when the UAS threshold is exceeded in a 15 minute sliding window. A minor UAS alarm is generated if Force link to RED is set to no. A major alarm is generated if Force link to RED is set to yes. Disable - (default) UAS levels will not generate an alarm.</td>
</tr>
<tr>
<td>Threshold</td>
<td>This is a three digit editable field. Enter the number of unavailable seconds allowed during a 15 minute sliding window before an alarm is declared for the specified link.</td>
</tr>
</tbody>
</table>
### TUI Configuration

#### Configuring Threshold Alarms

To set thresholds:

1. Select the card using the N/P keys, then press enter.
2. At Force Link to RED cycle between Yes and No, then enter. Select Yes if the link is forced to a red alarm when a set error threshold is exceeded. Select No to log an exceeded threshold as a minor alarm.
3. To set a threshold, select Enable, then enter.
4. In the threshold (thresh) field, type the number of errored and/or unavailable seconds allowed before setting a threshold alarm.
5. Type the number of errored or unavailable seconds allowed during a 15-minute sliding window before an alarm is declared for the specified link.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES Errored Seconds</td>
<td>This field configures whether errored seconds (ES) will generate an alarm.</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td><strong>Enable</strong> - Triggers an alarm when the ES threshold is exceeded in a 15 minute sliding window. A minor ES alarm is generated if Force link to RED is set to no. A major alarm is generated if Force link to RED is set to yes. <strong>Disable</strong> - (default) ES levels will not generate an alarm.</td>
</tr>
<tr>
<td><strong>Threshold</strong></td>
<td>This is a three digit editable field. Enter the number of errored seconds allowed during a 15 minute sliding window before an alarm is declared for the specified link.</td>
</tr>
</tbody>
</table>
**NOTE:** This feature is not supported in release 6.01.

Use the idle signaling patterns screen to define the ABCD idle signaling bit patterns.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>This is a 12 position editable field. Type your superuser password and press enter. If the password is not entered correctly, read only access is provided.</td>
</tr>
<tr>
<td>ABCD signaling Bit Patterns</td>
<td>This area consists of two columns of editable fields that allow you to define the ABCD idle signaling bit patterns. The idle signals defined here can be assigned to any time slot on any link using the Abcd field on the connect screen.</td>
</tr>
</tbody>
</table>
Configuring Telnet Access

Connect to the module using a Telnet TCP/IP application. The module must be connected via Ethernet. The default IP address is 192.168.2.101.

Login: admin
Password: /#

Using Telnet

- Three Telnet sessions are allowed at a time. When the maximum sessions are in use, another user will get the message "Exceeding MAX CLI sessions" when they try to Telnet in.
- If you exit out of the Telnet session unexpectedly (for example, by killing the window, or keying control+C), no information is sent to the module to indicate that the client terminated the session. The telnet timer will have to expire before the next Telnet session is allowed.
- When using HyperTerminal or Procomm Plus, the Telnet session will expire but the window will remain open. Press enter to create a new Telnet session, and the Enter passes to the Login prompt for a new session.

Changing the IP Address

To change the IP address, see Setting Ethernet Interfaces on page 12-2.
Setting the System Name

Use the Sysname screen to create a custom system name. This name is displayed on the second line of all screens.

To specify a custom system name:
1. To enter the screen, type the superuser password and press enter.
2. Type a name for this module. The maximum length is 64 characters, including spaces.
3. Press ESC to exit this screen and save changes.

NOTE: This sysname is not related to the MIB II sysName object.
In this Chapter

- Overview
- Benefits
- Technical Specifications
- LEDs
- FLEXmaster Adapter Module
- Connectors
Overview

The FLEXmaster™8 T1 Application Module is a component of the MASTERseries™ Platform, designed to reduce the cost and improve the efficiency of operating a mobile radio access network. The FLEXmaster8 Module enables wireless carriers to control transport costs, quickly provision new services, and use existing T1 circuits more efficiently. It is the ideal solution for wireless carriers implementing next-generation wireless services over T1 network infrastructures.

TDM Multiplexing and IP Routing in a Single Module

Built on Carrier Access' innovative FLEXengine™ technology, the FLEXmaster8 T1 Module incorporates a multi-service, high-speed processing engine in a single compact package. DS0 level cross connect, IP access routing and MPoA bridged services are supported. Software releases also support ATM access and cell switching. The FLEXengine can support RAN access protocol migrations without costly hardware upgrades. This combination of features makes the FLEXmaster8 T1 Module ideal for wireless carriers that require TDM access support today but need to migrate to ATM or IP transport in the future.

The FLEXengine design provides a powerful platform with software protocol upgrades enabling a powerful, flexible and programmable architecture used in implementing traffic optimization and interworking functions with low latency and high speed processing for packet transport. FLEXengine provides a smooth migration path to UMTS while maintaining GSM, all over the same infrastructure. Co-location of both networks keeps operating and maintenance costs low, and results in reduced outlay for equipment.

Unparalleled Versatility Improves Cell site Economics

The FLEXmaster8 Module offers significant savings in cost, space, and power as well as simplified management. The FLEXmaster8 Module includes eight T1 ports, one V.35 port and two Ethernet ports and installs in any MASTERseries enclosure slot to provide improved RAN access efficiency for 2G, 2.5G, Location-based Services, remote management, and 3G Node B radio traffic. With the FLEXmaster8 Module installed, the MASTERseries platform can provide IP routing, TDM multiplexing, DSU/CSU, Abis protocol compression, and ATM access functions in a single, compact platform - replacing the need to deploy multiple equipment. ATM access and Abis compression are supported as software upgrades to the FLEXengine. With the FLEXmaster8 Module MASTERseries scales from 8 T1 interfaces to as high as 32 T1s.

Benefits

- Eight T1 interfaces with integrated CSUs
- V.35 data port
- Dual 10/100 Ethernet ports
- Integrated IP Router
- Non blocking DS0 cross-connect
- Environmentally hardened
- Optional ATM-IMA-IWF Software with CES
MASTERseries with the FLEXmaster8 Service Module

Technical Specifications

Special Requirements

- FLEXmaster8 T1 Modules install in MASTERseries 8-slot or Dual slot VDC enclosures
- Installation of FLEXmaster modules in the 2-slot MASTERseries VDC enclosure requires the 2-slot enclosure power supply (P/N 8662D), and fan assembly (P/N 8663)
- MASTERseries Release 5.0 or higher

Components

- Front FLEXmaster8 engine module, includes RS-232 craft and dual 10/100 Ethernet ports
- Rear interface adapter module, includes 8 T1 ports (RJ48C) and V.35 (DB-25S) port.

T1 Network Ports

- 8 T1 ports
- Line rate: 1.544 Mbps
- Framing: SF/ESF
- Coding: AMI or B8ZS for T1
- Connector: 8-pin RJ-48C jack
- Timing: Internal or external from T1 port
- LED indicators: YEL/TEST, OOF/LOS, SYNC, AIS
- Line interface: T1-CSU
- Receive sensitive (DS-1): 0 to -22 dB @ 772KHz ALBO
**Output level (DS-1):** selectable at 0 to -22dB
**Jitter:** meets AT&T Pub. TR-62411, G.832
**Solid-state fuse-less, over voltage and over current T1 line protection**

### Data Port
- **Data rate:** N x 56/64Kbps for N = 1-24
- **Interface:** CCITT V.35 DCE Synchronous Data
- **Connector:** Female DB-25 pin connector
- **Indicators:** RxD, TxD

### Management
- **Front access from** RS-232 (RJ-45) or 10/100Base-T Ethernet ports (RJ-45)
- **VT100** RS-232 port, 4,800-19,200 bps; RJ-45 connector, external modem supported
- **In-band Remote Access via DS0s, Telnet supported**
- **3-level password control**
- **Manageable Network Element under OMC-Companion**

### Diagnostics
- **Loopback types:** line, local, payload, data port, remote loopback, local AIS loopback, fixed or timed loopback option

### Performance Monitoring
- **Data storage:** Last 24 hours of data in 15-min. increments, 72-hour summary
- **Monitors:** All network interfaces
- **Reports:** Based on T1.403 for T1 alarm history and network interface statistics

### Ethernet Ports
- **2 10/100Base Ports, RJ-45 jacks, front access**
- **LED indicators:** links activity, link status

### Routing Features
- **PPP Nx56/K64K WAN data rates**
- **Static, RIPv1, RIPv2, Routing**
- **Un-numbered ports interface support**
- **DHCP - Client, Relay and Server**
- **NAT/NAPT**
- **Ethernet Interface 1 and 2 support**
- **Frame Relay**
- **OSPFv2**
**FLEXmaster8 Module**

- Firewall
- DNS relay
- DNS resolver
- SNTP
- SNMP agent configuration
- Ping, Trace Route

**Power**
- Wide Ranging VDC power supplies
- VDC input range (+/- 20 to 65 VDC)

**Regulatory**
- USA
  - UL60950-1
  - FCC Part 15, Class A
  - FCC Part 68 and TIA-968-A
- Canada
  - CSA 60950-1
  - ICES-003 Class A
  - CS-03

**Dimensions (Enclosures)**
- 2-slot enclosure
  - 1.75 in (H) x 19 in (W) x 10.2 in (D)
  - 4.4 cm (H) x 48.3 cm (W) x 25.9 cm (D)
- 8-slot enclosure
  - 5.25 in H x 19 in W x 10.2 in D
  - 13.3 cm (H) x 48.3 cm (W) x 25.9 cm (D)

**Environment**
- Ambient temperature: -40°F to 149°F
- Extended temperature range: (-40°C to 65°C)
- Humidity: Up to 95% non-condensing
- Operating altitude: 0 -10,000 ft
LEDs

The front panel of the FLEXmaster application module has LEDs to display the current status of each link and port. The links are seen to the right of the panel, the ports are seen to the left of the panel. The following figure shows the application module.

**RxD and TxD**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxD</td>
<td>solid</td>
<td>Receiving data</td>
</tr>
<tr>
<td></td>
<td>off</td>
<td>Idle or not used</td>
</tr>
<tr>
<td>TxD</td>
<td>solid</td>
<td>Transmitting data</td>
</tr>
<tr>
<td></td>
<td>off</td>
<td>Idle or not used</td>
</tr>
</tbody>
</table>

**Link Status**

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>solid red</td>
<td>OOF, AIS Check the status screen for more information</td>
</tr>
<tr>
<td>solid green</td>
<td>Link is up.</td>
</tr>
<tr>
<td>blinking red</td>
<td>LOS.</td>
</tr>
<tr>
<td>solid yellow</td>
<td>Yellow sync alarm or RAI. Indicates red alarm on the far end.</td>
</tr>
<tr>
<td>blinking yellow</td>
<td>Diagnostic function present.</td>
</tr>
<tr>
<td>off</td>
<td>Link is disabled.</td>
</tr>
</tbody>
</table>

**Ethernet Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet status light</td>
<td>solid yellow</td>
<td>Indicates ethernet cable is connected to a device. (If connecting directly to a NIC card, use a crossover cable.)</td>
</tr>
<tr>
<td>Ethernet activity light</td>
<td>blinking green</td>
<td>Ethernet activity.</td>
</tr>
</tbody>
</table>

**Module Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST</td>
<td>blinking</td>
<td>Passed power on self test. Indicates this is the master module for the chassis.</td>
</tr>
<tr>
<td>ALM</td>
<td>solid red</td>
<td>Alarm - failed power on self test.</td>
</tr>
</tbody>
</table>
**FLEXmaster Adapter Module**

The adapter module is the I/O unit for the FLEXmaster application module. The following figure shows the pinouts and positioning of each port and link.

---

### Connectors

**DB-25 Connector (Port E)**

The 25-pair connector pinout is as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shield (Prot. Ground)</td>
<td>12</td>
<td>Tx Clock B</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data A</td>
<td>13</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>Rx Data A</td>
<td>14</td>
<td>Tx Data Clock</td>
</tr>
<tr>
<td>4</td>
<td>Request to Send</td>
<td>15</td>
<td>Tx Clock A</td>
</tr>
<tr>
<td>5</td>
<td>Clear to Send</td>
<td>16</td>
<td>Receive Data B</td>
</tr>
<tr>
<td>6</td>
<td>Data Set Ready</td>
<td>17</td>
<td>Receive Clock A</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>18-19</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Carrier Detect</td>
<td>20</td>
<td>Data Term Ready</td>
</tr>
<tr>
<td>9</td>
<td>Rx Clock B</td>
<td>21-23</td>
<td>N/C</td>
</tr>
<tr>
<td>10</td>
<td>N/C</td>
<td>24</td>
<td>Ext Clock A</td>
</tr>
<tr>
<td>11</td>
<td>Ext Clock B</td>
<td>25</td>
<td>N/C</td>
</tr>
</tbody>
</table>

---

*MASTERseries - Release 6.01*
**RJ-48C Connector (1-8)**

The adapter module is the I/O unit for the FLEXmaster. The rear adapter has RJ-48C female connectors and supports up to eight T1 link interfaces. The pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive Ring</td>
</tr>
<tr>
<td>2</td>
<td>Receive Tip</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>Transmit Ring</td>
</tr>
<tr>
<td>5</td>
<td>Transmit Tip</td>
</tr>
<tr>
<td>6-7</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Chassis Ground</td>
</tr>
</tbody>
</table>

**RJ-45 Connector (NMS)**

The RJ-45 connector for Network Management Systems (NMS), pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data</td>
</tr>
<tr>
<td>3</td>
<td>Rx Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Ground/Drain</td>
</tr>
<tr>
<td>6-8</td>
<td>N/C</td>
</tr>
</tbody>
</table>
FLEXmaster8A and FLEXmaster16

In this Chapter

- Overview
- Technical Specifications
- LEDs
- FLEXmaster16 Adapter Module
- Connectors
- Comparing the FLEXmaster8 and FLEXmaster16
Overview

The FLEXmaster16 provides Access and Transport Optimization for Greater T1/E1 Bandwidth utilization.

**Key features**

- 8 or 16 local T1/E1 ports
- V.35 port
- 4 10/100 Ethernet LAN ports
- 2 10/100 WAN uplink ports for T1/E1 transport over Ethernet
- Software upgrades for TDM, ATM and Ethernet Transport
- Supports Abis Optimization, ATM-IMA and Pseudo-wire capabilities
- Non-Blocking DS0 cross-connect
- GUI

**Benefits**

- Enable a highly efficient and more cost-effective RAN access network
- Advanced bandwidth and traffic management capabilities
- Greater transport utilization with Abis protocol optimization
- Intelligent transport and 1/0 Timeslot cross-connect grooming
- Converge GSM, 3G UMTS and IP traffic over same transport
- Dynamic transport Bandwidth, CAC optimization algorithm
- Interoperability with infrastructure interfaces
- High Availability - Extended operating temperature range, redundant power
- Supported by OMC Companion Element Management, Performance Monitoring, Configuration, Upgrade and Alarm gathering

**Introduction**

The FLEXmaster8A and 16 Modules are components of the MASTERseries cell site access platform that adds increased T1/E1 traffic carrying capacity with the powerful Carrier Access FLEXengine™. The FLEXmaster8A and FLEXmaster16 modules eliminate the uncertainty of cell site backhaul network protocol migration from TDM to ATM or IP by offering unparalleled backhaul networking flexibility for UMTS migration paths. ATM, IP and GSM Abis compression options can be remotely upgradeable via simple software loads. Wireless carriers can now control transport costs, install new services, and more efficiently utilize existing T1/E1 lines with the FLEXmaster8A and16 modules with GSM, UMTS and IP traffic consolidation over a common backhaul transport (TDM, ATM or Ethernet). It is the ideal solution for carriers implementing next-generation transport solutions for their BSS network over existing infrastructures.
**Unparalleled Versatility Improves Cell site Economics**

Software features enable easy expansion and upgrades for GSM transport optimization to further maximize bandwidth between the BTS and BSC. BTS network access bandwidth can be T1/E1, or multi-T1/E1 in order to satisfy user demand for the increasing bandwidth required for today's wireless transport applications.

The FLEXmaster8A and 16 Module install in any MASTERseries dual- or 8- slot enclosures capable of supporting FLEXmaster modules to provide improved backhaul transport optimization and compression functions that consolidates GSM traffic over a truly dynamic backhaul transport.

The FLEXmaster8A and 16 provide full featured T1/E1 access and management as well as, timeslot cross-connects, CSU and terminal server router functions in a single, compact platform, replacing multiple pieces of equipment. The result is significant savings in cost, space, and power and simplified management.
FLEXmaster8A and FLEXmaster16 Module General Information

The front-loading FLEXmaster16 engine includes six 10/100 Ethernet RJ45 ports and RJ45 RS-232 craft port. The rear-loading interface adapter includes 16 T1/E1 (RJ48C) ports and one V.35 port (sub-miniature DB-26 connector).

- 16 T1/E1 Full Non-blocking DS0 cross-connect
- Resides in MASTERseries 8-slot or 2-slot enclosure

The front-loading FLEXmaster8A engine includes six 10/100 Ethernet RJ45 ports and RJ45 RS-232 craft port. The rear-loading interface adapter includes 8 T1/E1 (RJ48C) ports and one V.35 port (sub-miniature DB-26 connector).

- 8 T1/E1 Full Non-blocking DS0 cross-connect
- Resides in MASTERseries 8-slot or 2-slot enclosure

Management Interfaces

- RJ45 8-pin jack RS-232 craft port
- Remote Access Telnet support
- Local management through 10/100 or RS-232 port

Ethernet Interfaces

- 6 Ethernet 10/100BaseTX LAN ports

Routing Features

- PPP, Frame Relay (RFC 1490) Nx56/K64K WAN data rates
- Static, RIPv1, RIPv2, OSPF v2 Routing
- Un-numbered ports interface support
- DHCP - Client, Relay and Server
- NAT/NAPT
- Frame Relay
- OSPFv2
- Firewall
- DNS relay
- DNS resolver
- SNTP
- SNMP agent configuration
- Ping, Trace Route

T1 Interfaces

- Line rate: 1.544 Mbps ±50 bps
- Framing: SF/ESF
• Coding: AMI or B8ZS for T1
• Front T1 Connectors: 8-pin RJ-48C jacks
• Rear T1 Connectors: Wire-wrap terminals (backplane TDM bus support in Phase 2)
• Timing: Internal or external from T1 port
• Line interface: T1-CSU
• Receive sensitive (DS-1): 0 to -22 dB @ 772KHz ALBO
• Output level (DS-1): selectable at 0 to -22dB
• Jitter: meets AT&T Pub. TR-62411, G.832

**E1 Interfaces**

• E1 ports meet: RFC-2495, ITU G.703, G.704, G.706, G.823, I.431, TBR12 & 13
• Line rate 2.048Mbps ±50 bps
• HDB3 coding
• Supports standard G.732 alarms
• Jitter and Wander meet ITU-T G.824
• E1 Framing: E1 Double Framed, E1 Multi-Frame (CRC-4)

**Timing Source**

• Internal Timing: The internal oscillator provides the master clock.
• Loop Timing: The transmit clock is derived from a T1/E1 port's receive clock.
• Revertive or non-revertive (provisionable) clock switching provides automatic backup to secondary T1/E1 should the primary T1/E1 fail

**Diagnostics**

• T1/E1 Port Loopbacks: Bi-directional, fractional DS0, line, local, payload

**Performance Monitoring**

• Data storage: Last 24 hours of data in 15-min. increments, 24-hour summary
• Monitors: All T1 interfaces

**Environment**

• Operating temperature: -40 to 149 °F (-40 to 65 C)
• Storage temperature range: -40 to 158 °F (-40 to 70 C)
• Maximum operating altitude: 10,000 ft (3,048 m)
• Minimum operating altitude: 197 ft (60 m) below sea level
• Maximum non-operating altitude: 40,000 ft (12,192 m)
• Relative humidity (non-condensing) range: 0% to 95%
Regulatory

- USA
  - UL60950-1
  - FCC Part 15, Class A
  - FCC Part 68 and TIA-968-A
- Canada
  - CSA 60950-1
  - ICES-003 Class A
  - CS-03
6.01 ATM Software Specifications

Introduction

The ATM software for the FLEXmaster™ 8A and FLEXmaster16 modules provides wireless mobile transport networking solutions for: voice and data T1/E1 integrated access; wireless cell site traffic grooming, concentration, backhaul and LAN extension. The FLEXmaster8A and FLEXmaster16 with ATM software act as an 8 or 16 T1/E1 ATM access concentrator and multi-link T1 DSU/CSU with Ethernet bridging.

The ATM software supports RFC2684 Bridged operation (essentially AAL5 Transparent Bridging) for the front panel 10/100BaseTX Ethernet ports. This provides the connections for the management data channel and the FLEXmaster module acts as a transparent LAN Bridge providing a data transport pipe for the private management LAN extension network at the cell site.

A separate purchase of the ATM software or a software key is required to install the ATM features.

ATM Capacity

- Up to 8 T1 CES ports with an AAL1 capacity of up to six full T1 TDM streams
- Up to 8 T1 ATM-UNI-IMA Node B ports can be supported
- 1-8 T1 IMA network ports can be supported
- Up to 4 IMA groups can be supported
- Per VC queuing
- Provides weighted fair queueing scheduling
- Buffer management: early packet discard (EPD), partial packet discard (PPD), cell discard (CLP)
**ATM Interworking**

- General: ATM Forum UNI 3.0/4.0
- Ethernet Bridging: MPoA bridging (RFC 1483/2684), 802.1q VLAN pass-through
- Adaptation: AAL1, AAL5
- Service Categories CBR, UBR, VBR
- Connections: 255 connections, 8 VPi bits, 16 VCi bits
- OAM Support: F5 Fault Management and Performance Monitoring
- Adaptation Layer: AAL1 Circuit Emulation Service V2.0
- Supports T1 over ATM-f structured CES service, version 1.0/2.0, and AAL1 adaptation with CCS support

**ATM Standards**

ATM Forum

- Traffic Management 4.0 af-tm-0121.000
- Signaling 4.0 af-sig-0061.000
- ILMI 4.0 af-ilmi-0065.000
- T1 Physical Layer Interface af-phy-0016.000
- IMA Physical Layer Interface af-phy-0086.001
- Circuit Emulation Service 2.0 af-vtoa-0078.00
The LEDs on the front panel of the FLEXmaster16 and FLEXmaster8A application modules are described below.

### Module Status

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
</table>
| PST | blinking | Passed power on self test.  
Indicates this is the master module for the chassis. |
| ALM | solid red | Alarm - failed power on self test |

### Link Status

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
</table>
| solid red | OOF, AIS  
Check the status screen for more information |
| solid green | Link is up. |
| blinking red | LOS. |
| solid yellow | Yellow sync alarm or RAI. Indicates red alarm on the far end. |
| blinking yellow | Diagnostic function present. |
| off       | Link is disabled. |

### Ethernet Status

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
</table>
| Ethernet status light | solid yellow | Indicates ethernet cable is connected to a device.  
(If connecting directly to a NIC card, use a crossover cable.) |
| Ethernet activity light | blinking green | Ethernet activity. |

LEDs
**FLEXmaster16 Adapter Module**

The adapter module is the I/O unit for the FLEXmaster application module. The following figure shows the pinouts and positioning of each port and link.

---

**Connectors**

**Subminiature DB-26 Connector (Port E)**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shield (Prot. Ground)</td>
<td>14</td>
<td>Transmit Data B</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data A</td>
<td>15</td>
<td>Receive Clock A</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data A</td>
<td>16</td>
<td>Receive Data B</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>17</td>
<td>Receive Clock B</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>18</td>
<td>Open Pins/No Contact</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>19</td>
<td>Open Pins/No Contact</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>20</td>
<td>DTR</td>
</tr>
<tr>
<td>8</td>
<td>CD (RLSD)</td>
<td>21</td>
<td>Open Pins/No Contact</td>
</tr>
<tr>
<td>9</td>
<td>Open Pins/No Contact</td>
<td>22</td>
<td>N/C Not Connected</td>
</tr>
<tr>
<td>10</td>
<td>Xmit Clock A</td>
<td>23</td>
<td>Xmit Clock B</td>
</tr>
<tr>
<td>11</td>
<td>External Clock A</td>
<td>24</td>
<td>External Clock B</td>
</tr>
<tr>
<td>12</td>
<td>N/C Not Connected</td>
<td>25</td>
<td>N/C Not Connected</td>
</tr>
<tr>
<td>13</td>
<td>Open Pins/No Contact</td>
<td>26</td>
<td>Open Pins/No Contact</td>
</tr>
</tbody>
</table>

Carrier Access makes a V.35 female to DB-26 male cable which can be used with FLEXmaster16 and FLEXmaster 8A.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>005-0014</td>
<td>10 feet</td>
</tr>
<tr>
<td>005-0068-0100</td>
<td>25ft</td>
</tr>
<tr>
<td>005-0069-0100</td>
<td>50ft</td>
</tr>
</tbody>
</table>
RJ-48C Connector (1-8)

The adapter module is the I/O unit for the FLEXmaster. The rear adapter has RJ-48C female connectors and supports up to 16 T1 link interfaces. The pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive Ring</td>
</tr>
<tr>
<td>2</td>
<td>Receive Tip</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>Transmit Ring</td>
</tr>
<tr>
<td>5</td>
<td>Transmit Tip</td>
</tr>
<tr>
<td>6-7</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Chassis Ground</td>
</tr>
</tbody>
</table>

RJ-45 Connector (NMS)

For the RJ-45 connector for Network Management Systems (NMS), the pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data</td>
</tr>
<tr>
<td>3</td>
<td>Rx Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Ground/Drain</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>DSR</td>
</tr>
<tr>
<td>8</td>
<td>DTR</td>
</tr>
</tbody>
</table>

**NOTE:** Install one ferrite p/n 010-0365 on the NMS cable with one loop (two turns) when the FLEXmaster16 or FLEXmaster8A is used in the 2 or 8 slot platforms.

**NOTE:** Install one ferrite p/n 010-0051 on the Alarm cable with one loop (two turns) when the FLEXmaster16 or FLEXmaster8A is used in the 2 or 8 slot platforms.
Comparing the FLEXmaster8 and FLEXmaster16

Ethernet Ports on FLEXmaster8 and FLEXmaster16/8A

The Ethernet ports on the front of the FLEXmaster8 and the FLEXmaster16 behave differently. The following table maps the various Ethernet pieces. For ease of demonstration, all slot references are for slot 1.

<table>
<thead>
<tr>
<th>Module</th>
<th>representation in the ...</th>
<th>Faceplate</th>
<th>TUI</th>
<th>CLI</th>
<th>GUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLEXmaster8</td>
<td></td>
<td>ENET1</td>
<td>ETH1</td>
<td>1e1</td>
<td>1E01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENET2</td>
<td>ETH2</td>
<td>1e2</td>
<td>1E02</td>
</tr>
<tr>
<td>FLEXmaster16/</td>
<td>ETHETERNET 1 - 6</td>
<td>Not</td>
<td></td>
<td>via commands:</td>
<td>not</td>
</tr>
<tr>
<td>FLEXmaster8A</td>
<td></td>
<td>represented</td>
<td></td>
<td>clear switch counters</td>
<td>represented</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>show switch stats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>These ports are not</td>
<td>ETH1</td>
<td></td>
<td>1e1</td>
<td>1E01</td>
</tr>
<tr>
<td></td>
<td>available from the</td>
<td>ETH2</td>
<td></td>
<td>1e2</td>
<td>1E02</td>
</tr>
<tr>
<td></td>
<td>faceplate, but are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>internal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>links to the switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ethernet Ports on FLEXmaster8

In the FLEXmaster8, there are 2 Ethernet ports with physical interfaces on the front of the module, labeled ENET1 and ENET2.

- In a TDM module, port 1e1 should be used as the Ethernet port while 1e2 should be shut down.
- In an ATM module, port 1e2 should be used for bridging, while port 1e1 should be shut down.

CLI

The following shows how the Ethernet ports are represented in the CLI for a FLEXmaster8.

```
# show int conf all

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
</tbody>
</table>
```
**TUI**

The following shows how the Ethernet ports are represented in the TUI for a FLEXmaster8.

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
Alarms Linklog Syslog trHold Performance trunK ac0
----- EDIT: CFG 1 ------------------------------------------ RUN: CFG 1 -------
LINK    DS3   PORT   ETH   MSRV
<----------------->  <->  <-->  <->  <----------------->
M Tn       ABCD   111 1111   EFGH   111 1111
# S En MODULE TYPE 1234 5678 9012 3456 123 1234 123 1234 5678 9012 3456
- - -- --------------- ---- ---- ---- ----  ---  ----  --   ---- ---- ---- ----
1 M T1 FLEXmaster8 DDDD DDDD       u    UD   uuuu uuuu uuuu uuuu
2 -
3 -
4 -
5 S T1 FLEXmaster16 DDDD DDDD DDDD DDDD       u    DD
6 -
7 -
8 -
```

**GUI**

The following shows how the Ethernet ports are represented in the GUI for a FLEXmaster8.
**Ethernet Ports on FLEXmaster16 and FLEXmaster8A**

In the FLEXmaster16 and FLEXmaster8A, the same Ethernet ports exist, but they are not directly available via the faceplate. Instead, 6 switch ports are found in the engine. The ports act as a switch and provide a LAN extension. You can connect other IP manageable devices such as microwaves, antenna tilts and on-site generators and manage them remotely, provided they are all in the same broadcast network.

- The 6 (six) switch ports are not represented by the TUI or the GUI, but are via the CLI `show switch stat` command.
- If a cable is connected to any of the switch ports (1 – 6), the status of 1E1 will be UP.
- Port 1e1 (also known as ETH1 or 1E01) by default will be in an up state.
- You should configure 1e1 to be in the same broadcast domain as the devices connected to the switch ports.
- For TDM operation, port 1e2 should be not be used.
- For ATM operation, port 1e2 should only be used for bridging.
- If any one of the switch ports is connected, the Eth status for 1E1 will be UP. If all connections on the external ports are down, the Eth status will be DOWN.

**ATM Modules**

When there is only one FM16, FM8A or FM8 in the chassis as an ATM card, configure and IP address for the bridge using eth1. In the case of a single ATM module, you can’t assign an IP address to Eth 2.
FLEXmaster8 ATM Module

In this Chapter

- Overview
- Features
- Technical Specifications
- LEDs
- FLEXmaster Adapter Module
- Connectors
Overview

8-Port T1 Cell Site ATM Access for MASTERseries

The FLEXmaster™8 ATM module for the Carrier Access MASTERseries™ platform is an intelligent compact device that provides wireless mobile transport networking solutions for: voice and data T1 integrated access; wireless cell site traffic grooming, concentration, backhaul and LAN extension. The FLEXmaster8 ATM functions as an 8-T1 ATM access concentrator and multi-link T1 DSU/CSU with Ethernet bridging and features the powerful Carrier Access FLEXengine™ processor for ATM-based transport migration. The FLEXmaster8 ATM eliminates the uncertainty of cell site backhaul network protocol migration to ATM or IP by offering unparalleled backhaul networking flexibility for UMTS migration paths. ATM, IP and GSM Abis compression options can be remotely upgradeable to the FLEXmaster8 module via simple software loads once available.

The FLEXmaster8 ATM module supports RFC2684 Bridged operation (essentially AAL5 Transparent Bridging). This is sufficient to provide the connections that are required for the management data channel as we are a transparent Bridge providing a data transport pipe for the private management LAN extension network at the cell sites. Typically this VC pipe will be used for management and Node B control traffic.

T1 Scalability and Processing to Grow with Future Demands

The FLEXmaster8 ATM Module is designed to fit in the 2-slot and 8-slot MASTERseries enclosures. The module supports eight T1 circuits and provides one V.35 high-speed data port, with integral T1 DSU support to drop and insert local data into available T1 NxDS0 timeslots. In addition, it supports two Ethernet 10/100 Base-T ports to provide extending Ethernet LAN access to the remote cell site.

Cell Site ATM Access Flexibility

The FLEXmaster8 Module with ATM software in this release works as a master or a slave.

Simplified Configuration and Management

All features are soft programmable, eliminating the need to set or change any switch settings to reconfigure the unit. The FLEXmaster8 module has been designed for easy configuration and management with flexible provisioning options. Any VT100 terminal or PC with terminal emulator can access all management functions, including alarm screens, configuration commands, and diagnostics. The intuitive user interface reduces training and provisioning time for technicians.

Configuration and maintenance is performed locally or remotely. The command line interface is accessed locally through the serial port on the unit or remotely through Telnet. SNMP is used for alarm and performance monitoring. Best of all, no site visits are required to increase the capabilities or manage the system; thereby reducing cost and personnel required to support the system.
**Features**

- Up to 8 T1 Interfaces supporting ATM-UNI/IMA
- Supports ATM on T1, af-phy-0130.00 October, 1999
- T1 ATM UNI support for UMTS Radio T1 interfaces
- ATM cell switching and forwarding
- Module-to-Module management and cross-connects
- Supports T1 ports over ATM-f structured CES service, version 1.0/2.0, and AAL1 adaptation with CCS support
- Supports ATM adaptation of wireless data services (GPRS, EDGE) using CES/AAL1 or AAL5
- Provides ATM multiplexing of legacy radio traffic with NODE B Radio Network Controller traffic.
- Traffic Management: CBR, VBR, and UBR QoS queues
- Per VC queuing
- Weighted Fair Queuing (WFQ) scheduling
- Per-VC PCR limiting
- Buffer management: early packet discard (EPD), partial packet discard (PPD), cell discard (CLP)
Technical Specifications

Special Requirements

- 2-slot VDC enclosure requires 2-slot VDC power supply (P/N 8662D), and fan assembly (P/N 8663) - Required for installing FLEXmaster 8 Module in the 2-slot enclosure
- MASTERseries Release 5.0 or higher.

User and Network Interface

- Up to 8 T1 CES, ATM UNI or IMA software selectable ports
- Up to 8 T1 CES (AAL 1) ports
- Up to 8 T1-UNI (performing cell forwarding of UMTS ATM cells (AAL1/2/5) to ATM-IMA up links)
- 2 Ethernet 10/100BaseT
- 1 Serial V.35

ATM Capacity

- Up to 8 T1 CES ports with an AAL1 capacity of up to six full T1 TDM streams
- Up to 8 T1 ATM-UNI Node B ports can be supported
- Up to 8 T1's IMA network ports can be supported
- Up to 8 IMA groups can be supported

ATM Interworking

- General: ATM Forum UNI 3.0/4.0
- Ethernet Bridging: MPoA bridging (RFC 1483/2684), 802.1q VLAN pass-through
- Adaptation: AAL1, AAL5
- Service Categories CBR, UBR, VBR
- Connections: 255 connections, 8 VPi bits, 16 VCi bits
- Scheduling/Shaping: Strict (with over-subscription) and rate-shaped scheduling; per VC shaping and QoS; synthesized VP shaping
- Serial: HDLC frame forwarding
- OAM Support: F5 Fault Management and Performance Monitoring
- AAL1 Capacity: Up to six full T1 TDM streams
- Adaptation Layer: AAL1 Circuit Emulation Service V2.0

Rate Conversion Buffer

- Supports a cell buffer pool of 128,000 cells to be shared across all VC connections
**ATM Standards**

ATM Forum

- Traffic Management 4.0 af-tm-0121.000
- Signaling 4.0 af-sig-0061.000
- ILMI 4.0 af-ilmi-0065.000
- T1 Physical Layer Interface af-phy-0016.000
- IMA Physical Layer Interface af-phy-0086.001
- Circuit Emulation Service 2.0 af-vtoa-0078.00

**ATM transport**

- IMA - (2-8 T1)
- AAL1 CES (up to 8 T1)
- AAL5 UBR
- AAL2 cell forwarding
- UBR, CBR, VBR QoS queues
- Per VC queuing
- Provides weighted fair queuing scheduling
- Buffer management: early packet discard (EPD), partial packet discard (PPD), cell discard (CLP)

**T1 Ports**

- 8 T1 Ports
- Female 8-pin RJ48C Jack
- Timing: Internal or external from T1 port
- LED indicators: YEL/TEST, OOF/LOS, SYNC, AIS
- Line interface: 4-Wire
- Solid-state fuse-less, over voltage and over current line protection

**Data Port**

- Data rate: N x 56/64Kbps for N = 1
- Interface: CCITT V.35 DCE Synchronous Data
- Connector: Female DB-25 pin connector
- Indicators: RxD, TxD
- VC AAL1 CES ATM Transport

**Ethernet Ports**

- 2 10/100 Ports, RJ-45 jacks, front access
- LED indicators: links activity, link status
- Ethernet Bridging: MPoA bridging (RFC 1483/2684), 802.1q VLAN pass-through
FLEXmaster® ATM Module
Technical Specifications

Management
- Front access from RS-232 (RJ-45) or 10/100Base-T Ethernet ports (RJ-45)
- VT100 RS-232 port, 4,800-19,200 bps; RJ-45 connector, external modem supported
- In-band Remote Access via DS0s, Telnet supported
- 3-level password control
- Manageable Network Element under OMC-Companion

Diagnostics
- Loopback types: Bi-directional, line, local, payload, dataport, remote loopback, fixed or timed loopback option

Performance Monitoring
- Data storage: Last 24 hours of data in 15-min. increments, 72-hour summary
- Monitors: All T1 interfaces

Power
- VDC input range (+/- 20 to 65 VDC)

Regulatory
- USA
  - UL60950-1
  - FCC Part 15, Class A
  - FCC Part 68 and TIA-968-A
- Canada
  - CSA 60950-1
  - ICES-003 Class A
  - CS-03

Dimensions (Enclosures)
- 2-slot enclosure
  - 19" W x 10.2" D x 1.75" H
- 8-slot enclosure
  - 19" W x 10.2" D x 5.25" H

Environment
- Ambient temperature: -40°F to 149°F (-40°C to 65°C) extended temperature range
- Humidity: Up to 95% non-condensing
LEDs

The front panel of the FLEXmaster application module has LEDs to display the current status of each link and port. The links are seen to the right of the panel, the ports are seen to the left of the panel. The following figure shows the application module.

**RxD and TxD**

This is the status of 1P01.

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxD</td>
<td>solid</td>
<td>Receiving data</td>
</tr>
<tr>
<td></td>
<td>off</td>
<td>Idle or not used</td>
</tr>
<tr>
<td>TxD</td>
<td>solid</td>
<td>Transmitting data</td>
</tr>
<tr>
<td></td>
<td>off</td>
<td>Idle or not used</td>
</tr>
</tbody>
</table>

**Link Status**

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>solid red</td>
<td>OOF, AIS. Check the status screen for more information</td>
</tr>
<tr>
<td>solid green</td>
<td>Link is up.</td>
</tr>
<tr>
<td>blinking red</td>
<td>LOS.</td>
</tr>
<tr>
<td>solid yellow</td>
<td>Yellow sync alarm or RAI. Indicates red alarm on the far end.</td>
</tr>
<tr>
<td>blinking yellow</td>
<td>Diagnostic function present.</td>
</tr>
<tr>
<td>off</td>
<td>Link is disabled.</td>
</tr>
</tbody>
</table>

**Ethernet Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet status light</td>
<td>solid yellow</td>
<td>Indicates ethernet cable is connected to a device. (If connecting directly to a NIC card, use a crossover cable.)</td>
</tr>
<tr>
<td>Ethernet activity light</td>
<td>blinking green</td>
<td>Ethernet activity.</td>
</tr>
</tbody>
</table>

**Module Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST</td>
<td>blinking</td>
<td>Passed power on self test. Indicates this is the master module for the chassis.</td>
</tr>
<tr>
<td>ALM</td>
<td>solid red</td>
<td>Alarm - failed power on self test.</td>
</tr>
</tbody>
</table>
FLEXmaster Adapter Module

The adapter module is the I/O unit for the FLEXmaster application module. The following figure shows the pinouts and positioning of each port and link.

Connectors

**DB-25 Connector (Port E)**

The 25-pair connector pinout is as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shield (Prot. Ground)</td>
<td>12</td>
<td>Tx Clock B</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data A</td>
<td>13</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>Rx Data A</td>
<td>14</td>
<td>Tx Data Clock</td>
</tr>
<tr>
<td>4</td>
<td>Request to Send</td>
<td>15</td>
<td>Tx Clock A</td>
</tr>
<tr>
<td>5</td>
<td>Clear to Send</td>
<td>16</td>
<td>Receive Data B</td>
</tr>
<tr>
<td>6</td>
<td>Data Set Ready</td>
<td>17</td>
<td>Receive Click A</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>18-19</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Carrier Detect</td>
<td>20</td>
<td>Data Term Ready</td>
</tr>
<tr>
<td>9</td>
<td>Rx Clock B</td>
<td>21-23</td>
<td>N/C</td>
</tr>
<tr>
<td>10</td>
<td>N/C</td>
<td>24</td>
<td>Ext Clock A</td>
</tr>
<tr>
<td>11</td>
<td>Ext Clock B</td>
<td>25</td>
<td>N/C</td>
</tr>
</tbody>
</table>
**RJ-48C Connector (1-8)**

The adapter module is the I/O unit for the FLEXmaster. The rear adapter has RJ-48C female connectors and supports up to eight T1 link interfaces. The pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive Ring</td>
</tr>
<tr>
<td>2</td>
<td>Receive Tip</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>Transmit Ring</td>
</tr>
<tr>
<td>5</td>
<td>Transmit Tip</td>
</tr>
<tr>
<td>6 - 7</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Chassis Ground</td>
</tr>
</tbody>
</table>

**RJ-45 Connector (NMS)**

The RJ-45 connector for Network Management Systems (NMS), pinouts are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data</td>
</tr>
<tr>
<td>3</td>
<td>Rx Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Ground/Drain</td>
</tr>
<tr>
<td>6-8</td>
<td>N/C</td>
</tr>
</tbody>
</table>
CHAPTER 9

FLEXmaster DS3c-3 ATM Module

In this Chapter

- Overview
- Key Features and Benefits
- Technical Specifications
- LEDs
- FLEXmaster DS3c-3 Rear Adapter
FLEXmasterDS3c-3 ATM Module

Overview

The FLEXmasterDS3c-3 module provides 3x DS3 ATM interfaces and Inter Working Functions for collecting of Node B DS3 UMTS ATM traffic and converging GSM traffic, management and E911 traffic on to the same DS3 ATM access network. When the FLEXmasterDS3c-3 ATM module is combined with the FLEXmaster8 Module, T1 Node B and GSM radios can be connected to the DS3c ATM module with module-to-module mid-plane connections. The FLEXmasterDS3c-3 module with ATM functions works as a slave unit to a FLEXmaster8, FLEXmaster16, or FLEXmaster8A with standard TDM software release 6.01.

Networking Solution for

- Cell site DS3c ATM access, 3rd DS3c port for ATM Add drop
- CES, IMA and Inter-Working Functions
- Supports NodeB UMTS RAN ATM networking
- Converged ATM Transport Solution for 2.5G GSM and 3G UMTS

FLEXmasterDS3c-3

The FLEXmasterDS3c-3 Module is a highly integrated solution that can be fully integrated with the FLEXmaster8 modules in MASTERseries 2- and 8-slot enclosures. The FLEXmasterDS3-3 module comprises a front-loading FLEXmasterDS3-3 module with and a rear loading interface adapter module with 3 DS3c (concatenated) ATM-UNI interfaces. Together they form an intelligent compact ATM access solution that provides connectivity, cell multiplexing, switching and inter-working functions for DS3 ATM access, DS3 Node B UMTS radios, remote management and E911 Location Services.

T1 CES and T1 UNI support into a DS3 ATM service can be provided using the FLEXmaster8 module and T1 backplane connectivity to the DS3 ATM Module. The DS3 ATM Module can combine traffic from DS3 Node B and T1 Node B interfaces onto a single DS3 ATM network. T1 CES service on the FLEXmasterDS3-3 module provides the capability to combine GSM traffic and UMTS ATM Node B traffic over the ATM access network.

The FLEXmasterDS3c-3 Module is designed for installation in the 2- and 8-slot MASTERseries enclosures. It provides three DS3c ATM-UNI ports. Up to 16 T1 streams can be supported from the backplane for T1 equipment connected to a FLEXmaster8 in the same enclosure. Up to 4 FLEXmaster modules can be installed in an 8-slot enclosure. The FLEXmasterDS3c-3 Module has the ability to connect to T1s in a MASTERseries enclosure over the mid-plane bus utilizing the FLEXmaster-to-FLEXmaster bus to connect to the FLEXmaster8, FLEXmaster16 and FLEXmaster8A.

All of the features are soft programmable, eliminating the need to set or change any switch settings to reconfigure the unit. Multiple configurations can be stored in non-volatile memory. These may be invoked manually or upon user defined conditions. This provides the ability to automatically reroute and or vary link or channel parameters based on link failure or user defined thresholds.

The FLEXmaster modules can be easily configured and managed. Any VT100 terminal, or PC with terminal emulator accesses all management functions, including alarm screens, configuration commands, and diagnostics. Module management may be accessed locally or remotely via an external modem, or telnet session over a management DS0 channel.
Key Features and Benefits

- Cell Site ATM Access and 3G Node B DS3 UMTS support
- 2 Network DS3c ATM UNI Ports
- 1 Equipment-side Access DS3c ATM UNI for Node B radio
- Up to 16 T1s supported across the backplane to FLEXmaster8 Modules
- Environmentally hardened
- Module-to-module management and cross-connects
- 2- or 8-slot integrated rack mount configurations
- Consolidates traffic to save transport access charges and equipment costs
- Integrates multiple functions for a variety of networking solutions ATM, CES, IMA and IWF

Technical Specifications

Special Requirements

- FLEXmasterDS3c-3 Modules install in MASTERseries 8-slot or Dual slot VDC enclosures
- Installation of FLEXmaster modules in the 2-slot MASTERseries VDC enclosure requires the 2-slot enclosure power supply (P/N 8662D), and fan assembly (P/N 8663)
- MASTERseries Release 5.0 or higher

Components

- Front FLEXmasterDS3c-3 engine module, includes RS-232 craft and dual 10/100 Ethernet ports
- Rear interface adapter module, includes 3 DS3c ports (SMB connectors)

User and Network Interfaces

- Two DS3c ATM UNI network interface
- One DS3c ATM UNI equipment interface - cell forwarding of UMTS ATM cells (AAL1/2/5) to DS3 ATM link
- Up to 8 T1 CES, or 16 ATM UNI interfaces supported from FLEXmaster8 Module

ATM Features

- General: ATM Forum UNI 3.0/3.1/4.0
- Adaptation: AAL1, AAL5, (AAL2 cell forwarding)
- Service Categories CBR, UBR and VBR
- Connections: 1024 connections, 8 VPi bits, 16 VCi bits
- Scheduling/Shaping: Strict (with over-subscription) and rate-shaped scheduling; per VC shaping and QoS; synthesized VP shaping
- OAM Support: F5 Fault Management and Performance Monitoring
FLEXmasterDS3c-3 ATM Module
Technical Specifications

- AAL1 Capacity: Up to 8 full T1 TDM streams CES
- Adaptation Layer: AAL1 Circuit Emulation Service V2.0
- AAL1 Features: Structured Data Transfer modes
- Conformance to ATM Forum Standards (UNI 3.1, UNI 4.1)
- Supports PVC connectivity (255 VCs)
- Queueing and Traffic Management: ATM Forum af-TM-121.000 CBR, rt-VBR, nrt-VBR, UBR, UBR+
- VP Switching

ATM Forum Standards

- af-arch-0193.000
- af-phy-0016.000
- af-phy-0086.001
- af-phy-0130.000
- af-vt0a-0078.000

DS3c ATM-UNI Ports

- Rear Access SMB DS3 connectors
  - Compliant with ATM Forum DS3 Physical Layer Interface af-phy-0054.000
- Line rate: 44.736 Mbps
- Line code: B3ZS
- Framing format: M23 and C-bit parity
- Transmit Impedance: 75ohm ± 5% resistive, unbalanced
- Transmit Jitter Attenuation: Meets ANSI T1.102
- Transmit Amplitude: Meets ANSI T1.102 pulse mask with 0.36 to 0.85 Vp
- Transmit Length (cable) 500 ft. to cross connect
- Receive Sensitivity: -10 dB w/r DSX-3 120 mVp to 900 mVp input range with automatic gain control circuit

Network Standards

- ANSI
- T1.102-1993; T1.107-1995
- T1.403-1996; 404a-1994
- T1.404a-1996, T1.105
- Telcordia™ GR-499-CORE
- AT&T 62411 (Stratum 4 enhanced T1 CPE)

Management

- Operator access from the serial port or on-board Ethernet port, or remotely via an externally connected modem or dedicated management DS0
RS-232 (RJ45) or 10/100Base-T Ethernet ports (RJ-45)
- VT100 RS232 port, 1200-19,200 bps; RJ45 connector, external modem supported
- In-band Remote Access via DS0s, Telnet supported
- Three level Password Control

**Network Synchronization**
- Stratum 4 and 4E clocking from any I/O port except V.35 or Ethernet
- Local: On-board stratum 4E clock source
- From any DS3 port Network: Recovered from DS3 network receive signal
- PLCP mode

**Diagnostics**
- DS3 Diagnostics:
  - C-bit FEAC Loopback/Loopup
  - NIU Loopback/Loopup

**Performance Monitoring**
- Performance Data Storage: 15-min. increments, 72-hour summary
- Performance Monitors: All DS3/DS1 interfaces
- DS3 Performance Reports: Based on Telcordia™ GR-474-CORE, GR-820-CORE

**Alarms**
- External alarm contacts for critical and non-critical alarms
- Normally open and normally closed pin out

**Power**
- Wide Ranging universal VDC Power Supply: +/- 22 VDC to +/-60 VDC
- Redundant power supply available

**Environment**
- Ambient Temp: -40° to 65°C extended temperature range
- Humidity: up to 95% non-condensing

**Regulatory**
- FCC: Part 15, Class A; Part 68
- UL: Evaluated to UL60950

**Dimensions (Enclosures)**
- 2-slot Enclosure: 19" W x 10.2" D x 1.75" H
- 8 slot Enclosure: 19" W x 10.2" D x 5.25" H
**LEDs**

The front panel of the DS3 application module has LEDs to display the current status of each link and port. The LEDs are described in the following tables.

**Link Status**

Status for each link is represented by two LEDs, STAT and LOS.

<table>
<thead>
<tr>
<th>STAT</th>
<th>LOS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>green</td>
<td>Normal, the link is up.</td>
</tr>
<tr>
<td>flashing red</td>
<td>flashing red</td>
<td>LOS - Loss of signal</td>
</tr>
<tr>
<td>solid red</td>
<td>solid green</td>
<td>OOF- out of frame. (Check the status screen for more information.)</td>
</tr>
<tr>
<td>solid yellow</td>
<td>solid green</td>
<td>FERF - Far-end receive failure, or yellow alarm.</td>
</tr>
<tr>
<td>flashing yellow</td>
<td>green</td>
<td>Loopback in progress.</td>
</tr>
</tbody>
</table>

**Ethernet Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet status light</td>
<td>solid yellow</td>
<td>Indicates ethernet cable is connected to a device. (If connecting directly to a NIC card, use a crossover cable.)</td>
</tr>
<tr>
<td>Ethernet activity light</td>
<td>blinking green</td>
<td>Ethernet activity.</td>
</tr>
</tbody>
</table>

**Module Status**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST</td>
<td>blinking</td>
<td>Passed power on self test.</td>
</tr>
<tr>
<td>ALM</td>
<td>solid red</td>
<td>Alarm - failed power on self test.</td>
</tr>
</tbody>
</table>
The adapter module is the I/O unit for the FLEXmaster DS3c-3 application modules.

The adapter supports 3 DS3c ATM UNIs. They support network upstream, network downstream, and NodeB Radio.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3-3 RX</td>
<td>75 ohm SMB type connectors</td>
</tr>
<tr>
<td>DS3-3 TX</td>
<td></td>
</tr>
<tr>
<td>DS3-2 RX</td>
<td></td>
</tr>
<tr>
<td>DS3-2 TX</td>
<td></td>
</tr>
<tr>
<td>DS3-1 RX</td>
<td></td>
</tr>
<tr>
<td>DS3-1 TX</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 10

HUBmaster Module

In this Chapter

- Overview
- Features
- Technical Specifications
- LEDs
- Connectors
- Uplink Switch
Overview

The HUBmaster module is a five-port 10/100 Ethernet hub. The HUBmaster expands the number of Ethernet ports available while conserving space. Its environmental hardening ensures that it will stand up to the extreme temperature and humidity requirements of cell sites and remote locations. Integration with the MASTERseries platform simplifies power and mounting in locations where space is at a premium.

At cell sites, HUBmaster connects to IP-based devices such as remote testing units, management ports on other equipment, location devices, and the technician’s laptop.

NOTE: The HUBmaster consists of an Engine only, there is no Adapter Module for this Module.

Features

- Five port Ethernet/Fast Ethernet hub
- Independent auto-negotiations of all port speeds, 10 Mbps or 100 Mbps
- User-selectable uplink/crossover port
- Environmental hardening
- LEDs indicate Power On, Link Status, and Activity Detection/Collision
- Works in any MASTERseries multi-slot chassis
- Plug and play operation – no configuration needed
- All front interfaces
Technical Specifications

**Ports**
- Five Ethernet ports

**Diagnostics**
- LED Indicators

**Physical**
- Dimensions:
  - 5 in (H) x 1.75 in (W) x 7.5 in (D)
  - 12.7 cm (H) x 4.45 cm (W) x 19 cm (D)

**Environment**
- Operating Temperature: -40 °F to 149 °F (-40 °C to 65 °C)
- Relative humidity (non-condensing) range: 0% to 95%
LEDs

The front panel of the HUBmaster application module has LEDs to display the current status of each port. The following figure shows the application module.

<table>
<thead>
<tr>
<th>LED</th>
<th>State/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL</td>
<td>Green - Collisions present</td>
</tr>
<tr>
<td>PWR</td>
<td>Green - Power to the unit</td>
</tr>
<tr>
<td>10/100</td>
<td>Green - 100 MB</td>
</tr>
<tr>
<td>L/A</td>
<td>Green - Link on</td>
</tr>
<tr>
<td></td>
<td>Green Flashing - Activity</td>
</tr>
<tr>
<td>Uplink Port</td>
<td>Connects this hub to a larger network</td>
</tr>
</tbody>
</table>
Connectors

**Ethernet (RJ-45)**

The HUBmaster uses a standard Ethernet pinout. The figure on the right shows the HUBmaster RJ-45 Ethernet connector pin connections.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive +</td>
<td>Receive from network</td>
</tr>
<tr>
<td>2</td>
<td>Receive -</td>
<td>Receive from network</td>
</tr>
<tr>
<td>3</td>
<td>Transmit +</td>
<td>Transmit to network</td>
</tr>
<tr>
<td>4 - 5</td>
<td>N/C</td>
<td>Not connected</td>
</tr>
<tr>
<td>6</td>
<td>Transmit -</td>
<td>Transmit to network</td>
</tr>
<tr>
<td>7 - 8</td>
<td>N/C</td>
<td>Not connected</td>
</tr>
</tbody>
</table>
Uplink Switch

The Ethernet uplink port on the HUBmaster can be set as straight or cross-over. To change the port, use the switch just behind the front panel on the board. Refer to the picture below.
CHAPTER 11

CLI Commands

In this Chapter

- Accessing the CLI
- Using the Command Line Interface
- Interface Identifiers
- CLI Commands by Mode
Accessing the CLI

When you log in to the MASTERseries using a VT100 terminal or through a PC using a VT100 terminal emulation software application (for example, HyperTerminal), you start in the root mode of the command line interface (CLI). For more information about logging in, see Logging in to the MASTERseries on page 4-2.

Using the Command Line Interface

The CLI provides a direct-connect method for configuring, monitoring, and troubleshooting the MASTERseries.

CLI Command Syntax

This chapter uses the following conventions for the command syntax:

- **bold** identifies commands and keywords
- **bold-italic** identifies variables that must be set by the user
- Courier Font is used for command words
- {} (braces) enclose required parameters
- [ ] (square brackets) enclose optional parameters
- | (vertical bar) separates options for which you must select only one option

CLI Prompts

The CLI command prompt indicates the type of user currently logged in. For a list of user types, see adduser on page 11-29.

For users with manager privileges, the command prompt is /{mode}#. For example:

/ indicates the root mode for a manager user
/nat indicates the nat mode for a manager user

**NOTE:** In this chapter, all examples are shown using the manager user prompt /#.

For all other operator and monitor users, the command prompt is /{mode}>. For example:

/> indicates root mode for an operator or monitor user
/nat> indicates nat mode for an operator or monitor user
Getting Help

During a CLI session, help is available at any time. Type the command followed by \? or help followed by the command name at any time for quick command information.

**Example:** /# date?

Available commands:

[Syntax] : date [{MMDDHHmmYYYY.ss}]

**Example:** /# help date

[Syntax] : date [{MMDDHHmmYYYY.ss}]

Description: To set or view the present date.

Using TAB to complete a word or command

The TAB key provides a quick method for entering commands in the CLI.

- Use the TAB key to complete a command word. For example:
  
  /# sh TAB

  Results in the completed command:

  /# show

- Type the first three characters of a command and then use the TAB key to auto-complete the command.

  /#E1# shut

  This command is recognized as “shutdown”.

Using Auto-Complete

If you enter an partial command which matches multiple commands, the last command (alphabetically) that matches the incomplete string is selected. To avoid automatic completion of a partial command, follow the command with a \? to display all the commands that match the partial string.

**Examples**

<table>
<thead>
<tr>
<th>Partial String</th>
<th>Matches these commands</th>
<th>Auto-completion yields</th>
</tr>
</thead>
<tbody>
<tr>
<td>show arp c</td>
<td>show arp cache</td>
<td>show arp config</td>
</tr>
<tr>
<td></td>
<td>show arp config</td>
<td></td>
</tr>
<tr>
<td>show snmp c</td>
<td>show snmp community config</td>
<td>show snmp-trap config</td>
</tr>
<tr>
<td></td>
<td>show snmp-trap config</td>
<td></td>
</tr>
<tr>
<td>show dhcp c</td>
<td>show dhcpclnt config</td>
<td>show dhcpsrv config</td>
</tr>
<tr>
<td></td>
<td>show dhcpsrv config</td>
<td></td>
</tr>
</tbody>
</table>

Issuing Multiple Commands

If you want to issue multiple commands from a single command prompt, insert a semicolon (;) between each command. For example:

  /# date;autoexit 1800
  THU NOV 09 09:39:15 2006
  Session timeout set (in secs) to: 1800
**CLI Commands**

*Using the Command Line Interface*

**Reusing Commands**

Use the up arrow ↑ to scroll through previously entered commands. Edit the command string if necessary and press Enter.

**Creating CLI Command Scripts**

Multiple CLI commands can be listed in a script that can copied to the MASTERseries system directory using the system mode `file-download` command, as described on page 11-320. After copying the script file to the system directory, you can run the script using the `run script` command, described on page 11-20. The `run script` command is available from any mode. If you use a script to create or modify configuration parameters, the script must include the `edit-config` mode commands necessary to open a configuration in the configuration editor, save the changes to the configuration when complete, and activate the updated configuration. See `edit-config` on page 11-122 for information about the available commands.

**Navigating through CLI modes**

The CLI commands are grouped into modes according to function. Each mode provides access to a different command set. The available CLI commands depend on which control mode you are using, that you enter at login. Use the commands below to move from one CLI mode to another. See CLI Commands by Mode beginning on page 11-6 for detailed information about the CLI modes.

- To return to the root mode prompt from any other mode or interface, use any of the following commands. These commands are available from all modes.

  **Syntax:** /

  **Example:** /sntp# /
  
  #

  **Example:** /sntp# ../
  
  #

  **Syntax:** cd ..

  **Example:** /rtm# cd ..
  
  #

- Use the following command to change from one mode to another. This command is available from all modes.

  **Syntax:** /{mode}# cd /{mode}

  **Example:** /system# cd /atm
  
  /atm#

- Use the following command to log out of the MASTERseries. This command is available from all modes.

  **Syntax:** exit

  **Example:** /#exit
## Interface Identifiers

The following table summarizes the identifiers used to specify interfaces and services in MASTERseries CLI commands.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Definition</th>
<th>Format</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bridge-id</strong></td>
<td>ATM bridge group identifier</td>
<td>Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
<td>Bridge1</td>
</tr>
<tr>
<td><strong>ces-id</strong></td>
<td>Circuit emulation service (CES) identifier</td>
<td>Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
<td>CES1</td>
</tr>
<tr>
<td><strong>port-id</strong></td>
<td>Link or port identifier</td>
<td>Syntax is <code>{slot-number}{interface-type}{port-number}</code></td>
<td></td>
</tr>
<tr>
<td><code>{slot-number}</code></td>
<td>This is the slot position of the module in the chassis. Range is 1 – 8.</td>
<td>1L07 specifies a DS1 link for port 07 of the module in slot 1.</td>
<td></td>
</tr>
<tr>
<td><code>{interface-type}</code></td>
<td>Single character representation of the interface or link type, as follows: Interface Types: E = Ethernet, F = Frame relay, F-{dlci} = Frame relay DLCI, M = Management/MSrv, P = V.35 Port, X =PPP (point-to-point).</td>
<td>1F3-8 specifies DLCI 8 for frame relay interface 3 in slot 1.</td>
<td></td>
</tr>
<tr>
<td><code>{port-number}</code></td>
<td>The port number on the specified interface or link. The range depends on the interface or link type, as follows: E = 1 – 2, F = 1 – 32, (dlci) = 1 – 8 per frame relay interface, M = 1 – 16, P = 1, X = 1 – 16.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>pvc-id</strong></td>
<td>Permanent virtual connection identifier</td>
<td>Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
<td>MyPVC1</td>
</tr>
<tr>
<td><strong>td-id</strong></td>
<td>Traffic descriptor identifier</td>
<td>Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
<td>webservice</td>
</tr>
<tr>
<td><strong>vpi/vci</strong></td>
<td>Virtual path identifier/Virtual channel identifier</td>
<td>vpi: Numerical value. Range is 0 – 255, vci: Numerical value. Range is 0 – 65535</td>
<td>1/33</td>
</tr>
</tbody>
</table>
The CLI commands in this chapter are grouped by mode. Each mode provides a different command set. The remainder of this chapter provides detailed information about all of the commands available in each mode. Use the hyperlinks below to jump a list of commands associated with each mode.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Command to enter mode</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>all modes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>root (# or /)</td>
<td></td>
<td>/#</td>
</tr>
<tr>
<td>atm</td>
<td># cd atm</td>
<td>/dhcp#</td>
</tr>
<tr>
<td>dhcp</td>
<td># cd dhcp</td>
<td>/atm#</td>
</tr>
<tr>
<td>dhcpc (DHCP Client)</td>
<td># cd dhcpc</td>
<td>/dhcpc#</td>
</tr>
<tr>
<td>dhcprelay (DHCP Relay)</td>
<td># cd dhcprelay</td>
<td>/dhcprelay#</td>
</tr>
<tr>
<td>edit-config</td>
<td># cd edit-config</td>
<td>/profile-no]#</td>
</tr>
<tr>
<td>firewall</td>
<td># cd firewall</td>
<td>/firewall#</td>
</tr>
<tr>
<td>frame-relay</td>
<td># cd frame-relay</td>
<td>/frame-relay#</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface:atm</td>
<td># interface {atm-interface-name}</td>
<td>/atm-interface-name]#</td>
</tr>
<tr>
<td>Interface:ds3</td>
<td># interface {ds3-interface-name}</td>
<td>/ds3-interface-name]#</td>
</tr>
<tr>
<td>Interface:ima</td>
<td># interface {ima-interface-name}</td>
<td>/ima-interface-name]#</td>
</tr>
<tr>
<td><strong>interface:ethernet</strong></td>
<td># interface {eth-interface-name}</td>
<td>/eth-interface-name]#</td>
</tr>
<tr>
<td>Interface:frame-relay</td>
<td># interface {fr-interface-name}</td>
<td>/fr-interface-name]#</td>
</tr>
<tr>
<td>Interface:dlci</td>
<td># interface {fr-interface-name}</td>
<td>/fr-interface-name]#</td>
</tr>
<tr>
<td>Interface:hdlc</td>
<td># interface {hdlc-interface-name}</td>
<td>/hdlc-interface-name]#</td>
</tr>
<tr>
<td>Interface:ppp</td>
<td># interface {ppp-interface-name}</td>
<td>/ppp-interface-name]#</td>
</tr>
<tr>
<td>ip</td>
<td># cd ip</td>
<td>/ip#</td>
</tr>
<tr>
<td>nat</td>
<td># cd nat</td>
<td>/nat#</td>
</tr>
<tr>
<td>ospf</td>
<td># cd ospf</td>
<td>/ospf#</td>
</tr>
<tr>
<td>ppp</td>
<td># cd ppp</td>
<td>/ppp#</td>
</tr>
<tr>
<td>radius</td>
<td># cd radius</td>
<td>/radius#</td>
</tr>
<tr>
<td>relay</td>
<td># cd relay</td>
<td>/relay#</td>
</tr>
<tr>
<td>resolver</td>
<td># cd resolver</td>
<td>/resolver#</td>
</tr>
<tr>
<td>rip</td>
<td># cd rip</td>
<td>/rip#</td>
</tr>
<tr>
<td>rtm</td>
<td># cd rtm</td>
<td>/rtm#</td>
</tr>
<tr>
<td>snmp</td>
<td># cd snmp</td>
<td>/snmp#</td>
</tr>
<tr>
<td>sntp</td>
<td># cd sntp</td>
<td>/sntp#</td>
</tr>
<tr>
<td>system</td>
<td># cd system</td>
<td>/system#</td>
</tr>
<tr>
<td>tui</td>
<td># cd tui</td>
<td>/tui#</td>
</tr>
</tbody>
</table>
all modes

The commands listed below are available in all modes. Each command in the following list is a hyperlink to the detailed definition of the command.

- alarms
- autoexit
- cardstatus
- cd
- clear
- date
- end
- exit
- help or ?
- history
- listuser
- log
- masterToggle
- passwd
- ping
- print config
- print packet config
- run script
- screen pause
- show backup-config
- show config
- show console
- show inventory
- show mode
- show running-config
- show version
- traceroute
- version
**CLI Commands**

**all modes**

### alarms

Use this command to display active alarms for the specified FLEXmaster module (card). Omitting the *card-no* parameter displays all active alarms for all installed cards.

**Mode:** all modes

**Syntax:** alarms [card-no]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>card-no</td>
<td>The slot number of the module (card) for which you want to display the active alarms. Omitting the <em>card-no</em> parameter displays all active alarms for all installed cards.</td>
</tr>
</tbody>
</table>

**Example:**

```
#/ alarms [1]

Card [1], Link [1]
23:32:52 10, Aug 2006: RED - TxD: Yel RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Norm
23:32:49 10, Aug 2006: ***** End of Log ******

Card [1], Link [2]
23:32:52 10, Aug 2006: RED - TxD: Yel RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Norm
23:32:49 10, Aug 2006: ***** End of Log ******

Card [1], Link [3]
23:32:52 10, Aug 2006: RED - TxD: Yel RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Norm
23:32:49 10, Aug 2006: ***** End of Log ******

Card [1], Link [4]
23:32:52 10, Aug 2006: RED - TxD: Yel RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Norm
23:32:49 10, Aug 2006: ***** End of Log ******

Card [1], Link [5]
23:32:52 10, Aug 2006: RED - TxD: Yel RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Los
23:32:49 10, Aug 2006: GREEN - TxD: Norm RxD: Norm
23:32:49 10, Aug 2006: ***** End of Log ******
```
**autoexit**

Use this command to display or set the autoexit timeout in seconds. After the specified timeout elapses, the current CLI session automatically ends. You must log in again to resume using the CLI.

**NOTE:** Any change made to the autoexit value is for the current session only. The default value is restored with each new session. Autoexit setting also applies to the TUI.

**Mode:** all modes  
**Syntax:** autoexit [timeout]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>timeout</td>
<td>A set timeout period, in seconds. A value of zero disables autoexit. Range is 0 – 18000 seconds. The default is 600 seconds (10 minutes). Setting the timeout to zero (0) disables the autoexit.</td>
</tr>
</tbody>
</table>

**Example:**  
/ # autoexit  
Current Session Timeout (in secs) = 600

**Example:**  
/ # autoexit 900  
Session Timeout set (in secs) to: 900

**Example:**  
/ # autoexit 0  
Session Timeout disabled

---

**cardstatus**

Use this command to determine whether the module (card) connected to the NMS (serial) cable is master or slave.

**Mode:** all modes  
**Syntax:** cardstatus

**Example:**  
/ # cardstatus  
Master
CLI Commands

All modes

### cd

Use this command to leave the current mode and enter another mode.

**Mode:** all modes  
**Syntax:** cd {path}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>path</td>
<td>The mode or interface port to which you want to change, as follows:</td>
</tr>
<tr>
<td></td>
<td>Mode options Specify one of the following modes: atm, dhcp, dhcpv6, firewall, frame-relay, ip, nat, ospf, ppp, radius, relay, resolver, rip, rtm, snmp, sntp, system, tui</td>
</tr>
<tr>
<td></td>
<td>Interface options Specify the interface identifier for the desired interface using the format {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 and Interface on page 11-171 for more information about interfaces.</td>
</tr>
</tbody>
</table>

**Example:**  
```
# cd 1e1
/1e1#

/ip# cd /sntp
/sntp#
```

### clear

Use this command to clear the screen of all previous commands and output.

**Mode:** all modes  
**Syntax:** clear

**Example:**  
```
/# clear
```

### date

Use this command to display or set the current date. Including the date parameter, sets the current date using the format shown in the syntax. Omitting the date parameter displays the current date.

**Mode:** all modes  
**Syntax:** date [MMDDHhmmYYYY.ss]

**Example:**  
```
/# date 072514302006.43
Changed system date/time
```

**Example:**  
```
/# date
TUE JUL 25 14:30:47 2006
```
**CLI Commands**

---

### end

Use this command to exit the current mode and return to root mode.

**Mode:** all modes  
**Syntax:** end  
**Example:** /rtm# end  
/#

### exit

Use this command to exit the current session and log out of the CLI.

**Mode:** all modes  
**Syntax:** exit  
**Example:** /# exit

### help or ?

Use the help or ? command to display the available help information.

- To list all commands available in a particular mode, as well as all general commands, switch to the desired mode and type help or ?.
- To display help for a specific command, type help followed by the command enclosed in quotes.
- To display all possible commands starting with a specific keyword, type help followed by the keyword.
- To list all commands matching an abbreviation in the help string, type help followed by the abbreviation enclosed in quotes.

**Mode:** all modes  
**Syntax:** help [command]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>command</td>
<td>Any valid command word or partial command word.</td>
</tr>
</tbody>
</table>

**Example:** /dhcprelay# ?  
dhcprelay trace {Hex value: Pattern 0xAB}  
rai-option-control {enable|disable}  
server {ip address}  
servers-only {enable|disable}  
state {enable|disable}
CLI Commands

Example:  /# help "show eth stats"
   [Syntax] :  show eth stats {interface-name}
   Description :  Display Ethernet interface statistics

Example:  /# help set
   [Syntax] :  set aco {enable|reset|disable}
   Description :  Sets the ACO.

   [Syntax] :  set console bitrate [{4800|9600|19200}]
   management [{Console}]
   Description :  Sets the console bit rate and management.

Example:  /# help "sh dh ex add"
   [Syntax] :  show dhcpsrv exclude addresses
   Description :  Display exclude IP addresses from each pool

history

Use this command to display a list of the last 15 commands issued.

Mode:  all modes

Syntax: history

Example:  /# history
   1  history
   2  cd 1e2
   3  ip address dhcp
   4  traceroute 10.10.2.49
   5  history
   6  cd dhcp
   7  list options
   8  history
   /dhcp#

If you want to reuse a previously issued command in the list, type ! {command-number}, where command-number is the number of the command from the list of commands in the history.

Example:  /# !6
           /dhcp#
listuser

Use this command to display all existing user names. The asterisk next to a user name indicates the user currently logged in. User names are case sensitive. The user name “admin” is the built-in user name with full administrative privileges.

**Mode:** all modes

**Syntax:** listuser

**Example:** /# listuser

<table>
<thead>
<tr>
<th>USER</th>
<th>DEFAULT MODE</th>
<th>GROUP ACCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>*admin</td>
<td>/</td>
<td>MANAGER OPERATOR ALLMONITOR</td>
</tr>
<tr>
<td>moe</td>
<td>/</td>
<td>OPERATOR ALLMONITOR</td>
</tr>
<tr>
<td>John</td>
<td>/</td>
<td>OPERATOR ALLMONITOR</td>
</tr>
</tbody>
</table>

* = active user

log

Use this command to display the system log. The system log contains a running list of all events that have occurred on the system.

**Mode:** all modes

**Syntax:** log

**Example:** /# log

Power Supply 1 UP
System has been restarted
Eth interface up 1E1
Eth interface down 1E1
FLEXmaster system log open
Eth interface up 1E1
***** End of Log *****
**masterToggle**

Use this command to toggle mastership to the next eligible module. A Master Module configures the rest of the modules (slaves). If there is only one module, or the slave is a FLEXmaster DS3 card, the masterToggle command has no effect.

**Mode:** all modes  
**Syntax:** masterToggle  

**Example:**
```
/# masterToggle
Warning: Access to FM card will be lost.
Do you really want to Toggle Master card (y/n) ?

FLEXmaster is going to reboot
Warning: Access to FM card will be lost.
```

**Example:**
```
/# masterToggle
Master Toggle cannot be done.
```

**passwd**

Use this command to change the password for the currently logged in user. Passwords are case sensitive. You cannot set a blank password. Users with administrative privileges can modify user password using the **moduser** command. See **moduser** on page 11-32.

**Mode:** all modes  
**Syntax:** passwd  

**Example:**
```
/# passwd
Old Password:
Enter New Password:
Reenter the Password:
Password updated successfully
```
ping

Use this command to ping from the router to the specified host. Sends a message to a host machine or switch at the specified IP address.

**Mode:** all modes

**Syntax:** ping {ipaddr|DNS name} [-n {count}] [-l {size}] [-w {timeout}] [-h {interface-address}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ipaddr</td>
<td>IP address of the host to ping.</td>
</tr>
<tr>
<td>DNS name</td>
<td>DNS name of the host to ping.</td>
</tr>
<tr>
<td>-n {count}</td>
<td>Specifies the number of ping requests to be sent. Range is 1 – 1000.</td>
</tr>
<tr>
<td>-l {size}</td>
<td>Specifies the size of the ping requests packets to be sent. Range is 0 – 2080.</td>
</tr>
<tr>
<td>-w {timeout}</td>
<td>Specifies the time to wait for a response before sending the next ping request packet. Timeout is given in seconds. Range 1-100. The default is 2 seconds.</td>
</tr>
<tr>
<td>-h {interface-address}</td>
<td>IP address of the local host interface.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
# ping 192.168.1.3
Reply Received From : 192.168.1.3, TimeTaken : 0.20 msecs
Reply Received From : 192.168.1.3, TimeTaken : 0.20 msecs
Reply Received From : 192.168.1.3, TimeTaken : 0.20 msecs
--- 192.168.1.3 Ping Statistics ---
3 Packets Transmitted, 3 Packets Received, 0% Packets Loss
```

**Example:**
```bash
# ping 192.168.1.3 -n 1 -l 1200
Reply Received From : 192.168.1.3, TimeTaken : 0.20 msecs
--- 192.168.1.3 Ping Statistics ---
1 Packet Transmitted, 1 Packet Received, 0% Packets Loss
```

print config

Use this command to print the entire system configuration, except for router information, to the console. You can also redirect the output to a user-specified file name which can be uploaded for backup purposes. (To print the routing information, see print packet config on page 11-17.)

If you do not specify a file name, the configuration displays on the console. If desired, you copy and paste the output to the CLI or to a text file. If you save the command output to a file, you can use the file with the restore config command described on page 11-33 to restore the configuration configuration.
**CLI Commands**

*all modes*

**NOTE:** The file created by the print config command is quite large and takes a long time to save.

**NOTE:** If you are restoring both the system configuration and the router configuration, do not paste the output from both the print config and print packet config commands at the same time. Because the system needs time to process each command, you must paste the output from each command separately.

**Mode:** all modes

**Syntax:** `print config [file-name]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>file-name</code></td>
<td>Name of the file to save the configuration. Limit 12 characters including extension (such as <code>.cfg</code> or <code>.txt</code>). This file is located in the system directory.</td>
</tr>
</tbody>
</table>

**Example:** `/# print config prcfg.txt`

This example redirects the output from the print config command to a file named prcfg.txt. The file can be accessed from the system mode. See `system` on page 11-319 for more information about the system mode.

```
/> cd system
/system> show files
<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>flash</td>
<td>278104 bytes</td>
</tr>
<tr>
<td>forcetrap.txt</td>
<td>693 bytes</td>
</tr>
<tr>
<td>cacLogo.gif</td>
<td>3166 bytes</td>
</tr>
<tr>
<td>index.htm</td>
<td>2854 bytes</td>
</tr>
<tr>
<td>blank.jpg</td>
<td>888 bytes</td>
</tr>
<tr>
<td>ds3Front.jpg</td>
<td>12125 bytes</td>
</tr>
<tr>
<td>fm8aFrnt.jpg</td>
<td>13357 bytes</td>
</tr>
<tr>
<td>fm8Front.jpg</td>
<td>12577 bytes</td>
</tr>
<tr>
<td>fm16Frnt.jpg</td>
<td>13330 bytes</td>
</tr>
<tr>
<td>flexgui.jar</td>
<td>341283 bytes</td>
</tr>
<tr>
<td>ver6xx.pgl</td>
<td>3945242 bytes</td>
</tr>
<tr>
<td>psFront.jpg</td>
<td>5368 bytes</td>
</tr>
<tr>
<td>prcfg.txt</td>
<td>51902 bytes</td>
</tr>
</tbody>
</table>
/system>
```
**print packet config**

Use this command to print the router configuration to the console or to redirect the output to a user-specified file name which can be uploaded for backup purposes.

If you do not specify a file name, the configuration displays on the console. If desired, you copy and paste the output to the CLI or to a text file. If you save the command output to a file, you can use the file with the `restore config` command described on page 11-33 to restore the configuration configuration.

The command `print packet config all` actually builds commands for all the router configuration including default values. If you do not use the 'all' option, it will show what the user configured that differs from the default, plus all IP address configuration.

**NOTE:** Issuing the `restore config` command will not replace the existing router configuration, but will overlay it and some commands may fail.

**NOTE:** If you are restoring both the system configuration and the router configuration, do not paste the output from the `print config` command followed immediately by the output from the `print packet config` command. Instead, paste the first set of commands and wait for them to be processed before pasting the second set of commands.

**Mode:** all modes

**Syntax:** `print packet config [all] [file-name] [ipaddr {ip-addr}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Prints all of the router settings that were configured by the user.</td>
</tr>
<tr>
<td>file-name</td>
<td>Name of the file to save the configuration. Limit 32 characters including extension (such as .cfg or .txt). The file is located in the system directory.</td>
</tr>
<tr>
<td>ip-addr</td>
<td>The IP address of router for which the configuration settings are requested.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # print packet config all
Building configuration............
******************************************************************************
ASSUMPTION:This configuration will work only on a fresh reboot
******************************************************************************

cd /
##### ETHERNET INTERFACES CONFIGURATION #####
interface 1E1
shutdown
encapsulation 8
autoneg enable
address alloc manual
ip config 192.168.2.101 mask 255.255.255.0 local
no shutdown
ip rip 192.168.2.101 split-horizon 2
authentication 192.168.2.101 none
send 192.168.2.101 ripvlcompatible
recv 192.168.2.101 both
```
CLI Commands

all modes

cost 192.168.2.101 1
route age 192.168.2.101 180
update interval 192.168.2.101 30
delete interval 192.168.2.101 120
no ip rip 192.168.2.101

interface 1E2
shutdown
encapsulation 8
autoneg enable

cd ..

##### HDLC INTERFACES CONFIGURATION #####

/shutdown
/1M1/shutdown
/1M2/shutdown
/1M3/shutdown
/1M4/shutdown
/1M5/shutdown
/1M6/shutdown
/1M7/shutdown
/1M8/shutdown
/1M9/shutdown
/1M10/shutdown
/1M11/shutdown
/1M12/shutdown
/1M13/shutdown
/1M14/shutdown
/1M15/shutdown
/1M16/shutdown

##### NAT CONFIGURATIONS #####

cd nat
idle timeout 60
free port 8001
tcp timeout 1200
udp timeout 60

cd ..

##### PPP MODE COMMANDS #####

cd ppp
ppp authentication aaa local

cd ..

##### IP MODE COMMANDS #####

cd ip
arp max retries 10
arp timeout 1200
icmp send echo reply
ip aggregate route 10
ip default ttl 64
no ip directed broadcast 1E1
no ip directed broadcast 1E2
ip forwarding
ip fragments 10
no ip path mtu discover
ip path mtu age 10
ip process option
no ip proxy arp
ip redirects
ip route age 180
ip unreachable
ip reassembly 10
ip reassembly 10 size 65535 1E1
rarp disable
cd ..

##### RADIUS MODE COMMANDS #####
cd radius
radius max-user 10
cd ..

##### OSPF MODE COMMANDS #####
cd ospf
abr-type standard
compatible rfc1583
no ASBR Router
no nssaAsbrDfRtTrans
exit-overflow-interval 0
no router ospf
cd..

##### RIP MODE COMMANDS #####
cd rip
neighbor disable
security max
no spacing
re-transmit 5
cd..

##### RTM MODE COMMANDS #####
cd rtm
as-num 0
permit all
cd..

##### DHCP RELAY MODE COMMANDS #####
cd dhcprelay
rai-option-control disable
state disable
servers-only disable
cd..

##### DNS RESOLVER MODE COMMANDS #####
cd resolver
resolver cache disable
resolver cache ttl 60
resolver disable
cd..

##### DNS RELAY MODE COMMANDS #####
cd relay
dns relay cache ttl 60
dns relay maxCacheEntries 10
dns relay maxNameServer 10
dns relay maxQueries 10
dns relay maxUrlFilters 10
dns relay port type 7000
dns relay query timeout 10
relay cache disable
relay enable
CLI Commands

all modes

cd..

##### SNMP MODE COMMANDS #####
cd snmp
snmp-community 1 community-name public ipaddr 0.0.0.0 privilege readonly
snmp-community 2 community-name NETMAN ipaddr 0.0.0.0 privilege readwrite
no snmp-shutdown
cd..

##### FIREWALL MODE COMMANDS #####
cd firewall
logs disable
icmp suppress
disable

cd..

##### SNTP MODE COMMANDS #####
cd sntp
snntp disable
snntp server multicast 0.0.0.0
snntp poll-interval 16

cd..

##### SYSTEM MODE COMMANDS #####
cd system
file-timeout 700
login authentication local

cd..

run script

Use this command to run a series of CLI commands from a specified script file. The output of the commands can print to the console or to an output file.

To save the current system configuration, use the print config command described on page 11-15. To save the current router configuration, use the print packet config command described on page 11-17. Alternatively, create a text file containing the desired CLI commands in the sequence they should be executed. Before a script can be run, it must be located in the local system directory. Use the file-download command to load the script file, as described on page 11-323.

The script does not stop if a command error occurs.

NOTE: Do not attempt to delete the script file while you are running it. For example, if the file is named script.txt, do not include the command file-delete script.txt in the script. If you delete a script while it is running, you will have to reset the module.
**CLI Commands**

**screen pause**

*Mode:* all modes

*Syntax:* run script `{script file}` [output file]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>script file</code></td>
<td>The text file containing the CLI commands to be executed.</td>
</tr>
<tr>
<td><code>output file</code></td>
<td>Redirects the output from the commands to a text file. If no output file is specified, the output displays only on the console.</td>
</tr>
</tbody>
</table>

*Example:* /system# run script commands.txt
/system# show mode
SYSTEM : system
/system# cd /
/# show int config all

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>3</td>
<td>1M1</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>4</td>
<td>1M2</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>5</td>
<td>1X1</td>
<td>PPP</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>PPP</td>
</tr>
</tbody>
</table>

**screen pause**

Use this command to enable (on) or disable (off) the screen pause. Screen pause enables the “more” prompt for large screen output. It is enabled by default.

*Mode:* all modes

*Syntax:* screen pause `{on|off}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>Default. Enables screen pause.</td>
</tr>
<tr>
<td>off</td>
<td>Turns the screen pause off or disables the screen pause.</td>
</tr>
</tbody>
</table>

*Example:* /# screen pause off
show backup-config

Use this command to display the contents or configuration details of the given valid stored configuration. This command display the ASCII configuration files or any other specified text file.

**Mode:** all modes

**Syntax:** show backup-config *{file-name}*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>file-name</td>
<td>Name of the FLEXmaster system file to be displayed. The file name follows the DOS 8.3 file naming convention, the extension is optional.</td>
</tr>
</tbody>
</table>

**Example:** show backup-config prcfg.txt

This example prints the contents of text file prcfg.txt to the console.

show config

Use this command to display the number of the configuration currently open in the configuration editor and the number of the configuration currently running. Up to 16 configuration can be stored.

**Mode:** all modes

**Syntax:** show config

**Example:** show config

EDIT: CFG 1
RUN : CFG 1

show console

Use this command to display console parameters. This command can be executed through master as well as slave cards. Telnet users can also execute this command to display the console parameters set currently.

**Mode:** all modes

**Syntax:** show console

**Example:** /# show console

Console Settings:

-------------
Rate : 9600
Mgmt : Console
Data : 8
Stop : 1
Parity: Disable


**show inventory**

Use this command to display the inventory currently in the system.

**Mode:** all modes

**Syntax:** show inventory

**Example:**

```
#/ show inventory
Card Number: 1     Master/Slave: Master   Tn/En: T1     TDM/ATM: TDM
Unit Type: FLEXmaster8
No of DS1 links: 8
No of DS3 links: 0
No of Ethernet links: 2
No of Management ports: 16
No of V35 ports: 1
ATM Supported: No CES Supported: No
BERT Supported:
  link :  1       None
  link :  2       None
  link :  3       None
  link :  4       None
  link :  5       None
  link :  6       None
  link :  7       None
  link :  8       None

----------------------------------------
Card Number: 2     Master/Slave: Slave   Tn/En: T3     TDM/ATM: ATM
Unit Type: FLEXmaster
No of DS1 links: 0
No of DS3 links: 3
No of Ethernet links: 2
No of Management ports: 16
No of V35 ports: 0
ATM Supported: Yes CES Supported: Yes
BERT Supported:
  link :  1       None
  link :  2       None
  link :  3       None

----------------------------------------
```

Power Supply 1    Up
Power Supply 2    Up

Fan Status None
show mode

Use this command in root mode to display the available modes. When executed from a mode other than root, displays the current mode.

**Mode:** all modes

**Syntax:** show mode

**Example:**
```
/# show mode
ROOT  : /
FR    : frame-relay
SNTP  : sntp
RESOLVER : resolver
RELAY : relay
SYSTEM : system
TUI   : tui
INTERFACE : <slot#><A|E|M|X|F><interface#>
ATM   : atm
IP    : ip
RTM   : rtm
RADIUS : radius
PPP   : ppp
OSPF  : ospf
DHCP_RELAY : dhcprelay
DHCP  : dhcp
DHCP_CLIENT : dhcpc
FIREWALL : firewall
RIP   : rip
NAT   : nat
SNMP  : snmp
EDITCONFIG : edit-config[#]
```

**Example:**
```
/# cd ip
/ip# show mode
IP: ip
```
**show running-config**

Displays the major configuration that is in effect on the router. It shows all the show commands for various features and interfaces. It does not show statistics.

**Mode:** all modes

**Syntax:** `show running-config`

**Example:** `/# show running-config`

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>3</td>
<td>1M1</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>4</td>
<td>1M2</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>5</td>
<td>1X1</td>
<td>PPP</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>PPP</td>
</tr>
</tbody>
</table>

**ETHERNET INTERFACES CONFIGURATION**

**Interface Configuration**

| Interface Index | : 1 |
| Interface Name  | : 1E1 |
| Encapsulation Type | : Ethernet V2 |
| MTU             | : 1500 |
| Admin Status    | : Up  |
| Operational Status | : Up  |
| Auto Negotiation | : Enabled |
| Ethernet Link Status | : 100 full-duplex |
| MAC Address     | : 00:e0:97:10:95:ea |
show version

Use this command to display the current versions for the hardware, software, and firmware. Manager level users are provided with more information than Operator and User levels. If software features installed, they are listed along with their enabled status. See also version on page 11-26.

Mode: all modes
Syntax: show version
Example: /# show version

| CARD: 1    | Version Information |
| Platform Software Version: 6.00 |
| Packet Software Version: 1.0.0.107 |
| ATM Software Version: 6.0.12.9 |

traceroute

Use this command to trace the route to the specified destination IP address.

Mode: all modes
Syntax: traceroute {ip-address} [-m {max_ttl}] [-w {wait_time}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the destination host.</td>
</tr>
<tr>
<td>-m {max_ttl}</td>
<td>The maximum number of hops to trace. Range is 1 – 30. Default is 15.</td>
</tr>
<tr>
<td>-w {wait_time}</td>
<td>Defines the time to wait for a response before sending the next probe packet. Timeout is given in seconds. Range is 1 – 100. Default is 1 second.</td>
</tr>
</tbody>
</table>

Example: /# traceroute 192.168.4.12
traceroute to 192.168.4.12 (192.168.4.12), 15 hops max, 38 byte packets
1. 192.168.2.101 (192.168.2.101) 0.90 msecs 0.15 msecs 0.25 msecs
2. 33.33.1.97 (33.33.1.97) 0.35 msecs 0.45 msecs 0.55 msecs
3. 192.168.4.12 (192.168.4.12) 0.65 msecs 0.75 msecs 0.00 msecs/#

version

This command displays the version for the hardware, software, and firmware. Manager level users are provided with more information than Operator and User levels. If software features are installed, they are listed along with their enabled status. See also show version on page 11-26.

Mode: all modes
Syntax: version
Example: /# version
CARD: 1    Version Information
Platform Software Version: 6.00
Packet Software Version: 1.0.0.107
ATM Software Version: 6.0.12.9
The commands in **root** command mode allows you to administer users, create interfaces (for example, ATM, Frame-relay), and display certain types of information. The commands listed below are available in the root mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- activeconfig
- adduser
- clear switch counters
- delete interface
- deluser
- interface
- moduser
- restore config
- saveconfig
- set aco
- set console bitrate
- show aco
- show arp cache
- show arp config
- show arp stats
- show dhcp relay info
- show dhcpclnt config
- show dhcpclnt stats
- show dhcpsrv bindings
- show dhcpsrv boot config
- show dhcpsrv config
- show dhcpsrv exclude addresses
- show dhcpsrv global options
- show dhcpsrv global stats
- show dhcpsrv host options
- show dhcpsrv pools
- show dhcpsrv subnet options
- show eth stats
- show frame-relay config
- show icmp config
- show icmp stats
- show inarp stats
- show interface config
- show interface stats
- show ip global config
CLI Commands

- show ip interface
- show ip nat
- show ip ospf border-routers
- show ip ospf database
- show ip ospf exit-overflow-interval
- show ip ospf interface
- show ip ospf neighbor
- show ip ospf overflow-state
- show ip ospf request-list
- show ip ospf retransmission-list
- show ip ospf route
- show ip ospf summary-address
- show ip ospf virtual-links
- show ip path mtu
- show ip traffic
- show login authentication
- show nat config
- show nat stats
- show ospf
- show radius acc client
- show radius auth client
- show radius extension table
- show radius general config
- show rarp config
- show rarp stats
- show rip config
- show rip interface stats
- show rip stats
- show route
- show rrd deny routes
- show rrd permit routes
- show rtm config
- show snmp-community config
- show snmp-trap config
- show switch stats
- show virtual servers
**activeconfig**

Use this command to activate a saved configuration. Use the **saveconfig** described on page 11-34 to save a configuration.

**Mode:** root  
**Syntax:** `activeconfig {config no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configurations. Range is 1 – 16.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# activeConfig 13  
Config #13 activated
```

**adduser**

Use this command to create a new user login for CLI. This command is available to users in the manager group, as well as the default admin user. Omitting the password, mode, and group name parameters creates a user with operator privileges who logs into **root** mode.

**Mode:** root  
**Syntax:** `adduser {user-name} [-p {passwd}] [-d {default-mode}] [-g {grp-name}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>user-name</td>
<td>This is the name of the user to be added or created. Maximum 15 alphanumeric characters. Case sensitive.</td>
</tr>
<tr>
<td>passwd</td>
<td>Password for the user. Maximum 15 alphanumeric characters.</td>
</tr>
<tr>
<td>default-mode</td>
<td>The mode the user enters when they log in. The default is <strong>root</strong> mode.</td>
</tr>
</tbody>
</table>
| grp-name       | The name of the group (user type) to which this user is being added. The available groups are:  
|                | **manager** – Read and write privileges, including user access management.  
|                | **operator** – Default. Read and write privileges, excluding user access management.  
|                | **allmonitor** – Read only privileges.                       |

**Example:**  
```
/# adduser user1 -p userpasswd -d tui -g manager  
Added user - user1 successfully  
```

This examples creates a user who by default is logged in to the TUI mode.
**CLI Commands**

**root**

### clear switch counters

Use this command to clear the counters for Ethernet switch ports. Ethernet switch ports are available on the on the FLEXMaster16 and FLEXmaster8A. For more information about the Ethernet switch ports, see *Ethernet Ports on FLEXmaster16 and FLEXmaster8A* on page 7-14.

**Mode:** root

**Syntax:**

```
clear switch counters {port number|all}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port number</td>
<td>Specifies the Ethernet port for which counters will be cleared. Range is 1 – 6.</td>
</tr>
<tr>
<td>all</td>
<td>Clears the counters for all of the Ethernet ports.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# clear switch counters 3  
Switch port counters cleared.
```

### delete interface

Use this command to remove a logical interface from the provisioning.

**Mode:** root

**Syntax:**

```
delete interface {interface-name/index}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| interface-name/index | Specify the interface by name or index.  
interface-name – The name of interface in the form {slot-number}{interface-type}{port-number}. See *Interface Identifiers* on page 11-5 for more information.  
index – Determine the index number of the desired interface by issuing a root mode show interface config all command as described on page 11-45. This is an SNMP definition. |

**Example:**  
```
/# delete interface 1X1
```
**deluser**

Use this command to delete the specified user.

*Mode:* root  

*Syntax:* `deluser {user-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>user-name</code></td>
<td>Name of the user. Maximum 15 alphanumeric characters. Only the admin user has privileges to delete existing users.</td>
</tr>
</tbody>
</table>

*Example:*  
```bash  
#/ deluser user1  
Deleted user -user1 successfully  
```

**interface**

Use this command to create the specified interface or change from the current mode into the provisioning mode for the specified interface. For more information about interface naming, see *Interface Identifiers* on page 11-5.

The Ethernet and the serial (HDLC) Management/MSrv interfaces are physically present and enabled are created at system start up. You do not have to issue the `interface` command to create physical interfaces. For these interfaces the interface command is equivalent to using the `cd` command to enter the provisioning mode for the specified interface.

The remaining interfaces are logical (for example ATM, PPP) and must be created using the `interface` command before the interface can be provisioned. After the interface is created, the CLI enters into the provisioning mode for the specified interface. See *Interface* on page 11-171 for more information about interface commands.
CLI Commands

After you create an interface, you can use the `interface` command or the `cd` command to enter the provisioning mode for the specified interface.

**Mode:** root

**Syntax:** `interface {interface name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interface name</code></td>
<td>The name of the interface in the form <code>{slot-number}{interface-type}{port-number}</code>. The following interfaces are available:</td>
</tr>
<tr>
<td>ATM</td>
<td><code>{slot}A{1 – 8}</code></td>
</tr>
<tr>
<td>Ethernet Port</td>
<td><code>{slot}E{1-2}</code></td>
</tr>
<tr>
<td>Frame Relay</td>
<td><code>{slot}F{1 – 32}</code></td>
</tr>
<tr>
<td>IMA</td>
<td><code>{slot}B{1 – 4}</code></td>
</tr>
<tr>
<td>V.35 Port</td>
<td><code>{slot}P{01 – 03}</code></td>
</tr>
<tr>
<td>PPP interface</td>
<td><code>{slot}X{1 – 16}</code></td>
</tr>
<tr>
<td>Management/MSrv</td>
<td><code>{slot}M{1 – 2}</code></td>
</tr>
</tbody>
</table>

**Example:**

```bash
ATM interface created
```

This example creates a logical ATM interface for port 1 of the module in chassis slot 1 and then enters the provisioning mode for the newly created ATM interface.

**Example:**

```bash
ETH1# moduser 111
```

This example changes to the provisioning mode for the physical Ethernet interface for port 1 of the module in chassis slot 1.

**moduser**

Use this command to modify the password, default mode, or group name for an existing user.

**Mode:** root

**Syntax:** `moduser {user-name} [-p {passwd}] [-d {default-mode}] [-g {grp-name}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>user-name</code></td>
<td>This is the name of the user to be added or created. Maximum 15 alphanumeric characters. Case sensitive.</td>
</tr>
<tr>
<td><code>passwd</code></td>
<td>Password for the user. Maximum 15 alphanumeric characters.</td>
</tr>
<tr>
<td><code>default-mode</code></td>
<td>The mode the user enters when they log in. The default is root mode.</td>
</tr>
</tbody>
</table>
**CLI Commands**

*restore config*

Use this command to restore a configuration previously saved as a file. If commands in the file error, the script will stop running.

To save the current system configuration, use the `print config` command described on page 11-15. To save the current router configuration, use the `print packet config` command described on page 11-17.

**NOTE:** If you are restoring both the system configuration and the router configuration, do not restore both configurations using multiple `restore config` commands on a single command line. Because the system needs time to process each command, you must use separate `restore config` commands to restore the system configuration and the router configuration.

### Mode:

**root**

### Syntax:

`restore config [random_str]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>random_str</code></td>
<td>Name of the configuration file to be restored. Limit 12 characters including extension (such as <code>.cfg</code> or <code>.txt</code>).</td>
</tr>
</tbody>
</table>

**Example:**

```
/# restore config ppc.cfg
Executing: cd /system/ command
Executing: cd .. command
Executing: set aco enable command
Executing: cd edit-config command
Executing: edit 1 command
Config #1 is opened for edit
Executing: set default 1 command
...```

---

**Variable**

| grp-name | The name of the group to which this user is being added. The available groups are: manager – Read and write privileges, including user access management. operator – Default. Read and write privileges, excluding user access management. allmonitor – Read only privileges. |

**Example:**

```
/# moduser user1 -p passwd1 -d system -g OPERATOR
```
CLI Commands

saveconfig

Use this command to save the configuration currently being edited. The saved configuration becomes available after a reboot. Configurations are complete sets of operational parameters that define how the system functions. Up to 16 configurations can be saved. You can also use the `save` command in the edit-config mode to save the configuration, as described on page 11-125.

You must use the `activeconfig` command described on page 11-29 before a saved configuration is used to control the system.

**NOTE:** You must issue the `edit` command to open an edit buffer before making configuration changes. If you issue the `edit` command after making changes, your changes will be lost. See the `edit` command on page 11-124 for more information.

**Mode:** root

**Syntax:** `saveconfig {config no}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configuration profiles. Valid entries are from 1 – 16.</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ edit-config/
/edit-config[13]# edit 13
Config #13 is opened for edit

Change configuration parameters as required.
/edit-config[13]# cd ..
#/ saveconfig 13
Config #13 saved.
```

**Example:**
```
#/ saveConfig 13
You cannot save because
-you have insufficient privileges, or
-the edit buffer has not been opened (see the edit command)
```

See the `edit` command on page 11-124 for more information.
set aco

Configures the operation of the external alarm contact closures at the rear of the chassis.

**Mode:** root

**Syntax:** `set aco {enable|reset|disable}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enables / activates alarm cutoff (ACO)</td>
</tr>
<tr>
<td>disable</td>
<td>Disables/Deactivates alarm cutoff (ACO)</td>
</tr>
<tr>
<td>reset</td>
<td>Resets alarm cutoff (ACO)</td>
</tr>
</tbody>
</table>

**Example:** `/# set aco enable`

set console bitrate

Use this command to set console parameters.

**NOTE:** The console can be set through serial interface only. Telnet users can not use this command to modify the control settings.

**Mode:** root

**Syntax:** `set console bitrate {4800|9600|19200} management {Console}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>4800</td>
<td>9600</td>
</tr>
<tr>
<td>console</td>
<td>Specifies management using the console.</td>
</tr>
</tbody>
</table>

**Example:** `set console bitrate 4800 management console`

show aco

Displays the current alarm cutoff (ACO) configuration.

**Mode:** root

**Syntax:** `show aco`

**Example:** `/# show aco`

ACO Mode: Enabled
**CLI Commands**

**root**

---

**show arp cache**

Use this command to display the Address Resolution Protocol (ARP) cache information.

*Mode:* root

*Syntax:* `show arp cache`

*Example:* `/# show arp cache`

<table>
<thead>
<tr>
<th>Iface</th>
<th>Physical Address</th>
<th>IP Address</th>
<th>Mapping</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1E1</td>
<td>00:50:04:b1:fe:02</td>
<td>192.168.2.243</td>
<td>Dynamic</td>
<td>155</td>
</tr>
</tbody>
</table>

---

**show arp config**

Use this command to display the Address Resolution Protocol (ARP) configuration information.

*Mode:* root

*Syntax:* `show arp config`

*Example:* `/# show arp config`

---

**show arp stats**

Use this command to display the Address Resolution Protocol (ARP) statistics.

*Mode:* root

*Syntax:* `show arp stats`

*Example:* `/# show arp stats`

---
show dhcp relay info

Use this command to display the DHCP Relay configuration information.

Mode: root
Syntax: show dhcp relay info
Example: /# show dhcp relay info

DHCP Relay Information
DHCP Relay:   Enabled
DHCP Relay Servers only:  Enabled
Server IP Address:  10.0.0.27
DHCP Relay RAI option:  Enabled
Trace Level:  0x1
No of Packets inserted RAI option:  0
No of Packets inserted circuit ID suboption:  0
No of Packets inserted remote ID suboption:  0
No of Packets inserted subnet mask suboption:  0
No of Packets dropped: 0
No of Packets which did not insert RAI option:  0

show dhcpclnt config

Use this command to display the DHCP client configuration.

Mode: root
Syntax: show dhcpclnt config
Example: /# show dhcpclnt config
DHCP Client Configuration

Trace level:  None

<table>
<thead>
<tr>
<th>Index</th>
<th>Interface</th>
<th>State</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E2</td>
<td>Bound to address</td>
<td>90.0.0.3</td>
</tr>
</tbody>
</table>
show dhcpclnt stats

Use this command to display the general statistics of the DHCP Client.

Mode: root
Syntax: show dhcpclnt stats
Example: /
          # show dhcpclnt stats
          DHCP Client Counter Table
          -----------------------------
          Count Discovers : 13
          Count Requests : 7
          Count Releases : 1
          Count Declines : 0
          Count Informs : 0
          Count Offers : 2
          Count Acks in Req state : 2
          Count Nacks in Req state : 0
          Count Acks in Renew state : 0
          Count Nacks in Renew state : 0
          Count Acks in rebind state : 0
          Count Nacks in rebind state : 0
          Count Acks in reboot state : 0
          Count Nacks in reboot state : 0
          Count Error in header : 0
          Count Error in Xid : 0
          Count Error in Options : 0
          Client Ip Address : 90.0.0.3
          Client Lease Time : 3900
          Counter Reset : 0
          Client Remain Lease Time : 3856
**show dhcpsrv bindings**

Use this command to display the server bindings with the clients (that is, the IP addresses assigned to clients).

*Mode:* root  
*Syntax:* show dhcpsrv bindings  
*Example:*  
```
/# show dhcpsrv bindings
DHCP Server Current Bindings :
     Ip       Hw       Hw   Alloc  Expire  Binding
     Address  Type  Address  Method  Time  State
         --------    --------- ------ ---- ---- ----
         20.1.2.5  Ethernet 00:e0:97:10:a2:44  Dynamic 2847  Assigned
         20.1.2.6  Ethernet 00:e0:97:6b:cf:1a  Dynamic 78  Assigned
         20.1.2.7  Ethernet 00:e0:97:6b:cf:1b  Dynamic 3588  Assigned
```

**show dhcpsrv boot config**

Use this command to display the Boot Server configuration information.

*Mode:* root  
*Syntax:* show dhcpsrv boot config  
*Example:*  
```
/# show dhcpsrv boot config
DHCP Boot Server Configuration
     BOOTP-Support Auto-BOOTP Server-Addr   BOOTP-File
     Disabled     Enabled  10.7.5.23  file1
```

**show dhcpsrv config**

Use this command to display the DHCP Server configuration information.

*Mode:* root  
*Syntax:* show dhcpsrv config  
*Example:*  
```
/# show dhcpsrv config
DHCP Server Configuration
Server Status: Disable
Server ICMP Echo: Disable
Server Address Reuse Timeout: 60
Trace Level: None
```
**show dhcpsrv exclude addresses**

Use this command to display the exclude IP addresses from each pool.

*Mode:* root

*Syntax:* `show dhcpsrv exclude addresses`

*Example:* `/# show dhcpsrv exclude addresses`

```
DHCP Server Exclude Addresses

<table>
<thead>
<tr>
<th>PoolIndex</th>
<th>StartIpAddress</th>
<th>EndIpAddress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.0.0.15</td>
<td>10.0.0.25</td>
</tr>
</tbody>
</table>
```

**show dhcpsrv global options**

Use this command to display the DHCP server options.

*NOTE:* The DHCP Server provides a framework for passing configuration information to hosts on a TCP/IP network. Configuration parameters and other control information are carried in tagged data items that are stored in the “options” field of the DHCP message.

*Mode:* root

*Syntax:* `show dhcpsrv global options`

*Example:* `/# show dhcpsrv global options`

```
DHCP Global Option Table

<table>
<thead>
<tr>
<th>Type</th>
<th>Length</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>198.162.1.254</td>
</tr>
</tbody>
</table>
```

**show dhcpsrv global stats**

Use this command to display the DHCP server statistics.

*Mode:* root

*Syntax:* `show dhcpsrv global stats`

*Example:* `/# show dhcpsrv global stats`

```
DHCP Server Global Statistics
Num of Discovers received : 0
Num of Requests received   : 0
Num of Releases received   : 0
```
show dhcpsrv host options

Use this command to display the DHCP host server options.

Mode: root
Syntax: show dhcpsrv host options
Example: /# show dhcpsrv host options

DHCP Server Host Options

<table>
<thead>
<tr>
<th>PoolId</th>
<th>HostType</th>
<th>ClientIdentifier</th>
<th>OptType</th>
<th>OptLen</th>
<th>OptValue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>00.ae.16.93.f3.51</td>
<td>19</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>00.la.09.48.2b.11</td>
<td>3</td>
<td>4</td>
<td>255.255.255.0</td>
</tr>
</tbody>
</table>

show dhcpsrv pools

Use this command to display the DHCP Server pool network configuration information.

Mode: root
Syntax: show dhcpsrv pools
Example: /# show dhcpsrv pools

DHCP Server Pool Configuration:

<table>
<thead>
<tr>
<th>Pool</th>
<th>Port</th>
<th>Subnet</th>
<th>SubnetMask</th>
<th>StartIpAddr</th>
<th>EndIpAddr</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>10.0.0.0</td>
<td>255.0.0.0</td>
<td>10.0.0.1</td>
<td>10.0.0.20</td>
<td>3600s</td>
</tr>
</tbody>
</table>
**show dhcpsrv subnet options**

Use this command to display the DHCP server subnet options.

**Mode:** root

**Syntax:** `show dhcpsrv subnet options`

**Example:**

```
/# show dhcpsrv subnet options
```

<table>
<thead>
<tr>
<th>Pool</th>
<th>Option</th>
<th>Option</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>Type</td>
<td>Length</td>
<td>Value</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td>255.0.0.0</td>
</tr>
</tbody>
</table>

**show eth stats**

Use this command to display the interface statistics for the specified Ethernet interface.

**Mode:** root

**Syntax:** `show eth stats {interface-name/index}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| `interface-name/index` | Specify the Ethernet interface by name or index.  
interface-name – The name of Ethernet interface in the form 
{slot-number}E{port-number}. See Interface Identifiers on page 11-5 for more information.  
index – Determine the index number of the desired interface by issuing a root mode show interface config all command as described on page 11-45. This is an SNMP definition. |

**Example:**

```
/# show eth stats 1E2
```

**1E2 Interface Statistics**

- Alignment Errors : 0
- Frame Checksum Errors : 0
- Single Collision Frames : 0
- Multiple Collision Frames : 0
- SQE Test Errors : 0
- Deferred Transmissions : 0
- Late Collisions : 0
- Excessive Collisions : 0
- Internal MAC Tx Errors : 0
- Carrier Sense Errors : 0
- Frames Too Long : 0
show frame-relay config

Use this command to display the general frame relay provisioning on the router.

**Mode:** root

**Syntax:** show frame-relay config

**Example:** /# show frame-relay config

Frame Relay Configuration
-----------------------
Max DLCIs per Frame Relay Interface : 8
Max Total DLCIs : 32
Current DLCIs Configured : 5
Trace Level : None

show icmp config

Use this command to display the Internet Control Message Protocol (ICMP) configuration information.

**Mode:** root

**Syntax:** show icmp config

**Example:** /# show icmp config

ICMP Global Configuration
Send Redirect : Enabled
Send Unreachable : Enabled
Send Echo Reply : Enabled
Net Mask Reply : Enabled
Timestamp Reply : Enabled
Direct Query : Disabled
Send Security Failure : Enabled
Recv Security Failure : Enabled
**CLI Commands**

**show icmp stats**

Use this command to display the Internet Control Message Protocol (ICMP) statistics.

*Mode:* root  
*Syntax:* show icmp stats  
*Example:* /# show icmp stats  
  
  Received:  
  total: 16  
  checksum errors: 0 unreachable: 1 redirects: 0  
  time exceeded: 0 param problems: 0 quench: 0  
  echo: 0 echo reply: 0 timestamp: 0  
  timestamp reply: 0 mask req: 0 mask reply: 0  
  domain name req: 0 domain name reply: 0 security failure: 0  

  Sent:  
  total: 10670  
  checksum errors: 0 unreachable: 10670 redirects:0  
  time exceeded: 0 param problems: 0 quench:0  
  echo: 0 echo reply: 0 timestamp 0  
  timestamp reply: 0 mask req: 0 mask reply:0  
  domain name req: 0 domain name reply:0 security failure: 0  

**show inarp stats**

Use this command to display the InARP statistics.

*Mode:* root  
*Syntax:* show inarp stats  
*Example:* /# show inarp stats  

  InARP Statistics  
  Received  
  Total InARP Packets Received : 0  
  InARP Replies Received : 0  
  Invalid InARP Requests Received: 0  

  Sent  
  Total InARP Packets Sent : 0  
  InARP Replies Sent : 0  
  InARP Requests Not Got Reply : 0
**show interface config**

Use this command to display the interface configuration information for all interfaces or for a specific interface.

**Mode:** root  
**Syntax:** `show interface config {all|interface-name|interface-index}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Displays the configuration information for all interfaces.</td>
</tr>
<tr>
<td>interface-name</td>
<td>Specify the interface by name or index, as follows:</td>
</tr>
</tbody>
</table>
|               | *interface-name* – The name of interface in the form `{slot-number}`  
|               | `{interface-type}`{port-number}. See Interface Identifiers on page 11-5 for |
|               | more information.                                              |
| interface-index| Determine the index number of the desired interface by         |
|               | issuing a root mode `show interface config all` command as      |
|               | described on page 11-45. This is an SNMP definition.            |

**Example:** `/#show interface config 1E1`

Interface Configuration  
------------------------  
| Interface Index | : 1     |
| Interface Name  | : 1E1   |
| Encapsulation Type | : Ethernet V2  |
| MTU             | : 1500  |
| Admin Status    | : Up    |
| Operational Status | : Up      |
| Auto Negotiation| : Enabled|
| Ethernet Link Status | : 100 full-duplex |
| MAC Address     | : 00:e0:97:10:95:7e|

**show interface stats**

Use this command to display the statistics of specified interface.

**Mode:** root  
**Syntax:** `show interface stats {interface-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface-name</td>
<td>The name of interface in the form <code>{slot-number}</code>{interface-type} {port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
CLI Commands

Example: # show interface stats 1E2

1E2 Interface Statistics
Received
   Octets : 0
   Unicast Packets : 0
   Discarded Packets : 0
   Multicast Packets : 0
   Broadcast Packets : 0

Transmitted
   Octets : 1680
   Unicast Packets : 0
   Discarded Packets : 0
   Multicast Packets : 28
   Broadcast Packets : 0

show ip global config

Use this command to display the global IP configuration information.

Mode: root
Syntax: show ip global config
Example: # show ip global config

Global IP Configuration
IP Forwarding : Enabled
Default TTL : 64
Route Cache Age : 180 secs
IP Options Processing : Enabled
Path MTU Discovery : Disabled
Path MTU Entry Age : 10 min
Reassembly Queue Depth : 32
Maximum Static Routes : 25
Maximum Number Of Fragments : 128
Trace level : 0
**show ip interface**

Use this command to display the configuration for all of the IP interfaces or a specific interface. If you do not specify an interface name or index, this command returns all of the IP interfaces.

**Mode:** root  
**Syntax:** `show ip interface [interface-name/index]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Displays all the interfaces</td>
</tr>
</tbody>
</table>
| `interface-name/index` | Specify the interface by name or index.  
| `interface-name` | The name of interface in the form `{slot-number}`  
| `{interface-type}` | `{port-number}`. See Interface Identifiers on page 11-5 for more information.  
| index | Determine the index number of the desired interface by issuing a root mode `show interface config all` command as described on page 11-45. This is an SNMP definition. |

**Example:** `#/ show ip interface`

IP Interface Configuration
----------------------------

1E1 IP Interface Configuration
-------------------------------

| Interface Index | : 1 |
| Interface Admin Status | : Up |
| Interface Oper Status | : Up |
| IP Address | : 192.168.2.101 |
| Subnet Mask | : 255.255.255.0 |
| Broadcast Address | : 192.168.2.255 |
| IP Directed Broadcast | : Disabled |
| Max Reassembly Size | : 65535 |
| Address Allocation | : Manual |
| Interface MTU | : 1500 |
| MAC Address | : 00:e0:97:6b:d7:40 |
| NAT Address Domain | : Local |

1E2 IP Interface Configuration
-------------------------------

| Interface Index | : 2 |
| Interface Admin Status | : Down |
| Interface Oper Status | : Down |
| IP Address | : 0.0.0.0 |
| Subnet Mask | : 0.0.0.0 |
| Broadcast Address | : 255.255.255.255 |
| IP Directed Broadcast | : Disabled |
CLI Commands

Max Reassembly Size : 65535
Address Allocation : Manual
Interface MTU : 1500
MAC Address : 00:e0:97:6b:d7:41
NAT Address Domain : Local

Example: /# show ip interface 1e1

1E1 IP Interface Configuration
--------------------------------
Interface Index : 1
Interface Admin Status : Up
Interface Oper Status : Up
IP Address : 192.168.2.101
Subnet Mask : 255.255.255.0
Broadcast Address : 192.168.2.255
IP Directed Broadcast : Disabled
Max Reassembly Size : 65535
Address Allocation : Manual
Interface MTU : 1500
MAC Address : 00:e0:97:6b:d7:40
NAT Address Domain : Local

Example: /# show ip interface 1

1E1 IP Interface Configuration
--------------------------------
Interface Index : 1
Interface Admin Status : Up
Interface Oper Status : Up
IP Address : 192.168.2.101
Subnet Mask : 255.255.255.0
Broadcast Address : 192.168.2.255
IP Directed Broadcast : Disabled
Max Reassembly Size : 65535
Address Allocation : Manual
Interface MTU : 1500
MAC Address : 00:e0:97:6b:d7:40
NAT Address Domain : Local
**show ip nat**

Use this command to display the specified NAT table.

**Mode:** root

**Syntax:** `show ip nat {global|local|static|translations|interface}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>global</td>
<td>Public side IP address information.</td>
</tr>
<tr>
<td>local</td>
<td>Private side IP pool definitions.</td>
</tr>
<tr>
<td>static</td>
<td>Static NAT translations defined.</td>
</tr>
<tr>
<td>translations</td>
<td>Current dynamic translations.</td>
</tr>
<tr>
<td>interface</td>
<td>Public side interface.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# show ip nat local
[WinPath information]
Pool #1: 192.168.10.0 - 223.233.10.255: 524353792 addr(s)
[end WinPath information]

Addresses to be Translated

<table>
<thead>
<tr>
<th>Interface</th>
<th>Local IP Address</th>
<th>Local Address Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1E2</td>
<td>192.168.10.0</td>
<td>192.168.10.0</td>
</tr>
</tbody>
</table>

/# show ip nat global

[WinPath information]
Global address pool: 1 NAT pool(s); 1 NAPT pool(s)
  Pool #2: NAT: 12.12.12.4 - 12.12.12.6: 3 addr(s)
[end WinPath information]

Global Addresses Configured

<table>
<thead>
<tr>
<th>Interface</th>
<th>Translated Local IP</th>
<th>Translated IP Address Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X2</td>
<td>12.12.12.4</td>
<td>4</td>
</tr>
</tbody>
</table>

/# show ip nat static

Static Address Mapping

<table>
<thead>
<tr>
<th>Interface</th>
<th>Local IP</th>
<th>Translated Local IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X2</td>
<td>192.168.10.55</td>
<td>12.12.12.9</td>
</tr>
</tbody>
</table>
CLI Commands

**root**

### show ip ospf border-routers

Use this command to display the internal OSPF routing table entries to an ABR.

**Mode:** root

**Syntax:** show ip ospf border-routers

**Example:**

```
/# show ip ospf border-routers
```

OSPF Process Border Router Information

<table>
<thead>
<tr>
<th>Destination</th>
<th>TOS</th>
<th>Type</th>
<th>NextHop</th>
<th>Cost</th>
<th>Rt.Type</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.2.2</td>
<td>0</td>
<td>ABR</td>
<td>100.100.100.1</td>
<td>49</td>
<td>intraArea</td>
<td>0.0.0.1</td>
</tr>
<tr>
<td>3.3.3.3</td>
<td>0</td>
<td>ASBR</td>
<td>34.34.34.2</td>
<td>49</td>
<td>intraArea</td>
<td>0.0.0.1</td>
</tr>
</tbody>
</table>

### show ip ospf database

Use this command to display the Link-State Advertisement (LSA) information in the IP OSPF database. Omitting the optional parameter displays information about LSAs except the external ones.

**Mode:** root

**Syntax:** show ip ospf database [external]

**Variable** | **Definition**
-------------|-----------------------
external     | Only display information about the external LSAs (Link-State Advertisements).

**Example:**

```
show ip ospf database
```

Display of all the LSAs except External

LSA ID : 2.2.2.2
LSA Type : Router LSA
AreaID : 0.0.0.1
Router Id : 2.2.2.2
Age : 525
Sequence : 8000009c
Checksum : 3c1e

LSA ID : 3.3.3.3
LSA Type : Router LSA
AreaID : 0.0.0.1
Router Id : 3.3.3.3
Age : 826
Sequence : 80000092
Checksum : 7cb0

LSA ID : 4.4.4.4
**CLI Commands**

*show ip ospf exit-overflow-interval*

Use this command to display the IP OSFP exit interval, which is the time interval that defines how often that the router checks to see if the IP OSFP overflow has been eliminated. Before you use this command, use the `exit-overflow interval` command to set the interval as described on page 11-274.

**Mode:** root

**Syntax:** `show ip ospf exit-overflow-interval`

**Example:** `/# show ip ospf exit-overflow-interval`

```
Overflow Interval: 0
```
CLI Commands

**show ip ospf interface**

Use this command to display the interface information for OSPF.

**Mode:** root

**Syntax:** show ip ospf interface {interface-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface-name</td>
<td>The name of interface to display in the form {slot-number}interface-type</td>
</tr>
</tbody>
</table>

**Example:** /# show ip ospf interface 1x1

OSPF Interface Settings

Internet Address 100.100.100.2, Mask 255.255.255.252, Area 0.0.0.1 AS 0 Router Id 4.4.4.4, Network Type PointToPoint, Cost 49 Transmit Delay is 1 sec, State 3, Priority 1 Timer Intervals Configured: Hello 10, Dead 40, Wait 40, Retransmit 5 Hello due in 8 sec Neighbor count is 1 Adjacent with the neighbor 2.2.2.2 Simple-Password authentication enabled

**show ip ospf neighbor**

Use this command to display the OSPF neighbor information.

**Mode:** root

**Syntax:** show ip ospf neighbor

**Example:** /# show ip ospf neighbor

OSPF All Neighbor Information

<table>
<thead>
<tr>
<th>ID</th>
<th>Pri</th>
<th>State</th>
<th>DeadTime</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3.3.3</td>
<td>1</td>
<td>FULL/PTOP</td>
<td>31</td>
<td>34.34.34.2</td>
</tr>
<tr>
<td>2.2.2.2</td>
<td>1</td>
<td>FULL/PTOP</td>
<td>30</td>
<td>100.100.100.1</td>
</tr>
</tbody>
</table>
**show ip ospf overflow-state**

Use this command to display the current state of the OSPF database.

**Mode:** root

**Syntax:** `show ip ospf overflow-state`

**Example:**

```
Overflow State : FALSE
```

**show ip ospf request-list**

Use this command to display the list of all link state advertisements (LSAs) requested.

**Mode:** root

**Syntax:** `show ip ospf request-list {Neighbor-RouterID}`

**Example:**

```
/# show ip ospf request-list 3.3.3.3
OSPF Router with ID (4.4.4.4)(Process ID 1)
Neighbor 3.3.3.3, address 34.34.34.2
Type LSID ADVRTR SeqNo Age checksum
```

**show ip ospf retransmission-list**

Use this command to display the link state advertisements (LSAs) waiting to be retransmitted.

**Mode:** root

**Syntax:** `show ip ospf retransmission-list {Neighbor-RouterID}`

**Example:**

```
/# show ip ospf retransmission-list 3.3.3.3
OSPF Router with ID (4.4.4.4)(Process ID 1) /# show ip ospf route
```

OSPF Process Routing Table

<table>
<thead>
<tr>
<th>Dest/Mask</th>
<th>TOS</th>
<th>NextHop/IfIndex</th>
<th>Cost</th>
<th>Rt.Type</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.11.121.32/255</td>
<td>0</td>
<td>0.0.0.0.1</td>
<td>0</td>
<td>0.100.100.1/1X1</td>
<td>199</td>
</tr>
</tbody>
</table>
show ip ospf route

Use this command to display the routes learned by the OSPF process.

 Mode: root
 Syntax: show ip ospf route
 Example: */# show ip ospf route

OSPF Process Routing Table

<table>
<thead>
<tr>
<th>Dest/Mask</th>
<th>TOS</th>
<th>NextHop/IfIndex</th>
<th>Cost</th>
<th>Rt.Type</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.10.2.0/255.255.255.0</td>
<td>0</td>
<td>0.0.0.0/eth1</td>
<td>10</td>
<td>intraArea</td>
<td>0.0.0</td>
</tr>
</tbody>
</table>
**show ip ospf summary-address**

Use this command to display a summary of the link state advertisements (LSAs) address information. Omitting the optional parameter displays a summary of all the addresses except the external ones.

**Mode:** root  
**Syntax:** show ip ospf summary-address [external]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>external</td>
<td>Only display information about the external LSAs (Link-State Advertisements).</td>
</tr>
</tbody>
</table>

**Example:**  
show ip ospf summary-address  
Display of Summary addresses for Type3 and Translated Type5  
No Entries in the Table

**show ip ospf virtual-links**

Use this command to display information about the current state of OSPF virtual links.

**Mode:** root  
**Syntax:** show ip ospf virtual-links  
**Example:**  
show ip ospf virtual-links  
Interface State: PointToPoint, Neighbor State: FULL Transit Area: 6.6.6.6, Virtual Neighbor: 4.4.4.4 Intervals Configured for the Virtual Interface:

**show ip path mtu**

Use this command to display the path MTU (Maximum Transmission Unit) table.

**Mode:** root  
**Syntax:** show ip path mtu  
**Example:**  
/ # show ip path mtu

<table>
<thead>
<tr>
<th>Destination Address</th>
<th>Type Of Service</th>
<th>Path MTU</th>
<th>Discovery Status</th>
<th>Entry Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.0.2</td>
<td>0</td>
<td>1200</td>
<td>Enabled</td>
<td>ACTIVE</td>
</tr>
<tr>
<td>20.0.0.2</td>
<td>0</td>
<td>1500</td>
<td>Enabled</td>
<td></td>
</tr>
</tbody>
</table>
**CLI Commands**

**show ip traffic**

Use this command to display the IP traffic statistics.

*Mode:* root  
*Syntax:* show ip traffic  
*Example:* /# show ip traffic

```
IP Statistics:
Received:
  Total IP Packets Received: 35817, IP Header Errors Discards: 0
  Bad IP Address Discards: 0, Unsupported Protocol Discards: 1571
  Bad IP Header Length Discards: 0, Discards For Checksum errors: 0
  Version error Discards: 0, TTL error Discards: 0
  Bad options Discards: 0 Successfully Received 35817

Fragmented:
  Reassembled Packets: 0, Reassembly Timeout: 15
  Packets Needs Reassembly: 0, Packets Fragmented: 0
  Cannot Fragment: 0

Broadcast:
  Total Broadcasts Received: 34130

Sent:
  Packets to Forward: 0, Generated Requests: 10441
  Discards Due To No Routes: 2, Discards Due To General Errors: 0
```

**show login authentication**

Use this command to display the current authentication method. Can be LOCAL or radius.

*Mode:* root  
*Syntax:* show login authentication  
*Example:* /# show login auth

```
Login authentication mode: LOCAL
```

**show nat config**

Use this command to display the NAT configuration information.

*Mode:* root  
*Syntax:* show nat config
Example:  
```bash
/# show nat config

[WinPath information]
NAT interworking system   : Active
Active local pool(s)      : 1
Active global address(es) : 1003 (2 pools)
Active dynamic session(s) : 0
Active static session(s)  : 0

HARDWARE SUPPORT MAXIMUMS
Dynamic sessions : 400
Static sessions : 100
Classifiers      : 2025
Aggregations     : 1002
NATtable addrs   : 1024
NAPT ports       : 1000
Configured virtual servers: 1
    Lcl 192.168.10.55:23 visible as 12.12.12.5:23
[end WinPath information]

NAT Configuration
NAT Status       : Disabled
Start Free Port  : 6001
Idle Timeout     : 60 seconds
TCP  Timeout     : 86400 seconds
UDP  Timeout     : 60 seconds
Trace Level      : None
```

**show nat stats**

Use this command to display the general NAT statistics.

**Mode:** root

**Syntax:** show nat stats

**Example:**  
```bash
/# show nat stats

NAT Statistics
---------------
Total Translations on all interfaces : 0
Active sessions on all interfaces    : 0
```
CLI Commands

Root

**show ospf**

Use this command to display general information about the OSPF routing process.

*Mode:* root

*Syntax:* show ospf

*Example:* /# show ospf

Routing Process 1, with ID 0.0.0.0
Supports only single TOS(TOS0) route
ABR Type supported: Standard ABR
Number of Areas in this router: 0

**show radius acc client**

Use this command to display the RADIUS accounting client details.

*Mode:* root

*Syntax:* show radius acc client

*Example:* /# show radius acc client

RADIUS Accounting Client Table
Port No: 2
Server address: 10.4.6.212
UDP Port number: 1812
Round trip time: 0
No of request packets: 0
No of retransmitted packets: 0
No of received packets: 0
No of malformed response packets: 0
No of invalid authenticators: 0
No of timeouts: 0
No of unknown type packets: 0
No of packets dropped: 0
**show radius auth client**

Use this command to display the RADIUS authentication client details.

**Mode:** root

**Syntax:** `show radius auth client`

**Example:** `/# show radius auth client`

```
Radius Authentication server table
-------------------------------------
Port No               : 2
Server address       : 10.4.6.212
UDP port number      : 1812
Round trip time      : 0
No of request packets: 0
No of retransmitted packets: 0
No of access-accept packets: 0
No of access-reject packets: 0
No of access-challenge packets: 0
No of malformed access responses: 0
No of bad authenticators: 0
No of pending requests: 0
No of time outs: 0
No of unknown types: 0
```

**show radius extension table**

Use this command to display the RADIUS extension table.

**Mode:** root

**Syntax:** `show radius extension table`

**Example:** `/# show radius extension table`

```
RADIUS Extension Server Table
Port No               : 2
Server address       : 10.4.6.212
Server type          : Both
Server status        : Enabled
Response time        : 10
Maximum retransmission: 2
```
**CLI Commands**

**root**

### show radius general config

Use this command to display the global configuration for RADIUS.

**Mode:** root

**Syntax:** show radius general config

**Example:** /# show radius general config

```
RADIUS Global Configuration
Debug Mask : disable all
Max user entries : 2
No of acc invalid server addresses : 0
Acc client identifier : FutureNAS
No of auth invalid server addresses : 0
Auth client identifier : FutureNAS
```

### show rarp config

Use this command to display the Reverse Address Resolution Protocol (RARP) configuration.

**Mode:** root

**Syntax:** show rarp config

**Example:** /# show rarp config

```
Rarp Configurations:
mode: client
retries: 4
entries: 20
timeout: 100
```

### show rarp stats

Use this command to display the Reverse Address Resolution Protocol (RARP) statistics.

**Mode:** root

**Syntax:** show rarp stats

**Example:** /# show rarp stats

```
Rarp Statistics:
requests discarded: 0
responses discarded: 0
```
**show rip config**

Use this command to display the RIP configuration.

**Mode:** root

**Syntax:** show rip config

**Example:** /# show rip config

<table>
<thead>
<tr>
<th>RIP Global Configuration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RIP2 Security</td>
<td>MAX</td>
</tr>
<tr>
<td>Max Peers</td>
<td>25</td>
</tr>
<tr>
<td>Spacing</td>
<td>Disabled</td>
</tr>
<tr>
<td>Retransmit Interval (Sec)</td>
<td>5</td>
</tr>
<tr>
<td>Redistribution</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

**show rip interface stats**

Use this command to display the statistics for the RIP interface.

**Mode:** root

**Syntax:** show rip interface stats

**Example:** /# show rip interface stats

<table>
<thead>
<tr>
<th>RIP Interface Stats</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>10.10.2.88</td>
<td></td>
</tr>
<tr>
<td>BADPkts</td>
<td>0</td>
</tr>
<tr>
<td>BADRoutes</td>
<td>0</td>
</tr>
<tr>
<td>Triggered Updates</td>
<td>0</td>
</tr>
<tr>
<td>RIP Admin Status</td>
<td>DISABLED</td>
</tr>
</tbody>
</table>

**show rip stats**

Use this command to display the global RIP statistics.

**Mode:** root

**Syntax:** show rip stats

**Example:** /# show rip stats

<table>
<thead>
<tr>
<th>RIP Global Stats</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Changes</td>
<td>0</td>
</tr>
<tr>
<td>Response Sent</td>
<td>0</td>
</tr>
<tr>
<td>Packets Dropped</td>
<td>0</td>
</tr>
</tbody>
</table>
**CLI Commands**

**root**

---

**show route**

Use this command to display the IP routing table information.

**Mode:** root

**Syntax:** show route

**Example:** /# show route

Codes: St - Route Status, UA - Up and Active, UI - Up and Inactive, Dn - Down

<table>
<thead>
<tr>
<th>Destination</th>
<th>Genmask</th>
<th>Gateway</th>
<th>proto</th>
<th>Iface</th>
<th>Metric</th>
<th>Pref</th>
<th>St</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0.0.0</td>
<td>255.0.0.0</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1E2</td>
<td>1</td>
<td>0</td>
<td>Dn</td>
</tr>
<tr>
<td>11.11.121.32</td>
<td>255.255.255.240</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>185</td>
<td>121 UA</td>
</tr>
<tr>
<td>11.11.121.48</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>185</td>
<td>121 UA</td>
</tr>
<tr>
<td>16.0.0.0</td>
<td>255.0.0.0</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>20.20.20.96</td>
<td>255.255.255.224</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>135</td>
<td>121 UA</td>
</tr>
<tr>
<td>21.21.21.160</td>
<td>255.255.255.240</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>135</td>
<td>121 UA</td>
</tr>
<tr>
<td>21.21.21.176</td>
<td>255.255.255.248</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>135</td>
<td>121 UA</td>
</tr>
<tr>
<td>21.21.21.184</td>
<td>255.255.255.248</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>1</td>
<td>135</td>
<td>121 UA</td>
</tr>
<tr>
<td>23.23.23.120</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>23.23.23.120</td>
<td>255.255.255.252</td>
<td>23.23.23.121</td>
<td>ospf</td>
<td>1X2</td>
<td>50</td>
<td>121 UI</td>
<td></td>
</tr>
<tr>
<td>23.23.23.121</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>33.33.1.96</td>
<td>255.255.255.240</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1E1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>33.33.1.96</td>
<td>255.255.255.240</td>
<td>0.0.0.0</td>
<td>ospf</td>
<td>1E1</td>
<td>1</td>
<td>100</td>
<td>121 UI</td>
</tr>
<tr>
<td>34.34.34.0</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>34.34.34.0</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>25</td>
<td>121 UI</td>
<td></td>
</tr>
<tr>
<td>34.34.34.1</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>44.44.44.52</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>85</td>
<td>121 UA</td>
<td></td>
</tr>
<tr>
<td>55.55.5.96</td>
<td>255.255.255.240</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>55.55.5.116</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>55.55.5.116</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>rip</td>
<td>1X1</td>
<td>1</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>55.55.5.118</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>55.55.5.120</td>
<td>255.255.255.252</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>88.0.0.0</td>
<td>255.0.0.0</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>100.100.100.0</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>35</td>
<td>121 UA</td>
<td></td>
</tr>
<tr>
<td>192.168.0.0</td>
<td>255.255.0.0</td>
<td>0.0.0.0</td>
<td>static</td>
<td>1X3</td>
<td>1</td>
<td>1 UA</td>
<td></td>
</tr>
<tr>
<td>210.20.21.0</td>
<td>255.255.255.224</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121 UA</td>
<td></td>
</tr>
</tbody>
</table>
**show rrd deny routes**

Use this command to display the entries created using the RRD deny commands available in rtm mode (see rtm on page 11-310).

*Mode:* root  
*Syntax:* show rrd deny routes  
*Example:* /# show rrd deny routes  
RRD Deny Table:  Table is empty.

**show rrd permit routes**

Use this command to display the entries created using the RRD permit commands available in rtm mode (see rtm on page 11-310).

*Mode:* root  
*Syntax:* show rrd permit routes  
*Example:* /# show rrd permit routes  

RRD Permit Control Table:

<table>
<thead>
<tr>
<th>DestNetwork</th>
<th>NetMask</th>
<th>SrcProtocol</th>
<th>DestProtocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0.0.0</td>
<td>255.255.255.255</td>
<td>any</td>
<td>all</td>
</tr>
</tbody>
</table>

**show rtm config**

Use this command to display the rtm (remote) configuration information.

*Mode:* root  
*Syntax:* show rtm config  
*Example:* /# show rtm config  

RTM Configuration  
-------------------  
Status : Enabled  
AS No : 0  
Router Id : 11.1.4.6
CLI Commands

**show snmp-community config**

Use this command to display the SNMP community configuration.

*Mode:* root

*Syntax:* `show snmp-community config`

*Example:* `/# show snmp-community config`

```
SNMP Community Details
Community Index:       1
Community Name:        NETMAN
IP Address:            10.0.6.204
Privilege Type:        readonly
```

**show snmp-trap config**

Use this command to display the SNMP trap configuration information.

*Mode:* root

*Syntax:* `show snmp-trap config`

*Example:* `/# show snmp-trap config`

```
SNMP Trap Manager Details
SNMP Index:            1
Community:             PUBLIC
IP Address:            10.0.6.204
Manager Type:          V1V2
```

**show switch stats**

Displays the statistics for the specified Ethernet port available on the FLEXMaster16 or FLEXmaster8A.

*Mode:* root

*Syntax:* `show switch stats {port number|all}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>port number</em></td>
<td>Specifies the Ethernet port for which to display statistics. Range is 1 – 6.</td>
</tr>
<tr>
<td><em>all</em></td>
<td>Display statistics for all six Ethernet ports.</td>
</tr>
</tbody>
</table>
**Example:**  
```shell
# show switch stats all
Switch Port 1 Statistics
-----------------------------------
Receive Byte High : 0
Receive Byte Low  : 994175021
Receive Frames    : 6955250
Transmit Byte High: 0
Transmit Byte Low : 4456410
Transmit Frames   : 18564
Frame Checksum Errors : 3893
Receive Frame Too Long : 0
Receive Frame Too Short : 0
Receive Internal MAC Errors : 10
Deferred Transmissions : 16
Single Collisions : 1
Late Collisions : 0
Excessive Collisions : 0
Duplex Status : HALF
Speed : 100
Link Status : UP
```

### show virtual servers

Use this command to display the current virtual server configuration information.

**Mode:**  root  

**Syntax:**  show virtual servers  

**Example:**  
```shell
/# show virtual servers
```

Virtual Servers Configuration  
-----------------------------------
<table>
<thead>
<tr>
<th>Interface</th>
<th>Status</th>
<th>Local IP</th>
<th>Local Port</th>
<th>Global IP</th>
<th>Global Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.76</td>
<td>53</td>
<td>88.8.8.2</td>
<td>53</td>
</tr>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.76</td>
<td>21</td>
<td>88.8.8.2</td>
<td>21</td>
</tr>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.76</td>
<td>23</td>
<td>88.8.8.2</td>
<td>23</td>
</tr>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.76</td>
<td>80</td>
<td>88.8.8.2</td>
<td>80</td>
</tr>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.245</td>
<td>69</td>
<td>88.8.8.2</td>
<td>69</td>
</tr>
<tr>
<td>1E2</td>
<td>Active</td>
<td>192.168.1.76</td>
<td>25</td>
<td>88.8.8.2</td>
<td>25</td>
</tr>
</tbody>
</table>
The commands listed below are available in the `atm` command mode. Use this mode to create, configure, and monitor ATM (asynchronous transfer mode) services. Before using these commands, you must switch to atm mode using `cd atm`.

Each command in the following list is a hyperlink to a detailed definition of the command.

- `bridge aging`
- `bridge discard`
- `bridge group`
- `bridge port`
- `bridge pvc`
- `bridge pvc encapsulation llc`
- `bridge pvc encapsulation vcmux`
- `bridge pvc remove fcs`
- `bridge pvc preserve fcs`
- `cbr`
- `ces buffer`
- `ces group`
- `ces partial`
- `ces status`
- `clear bridge statistics`
- `clear ces statistics`
- `clear uni statistics`
- `clear vc statistics`
- `clear vp statistics`
- `connect vc`
- `connect vp`
- `device`
- `disconnect vc`
- `disconnect vp`
- `ima group`
- `ima restart`
- `oam llid`
- `show bridge config`
- `show bridge interval`
- `show bridge interval current`
- `show bridge interval total`
- `show bridge statistics`
- `show ces config`
- `show ces interval`
• show ces interval current
• show ces interval total
• show ces statistics
• show ima config
• show ima group interval
• show ima group interval current
• show ima group interval total
• show ima link interval
• show ima link interval current
• show ima link interval total
• show ima states
• show oam interval
• show oam interval current
• show oam interval total
• show oam llid
• show td
• show uni interval
• show uni interval current
• show uni interval total
• show ds1 uni statistics
• show ds3 uni statistics
• show ima uni statistics
• show vc config
• show vc connections
• show vc interval
• show vc interval current
• show vc interval total
• show vc statistics
• show version atm
• show vp config
• show vp connections
• show vp interval
• show vp interval current
• show vp interval total
• show vp statistics
• td status
• ubr
• vbr-nrt
• vbr-rt
**CLI Commands**

**atm**

**No Variants**

The following `atm` commands are no variants of the corresponding affirmative command. For example, the `no bridge aging` command is the no variant of the `bridge aging` command. Descriptions of the no variants are included with the corresponding affirmative command.

- no bridge aging
- no bridge discard
- no bridge group
- no bridge port
- no bridge pvc
- no cbr
- no ces buffer
- no ces group
- no ces partial
- no ima group
- no oam llid
- no ubr
- no vbr-nrt
- no vbr-rt

**bridge aging**

Use this command to set the bridge aging parameter to a value other than the default value. To restore the default value, use `no bridge aging`.

**Mode:** atm

**Syntax:**
```plaintext
bridge aging {group-id} {seconds}
```

**Syntax:**
```plaintext
no bridge aging
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>seconds</td>
<td>The bridge age in seconds. Range is 5 – 65536. The default is 300.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# bridge aging br2 200
Bridge aging set to 200 seconds.
```

**Example:**
```
/atm# no bridge aging br2
Bridge aging set to 300 seconds, default.
```
CLI Commands

bridge discard

Use this command to set how the FLEXmaster handles incomplete frames. To restore the default condition, use no bridge discard.

Mode: atm

Syntax: bridge discard {group-id} {none|partial|early}

Syntax: no bridge discard {group-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>none</td>
<td>Default. No packet discard.</td>
</tr>
<tr>
<td>partial</td>
<td>Partial packet discard.</td>
</tr>
<tr>
<td>early</td>
<td>Early and partial packet discard.</td>
</tr>
</tbody>
</table>

Example: /atm# bridge discard br2 early
Bridge cell discard set to Early and Partial.

Example: /atm# no bridge discard br2
Bridge cell discard set to None, default.

bridge group

Use this command to create a bridge group. To deconstruct a bridge group (along with any associated ports and PVCs), use no bridge group.

Mode: atm

Syntax: bridge group {group-id}

Syntax: no bridge group {group-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
</tbody>
</table>

Example: /atm# bridge group br2

Example: /atm# no bridge group br2
CLI Commands

bridge port

Use this command to assign a port to a bridge group. To disassociate the port from the bridge group, use no bridge port.

Mode: atm
Syntax: bridge port {group-id} {port-id} [preserve_fcs|remove_fcs]
Syntax: no bridge port {group-id} {port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>preserve_fcs</td>
<td>Disables the removal of the Frame Check Sequence bytes for a bridge port.</td>
</tr>
<tr>
<td>remove_fcs</td>
<td>Enables the removal of the Frame Check Sequence bytes</td>
</tr>
</tbody>
</table>

Example: /atm# bridge port 1 1E2

bridge pvc

Use this command to assign a virtual channel to a bridge. To remove the virtual channel, use no bridge pvc.

If a specified virtual channel link does not exist, it will be created provided that the optional traffic descriptor is provided. Providing the optional traffic descriptor changes the traffic descriptor association of any existing link if the specified traffic descriptor differs from the one associated with the existing link. The bridge pvc command causes the admin status of the specified link to be set to up.

Mode: atm
Syntax: bridge pvc {group-id} {port-id} {vpi/vci} [td-id]
Syntax: no bridge pvc {group-id} {port-id} {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier.</td>
</tr>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
<tr>
<td>vci</td>
<td>Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>
### CLI Commands

#### bridge pvc encapsulation llc

Use this command to assign the AAL5 encapsulation type LLC for a PVC bridge.

**Mode:** atm

**Syntax:**

```
bridge pvc {group-id} {port-id} {vpi/vci} encapsulation llc
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>group-id</strong></td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td><strong>port-id</strong></td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>vpi/vci</strong></td>
<td>Virtual path identifier/virtual channel identifier. vci – Virtual channel identifier. Range is 0 – 65535. vpi – Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:**

```
bridge pvc BRDG1 2D01 10/100 encapsulation llc
```

### bridge pvc encapsulation vcmux

Use this command to assign the AAL5 encapsulation type VC Mux for a PVC bridge.

**Mode:** atm

**Syntax:**

```
bridge pvc {group-id} {port-id} {vpi/vci} encapsulation vcmux
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>group-id</strong></td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td><strong>port-id</strong></td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**

```
Bridge pvc BRDG1 2D01 10/100 encapsulation llc
```
CLI Commands

**atm**

### CLI Commands

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** bridge pvc BRDG1 2D01 10/100 encapsulation vcmux

### bridge pvc preserve fcs

Use this command to disable the Remove Frame Check Sequence for a PVC bridge.

**Mode:** atm

**Syntax:** `bridge pvc {group-id} {port-id} {vpi/vci} preserve fcs`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vci – Virtual channel identifier. Range is 0 – 65535. vpi – Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:** bridge pvc BRDG1 2D01 10/100 preserve fcs

### bridge pvc remove fcs

Use this command to enable the Remove Frame Check Sequence function for a PVC bridge.

**Mode:** atm

**Syntax:** `bridge pvc {group-id} {port-id} {vpi/vci} remove fcs`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vci – Virtual channel identifier. Range is 0 – 65535. vpi – Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:** bridge pvc BRDG1 2D01 10/100 remove fcs
Use this command to create an entry in the traffic descriptor table for Constant Bit Rate (CBR) traffic. To remove an entry from the traffic descriptor table, use the `no cbr atm` command.

**Mode:** atm

**Syntax:**
```
cbr {td-id} {pcr} {cdvt} [disabled] pcr
```

**Syntax:**
```
no cbr {td-id}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>td-id</code></td>
<td>Traffic descriptor identifier. Alphanumeric string with a maximum length of 12 characters.</td>
</tr>
<tr>
<td><code>pcr</code></td>
<td>Peak Cell Rate. The transmission rate, measured in cells per second, for CBR traffic. Range is 150 up to the full link or bundle rate in cells per second. The value cannot be set higher than the port’s actual connection speed (line rate).</td>
</tr>
<tr>
<td><code>cdvt</code></td>
<td>Cell Delay Variation Tolerance. The limit for delivery delay measured in microseconds, which may be caused by traffic, overhead or randomness. Range is 75 to 2304 cells per second. In MASTERseries, CDVT with the value 27 equates to a 270 microsecond delay. The 270 microsecond delay is the time it takes to transmit one cell of data at T1 line speed. At the faster DS3 line rate it takes 9.5 microseconds to transmit one cell of data and the default CDVT setting of 75 for DS3 VCs equates to a buffer of about 79 cells. How you set the CDVT depends on the QoS settings.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# cbr td1 150 75
/atm# show td
```

```
<-------ID-------><-------QoS-------><--------------UPC---------------><-Ctrl->
#   Name           Class   Shaping     PCR    SCR    MCR    MBS   CDVT  State
1   td1             CBR   Disabled    150      0      0      0     75    Up
```

**Example:**
```
/atm# no cbr td1
```
**CLI Commands**

**atm**

### ces buffer

Use this command to define the maximum size for the reassembly buffer. Use the `no ces buffer` command to restore the buffer to its default size.

**Mode:** atm  
**Syntax:** ces buffer {ces-id} {1 - 65535}

**Syntax:** no ces buffer {ces-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a</td>
</tr>
<tr>
<td></td>
<td>maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td>1 – 65536</td>
<td>Maximum size of the reassembly buffer in 10 microsecond increments. Range</td>
</tr>
<tr>
<td></td>
<td>is 1 – 65535. The default is 128.</td>
</tr>
</tbody>
</table>

**Example:** /atm# ces buffer CES1 356  
Success!

### ces group

Use this command to create a CES (Circuit Emulation Service) group. Use `no ces group` to remove a CES group. For more information about creating and removing CES groups, see ATM Command Sequences on page 12-26.

**Mode:** atm  
**Syntax:** ces group {ces-id} {tdm port1-id} {initial ts} {final ts}  
{atm port2-id} {vpi2/vci2} [td-id]

**Syntax:** no ces group {ces-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a</td>
</tr>
<tr>
<td></td>
<td>maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td>tdm port1-id</td>
<td>Port Identifier (TDM network side) for the first virtual channel link.</td>
</tr>
<tr>
<td></td>
<td>Format is {slot-number}{interface-type}{port-number}. See Interface</td>
</tr>
<tr>
<td></td>
<td>Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>initial ts</td>
<td>Initial time slot number in a consecutive time slot sequence. Range 1-24.</td>
</tr>
<tr>
<td>final ts</td>
<td>Final time slot number in a consecutive time slot sequence. Range 1-24.</td>
</tr>
<tr>
<td>atm port2-id</td>
<td>Port identifier (ATM network side) for the second virtual channel link in</td>
</tr>
<tr>
<td></td>
<td>the form {slot-number}{interface-type}{port-number}.</td>
</tr>
<tr>
<td>vpi2/vci2</td>
<td>Virtual path identifier/virtual circuit identifier for the second virtual</td>
</tr>
<tr>
<td></td>
<td>channel link. <code>vci</code> – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
<tr>
<td></td>
<td><code>vpi</code> – Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>
**CLI Commands**

**ces partial**

Use this command to define the partial cell fill. Use the `no ces partial` command to restore the default value. Setting the size to zero (0) disables partial cell fill.

**Mode:** `atm`

**Syntax:**

```
ces partial {ces-id} {0 - 47}
```

**Example:**

```
/atm# ces partial CES1 0
Success!
```

**ces status**

Use this command to set the administrative status of a Circuit Emulation Service (CES) to up or down.

**Mode:** `atm`

**Syntax:**

```
ces status {ces-id} {down|up}
```

**Example:**

```
/atm# ces status CES1 up
```
CLI Commands

**atm**

### clear bridge statistics

Use this command to reset the statistical information associated with bridging.

- **Mode:** atm
- **Syntax:** clear bridge statistics
- **Example:** /atm# clear bridge statistics

### clear ces statistics

Use this command to reset the statistical information associated with Circuit Emulation Services (CES). Omitting the optional identifier clears the statistics for all CESs.

- **Mode:** atm
- **Syntax:** clear ces statistics [ces-id]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive. Omitting the ces-id clears the statistics for all CESs.</td>
</tr>
</tbody>
</table>

- **Example:** /atm# clear ces statistics
  SUCCESS!

### clear uni statistics

Use this command to clear or reset the statistics associated with specific UNI ports. When specifying UNI ports, only a single port type may be specified (for example, DS3 or IMA). The ports must also be consecutive (for example, 3A01 3A02).

- **Mode:** atm
- **Syntax:** clear uni statistics {initial port-id} {final port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial port-id</td>
<td>The initial port identifier in a consecutive port sequence in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>final port-id</td>
<td>The final port identifier in a consecutive port sequence in the form {slot-number}{interface-type}{port-number}.</td>
</tr>
</tbody>
</table>

- **Example:** /atm# clear uni statistics 3A01 3A02
  SUCCESS!
### clear vc statistics

Use this command to clear or reset the statistics associated with VCs.

**Mode:** atm  
**Syntax:** `clear vc statistics`  
**Example:**  
`/atm# clear vc statistics`  
SUCCESS!

### clear vp statistics

Use this command to clear or reset the statistics associated with VPs.

**Mode:** atm  
**Syntax:** `clear vp statistics`  
**Example:**  
`/atm# clear vp statistics`  
SUCCESS!

### connect vc

Use this command to connect two virtual channel links or IMA groups to create a permanent virtual connection (PVC). If a specified link does not exist, it will be created provided that the optional traffic descriptor is provided. Providing the optional traffic descriptor also changes the traffic descriptor association of any existing link if the specified traffic descriptor differs from the one associated with the existing link. Connections between two links with different traffic descriptors are not permitted. The `connect vc` command causes the administrative status of the specified links to be set to up.

See also `disconnect vc` on page 11-79.

**Mode:** atm  
**Syntax:** `connect vc {pvc-id} {port1-id} {vpi1/vci1} {port2-id} {vpi2/vci2} [td-id]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pvc-id</code></td>
<td>PVC identifier string. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td><code>port1-id</code></td>
<td>Identifier (in combination with <code>vpi1/vci1</code>) for the first virtual channel link in the form <code>{slot-number}{interface-type}{port-number}</code>. See <code>Interface Identifiers</code> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
| `vpi1/vci1`| Virtual path identifier/virtual circuit identifier for the first virtual channel link.  
`vc` – Virtual channel identifier. Range is 0 – 65535.  
`vpi` – Virtual path identifier. Range is 0 – 255. |
CLI Commands

atm

### connect vp

Use this command to connect two virtual path links to create a permanent virtual connection (PVC). If a specified link does not exist, it will be created provided that the optional traffic descriptor is provided. Providing the optional traffic descriptor also changes the traffic descriptor association of any existing link if the specified traffic descriptor differs from the one associated with the existing link. Connections between two links with different traffic descriptors are not permitted. The `connect vp` command causes the administrative status of the specified links to be set to up.

See also `disconnect vp` on page 11-80.

**Mode:** atm

**Syntax:**
```
connect vp {pvc-id} {port1-id} {vpi1} {port2-id} {vpi2} [td-id]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pvc-id</td>
<td>PVC identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td>port1-id</td>
<td>Port identifier (in combination with vpi1) for the first virtual path link in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi1</td>
<td>Identifier for the first virtual path link. Range is 0 – 255.</td>
</tr>
<tr>
<td>port2-id</td>
<td>Port identifier (in combination with vpi2) for the second virtual path link in the form <code>{slot-number}{interface-type}{port-number}</code>.</td>
</tr>
<tr>
<td>vpi2</td>
<td>Identifier for the second virtual path link. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# connect vp mypvc 1a1 3 1a2 4 greatservice
```
**device**

Use this command to specify slot number for the ATM card you want to configure.

**Mode:** `atm`

**Syntax:** `device {device number}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>device number</em></td>
<td>Slot number of the ATM card.</td>
</tr>
</tbody>
</table>

**Example:**
/atm# device 3
Current device set to 3
This example directs subsequent `atm` commands to the card in slot 3.

**Disconnect vc**

Use this command to disconnect the virtual channel links or IMA groups from a permanent virtual connection (PVC).

**Mode:** `atm`

**Syntax:** `disconnect vc {pvc-id} [clean]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>pvc-id</em></td>
<td>PVC identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td><em>clean</em></td>
<td>Removes relevant entries from the Virtual Path Link table after disconnecting the cross-connect.</td>
</tr>
</tbody>
</table>

**Example:**
/atm# disconnect vc 1
CLI Commands

**atm**

---

### disconnect vp

Use this command to disconnect the virtual path links from a permanent virtual connection (PVC).

**Mode:** atm

**Syntax:** `disconnect vp {pvc-id} [clean]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pvc-id</td>
<td>PVC identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td>clean</td>
<td>Removes relevant entries from the Virtual Path Link table after disconnecting the cross-connect.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# disconnect vp mypvc`

### ima group

Use this command to create an IMA (Inverse Multiplexing over ATM) group. To remove an IMA group, use `no ima`.

When an IMA group is created, the attributes in the following table are initialized to default values. You can set these values individually from the interface mode for a specific IMA group using the commands indicated in the table.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Default Value</th>
<th>Set Value Using...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx ID</td>
<td>1</td>
<td><code>ima txid</code></td>
</tr>
<tr>
<td>Minimum # of Links</td>
<td>2</td>
<td><code>ima minlinks</code></td>
</tr>
<tr>
<td>Timing Mode</td>
<td>ctc (common transit clock)</td>
<td><code>ima timing</code></td>
</tr>
<tr>
<td>Frame Length</td>
<td>128 cells</td>
<td><code>ima frame</code></td>
</tr>
<tr>
<td>Max Differential Delay</td>
<td>25 ms</td>
<td><code>ima maxdelay</code></td>
</tr>
<tr>
<td>Alpha</td>
<td>2 cells</td>
<td><code>ima alpha</code></td>
</tr>
<tr>
<td>Beta</td>
<td>2 cells</td>
<td><code>ima beta</code></td>
</tr>
<tr>
<td>Gamma</td>
<td>1 cell</td>
<td><code>ima gamma</code></td>
</tr>
<tr>
<td>Activation State</td>
<td>Down (inactive)</td>
<td><code>ima status</code></td>
</tr>
</tbody>
</table>
**Mode:** atm

**Syntax:** ima group {group-id} [minimum links]

**Syntax:** no ima group {grp-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>IMA group identifier. IMA group identifier in the form {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>minimum links</td>
<td>Minimum number of links required to create an IMA group. Range is from 2 up to the system maximum. The default is 2.</td>
</tr>
</tbody>
</table>

**Example:** /atm# ima group 3b01 4

IMA interface created

**Example:** cd to the IMA group from the root directory to configure.

**ima restart**

Use this command to force resynchronization of the specified IMA group.

**Mode:** atm

**Syntax:** ima restart {group-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>IMA group identifier. IMA group identifier in the form {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:** /atm# ima restart 2b01

SUCCESS!

**oam llid**

Use this command to specify the OAM Logical Loop Identifier. To clear the logical loop identifier, use no oam llid.

**Mode:** atm

**Syntax:** oam llid {id}

**Syntax:** no oam llid

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Logical Loop Identifier. Hexadecimal string of up to 32 characters.</td>
</tr>
</tbody>
</table>
CLI Commands

atm

Example: /atm# oam llid 124521236521282000000
OAM LLID set.
Success!

show bridge config

Use this command to display the configuration information for one or more bridges.

Mode: atm

Syntax: show bridge config [group-id]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive. If the group-id is omitted, information for all bridge groups displays.</td>
</tr>
</tbody>
</table>

Example: /atm# show bridge config BRIDGE1
Bridge Group Name: BRIDGE1
<-----------------------------Global Bridge Options----------------------------->
Packet Discard: None Aging: 300
<-----------------------------Bridge Entry List----------------------------->
<-Port> <-PVC> <-Encap> <-RemoveFCS>
7E2 N/A Enabled
7D03 1/36 LLC Enabled

show bridge interval

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval.

Mode: atm

Syntax: show bridge interval {interval} {group-id} {port-id} {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td>group-id</td>
<td>The bridge group identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form: {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>
show bridge interval current

Use this command to display statistical information for the currently accumulating time interval.

**Mode:** atm

**Syntax:** show bridge interval current {group-id} {port-id} {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>group-id</strong></td>
<td>The bridge group identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td><strong>port-id</strong></td>
<td>Port identifier in the form: {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>vpi/vci</strong></td>
<td>Virtual path identifier/virtual channel identifier. \n\vpi – Virtual path identifier. Range is 0 – 255. \n\vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** /atm# show bridge current bridge1 1a1 3/31

show bridge interval total

Use this command to display the accumulated statistical information for the most recent 96 time intervals (twenty-four hour totals).

**Mode:** atm

**Syntax:** show bridge interval total {group-id} {port-id} {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>group-id</strong></td>
<td>Bridge group identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td><strong>port-id</strong></td>
<td>ATM port identifier in the form: {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>vpi/vci</strong></td>
<td>Virtual path identifier/virtual channel identifier. \n\vpi – Virtual path identifier. Range is 0 – 255. \n\vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** /atm# show bridge total bridge1 1a1 3/31
CLI Commands

**show bridge statistics**

Use this command to display statistics associated with bridging.

**Mode:** atm

**Syntax:** show bridge statistics

**Example:** /atm# show bridge statistics BRIDGE1

```
<--BPort/PVC--><<<<--Rx Pkts------><<--Discard Pkts--><<--Deny Pkts--><<--Forward Pkts-->>
                         Valid   BC  MC  Ingrs   Brg  Unk  Src  Dest  UC  BC  MC
                  ENET2           67   0   2  20    3   0   3   12   2   0   0
            7D03   1/36        0   0   0  0     0   0   0   0   0   0   0
```

**show ces config**

Use this command to display the configuration information for one or more Circuit Emulation Services (CESs).

**Mode:** atm

**Syntax:** show ces config [ces-id]

**Example:** /atm# show ces config CES1

```
CES Circuit Name       : CES1
TDM Port ID            : 7A01
Timeslots             : 1 to 1
          Mode, Timing      : Struct-No CAS, Sync
ATM Port ID            : 7D01
VP/VC                  : 1/32
Partial Fill          : 0
Control State Status  :
          Admin, Operational : Up, Down
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive. If no ces-id is specified, information for all CESs is displayed.</td>
</tr>
</tbody>
</table>
CLI Commands

show ces interval

Use this command to display statistical information previously accumulated during a specific fifteen
minute time interval for the specified Circuit Emulation Service (CES).

**Mode:** atm

**Syntax:** `show ces interval {interval} {ces-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interval</code></td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td><code>ces-id</code></td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show ces interval 1 CES1`

```
CES        INTERVAL STATISTICS       1 INTERVAL @ 00:00 for 900 s
<------ Cells ------><------ Frame ------><----- Errors ----->
ReassCells                          0
Header                                                                        0
Pointer & Parity                    0                    0
AAL1 Seq                                                                      0
Lost                                0
Misinserted                         0
Buffer Underflow                                                              0
Buffer Overflow                                                               0
Last Buff O-Flow                                                              0
Soak Loss State                     7
```

show ces interval current

Use this command to display statistical information for the currently accumulating time interval.

**Mode:** atm

**Syntax:** `show ces interval current {ces-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ces-id</code></td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show ces interval current CES1`

```
CES        INTERVAL STATISTICS CURRENT INTERVAL         for 608 s:
<------ Cells ------><------ Frame ------><----- Errors ------>
ReassCells                          0
Header                                                                        0
```
CLI Commands

atm

Pointer & Parity  0  0
AAL1 Seq  0
Lost  0
Misinserted  0
Buffer Underflow  0
Buffer Overflow  0
Last Buff O-Flow  0
Soak Loss State  0

show ces interval total

Use this command to display the accumulated statistical information for the most recent 96 time intervals (twenty-four hour totals).

Mode: atm

Syntax: show ces interval total {ces-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

Example: /atm# show ces interval total CES1

CES INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:

<------ Cells ------><------ Frame ------><----- Errors ------>
ReassCells  0
Header  0
Pointer & Parity  0  0
AAL1 Seq  0
Lost  0
Misinserted  0
Buffer Underflow  1
Buffer Overflow  0
Last Buff O-Flow  0
Soak Loss State  0
**show ces statistics**

Use this command to display statistics associated with the performance of one or more Circuit Emulation Services (CESs).

**Mode:** atm

**Syntax:** `show ces statistics [ces-id]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ces-id</td>
<td>Circuit emulation service (CES) identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive. If no <code>ces-id</code> is specified, information for all CESs is displayed.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show ces statistics CES1`

CES Circuit Name : CES1

AAL1 Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>1637310</td>
</tr>
<tr>
<td>Rx</td>
<td>1637314</td>
</tr>
<tr>
<td>Rx Discard</td>
<td>4</td>
</tr>
<tr>
<td>Rx Overrun</td>
<td>2</td>
</tr>
<tr>
<td>Rx CLP 1</td>
<td>0</td>
</tr>
</tbody>
</table>

Transparent Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx Underrun</td>
<td>0</td>
</tr>
<tr>
<td>Rx Overrun</td>
<td>0</td>
</tr>
</tbody>
</table>

**show ima config**

Use this command to display the configuration information for one or more IMA (Inverse Multiplexing over ATM) groups.

**Mode:** atm

**Syntax:** `show ima config [group-id]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>IMA group identifier in the form <code>{slot-number}</code>B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
CLI Commands

**CLI Commands**

```
Example: /atm# show ima config 7B01

<----- Group ------> Min  Frame <------ Timing ------> <Ctrl>
UNI  TxID Symmetry UNIs  Len  TClk  DDly  A  B  G  State
7B01  1  symOper  1 m256  ctc  25  1  3  2  Up
IMA LINKS:
  7A04
  7A05
```

**show ima group interval**

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval for the specified IMA group.

*Mode: atm*

*Syntax: show ima group interval {interval} {group-port-id}*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td>group-port-id</td>
<td>IMA group port identifier in the form {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

*Example: /atm# show ima group interval 1 7B02*

IMA GROUP INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s

<----- Near End ----><----- Far End ----><----- Others ------>
Unavailable s                                                              0
Failures                                                                  0

**show ima group interval current**

Use this command to display statistical information for the currently accumulating time interval for the specified IMA group.

*Mode: atm*

*Syntax: show ima group interval current {group-port-id}*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-port-id</td>
<td>IMA group port identifier in the form {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
**CLI Commands**

**show ima group interval total**

Use this command to display the accumulated statistical information for the most recent 96 time intervals (twenty-four hour totals) for the specified IMA group.

**Mode:** atm

**Syntax:** `show ima group interval total {group-port-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-port-id</td>
<td>IMA group port identifier in the form <code>{slot-number}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# show ima group interval total 7B01
IMA GROUP INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:
  <---- Near End ----><----- Far End ------><----- Others ------>
Unavailable s                          0
Failures s                              1   2
```

**show ima link interval**

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval for the specified IMA group.

**Mode:** atm

**Syntax:** `show ima link interval {interval} {group-id} {link-port-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td>group-id</td>
<td>IMA group port identifier in the form <code>{slot-number}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>link-port-id</td>
<td>Link port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# show ima link interval current 7B02
IMA GROUP INTERVAL STATISTICS CURRENT INTERVAL for 612 s:
  <---- Near End ----><----- Far End ------><----- Others ------>
Unavailable s                          0
Failures s                              0   0
```
CLI Commands

*atm*

**Example:** 
/atm# show ima link interval 1 7B01 7A04

IMA GROUP INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s

<----- Near End ----><----- Far End ----><----- Others ----->

Unavailable s 0
Failures 0 0

You Are Here: IMAL[Group 0][Link 3]

IMA LINK INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s

<----- Near End ----><----- Far End ----><----- Others ----->

Severe Errored s 0 0
Unavailable s 0 0
Tx Unusable s 0 0
Rx Unusable s 0 0
Tx Failures 0 0
Rx Failures 0 0
Tx Stuffs 0
Rx Stuffs 0
IMA Violations 0
OIF Anomalies

**show ima link interval current**

Use this command to display statistical information for the currently accumulating time interval for the specified IMA link.

*Mode:* atm

**Syntax:** show ima link interval current {group-port-id} {link-port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-port-id</td>
<td>IMA group port identifier in the form: {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>link-port-id</td>
<td>Link port identifier in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:** 
/atm# show ima link interval current 7B02 7A05

IMA GROUP INTERVAL STATISTICS CURRENT INTERVAL for 612 s:

<----- Near End ----><----- Far End ----><----- Others ----->

Unavailable s 0
Failures 0 0

You Are Here: IMAL[Group 1][Link 4]

IMA LINK INTERVAL STATISTICS CURRENT INTERVAL for 612 s:

<----- Near End ----><----- Far End ----><----- Others ----->

Severe Errored s 0 0
Unavailable s 0 0
Tx Unusable s 0 0
Rx Unusable s 0 0
Tx Failures 0 0
Rx Failures 0 0
show ima link interval total

Use this command to display the accumulated statistical information for the most recent 96 time intervals (twenty-four hour totals) for the specified IMA link.

**Mode:** atm

**Syntax:** show ima link interval total {group-id} {link-port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>group-id</td>
<td>IMA group identifier in the form {slot-number}B{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>link-port-id</td>
<td>Link port identifier in the form: [slot-number] [interface-type] [port-number].</td>
</tr>
</tbody>
</table>

**Example:** /atm# show ima link interval total 7B01 7A04

IMA GROUP INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:

Unavailable s 0
Failures 1 2

IMA LINK INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:

Severe Errored s 0 0
Unavailable s 0 0
Tx Unusable s 0 0
Rx Unusable s 0 0
Tx Failures 0 0
Rx Failures 0 0
Tx Stuffs 0
Rx Stuffs 0
IMA Violations 0
OIF Anomalies 0
show ima states

Use this command to display the current state of existing IMA (Inverse Multiplexing over ATM) groups.

**Mode:** atm

**Syntax:** `show ima states`

**Example:**
```
/atm# show ima states
Showing IMA Group States
<------------------ Near End -----------------><------------------ Far End ---------------->
#   State            Alarm State/Type             State       Alarm State/Type   TRL ID
7B01: Operational No Alarm/Unknown   Operational No Alarm/Unknown 3
7B02: Start-Up    No Alarm/Unknown           No ICP Rx     Alarm /Start-Up   0
```

show oam interval

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval.

**Mode:** atm

**Syntax:** `show oam interval {interval} {port-id}`

**Example:**
```
/atm# show oam interval 1 7D01
OAM INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s
<-------------------><-------- Tx --------><-------- Rx -------->
CLP 0 Cells                                      0                    0
CLP 1 Cells                                      0                    0
EFCI Cells                                       0                    0
OAM Cells                                        0                    0
RM Cells                                         0                    0
Idle Cells                                       0                    0
Last Unk Addr                                    0                    0
GFC Cells                                        0                    0
CRC Error Cells                                  0                    0
Unsupported Clis                                  0                    0
```
**show oam interval current**

Use this command to display OAM Performance Monitor statistical information for the currently accumulating time interval.

**Mode:** atm  
**Syntax:** `show oam interval current {port-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form: <code>{slot-number}[interface-type]{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show oam interval current 7D01  
OAM INTERVAL STATISTICS CURRENT INTERVAL for 614 s:  
<------------------><------- Tx --------><------- Rx -------->  
CLP 0 Cells 0 0  
CLP 1 Cells 0 0  
EFCI Cells 0 0  
OAM Cells 0 0  
RM Cells 0 0  
Idle Cells 0  
Last Unk Addr 0 0  
GFC Cells 0  
CRC Error Cells 0  
Unsupported Clls 0  

**show oam interval total**

Use this command to display statistical information or the most recent 96 time intervals (twenty-four hour totals).

**Mode:** atm  
**Syntax:** `show oam interval total {port-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form: <code>{slot-number}[interface-type]{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
CLI Commands

**atm**

**Example:** /atm# show oam interval total 7D01

```
OAM INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:

<-------------------><------- Tx --------><------- Rx -------->
CLP 0 Cells                                              0                    0
CLP 1 Cells                                              0                    0
EFCI Cells                                               0                    0
OAM Cells                                                0                    0
RM Cells                                                 0                    0
Idle Cells                                               0
Last Unk Addr                                                                 0
GFC Cells                                                                     0
CRC Error Cells                                                               0
Unsupported Clls
```

**show oam llid**

Use this command to display the Loopback Location ID for a segment loopback on a VP or VC. The Loopback Location ID specifies an intermediate connecting point in a segment where the loopback should occur. By default, the value is all 1s which indicates that the loopback should occur at the segment endpoint. Use the `oam llid` command described on page 11-81 to create an LLID.

**Mode:** atm

**Syntax:** show oam llid

**Example:** /atm# show oam llid

```
LLID: 1234 d0d0 d0d0 d0d0 d0d0 d0d0 d0d0 d0d0
```  

**show td**

Use this command to display configuration information associated with one or more entries in the traffic descriptor table. See `ubr` on page 11-105, `vbr-nrt` on page 11-106, and `vbr-rt` on page 11-107 for information about creating traffic descriptors.

**Mode:** atm

**Syntax:** show td [td-id]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>td-id</code></td>
<td>Traffic descriptor identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive. Omitting the <code>td-id</code> displays information for all entries in the traffic descriptor table.</td>
</tr>
</tbody>
</table>
show uni interval

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval.

**Mode:** atm

**Syntax:** show uni interval {interval} {port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td>port-id</td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:** /atm# show uni interval 1 7A08

UNI DEV INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s

RUN --- Sync --- Others ---

Rx HEC Error 0
Address Mismtch 0
Rx Out Sync 0
Rx Enter Sync 0
Rx Overrun 0
Rx Trans Over 0
Tx Trans Under 0
Cell Loss Status 0

show uni interval current

Use this command to display statistical information for the currently accumulating time interval.

**Mode:** atm

**Syntax:** show uni interval current {port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
CLI Commands

atm

Example: /atm# show uni interval current 7A08

    UNI DEV INTERVAL STATISTICS CURRENT INTERVAL for 616 s:

                  <------- Run -------><------- Sync -------><----- Others ------>

    Rx HEC Error                                           0
    Address Mismatch                                       0
    Rx Out Sync                                             0
    Rx Enter Sync                                           0
    Rx Overrun                                               0
    Rx Trans Over                                           0
    Tx Trans Under                                          0
    Cell Loss Status

show uni interval total

Use this command to display statistical information or the most recent 96 time intervals (twenty-four hour totals).

Mode: atm

Syntax: show uni interval total {port-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

Example: /atm# show uni interval total 7A08

    UNI DEV INTERVAL STATISTICS TOTAL INTERVAL for 78300 s:

                  <------- Run -------><------- Sync -------><----- Others ------>

    Rx HEC Error                                           25
    Address Mismatch                                       0
    Rx Out Sync                                             6
    Rx Enter Sync                                           6
    Rx Overrun                                               0
    Rx Trans Over                                           0
    Tx Trans Under                                          0
    Cell Loss Status


**show ds1 uni statistics**

Use this command to display statistics associated with specific DS1 UNI ports. The initial and final ports must also be consecutive. Listing only an initial port ID and omitting the final port ID displays a single port’s statistics. Omitting all port IDs displays statistics for all ports.

**Mode:** atm

**Syntax:** `show ds1 statistics [{initial port-id} {final port-id}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial port-id</td>
<td>The initial port identifier in a consecutive port sequence, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>final port-id</td>
<td>The final port identifier in a consecutive port sequence, in the form <code>{slot-number}L{port-number}</code>.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show ds1 uni statistics 3L03`

```plaintext
<UNI-><------ Header -------->BUFFERs --------><-------- Sync -------->
  HEC Err  Addr Msmtnch Rx Overrun Tx Underrun Rx OOS Rx Ent Sync
3L03      0       0     0       0       0       0       0       0
```

**show ds3 uni statistics**

Use this command to display statistics associated with specific DS3 UNI ports. The initial and final ports must also be consecutive. Listing only an initial port ID and omitting the final port ID displays a single port’s statistics. Omitting all port IDs displays statistics for all ports.

**Mode:** atm

**Syntax:** `show ds3 statistics [{initial port-id} {final port-id}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial port-id</td>
<td>The initial port identifier in a consecutive port sequence, in the form <code>{slot-number}D{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>final port-id</td>
<td>The final port identifier in a consecutive port sequence, in the form <code>{slot-number}D{port-number}</code>.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show uni statistics 3D03`

```plaintext
<UNI-><------ Header -------->BUFFERs --------><-------- Sync -------->
  HEC Err  Addr Msmtnch Rx Overrun Tx Underrun Rx OOS Rx Ent Sync
3D03      0       0     0       0       0       0       0       0
```
**CLI Commands**

**atm**

## show ima uni statistics

Use this command to display statistics associated with specific IMA UNI ports. The initial and final ports must also be consecutive. Listing only an initial port ID and omitting the final port ID displays a single port’s statistics. Omitting all port IDs displays statistics for all ports.

**Syntax:** `show ima statistics [{initial port-id} {final port-id}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>initial port-id</strong></td>
<td>The initial port identifier in a consecutive port sequence, in the form <code>{slot-number}B{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>final port-id</strong></td>
<td>The final port identifier in a consecutive port sequence, in the form <code>{slot-number}B{port-number}</code>.</td>
</tr>
</tbody>
</table>

**Example:** /atm# show uni statistics 3B03

```
<UNI-><----- Header -------><-------- Buffers --------><-------- Sync -------->
HEC Err Addr Msmtnch Rx Overrun Tx Underrun Rx OOS Rx Ent Sync
3B03   0     0       0       0       0       0       0       0
```

## show vc config

Use this command to display the configuration information for one or more virtual channel links (VCLs). Omitting the arguments displays the configuration information for all virtual channel links.

**Mode:** atm

**Syntax:** `show vc config [{port-id} {vpi/vci}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>port-id</strong></td>
<td>ATM port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
| **vpi/vci** | Virtual path identifier/virtual channel identifier.  
| vpi – Virtual path identifier. Range is 0 – 255.  
| vci – Virtual channel identifier. Range is 0 – 65535.  
| If no vpi/vci is specified, information for all virtual channel links is displayed. |

**Example:** /atm# show vc config

```
<PVC------><-----QoS------><----------UPC----------><Ctrl>
Port VP VC Class Use PCR SCR MCR MBS CDVT State
7D01 1 32 CBR CES PVC 171 0 0 0 75 Up
7D02 1 33 CBR CES PVC 171 0 0 0 75 Up
7D03 1 34 CBR CES PVC 171 0 0 0 75 Up
7D03 1 36 rt-VBR MFoA PVC 242 240 0 2 150 Up
7B01 1 35 CBR UNI PVC 171 0 0 0 75 Up
7B02 1 32 CBR UNI PVC 171 0 0 0 75 Up
```
show vc connections

Use this command to display the connections to the specified virtual channel link (VCLs). Omitting the argument displays the connections for all virtual channel links.

**Mode:** atm

**Syntax:** `show vc connections {pvc-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pvc-id</code></td>
<td>PVC identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# show vc connections

<-- Conn Name --> <--- High End ---> Dir <--- Low End --->
VC_XC_1     7B01   1/35       <===>  7B02   1/32
```

show vc interval

Use this command to display statistical information previously accumulated during a specific fifteen minute time interval.

**Mode:** atm

**Syntax:** `show vc interval {interval} {port-id} {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interval</code></td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><code>vpi/vci</code></td>
<td>Virtual path identifier/virtual channel identifier. <code>vpi</code> – Virtual path identifier. Range is 0 – 255. <code>vci</code> – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:**
```
/atm# show vc interval 1 7D01 1/32

VC INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s

<---- Cells 01 ----><----- Cells 0 ------><----- Others ------>
Cells 0 0
Lost Cells 0 0
Total Lost Cells 0 0
Cell Loss Ratio 0 0
Severe Error CB 0
Misinserted CIs 0
Impaired Blocks 0
MC with IB 0
Last MC with IB 0
```
CLI Commands

**atm**

### show vc interval current

Use this command to display statistical information for the currently accumulating time interval.

**Mode:** atm

**Syntax:** `show vc interval current {port-id} {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. <code>vpi</code> – Virtual path identifier. Range is 0 – 255. <code>vci</code> – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show vc interval current 7D01 1/32

| VC INTERVAL STATISTICS CURRENT INTERVAL for 620 s: | <----- Cells 01 ----> <----- Cells 0 ----> <----- Others ------>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells</td>
<td>0</td>
</tr>
<tr>
<td>Lost Cells</td>
<td>0</td>
</tr>
<tr>
<td>Total Lost Cells</td>
<td>0</td>
</tr>
<tr>
<td>Cell Loss Ratio</td>
<td>0</td>
</tr>
<tr>
<td>Severe Error CB</td>
<td>0</td>
</tr>
<tr>
<td>Misinserted Cls</td>
<td>0</td>
</tr>
<tr>
<td>Impaired Blocks</td>
<td>0</td>
</tr>
<tr>
<td>MC with IB</td>
<td>0</td>
</tr>
<tr>
<td>Last MC with IB</td>
<td>0</td>
</tr>
</tbody>
</table>

### show vc interval total

Use this command to display statistical information or the most recent 96 time intervals (twenty-four hour totals).

**Mode:** atm

**Syntax:** `show vc interval total {port-id} {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. <code>vpi</code> – Virtual path identifier. Range is 0 – 255. <code>vci</code> – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>
**CLI Commands**

*show vc statistics*

**Example:** /atm# show vc interval total 7D01 1/32

```
VC INTERVAL STATISTICS TOTAL INTERVAL for 79300 s:
<---- Cells 01 ----> <----- Cells 0 ----> <----- Others ------>

<table>
<thead>
<tr>
<th>Cells</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost Cells</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Lost Cells</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cell Loss Ratio</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Severe Error CB</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Misinserted Cls</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Impaired Blocks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MC with IB</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Last MC with IB</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**show vc statistics**

Use this command to display the virtual channel link (VCL) statistics.

**Mode:** atm

**Syntax:** show vc statistics

**Example:** /atm# show vc statistics

```
<----PVC----<-Tx---CLP0/1----><-Rx--CLP0/1-------Tagged----Discard-Nonconform>
7D01  1/32      1639442/0       1639447/0       0          4          0
7D02  1/33      1639442/0          0/0            0          0          0
7D03  1/34      1639442/0       1639447/0       0          4          0
7D03  1/36          0/0              0/0            0          0          0
7B01  1/35          0/0              0/0            0          0          0
7B02  1/32          0/0              0/0            0          0          0
```

**show version atm**

Use this command to show the version of the currently installed ATM software module.

**Mode:** atm

**Syntax:** show version atm

**Example:** /atm# show version atm

```
Running ATM Software Version: 6.0.12.4 DM3
```
**CLI Commands**

**atm**

### show vp config

Use this command to display the configuration information for one or more virtual path links (VPLs). Omitting both arguments displays the configuration information for all virtual path links.

**Mode:** atm

**Syntax:** `show vp config [{port-id} {vpi/vci}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. <code>vpi</code> – Virtual path identifier. Range is 0 – 255. <code>vci</code> – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show vp config`

```
<---------PVC--------> <-----QoS-------><----------------------UPC-----------------><Ctrl>
Port VP     Class  Use  PCR  SCR  MCR  MBS  CDVT  State
7B01 4   CBR UNI PVC  171  0  0  0  75  Up
7B02 4   CBR UNI PVC  171  0  0  0  75  Up
```

### show vp connections

Use this command to display the connections to the specified virtual path link (VPL). Omitting the argument displays the configuration information for all virtual path links.

**Mode:** atm

**Syntax:** `show vp connections [pvc-id]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pvc-id</td>
<td>PVC identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

**Example:** `/atm# show vp connections`

```
<-- Conn Name --> <--- High End --->  Dir  <--- Low End --->
   VP_XC_1    7B01   4  <===  7B02   4
```
**show vp interval**

Use this command to display statistical information for the currently accumulating time interval.

*Mode:* atm

*Syntax:* `show vp interval {interval} {port-id} {vpi}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interval</code></td>
<td>Specifies a completed fifteen minute interval, with a lower interval number representing a more recent interval. Range is 1 – 96.</td>
</tr>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><code>vpi</code></td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:**

```bash
/atm# show vp interval 1 7B01 4
VP INTERVAL STATISTICS 1 INTERVAL @ 00:00 for 900 s
  <---- Cells 01 ----><----- Cells 0 ------><----- Others ------>
  Cells          0       0
  Lost Cells     0       0
  Total Lost Cells          0       0
  Cell Loss Ratio          0       0
  Severe Error CB           0       0
  Misinserted CIs           0       0
  Impaired Blocks           0       0
  MC with IB               0       0
  Last MC with IB          
```

**show vp interval current**

Use this command to display statistical information for the currently accumulating time interval.

*Mode:* atm

*Syntax:* `show vp interval current {port-id} {vpi}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><code>vpi</code></td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:**

```bash
/atm# show vp interval current 7B01 4
VP INTERVAL STATISTICS CURRENT INTERVAL for 622 s:
  <---- Cells 01 ----><----- Cells 0 ------><----- Others ------>
  Cells          0       0
  Lost Cells     0       0
  Total Lost Cells          0       0
```
CLI Commands

**atm**

```plaintext
Cell Loss Ratio                     0                    0
Severe Error  CB                                                              0
Misinserted Cls                                                               0
Impaired Blocks                                                               0
MC with IB                                                                    0
Last MC with IB                                                               0
```

### show vp interval total

Use this command to display statistical information or the most recent 96 time intervals (twenty-four hour totals).

**Mode:** atm

**Syntax:** show vp interval total {port-id} {vpi}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Port identifier in the form: <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
</tbody>
</table>

**Example:** /atm# show vp interval total 7B01 4

```
VP   INTERVAL STATISTICS TOTAL  INTERVAL         for 78300 s:  
     <---- Cells 01 ----><----- Cells 0 ------><----- Others ------>

Cells                           0                    0
Lost Cells                      0                    0
Total Lost Cells                0                    0
Cell Loss Ratio                 0                    0
Severe Error  CB                0                    0
Misinserted Cls                0                    0
Impaired Blocks                 0                    0
MC with IB                      0                    0
Last MC with IB                 0                    0
```

### show vp statistics

Use this command to display virtual path link (VP) statistics.

**Mode:** atm

**Syntax:** show vp statistics

**Example:** /atm# show vp statistics

```
<----PVC----><-Tx--CLP0/1-----><-Rx--CLP0/1-------Tagged----Discard-Nonconform>
  7B01   4          0/0       0/0     0     0     0
  7B02   4          0/0       0/0     0     0     0
```
**td status**

Use this command to set the administrative status of a traffic descriptor to up or down.

*Mode:* atm  
*Syntax:* `td status {td-id} {down|up}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| `down|up`  | Sets the traffic descriptor administrative state.  
  `down` – Default, Inactive  
  `up` – Active. |

*Example:* `/atm# td status td1 up`

**ubr**

Use this command to create an entry in the traffic descriptor table for Unspecified Bit Rate (UBR) traffic. To remove an entry from the traffic descriptor table, use `no ubr`.

*Mode:* atm  
*Syntax:* `ubr {td-id} {pcr} {cdvt} {mcr} [disabled|pcr]`  
*Syntax:* `no ubr {td-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pcr</code></td>
<td>Peak Cell Rate. The maximum burst rate, in number of cells per second. Range is 150 up to the full link or bundle rate in cells per second. The value cannot be set higher than the port’s actual connection speed (line rate).</td>
</tr>
</tbody>
</table>
| `cdvt`   | Cell Delay Variation Tolerance. The limit for delivery delay measured in microseconds, which may be caused by traffic, overhead or randomness. Range is 75 – 2304 cells per second.  
  In MASTERseries, CDVT with the value 27 equates to a 270 microsecond delay. The 270 microsecond delay is the time it takes to transmit one cell of data at T1 line speed. At the faster DS3 line rate it takes 9.5 microseconds to transmit one cell of data and the default CDVT setting of 75 for DS3 VCs equates to a buffer of about 79 cells. How you set the CDVT depends on the QoS settings. |
| `mcr`    | Minimum Cell Rate. The minimum transmission rate, measured in cells per second, that is acceptable on a UBR connection.  
  **NOTE:** The connection can burst above this rate (up to the PCR) if bandwidth is available. This value must be equal to or less than SCR and is not required for any of the QoS types currently supported. |
CLI Commands

**atm**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>disabled</td>
<td>pcr</td>
</tr>
<tr>
<td></td>
<td>disabled – Default. Disables traffic shaping.</td>
</tr>
<tr>
<td></td>
<td>pcr – Peak cell rate.</td>
</tr>
</tbody>
</table>

**Example:**

```
/atm# ubr td3 150 75 0
success!
```

**vbr-nrt**

Use this command to create an entry in the traffic descriptor table for Variable Bit Rate - Non-Real Time (VBR-nrt) traffic. To remove an entry from the traffic descriptor table, use **no vbr-nrt**.

**Mode:** atm

**Syntax:**

```
vbr-nrt {td-id} {pcr} {cdvt} {scr} {mbs} [disabled|pcr|scr|pcr]
```

**Syntax:**

```
no vbr-nrt {td-id}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>td-id</td>
<td>Traffic descriptor identifier. Alphanumeric string with a maximum length of</td>
</tr>
<tr>
<td></td>
<td>12 characters. Case sensitive.</td>
</tr>
<tr>
<td>pcr</td>
<td>Peak Cell Rate. The maximum burst rate, in number of cells per second.</td>
</tr>
<tr>
<td></td>
<td>Range is 150 up to the full link or bundle rate in cells per second. The</td>
</tr>
<tr>
<td></td>
<td>value cannot be set higher than the port’s actual connection speed (line</td>
</tr>
<tr>
<td></td>
<td>rate).</td>
</tr>
<tr>
<td>cdvt</td>
<td>Cell Delay Variation Tolerance. The limit for delivery delay measured in</td>
</tr>
<tr>
<td></td>
<td>microseconds, which may be caused by traffic, overhead or randomness.</td>
</tr>
<tr>
<td></td>
<td>Range is 75 – 2304 cells per second.</td>
</tr>
<tr>
<td></td>
<td>In MASTERseries, CDVT with the value 27 equates to a 270 microsecond delay.</td>
</tr>
<tr>
<td></td>
<td>The 270 microsecond delay is the time it takes to transmit one cell of</td>
</tr>
<tr>
<td></td>
<td>data at T1 line speed. At the faster DS3 line rate it takes 9.5 microcells</td>
</tr>
<tr>
<td></td>
<td>to transmit one cell of data and the default CDVT setting of 75 for DS3</td>
</tr>
<tr>
<td></td>
<td>VCs equates to a buffer of about 79 cells.</td>
</tr>
<tr>
<td></td>
<td>How you set the CDVT depends on the QoS settings.</td>
</tr>
<tr>
<td>scr</td>
<td>Sustained Cell Rate. The average transmission rate, measured in cells per</td>
</tr>
<tr>
<td></td>
<td>second, on a VBR connection. The connection transmits the majority of</td>
</tr>
<tr>
<td></td>
<td>information at this rate or slower with occasional bursts of information.</td>
</tr>
<tr>
<td></td>
<td>This value must be equal to or less than PCR.</td>
</tr>
<tr>
<td>mbs</td>
<td>Maximum Burst Size. The maximum burst size, in number of cells, allowed</td>
</tr>
<tr>
<td></td>
<td>for the virtual channel. This is the maximum size in cells that the data</td>
</tr>
<tr>
<td></td>
<td>may burst above the SCR value. Range is 1 – 32 cells per second.</td>
</tr>
<tr>
<td>disabled</td>
<td>pcr</td>
</tr>
<tr>
<td></td>
<td>disabled – Default. Disables traffic shaping.</td>
</tr>
<tr>
<td></td>
<td>pcr – Peak cell rate.</td>
</tr>
<tr>
<td></td>
<td>pcr/scr – Peak cell rate/Sustained cell rate.</td>
</tr>
</tbody>
</table>
CLI Commands

vbr-rt

Use this command to create an entry in the traffic descriptor table for Variable Bit Rate - Real Time (VBR-rt) traffic. To remove the entry from the traffic descriptor table, use `no vbr-rt`.

**Mode:** atm

**Syntax:**

vbr-rt {td-id} {pcr} {cdvt} {scr} {mbs} [disabled|pcr|scr/pcr]

**Syntax:**

no vbr-rt {td-id}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>td-id</strong></td>
<td>Traffic descriptor identifier. Alphanumeric string with a maximum length of 12 characters. Case sensitive.</td>
</tr>
<tr>
<td><strong>pcr</strong></td>
<td>Peak Cell Rate. The maximum burst rate, in number of cells per second. Range is 150 up to the full link or bundle rate in cells per second. The value cannot be set higher than the port’s actual connection speed (line rate).</td>
</tr>
<tr>
<td><strong>cdvt</strong></td>
<td>Cell Delay Variation Tolerance. The limit for delivery delay measured in microseconds, which may be caused by traffic, overhead or randomness. Range is 75 – 2304 cells per second. In MASTERseries, CDVT with the value 27 equates to a 270 microsecond delay. The 270 microsecond delay is the time it takes to transmit one cell of data at T1 line speed. At the faster DS3 line rate it takes 9.5 microseconds to transmit one cell of data and the default CDVT setting of 75 for DS3 VCs equates to a buffer of about 79 cells. How you set the CDVT depends on the QoS settings.</td>
</tr>
<tr>
<td><strong>scr</strong></td>
<td>Sustained Cell Rate. The average transmission rate, measured in cells per second, on a VBR connection. The connection transmits the majority of information at this rate or slower with occasional bursts of information. This value must be equal to or less than PCR.</td>
</tr>
<tr>
<td><strong>mbs</strong></td>
<td>Maximum Burst Size. The maximum burst size, in number of cells, that the data may burst above the SCR value. Range is 1 – 32 cells per second.</td>
</tr>
<tr>
<td>**disabled</td>
<td>pcr</td>
</tr>
</tbody>
</table>

**Example:** /atm# vbr-rt nrtVBR 250 135 245 5 scr/pcr

success!
The DHCP mode is used when configuring a DHCP server and managing the address pools available to DHCP clients.

The commands listed below are available in the `dhcp` (dynamic host configuration protocol) mode. Before using these commands, you must switch to dhcp mode using `cd dhcp`.

Each command in the following list is a hyperlink to the detailed definition of the command.

- add pool
- boot server
- delete binding
- delete pool
- dhcp trace
- exclude pool
- global option
- host option
- icmp echo enable
- lease time
- list options
- remove exclude pool
- server addr timeout
- service dhcp
- subnet option

**No Variants**

The following dhcp commands are no variants of the corresponding affirmative command. For example, the `no global option` command is the no variant of `global option` command. Descriptions of the no variants are included with the corresponding affirmative command.

- no global option
- no host option
- no icmp echo
- no service dhcp
- no subnet option
add pool

Use this command to define a pool of addresses to be allocated by the DHCP server on a network. A maximum of six entries can be made in a pool. If there are hosts or PCs on the network that use static IP addresses, you can exclude those addresses from the pool using the exclude pool command described on page 11-111.

**Mode:** dhcp

**Syntax:**
```
add pool {pool index} {interface-name/index} {subnet} {mask} {start ip} {end ip}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool index</td>
<td>An integer value that uniquely identifies an address pool.</td>
</tr>
</tbody>
</table>
| interface-name/ index | Specify the interface by name or index, as follows:  
                      | interface-name – The name of interface in the form  
                      | {slot-number} {interface-type} {port-number}. See Interface Identifiers on page 11-5 for more information.  
                      | index – Determine the index number of the desired interface by issuing a root mode show interface config all command as described on page 11-45. This is an SNMP definition.  
| subnet          | Specify the subnet.                                                        |
| mask            | Specify the subnet mask.                                                   |
| start ipaddr    | Starting IP address for the range of IP addresses to be included in the address pool. |
| end ipaddr      | Ending IP address for the range of IP addresses to be included in the address pool. |

**Example:**
```
/# cd dhcp  
/dhcp# add pool 1 1E2 10.0.0.0 255.0.0.0 10.0.0.1 10.0.0.20
```

boot server

Use this command to configure the Boot Server information. The boot server file must be in the base directory of the TFTP server.

**Mode:** dhcp

**Syntax:**
```
boot server {ip-address} {file name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>Indicates the IP address of the next boot server.</td>
</tr>
<tr>
<td>file name</td>
<td>The file name indicates the boot server file name terminated with a null string</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd dhcp  
/dhcp# boot server 10.10.12.45 bootinfo.txt
```
**CLI Commands**

**dhcp**

### delete binding

Use this command to manually delete an IP address binding. The binding is created when the DHCP server assigns an IP address to a host or workstation. This IP address binding is automatically deleted when the host fails to renew the IP address after timeout.

**Mode:** dhcp  

**Syntax:** delete binding {ip-address}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>The IP address of the host or workstation whose binding is to be deleted.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ # cd dhcp  
/dhcp# delete binding 10.10.0.10
```

### delete pool

Use this command to remove a pool of IP addresses created using the `add pool` command described on page 11-109. The addresses in the specified pool are no longer available to the DHCP server.

**Mode:** dhcp  

**Syntax:** delete pool {pool index}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool index</td>
<td>An integer value that uniquely identifies the pool to delete.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ # cd dhcp  
/dhcp# delete pool 1
```

### dhcp trace

Use this command to set the debug level for tracing DHCP module.

**Mode:** dhcp  

**Syntax:** dhcp trace {all|events|packets|failure|bind|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Use all trace types.</td>
</tr>
<tr>
<td>events</td>
<td>Trace DHCP events.</td>
</tr>
<tr>
<td>packets</td>
<td>Trace packets.</td>
</tr>
<tr>
<td>failure</td>
<td>Trace failures.</td>
</tr>
<tr>
<td>bind</td>
<td>Trace all the bindings.</td>
</tr>
<tr>
<td>none</td>
<td>Disable all DHCP traces.</td>
</tr>
</tbody>
</table>
Example: 
`#/ cd dhcp`  
`#/ dhcp# dhcp trace all`

**exclude pool**

Use this command to exclude a set of IP addresses from being assigned to any host or PC on the network. The excluded IP addresses are typically those that are assigned to a host or a set of hosts that use static IP addressing. When you configure a large range of IP addresses, use this command to exclude a range of addresses to be used by the hosts with static IP addresses. Use the **remove exclude pool** command described on page 11-115 return the excluded addresses to the pool of available address.

**Mode:** dhcp  
**Syntax:** `exclude pool {pool index} {start ipaddr} {end ipaddr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool index</td>
<td>An integer value that uniquely identifies an address pool.</td>
</tr>
<tr>
<td>start ipaddr</td>
<td>Starting IP address for the range of IP addresses to be excluded from the address pool.</td>
</tr>
<tr>
<td>end ipaddr</td>
<td>Ending IP address for the range of IP addresses to be excluded from the address pool.</td>
</tr>
</tbody>
</table>

Example: 
`#/ cd dhcp`  
`#/ dhcp# exclude pool 1 10.0.0.10 10.0.0.20`

**global option**

Use this command to set the global options used by the DHCP server. Global options are applicable for all subnets (that is, all networks). DHCP server sends these options to all DHCP clients as a part of the response message. To see a list of the available option types and the valid length for the value specified for the option, use the **list options** command as described on page 11-114.

Use the **no global options** command to remove the global options used by DHCP server for the specified option type.

**Mode:** dhcp  
**Syntax:** `global option {type} {len} {val}`  
**Syntax:** `no global option {type}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>Specifies the option type. To see a list of the available option types and the valid length for the value specified for the option, use the <strong>list options</strong> command as described on page 11-114. Range is 1 – 76.</td>
</tr>
</tbody>
</table>
CLI Commands

dhcp

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>len</em></td>
<td>Specifies the length of the value (in bytes). Range is 16 – 60 bytes, depending on the option type.</td>
</tr>
<tr>
<td><em>val</em></td>
<td>Specifies the value for the specified option.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
/# cd dhcp
dhcp# global option 3 4 198.162.1.254
```

**Example:**
```bash
/# cd dhcp
dhcp# no global option 8
```

### host option

Use this command to set the options used by the DHCP host. To see a list of the available option types and the valid length for the value specified for the option, use the `list options` command as described on page 11-114.

Use the `no host option` command to remove the DHCP server host options used by the DHCP server.

**Mode:** dhcp

**Syntax:**
```
host option {pool index} {host type} {host id} {option type} {len} {val}
```

**Syntax:**
```
no host option {pool index} {host type} {host id} {option type}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>pool index</em></td>
<td>An integer value that uniquely identifies the DHCP address pool to which the hosts belong.</td>
</tr>
<tr>
<td><em>host type</em></td>
<td>Specifies the whether the Host ID is a MAC address or a string, as follows: 1 – MAC address 2 – a string is given as an input</td>
</tr>
<tr>
<td><em>host id</em></td>
<td>A MAC address or string which uniquely identifies the host in the pool.</td>
</tr>
<tr>
<td><em>option type</em></td>
<td>Specifies the option type. To see a list of the available option types and the valid length for the value specified for the option, use the <code>list options</code> command as described on page 11-114. Range is 1 – 76.</td>
</tr>
<tr>
<td><em>len</em></td>
<td>Specifies length of the value (in bytes). Range is 16 – 60 bytes, depending on the option type.</td>
</tr>
<tr>
<td><em>val</em></td>
<td>Specifies the value for the specified option.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
/# cd dhcp
dhcp# host option 1 1 00.a0.eb.00.00.01 1 20 192.168.1.4
```

**Example:**
```bash
/# cd dhcp
dhcp# no host option 1 1 00.a0.eb.00.00.01 1
```
**icmp echo**

Use this command to enable the ICMP echo mechanism in the DHCP server. Before allocating an IP address to a user, the DHCP server module checks the network to determine whether the IP address is already in use. The checking is performed by sending ICMP (ping) packets to the selected IP address. If the DHCP server does not receive a response, the IP address is assumed to be unique (the IP address is not being used by another host in the home network) and the address is allocated to the user.

Use the **no icmp echo** command to disable the ICMP echo mechanism in DHCP server. When icmp echo is disabled, the DHCP server module does not send ICMP (ping) packets to test the IP address for uniqueness before allocating it.

**Mode:** dhcp  
**Syntax:**  
*icmp echo enable*  
*no icmp echo*

**Example:**  
```
/# cd dhcp  
/dhcp# icmp echo enable
```

**lease time**

Use this command to configure the DHCP subnet lease time period for a particular Pool ID. To create a pool, use the **add pool** command as described on page 11-109.

**Mode:** dhcp  
**Syntax:** lease time \{pool-id\} \{value\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool-id</td>
<td>An integer value that uniquely identifies the specific subnet or address pool.</td>
</tr>
<tr>
<td>value</td>
<td>Specifies the lease time period in seconds. Range is 1 – 7200. The default is 3600.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd dhcp  
/dhcp# lease time 1 20
```
**CLI Commands**

**dhcp**

---

### list options

Use this command to display the global as well as the subnet-specific options used by the DHCP server in response to a DHCP DISCOVER.

**Mode:** dhcp

**Syntax:** list options

**Example:**

```
/# cd dhcp
/dhcp# list options
```

---

### RFC-2132 DHCP Options List

<table>
<thead>
<tr>
<th>Configuration using FlexMaster CLI</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Option Name</th>
<th>Type</th>
<th>Length</th>
<th>Example (assumed pool-id =1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt;pool-id&gt; &lt;type&gt; &lt;len&gt; &lt;val&gt;</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>------</td>
<td>--------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>1</td>
<td>4</td>
<td>1 1 4 255.0.0.0</td>
</tr>
<tr>
<td>Time Offset</td>
<td>2</td>
<td>4</td>
<td>1 2 4 3600</td>
</tr>
<tr>
<td>Def-Router</td>
<td>3</td>
<td>4</td>
<td>1 3 4 10.0.0.254</td>
</tr>
<tr>
<td>Time Server</td>
<td>4</td>
<td>4</td>
<td>1 4 4 10.0.0.1</td>
</tr>
<tr>
<td>Name Server</td>
<td>5</td>
<td>4</td>
<td>1 5 4 10.0.0.2</td>
</tr>
<tr>
<td>DNS Server</td>
<td>6</td>
<td>4</td>
<td>1 6 4 10.0.0.3</td>
</tr>
<tr>
<td>Log Server</td>
<td>7</td>
<td>4</td>
<td>1 7 4 10.0.0.4</td>
</tr>
<tr>
<td>Cookie Server</td>
<td>8</td>
<td>4</td>
<td>1 8 4 10.0.0.5</td>
</tr>
<tr>
<td>LPR Server</td>
<td>9</td>
<td>4</td>
<td>1 9 4 10.0.0.6</td>
</tr>
<tr>
<td>Impress Server</td>
<td>10</td>
<td>4</td>
<td>1 10 4 10.0.0.7</td>
</tr>
<tr>
<td>Resource Loc Server</td>
<td>11</td>
<td>4</td>
<td>1 11 4 10.0.0.8</td>
</tr>
<tr>
<td>Host Name</td>
<td>12</td>
<td>5**</td>
<td>1 12 5 host1</td>
</tr>
<tr>
<td>Merit Dump File</td>
<td>14</td>
<td>12**</td>
<td>1 14 20 filename</td>
</tr>
<tr>
<td>Domain Name</td>
<td>15</td>
<td>17**</td>
<td>1 15 20 carrieraccess.com</td>
</tr>
<tr>
<td>Swap Server</td>
<td>16</td>
<td>4</td>
<td>1 16 4 10.0.0.9</td>
</tr>
<tr>
<td>Root Path</td>
<td>17</td>
<td>12**</td>
<td>1 17 20 rootpath</td>
</tr>
<tr>
<td>Extensions Path</td>
<td>18</td>
<td>12**</td>
<td>1 18 20 extpath</td>
</tr>
<tr>
<td>IP Forwarding</td>
<td>19</td>
<td>1</td>
<td>1 19 1 1</td>
</tr>
<tr>
<td>Non-Local Routing</td>
<td>20</td>
<td>1</td>
<td>1 20 1 1</td>
</tr>
<tr>
<td>Policy Filter</td>
<td>21</td>
<td>8</td>
<td>1 21 8 10.0.0.10/255.0.0.0</td>
</tr>
<tr>
<td>Data Reassembly size</td>
<td>22</td>
<td>2</td>
<td>1 22 2 10</td>
</tr>
<tr>
<td>Default TTL</td>
<td>23</td>
<td>1</td>
<td>1 23 1 1</td>
</tr>
<tr>
<td>MTU Aging Timeout</td>
<td>24</td>
<td>4</td>
<td>1 24 4 3600</td>
</tr>
<tr>
<td>Path MTU Plateau</td>
<td>25</td>
<td>2</td>
<td>1 25 2 10</td>
</tr>
<tr>
<td>Interface MTU</td>
<td>26</td>
<td>2</td>
<td>1 26 2 10</td>
</tr>
<tr>
<td>All Subnets Local</td>
<td>27</td>
<td>1</td>
<td>1 27 1 1</td>
</tr>
<tr>
<td>Broadcast Address</td>
<td>28</td>
<td>4</td>
<td>1 28 4 10.255.255.255</td>
</tr>
<tr>
<td>Mask Discovery</td>
<td>29</td>
<td>1</td>
<td>1 29 1 1</td>
</tr>
<tr>
<td>Mask Supplier</td>
<td>30</td>
<td>1</td>
<td>1 30 1 1</td>
</tr>
<tr>
<td>Router Discovery</td>
<td>31</td>
<td>1</td>
<td>1 31 1 1</td>
</tr>
<tr>
<td>Rtr Solicitation Adr</td>
<td>32</td>
<td>4</td>
<td>1 32 4 10.0.0.11</td>
</tr>
<tr>
<td>Static Route</td>
<td>33</td>
<td>8</td>
<td>1 33 8 10.0.0.12/10.0.0.13</td>
</tr>
<tr>
<td>Trailer Encp</td>
<td>34</td>
<td>1</td>
<td>1 34 1 1</td>
</tr>
<tr>
<td>ARP Cache Timeout</td>
<td>35</td>
<td>4</td>
<td>1 35 4 90</td>
</tr>
<tr>
<td>Ethernet Encp</td>
<td>36</td>
<td>1</td>
<td>1 36 1 1</td>
</tr>
<tr>
<td>Tcp Default TTL</td>
<td>37</td>
<td>1</td>
<td>1 37 1 1</td>
</tr>
</tbody>
</table>
**CLI Commands**

### remove exclude pool

Use this command to delete an exclude address pool created using the exclude pool command as described on page 11-111. When the exclude pool is deleted, all of the previously excluded addresses, starting at the specified IP address, become available to the DHCP server. Before using this command, ensure that there are no PCs/workstations with static IP addresses that fall within the address pool.

**Mode:** dhcp

**Syntax:** remove exclude pool {pool index} {start ip}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool index</td>
<td>An integer value that uniquely identifies an address pool.</td>
</tr>
<tr>
<td>start ip</td>
<td>Starting IP address in the address pool.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd dhcp
/dhcp# remove exclude pool 1 10.0.0.10
```
**CLI Commands**

**dhcp**

---

**server addr timeout**

Use this command to set the DHCP server offer reuser timer.

*Mode:* dhcp

*Syntax:* server addr timeout {value}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Specifies the address timeout value. If the DHCP client does not send a request for renewal of an IP address, the IP address is returned back to the free pool. Value is in seconds. Do not set this time to a very low value (that is, lower than 10 seconds). This value should be greater than the time taken by the host for renewal of the IP address.</td>
</tr>
</tbody>
</table>

*Example:*
```
/# cd dhcp
/dhcp# server addr timeout 3600
```

---

**service dhcp**

Use this command to enable the DHCP Server. Use the `no dhcp service` command to disable the DHCP Server.

*Mode:* dhcp

*Syntax:* service dhcp

*Syntax:* no service dhcp

*Example:*
```
/# cd dhcp
/dhcp# service dhcp
```

---
subnet option

Use this command to set the subnet options. These options are applicable only to a specific IP subnet/address pool (for example, a network). Subnet options are assigned to all PC/workstations on the network along with global options. To create a pool, use the `add pool` command as described on page 11-109. To see a list of the available option types, use the `list options` command as described on page 11-114.

Use the `no subnet option` command to delete a configured subnet option.

**Mode:** dhcp

**Syntax:**

```
subnet option {pool index} {type} {len} {val}
```

```
no subnet option {pool index} {type}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool index</td>
<td>An integer value that uniquely identifies the subnet or address pool.</td>
</tr>
<tr>
<td>option type</td>
<td>Specifies the option type. To see a list of the available option types, use the <code>list options</code> command as described on page 11-114. Range is 1 – 76.</td>
</tr>
<tr>
<td>len</td>
<td>Specifies length of the value (in bytes). Range is 16 – 60 bytes, depending on the option type.</td>
</tr>
<tr>
<td>val</td>
<td>Specifies the value for the specified option.</td>
</tr>
</tbody>
</table>

**Example:**

```
/#! cd dhcp
/dhcp# subnet option 1 3 5 192.168.1.50
```

**Example:**

```
/#! cd dhcp
/dhcp# no subnet option 1 3
```
CLI Commands

dhcpc (DHCP Client)

**dhcpc (DHCP Client)**

A DHCP client is an Ethernet interface whose IP address is assigned dynamically by the DHCP server (host).

The following command is available in the dhcp client (dynamic host configuration protocol client) mode. Before using this command, you must switch to dhcp mode using `cd dhcpc`.

**dhcpc trace**

Use this command to set the debug level for tracing DHCP Client module.

**Mode:** dhcpc

**Syntax:**

```
dhcpc trace {all|events|failure|bind|none}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Use all trace types.</td>
</tr>
<tr>
<td>events</td>
<td>Trace DHCP client events.</td>
</tr>
<tr>
<td>packets</td>
<td>Trace packets.</td>
</tr>
<tr>
<td>failure</td>
<td>Trace failures.</td>
</tr>
<tr>
<td>bind</td>
<td>Trace all bindings.</td>
</tr>
<tr>
<td>none</td>
<td>Disable all DHCP client traces.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd dhcpc
/dhcpc# dhcpc trace all
```
dhcprelay (DHCP Relay)

A DHCP relay sends packets received on an Ethernet interface from a DHCP client to the specified DHCP server, which may be located further back in the network.

The commands listed below are available in the dhcp relay (dynamic host configuration protocol relay) mode. Before using these commands, you must switch to dhcp mode using `cd dhcprelay`.

Each command in the following list is a hyperlink to the detailed definition of the command.

- dhcprelay trace
- rai-option-control
- server
- server-only
- state


dhcprelay trace

Use this command to configure DHCP relay trace options.

**Mode:** dhcprelay

**Syntax:** dhcprelay trace {Hex value}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex value</td>
<td>A hexadecimal value, in the form 0xAB, which specifies the type of trace. 0xff – turn on the entire trace value 0x00 – turn off the trace 0x01 – initialization and shutdown activity 0x020 – FCR OS resource usage 0x040 – FCR failure conditions</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd dhcprelay
/dhcprelay# trace 0x00
```
***CLI Commands***
dhcprelay (DHCP Relay)

---

**rai-option-control**

Use this command to enable or disable Relay Agent Information (RAI) option control. When enabled, the Relay Agent processes Relay Agent Information options. An example of this processing is inserting the necessary options while relaying a packet from a client to a server and examining/stripping options when relaying a packet from a server to a client.

**Mode:** dhcprelay  
**Syntax:** rai-option-control {enable|disable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enable Relay Agent Information (RAI) option control.</td>
</tr>
<tr>
<td>disable</td>
<td>Default. Disable Relay Agent Information (RAI) option control.</td>
</tr>
</tbody>
</table>

**Example:**  
```bash  
/#!/ cd dhcprelay  
/dhcprelay# rai-option-control enable  
```

---

**server**

Use this command to set the IP address of the DHCP server to which the Relay Agent forwards packets from the client.

**Mode:** dhcprelay  
**Syntax:** server {ip-address}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the DHCP Server to which the Relay Agent forwards packets from the DHCP client.</td>
</tr>
</tbody>
</table>

**Example:**  
```bash  
/#!/ cd dhcprelay  
/dhcprelay# server 10.0.0.37  
```
**server-only**

Use this command to enable or disable the Relay Agent packet forwarding from a DHCP client to a specific DHCP server.

**Mode:** dhcprelay  
**Syntax:** server-only {enable|disable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enable Relay Agent packet forwarding.</td>
</tr>
<tr>
<td>disable</td>
<td>Default. Disable Relay Agent packet forwarding.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd dhcprelay
/dhcprelay# server-only enable
```

**state**

Use this command to enable or disable the DHCP relay protocol control. When enabled, the Relay Agent processes the related Relay Agent Information (RAI) options. An example of this processing is inserting the necessary options while relaying a packet from a client to a server and examining/stripping options when relaying a packet from a server to a client.

**Mode:** dhcprelay  
**Syntax:** state {enable|disable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enables the DHCP relay protocol.</td>
</tr>
<tr>
<td>disable</td>
<td>Default. Disables the DHCP relay protocol.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd dhcprelay
/dhcprelay# state enable
```
edit-config

The commands listed below are available in the edit-config mode. The prompt displays the configuration currently being edited. Before using these commands, you must switch to the edit-config mode using cd edit-config.

Each command in the following list is a hyperlink to the detailed definition of the command.

General Commands
- activate
- edit
- save
- set default
- set portrate
- show msrv

DS1 Interface Commands
- BertStatus
- LinkBertStart
- LinkBertStop
- set ais
- set datacode
- set DS1loopback
- set encoding
- set fd1
- set framing
- set FToRed
- set IdleCode
- set lbo
- set loopupcode
- set PortLoopBack
- set profile
- set signaling
- set StatusThreshold
- set threshold
- show datacode
- show signaling
- show tdm connect
**CLI Commands**

*DS3 Interface Commands*
- set clocksource
- set DS3loopback
- set FEACloopbackEnable
- set FEACloopbackReq
- set framing
- set linebuildout
- set mapping

*DS1 or DS3 Interface Commands*
- connect tdm
- disconnect tdm
- set clk
- set destination
- set down
- set name
- set scramble
- set up
- show
- show clk
- status

*V.35 Interface Commands*
- BertStatus
- PortBertStart
- PortBertStop
- set clk
- set cts
- set dcd
- set dsr
- set rate
- show v35
- status
CLI Commands
edit-config

General Commands

The commands listed below are available in the edit-config mode for all interface types. Each command in the following list is a hyperlink to the detailed definition for the command.

- activate
- edit
- save
- set default
- set portrate
- show msrv

activate

Use this command to activate a configuration profile. If the configuration you choose is currently being edited, save it before you activate it.

Mode: edit-config
Syntax: activate {config no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configurations. Valid entries are from 1 – 16.</td>
</tr>
</tbody>
</table>

Example: /edit-config[5]# activate 5
Config #5 activated.

edit

Use this command to open a configuration for editing. While you are editing the selected configuration, the configuration number is included in the command prompt.

After you finish making changes you must use the save command to save the configuration to the same config number or to another config number, as described on page 11-125. Before a configuration is used to control the system, you must activate it using the activate command, as described on page 11-124.

Mode: edit-config
Syntax: edit {config no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configurations. Valid entries are from 1 – 16.</td>
</tr>
</tbody>
</table>

Example: /edit-config# edit 12
/edit-config[12]#
Config #12 is opened for edit
save

Use this command to save the configuration currently being edited. The saved configuration becomes available after a reboot.

Configurations are complete sets of operational parameters that define how the system functions. Up to 16 configurations can be saved.

Specify a configuration number to save the currently-edited configuration to another configuration number. Omitting the argument saves the edited configuration to the current configuration number.

**NOTE:** You must issue the `edit` command to open an edit buffer before making configuration changes. If you issue the `edit` command after making changes, your changes will be lost. See the `edit` command on page 11-124 for more information.

**Mode:** edit-config

**Syntax:** `save [config no]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configuration profiles. Valid entries are from 1-16.</td>
</tr>
</tbody>
</table>

**Example:**
```
# edit-config/
/edit-config[13]# edit 13
Config #13 is opened for edit
Change configuration parameters as required
/edit-config[13]# save
Config #13 saved.
/edit-config[13]#
```

**Example:**
```
/edit-config[2]# save
You cannot save because
- you have insufficient privileges, or
- the edit buffer has not been opened (see the edit command)
/edit-config[2]#
```

**Example:**
```
/edit-config[2]# edit 2
Config #2 is opened for edit
Change configuration parameters as required.
/edit-config[2]# save 4
Config #4 saved.
/edit-config[4]#
```
set default

Restores a configuration to its default (factory) settings. This command does not save or activate the configuration. To save the configuration, use the save command. To activate the configuration, use the activate command.

This command sets the specified configuration to its default settings, but neither saves nor activates it. Using this command allows you to start the specified configuration from its default settings with no connections and then edit the configuration data as required. When the modifications are complete, the edited configuration must be saved and activated before it can be used.

You might want to revert to the factory-default configuration in the case of a corrupted database or a card inserted into the chassis with a different configuration than all the other cards in the chassis.

NOTE: Only TDM settings are restored to factory defaults. Router and ATM settings are not changed when you issue the set default command.

Mode: edit-config
Syntax: set default {config no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>config no</td>
<td>Identifies one of 16 configurations. Valid entries are from 1 – 16.</td>
</tr>
</tbody>
</table>

Example: /edit-config[1]# set default 1
profile 1 is set to default

/edit-config[1]# edit 1
config #1 is opened for edit

/edit-config[1]# save 1
Config #1 saved.

/edit-config[1]# activate 1
Config #1 activated.
/edit-config[1]#

This example uses a series of commands to set configuration 1 to its default values, opens it for editing, saves it, and then activates it.
**set portrate**

Sets base data rate of the specified multiservice port (port type M) to either 56k or 64k.

*Mode:* edit-config  
*Syntax:* `set portrate {ifName} {Rate56K|Rate64K}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifName</td>
<td>Interface name. The interface identifier, in the form <code>{slot-number}M{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>Rate56</td>
<td>Sets the base rate for the multiservice port to 56 kbps.</td>
</tr>
<tr>
<td>Rate64</td>
<td>Default. Sets the base rate for the multiservice port to 64 kbps.</td>
</tr>
</tbody>
</table>

*Example:*  
/edit-config[9]# set portrate 1m01 Rate56k  
Setting portrate to 64k  
Base Rate set to 56K

**show msrv**

Displays the configuration information for the specified multiservice port.

*Mode:* edit-config  
*Syntax:* `show msrv {Msrv-addr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Msrv-addr</td>
<td>The interface identifier, in the form <code>{slot-number}M{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

*Example:*  
/edit-config[3]# show msrv 1m01  
If Name : 1m01  
Rate : 0  
State : unassigned
**CLI Commands**

display-config

---

**DS1 Interface Commands**

The commands listed below are available in the **edit-config** mode for a DS1 interface. Each command in the following list is a hyperlink to the detailed definition for the command.

- BertStatus
- LinkBertStart
- LinkBertStop
- set ais
- set datacode
- set DS1loopback
- set encoding
- set fd1
- set framing
- set FToRed
- set IdleCode
- set lbo
- set loopupcode
- set PortLoopBack
- set profile
- set signaling
- set StatusThreshold
- set threshold
- show datacode
- show signaling
- show tdm connect

---

**BertStatus**

Use this command to display the BERT status information for the specified DS1 link.

*Mode:* **edit-config**

*Syntax:* BertStatus {DS1 interface-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface-name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

*Example:* `/edit-config[12]# BertStatus 1L02`

<table>
<thead>
<tr>
<th>State</th>
<th>Sync</th>
<th>Sync Lost</th>
<th>Bit Errors</th>
<th>Lapsed Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE</td>
<td>OUT</td>
<td>0</td>
<td>0</td>
<td>2 min</td>
</tr>
</tbody>
</table>
**CLI Commands**

**LinkBertStart**

Use this command to start a BERT on the specified DS1 link to run a test with the selected parameters (direction, pattern and timeout). BERT status is updated every five seconds.

**NOTE:** If a BERT is currently running on any other link or port on this module, the following message displays: **BERT BUSY xxx** where xxx indicates the interface name (for example, 3L01).

**Mode:** edit-config

**Syntax:**

```
LinkBertStart {DS1-interface-name} [direction {ToNetwork}]
[pattern {MARKS|SPACES|511|2047|2^15-1|QRSS}]
[timeout {value}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1-interface-name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>direction</td>
<td>ToNetwork – Egress BERT only, out the link toward the T1 circuit (Network) not ingress toward the Time Slot Interchanger (TSI). The BERT will only work if all of the timeslots on the link under test are being used and the type field is populated with a value other than idle. If all timeslots are dropped to a port or assigned as MSrv the state will be ACTIVE and the SYNC will be IN and the BERT will run. If the link under test is a full bypass to another link, the link not being tested must not be in alarm for the state to become ACTIVE and IN SYNC.</td>
</tr>
<tr>
<td>pattern</td>
<td>Select from one of the following patterns for the BERT: MARKS – Repetitive pattern of 1’s SPACES – Repetitive pattern of 0’s 511 – Pseudorandom pattern of length 511 bits 2047 – Pseudorandom pattern of length 2047 bits 2^15-1 – Pseudorandom pattern of length 2^15-1 bits QRSS – Quasi random signal - 2^{20}-1</td>
</tr>
<tr>
<td>timeout value</td>
<td>Timeout value.Range is 0 – 1440 minutes.</td>
</tr>
</tbody>
</table>

**Example:**

```bash
/edit-config[12]# LinkBertStart 2L03
LinkBert Updated Successfully
```

**Example:**

```bash
/edit-config[16]# linkBertStart 3L1 direction ToNetwork pattern QRSS timeout 4
BERT BUSY 3L03
```
**CLI Commands**

*edit-config*

## LinkBertStop

Use this command to stop BERT on the specified DS1 link.

**Mode:** `edit-config`

**Syntax:** `LinkBertStop {DS1-interface-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1_interface-name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]# LinkBertStop 2L01
LinkBert stopped Successfully.
```

## set ais

Use this command to enable or disable the Alarm Indication Signal forwarding on the DS1 link. The default is disabled.

**Mode:** `edit-config`

**Syntax:** `set {DS1 interface name} ais {disable|enable}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1_interface-name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>enable</td>
<td>Sets the interface to forward AIS.</td>
</tr>
<tr>
<td>disable</td>
<td><strong>Default.</strong> Stops the interface from forwarding AIS.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]#set 2L05 ais enable
Updated successfully
```
CLI Commands

set datacode

Use this command to set the trunk conditioning data patterns to be transmitted on the specified timeslot when the link is in an alarm state.

**Mode:** edit-config

**Syntax:** set \(DS1\) interface name\) datacode \{1|2|3|4\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>datacode {1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]# set 111:1-20 datacode 2
Updated successfully

set DS1loopback

Use this command to configure a loopback for the specified DS1 link.

**Mode:** edit-config

**Syntax:** set \(DS1\) interface name\) DS1loopback \{None|Local|LocAis|Line|Payld|RemLL|RemPL\} [timeout \{value\}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1loopback</td>
<td>Select the type of loopback to use for the DS1 link</td>
</tr>
<tr>
<td></td>
<td>None – Default. Loopback is not set.</td>
</tr>
<tr>
<td></td>
<td>Local – Loopback setting in local.</td>
</tr>
<tr>
<td></td>
<td>LocAis – Loopback setting in LocAis.</td>
</tr>
<tr>
<td></td>
<td>Line – Loopback setting in line.</td>
</tr>
<tr>
<td></td>
<td>Payld – Loopback setting in Payld.</td>
</tr>
<tr>
<td></td>
<td>RemLL – Loopback setting in RemLL</td>
</tr>
<tr>
<td></td>
<td>RemPL – Loopback setting in RemPL</td>
</tr>
<tr>
<td>timeout {value}</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]#set 2101 DS1loopback Line timeout 10
Updated Successfully

**Example:** /edit-config[12]#set 2L03 DS1loopback Payld timeout 100
Updated Successfully
### set encoding

Use this command to configure the encoding type for a DS1 link. The default is B8ZS.

**Mode:** `edit-config`

**Syntax:**
```
set {DS1 interface name} encoding {ami|b8zs}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DS1 interface name</strong></td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>ami</strong></td>
<td>Alternate mark inversion. This is an encoding type.</td>
</tr>
<tr>
<td><strong>b8zs</strong></td>
<td>Default. Bit-eight, zero suppression. This is an encoding type.</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config[12]#set 1L01 encoding b8zs
Updated Successfully
```

### set fdl

Use this command to user to configure the facilities data link (FDL) capabilities for a DS1 link.

**Mode:** `edit-config`

**Syntax:**
```
set {DS1 interface name} fdl {none|t1403}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DS1 interface name</strong></td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>none</strong></td>
<td>Disables FDL output messages.</td>
</tr>
<tr>
<td><strong>t1403</strong></td>
<td>Enable T1.403 FDL performance messages</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config[12]#set 2L05 fdl t1403
Updated Successfully
```

**Example:**
```
/edit-config[12]#set 2L05 fdl none
Updated Successfully
```
set framing

Use this command to configure the framing type for a DS1 link.

**Mode:** edit-config

**Syntax:** set {DS1 interface name} framing {d4|esf|eric}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>d4</td>
<td>Used primarily for voice only channels, has only signaling bits A and B.</td>
</tr>
<tr>
<td>esf</td>
<td>Extended superframe. Used primarily for data channels as well as voice. Uses signaling Bits ABCD.</td>
</tr>
<tr>
<td>eric</td>
<td>Select when connecting to equipment that uses Ericsson-modified D4 framing format. This format does not support signaling.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]#set 1L01 framing d4
Updated Successfully

set FToRed

Use this command to set the FToRed (force to red) configuration for the DS1 link.

**Mode:** edit-config

**Syntax:** set {DS1 interface name} FToRed {yes|no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
| yes|no | yes – The link will be forced into an alarm state when the threshold values configured for unavailable seconds (UAS) and errored seconds (ES) are met. This is very effective if APS is being used. See set threshold on page 11-137 for information about configuring the threshold values for unavailable seconds (UAS) and errored seconds (ES).

**Example:** /edit-config[12]#set 2L05 FtoRed yes
Updated Successfully
**set IdleCode**

Use this command to set an idlecode value for a DS1 link.

**Mode:** `edit-config`

**Syntax:** `set {DS1 interface name} IdleCode {value 0 to FF}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>value 0 to FF</td>
<td>The hexadecimal value for the idle code to be transmitted on the specified link. Range is 00h – FFh. The default is 50h (hex). See</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[12]# set 1l1 idlecode 22`  
Updated Successfully

**Example:** `/edit-config[12]# set 1l1 idlecode ff`  
Updated Successfully

**set lbo**

Use this command to configure a Line Build Out (LBO) value for the specified DS1 link.

**Mode:** `edit-config`

**Syntax:** `set {DS1 interface name} lbo {1|2|3|4}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
| 1|2|3|4 | Set the Line Build Out (LBO) to one of the following:
1 – DSX-1 equalization for 0-133 feet (CSU attenuation for LBO of 0dB)  
2 – DSX-1 equalization for 133 – 266 feet  
3 – DSX-1 equalization for 266 – 399 feet  
4 – DSX-1 equalization for 399 – 533 feet |

**Example:** `/edit-config[12]# set 2L05 lbo 1`  
Updated Successfully

This example sets the Line Build Out value for the DS1 link 2L05 to 1. That is, the value 1 corresponds to a LBO of 0 to 133 feet.
**set loopupcode**

Use this command to set the loopupcode value on the specified DS1 link.

**Mode:** *edit-config*

**Syntax:** `set {DS1 interface name}loopupcode {value}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}</code>L{port-number}. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>value</td>
<td>The hexadecimal value for the loop up code to be transmitted on each link. User defined LoopUp codes may be used to loop up mid-span repeaters. Range is 08h – 7Eh. The default is 10 (hex). With test equipment, always remove any leading zeros from the most significant digit. For example, if the loopup code is 70 (binary coded digital equivalent 0111 0000), then enter 110000 into your test equipment. <strong>NOTE:</strong> Loop codes below 10 do not work. Also, to avoid pattern duplication. Carrier Access recommends using only the following codes: 20, 30, 40, 50, 60, 70.</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[12]#set 2L05 loopupcode 30
Updated Successfully`

**set PortLoopBack**

Use this command to configure portloopback for the specified DS1 link.

**Mode:** *edit-config*

**Syntax:** `set {DS1 interface name} PortLoopBack {None|Loc|Rmt} [timeout {value}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}</code>L{port-number}. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>None</td>
<td>Default. No portloopback (or normal operation).</td>
</tr>
<tr>
<td>Loc</td>
<td><strong>Local PortLoopback.</strong> The local portloopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.</td>
</tr>
<tr>
<td>Rmt</td>
<td><strong>Remote PortLoop.</strong> DS3 linkback setting in Rmts.</td>
</tr>
<tr>
<td>timeout {value}</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>
CLI Commands

**edit-config**

**Example:** /edit-config[12]#set 2L01 PortDS3 link Loc timeout 10
Updated successfully

**Example:** /edit-config[12]#set 2L05 PortDS3 link Rmt timeout 500
Updated successfully

### set profile

Use this command to configure the automatic protection switch (aPS) for the specified DS1 link.

**Mode:** edit-config

**Syntax:** set {DS1 interface name} profile {profileNo} aPs {yes|no}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>profileNo</td>
<td>Number of the configuration profile for which the automatic protection switch is set. Range is 1 – 16.</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]#set 2L05 profileNo 16 aPs yes
Updated successfully

### set signaling

Use this command to set the trunk conditioning signaling patterns for the timeslots of the specified DS1 link.

**Mode:** edit-config

**Syntax:** set {ifName}[:channels] signaling {value}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifName</td>
<td>Interface name. The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>channels</td>
<td>The channel or channels for which signaling is set. Range is 1 – 24.</td>
</tr>
<tr>
<td>signaling {value}</td>
<td>Index of the trunk conditioning signaling patterns. Range is 1 – 10. These values are set in the TUI. See Defining ABCD/abcd Signaling Patterns on page 5-16.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]# set 1L1:1-20 signaling 2
Updated successfully
set StatusThreshold

Use this command to configure the alarm thresholds for a DS1 link.

**Mode:** edit-config

**Syntax:**
```
set {DS1 interface name} StatusThreshold {es|uas} {enable|disable}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}</code>L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>es</td>
<td>Errored seconds. Range is 0 – 900.</td>
</tr>
<tr>
<td>uas</td>
<td>Unavailable seconds. Range is 0 – 900.</td>
</tr>
<tr>
<td>enable</td>
<td>An alarm is generated when the threshold is exceeded in a 15 minute sliding window. A minor alarm is generated if Force link to RED is set to no. A major alarm is generated if Force link to RED is set to yes. See set FToRed on page 11-133 for additional information.</td>
</tr>
<tr>
<td>disable</td>
<td>No alarm is generated.</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config[6]# set 3L05 statusthreshold es enable
Updated Successfully
```

set threshold

Use this command to set the threshold values for a DS1 link. The threshold value is automatically enabled when the value is set using this command.

**Mode:** edit-config

**Syntax:**
```
set {DS1 interface name} threshold {es|uas} {value}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}</code>L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>es</td>
<td>uas</td>
</tr>
</tbody>
</table>
**CLI Commands**

*edit-config*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The number of unavailable seconds or errored seconds allowed during a 15 minute sliding window before an alarm is declared for the specified link. When using ES, the range is 0 – 900. When using UAS, the range is 0 – 900.</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[6]# set 3L05 threshold es 234`

This example sets a threshold value of 234 Errored Seconds (ES) for the DS1 link.

**show datacode**

Use this command to display the datacode pattern for the specified DS1 link.

**Mode:** `edit-config`

**Syntax:** `show datacode {DS1 interface name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}L{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[12]# show datacode 1L1`

No: 1L01

<table>
<thead>
<tr>
<th>TS</th>
<th>DataCode</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>10101000</td>
</tr>
<tr>
<td>02</td>
<td>00000000</td>
</tr>
<tr>
<td>03</td>
<td>11111111</td>
</tr>
<tr>
<td>04</td>
<td>00000000</td>
</tr>
<tr>
<td>05</td>
<td>00000000</td>
</tr>
<tr>
<td>06</td>
<td>00000000</td>
</tr>
<tr>
<td>07</td>
<td>00000000</td>
</tr>
<tr>
<td>08</td>
<td>00000000</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>00000000</td>
</tr>
<tr>
<td>17</td>
<td>00000000</td>
</tr>
<tr>
<td>18</td>
<td>00000000</td>
</tr>
<tr>
<td>19</td>
<td>00000000</td>
</tr>
<tr>
<td>20</td>
<td>00000000</td>
</tr>
<tr>
<td>21</td>
<td>00000000</td>
</tr>
<tr>
<td>22</td>
<td>00000000</td>
</tr>
<tr>
<td>23</td>
<td>00000000</td>
</tr>
<tr>
<td>24</td>
<td>00000000</td>
</tr>
</tbody>
</table>

=================================================================================
show signaling

Use this command to display the in use trunk conditioning signaling patterns for the specified DS1 link.

**Mode:** edit-config

**Syntax:** show signaling {DS1-interface-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1-interface-name</td>
<td>The interface identifier, in the form {slot-number}L{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]# show signalling 1L1
No: 1L01

TS     ABCD/abcd
01     1111/1111
02     1111/1111
03     1111/1111
04     1111/1111
05     1111/1111
06     1111/1111
07     1111/1111
08     1111/1111
[...]
16     1111/1111
17     1111/1111
18     1111/1111
19     1111/1111
20     1111/1111
21     1111/1111
22     1111/1111
23     1111/1111
24     1111/1111

=================================================================
```
**CLI Commands**

**edit-config**

### show tdm connect

Use this command to display the connection details for the specified DS1 link and channel. Omitting the channel argument returns connections for all the channels on the specified DS1 link.

**Mode:** edit-config

**Syntax:** show tdm connect {ifName[:channels]}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifName</td>
<td>Interface name. The interface identifier, in the form {slot-number}<em>L</em>{port-number}). See <strong>Interface Identifiers</strong> on page 11-5 for more information.</td>
</tr>
<tr>
<td>channels</td>
<td>The channel or channels for which connection details are returned. Range is 1 – 24.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[14]# show tdm connect 3L01

```
LINK:3L01
  TS  Type  Sig  ABCD  Port Type  Rate  Link  TS  ConNam
  01  -     -     -     -     -     -     -     -     -     -
  02  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
  03  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
  04  -     -     -     -     -     -     -     -     -     -
  05  -     -     -     -     -     -     -     -     -     -
  06  -     -     -     -     -     -     -     -     -     -
  07  -     -     -     -     -     -     -     -     -     -
  08  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
  09  -     -     -     -     -     -     -     -     -     -
 10  -     -     -     -     -     -     -     -     -     -
 11  -     -     -     -     -     -     -     -     -     -
 12  -     -     -     -     -     -     -     -     -     -
 13  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
 14  -     -     -     -     -     -     -     -     -     -
 15  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
 16  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
 17  Drop  Clr  3P01 V.35  448000  -     -     -     -     -     -
 18  -     -     -     -     -     -     -     -     -     -
 19  -     -     -     -     -     -     -     -     -     -
 20  -     -     -     -     -     -     -     -     -     -
 21  -     -     -     -     -     -     -     -     -     -
 22  -     -     -     -     -     -     -     -     -     -
 23  -     -     -     -     -     -     -     -     -     -
 24  -     -     -     -     -     -     -     -     -     -
```

Show Connect Successful
DS3 Interface Commands

The commands listed below are available in the edit-config mode for a DS3 interface. Each command in the following list is a hyperlink to the detailed definition for the command.

- set clocksource
- set DS3loopback
- set FEACloopbackEnable
- set FEACloopbackReq
- set framing
- set linebuildout
- set mapping

set clocksource

Use this command to set the specified DS3 link as a transmit clock source.

**Mode:** edit-config

**Syntax:** set {DS3 interface name} clocksource {loop |normal}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 interface name</td>
<td>The interface identifier, in the form {slot-number}D{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>loop</td>
<td>Use recovered timing.</td>
</tr>
<tr>
<td>normal</td>
<td>Use mastered timing.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]# set 2D03 clock loop
Updated Successfully

set DS3loopback

Use this command to configure a loopback for the specified DS3 link.

**Mode:** edit-config

**Syntax:** set {DS3 interface name} DS3loopback {None|Linel|Loc|Pyld} [timeout {value}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 interface name</td>
<td>The interface identifier, in the form {slot-number}D{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>None</td>
<td>Default. No portloopback (or normal operation).</td>
</tr>
<tr>
<td>Line</td>
<td><strong>Line Loopback:</strong> Causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module.</td>
</tr>
</tbody>
</table>
CLI Commands

**edit-config**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td><strong>Local Loopback.</strong> The local loopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.</td>
</tr>
<tr>
<td>Payld</td>
<td><strong>Payload Loopback.</strong> The payload loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, with the exception that the framing and CRC-6 bits are reinserted to the transmit signal stream. The receive signal to the module is not affected by the loopback.</td>
</tr>
<tr>
<td>timeout {value}</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]# set 2d01 DS3loopback Line timeout 10
Setting...Complete!
Loopback Updated Successfully

**set FEACloopbackEnable**

Use this command to enable the FEAC (Far End Alarm and Control) loopback function and configure the timeout value for the loopback test for the specified DS3 link.

**Mode:** edit-config

**Syntax:** set {DS3 interface name} FEACloopbackEnable {yes|no} [timeout {value}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 interface name</td>
<td>The interface identifier, in the form {slot-number}D{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>timeout {value}</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[12]# set 2D03 FEACloopbackEnable yes timeout 10
Setting...Complete!
FEAC loopback enable Updated Successfully
set FEACloopbackReq

Use this command to configure the FEAC (Far End Alarm and Control) loopback request for the specified DS3 link.

**Mode:** edit-config

**Syntax:**
```
set {DS3 interface name} FEACloopbackReq {yes |no} [timeout {value}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 interface name</td>
<td>The interface identifier, in the form {slot-number}D{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>timeout {value}</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config[12]#set 2D03 FEACloopbackReq yes timeout 10
Updated Successfully
```

set framing

Use this command to set the framing format for the specified DS3 link.

**Mode:** edit-config

**Syntax:**
```
set {DS3 interface name} framing {cbit|m23}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 interface name</td>
<td>The interface identifier, in the form {slot-number}D{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>cbit</td>
<td>Default. C-Bit parity framing format. Stuffing is always present.</td>
</tr>
<tr>
<td>m23</td>
<td>Multiplex 2-to-3 (also known as M13). All three C-bits in a subframe are set to 1 if stuffing occurs or to 0 (zero) if stuffing does not occur.</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config[12]#set 1D01 framing cbit
Updated Successfully
```
CLI Commands
edit-config

**set linebuildout**

Use this command to set the linebuildout (output attenuation level) for the specified DS3 link. (This prevents over-driving and cross-talk on short lines.)

*Mode:* edit-config

**Syntax:** `set {DS3 interface name} linebuildout {0|1}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DS3 interface name</strong></td>
<td>The interface identifier, in the form <code>{slot-number}D{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>**0</td>
<td>1**</td>
</tr>
<tr>
<td></td>
<td>1 – Set the Line Build Out (LBO) to &gt;255 ft.</td>
</tr>
</tbody>
</table>

*Example:* `/edit-config[12]#set 2d01 linebuildout 0`  
Updated Successfully

*Example:* `/edit-config[12]#set 2d02 linebuildout 1`  
Updated Successfully

**set mapping**

Use this command to configure mapping for the specified DS3 link.

*Mode:* edit-config

**Syntax:** `set {DS3 interface name} mapping {direct|plcp}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DS3 interface name</strong></td>
<td>The interface identifier, in the form <code>{slot-number}D{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>**direct</td>
<td>plcp**</td>
</tr>
<tr>
<td></td>
<td><strong>direct</strong> – ATM data is mapped to ATM cell boundaries based on the HEC field in the ATM cell header.</td>
</tr>
<tr>
<td></td>
<td><strong>plcp</strong> – Cells are mapped into the DS3 data stream using the ATM Physical Layer Convergence Protocol (PLCP) The PLCP mapping is a high overhead protocol and reduces the DS3 bandwidth from 106,000 CPS to about 96,000 CPS. It also allows users to transmit an independent clock reference through the DS3 link.</td>
</tr>
</tbody>
</table>

*Example:* `/edit-config[12]#set 2D02 mapping plcp`  
Updated Successfully
DS1 or DS3 Interface Commands

The commands listed below are available in the `edit-config` mode for a DS1 or DS3 interface. Each command in the following list is a hyperlink to the detailed definition for the command.

- connect tdm
- disconnect tdm
- set clk
- set destination
- set down
- set name
- set scramble
- set up
- show
- show clk
- status

**connect tdm**

Use this command to create bi-directional cross-connects between the DS0 ports of an interface and the specified DS1 or DS3 link.

**Mode:** edit-config

**Syntax:**

```
connect tdm {ifName[:channels]} {ifName[:channels]}
[Name {name}] [idleCode {1-8}] [Rob]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifName</td>
<td>Interface name. The interface identifier, in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>channels</td>
<td>The channel or channels for which the cross-connect is created. Range is 1 – 24.</td>
</tr>
<tr>
<td>name</td>
<td>Name for the cross connect. Alphanumeric string of up to 16 characters. Case sensitive.</td>
</tr>
<tr>
<td>idlecode</td>
<td>The value of the ABCD signaling. Range is 1 – 8. The default is 1.</td>
</tr>
<tr>
<td>Rob</td>
<td>Use robbed-bit signaling.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]#connect tdm 3L02 3L04
Cross connect Successful
```

This example connects one link to another.
CLI Commands
edit-config

**Example:** /edit-config[12]# connect tdm 1L01:1-24 1L02:1-24
Cross connect Successful
This example connects all 24 channels.

**Example:** /edit-config[12]# connect tdm 1L01:1-5 1p1
This example connects 5 contiguous DS0 channels to the slot 1 port.

**Example:** Connect tdm 1L01:1-12 3m1
This example connects msrv/management channels towards the DS3 module. (In this example, module in slot 3 is a DS3a.)

**disconnect tdm**

Use this command to remove the cross-connections between the DS0 ports of the specified DS1 or DS3 link.

**Mode:** edit-config

**Syntax:** disconnect tdm {ifName[:channels]}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifName</td>
<td>Interface name. The interface identifier, in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>channels</td>
<td>The channel or channels (timeslots) for which the cross-connect is created. Range is 1 – 24.</td>
</tr>
</tbody>
</table>

**Example:** /edit-config[5]# disconnect tdm 1L01:1-24
Disconnect Successful

**set clk**

Use this command to set the clock source configuration for the specified DS1 or DS3 link.

**NOTE:** The system timing source specifications for each of the 16 configuration files should be identical to simplify system administration.
CLI Commands

set clk

Mode: edit-config
Syntax: set clk {int|pri|sec|no} [intf {DS1/DS3 interface name}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>clk</td>
<td>Specify the clock source for the link.</td>
</tr>
<tr>
<td></td>
<td><strong>int</strong> – <strong>Internal</strong>. The timing source is the internal crystal of the module (±25ppm). The clock mode is set to “Internal”.</td>
</tr>
<tr>
<td></td>
<td><strong>pri</strong> – <strong>Primary</strong>. Indicates that the specified link (port) is the primary timing source for the chassis. You can select only one primary source. Clock mode is set to “External”.</td>
</tr>
<tr>
<td></td>
<td><strong>sec</strong> – <strong>Secondary</strong>. Indicates that the specified link (port) is an alternate timing source that can be used if the primary source fails. There is no limit to the number of secondary timing sources that can be used. The Clock mode is set to “External”.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The “sec” option checks for the existence of a primary link. If a primary link is not found, the link is not changed and the message “Clock not changed. Must set primary first” displays. If a primary link is found and the current command sets the same link to secondary, then the message “This link is already set to Primary. To make it Secondary, set any other link to Primary” displays.</td>
</tr>
<tr>
<td></td>
<td><strong>no</strong> – <strong>Default</strong>. Indicates that the specified link (port) is not a timing source.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The “no” option checks whether or not the specified link is already set to primary. If the specified link is set to primary, the link is not changed and the message “Clock not changed. This link is already set to Primary. Can not set a primary to no.” displays.</td>
</tr>
</tbody>
</table>

**DS1/DS3 interface name** The interface identifier, in the form \{slot-number\}\{interface-type\}\{port-number\}. See Interface Identifiers on page 11-5 for more information.

Example: /edit-config[1]# set clk int
Updated Successfully
This example sets the clock mode to “Internal” and all the link statuses to “No.”

Example: /edit-config[1]# set clk pri intf 1L1
Updated Successfully
This example sets the clock mode to “External” and the first link of the first card status to “Pr” (primary).

Example: /edit-config[1]# set clk sec intf 1L1
Updated Successfully
This example sets the clock mode to “External” and the first link of the first card status to “Se” (secondary).
**CLI Commands**

**edit-config**

---

**set destination**

Use this command to set the destination for the specified DS1 or DS3 link.

*Mode:* edit-config

*Syntax:* `set {DS1/DS3 interface name} destination {id-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1/DS3 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}\{interface-type}\{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>id-name</td>
<td>Name for the destination. Alphanumeric string of up to 16 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

*Example:* `/edit-config[3]# set 1L01 destination Chicago
Updated Successfully`

---

**set down**

Use this command to set the specified DS1 or DS3 link to out-of-service.

*Mode:* edit-config

*Syntax:* `set {DS1/DS3 interface name} down`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1/DS3 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}\{interface-type}\{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

*Example:* `/edit-config[12]# set 3L04 down
Updated Successfully`

---

**set name**

Use this command to create a user-friendly name for the specified DS1 or DS3 link.

*Mode:* edit-config

*Syntax:* `set {DS1/DS3 interface name} name {id-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1/DS3 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}\{interface-type}\{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>
**CLI Commands**

*set scramble*

---

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>id-name</td>
<td>Name for the interface. Alphanumeric string of up to 16 characters. Case sensitive.</td>
</tr>
</tbody>
</table>

**Example:**

```
/set 2L05 name Roanoke
Updated Successfully
```

**Example:**

```
/set 2D02 name Tulsa
Updated Successfully
```

---

Use this command to configure scrambling and idle cell discard for the specified DS1 or DS3 link.

**Mode:** `edit-config`

**Syntax:**

```
set {DS1/DS3 interface name} [scramble {Yes|No}] [idlceldis {Yes|No}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DS1/DS3 interface name</strong></td>
<td>The interface identifier, in the form <code>{slot-number}{interface-type}{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>scramble</td>
<td>Specifies whether scrambling in enabled for the specified DS3 link. yes – Set scrambling. no – Do not set scrambling.</td>
</tr>
<tr>
<td>idlceldis</td>
<td>Specifies whether the UNI discards the ATM idle filler cells. Idle cells are inserted into the data stream to fill up to bandwidth when there is insufficient data being transmitted. yes – Set idle cell discard for the specified DS3 link. no – Do not set idle cell discard for the specified DS3 link.</td>
</tr>
</tbody>
</table>

**Example:**

```
/set 2D03 scramble Yes
Updated Successfully
```

**Example:**

```
/set 4L03 scramble yes idlceldis yes
Updated Successfully
```
CLI Commands
edit-config

set up

Use this command to place the specified DS1 or DS3 link to the UP state (in service).

Mode: edit-config
Syntax: set {DS1/DS3 interface name} up

Example: /edit-config[12]#set 2L05 up
Updated Successfully

show

Use this command to display the current configuration settings for the specified DS1 or DS3 link.

Mode: edit-config
Syntax: show {DS1/DS3 interface name}

Example: /edit-config[12]# show 3L04
SLOT 3:
Setting for DS1 4:
  Circuit ID:
    Up/Down:            UP
    Framing:            ESF
    Line Coding:        B8ZS
    Line Build Out:     CSU attenuation for LBO of 0dB
    FDL Type:           None
    AIS Forwarding:     Disable
CLI Commands

**show**

Performance Threshold Settings for 15 min.
------------------------------------------
unavailable seconds: Disable 12
errored seconds: Disable 12
Auto Protection Switch:
Link  1 Config: NO APS Ret: NO
Link  2 Config: NO APS Ret: NO
Link  3 Config: NO APS Ret: NO
Link  4 Config: NO APS Ret: NO
Link  5 Config: NO APS Ret: NO
Link  6 Config: NO APS Ret: NO
Link  7 Config: NO APS Ret: NO
Link  8 Config: NO APS Ret: NO

**NOTE:** The preceding example shows a TDM module.

**Example:**
SLOT 1:
Setting for DS1 1:
Force To red :No
Circuit ID:
Up/Down: UP
Framing: ESF
Line Coding: B8ZS
Line Build Out: CSU attenuation for LBO of 0dB
FDL Type: T1403
Scramble: No
Idl Cel Dis: No
Idle Code: a1
AIS Forwarding: Disable
LoopupCode: 10

Performance Threshold Settings for 15 min.
------------------------------------------
unavailable seconds: Disable 12
errored seconds: Disable 12
Auto Protection Switch:
Link  1 Config: NO APS Ret: NO
Link  2 Config: NO APS Ret: NO
Link  3 Config: NO APS Ret: NO
Link  4 Config: NO APS Ret: NO
Link  5 Config: NO APS Ret: NO
Link  6 Config: NO APS Ret: NO
Link  7 Config: NO APS Ret: NO
Link  8 Config: NO APS Ret: NO

**NOTE:** The preceding example shows an ATM module.
CLI Commands
edit-config

**show clk**

Use this command to display the clock settings for the current DS1 or DS3 link.

*Mode:* edit-config  
*Syntax:* `show clk`  
*Example:* `/edit-config[1]# show clk`

---

Clock Mode : Internal

<----------------- LINK -----------------> <-- DS3 -->

<table>
<thead>
<tr>
<th># MODULE NAME</th>
<th>1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 1 2 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 FLEXmaster8</td>
<td>No No No No No No No No No No No No</td>
</tr>
<tr>
<td>2 FLEXmaster ATM</td>
<td>No No No No No No No No No No No No</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

---

**status**

Use this command to display the current status of the specified DS1 or DS3 link.

*Mode:* edit-config  
*Syntax:* `status {DS1/DS3 interface name} [performance] [history] [min15x|remotemin15x|cur24hr|cur48hr|cur72hr]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1/DS3 interface name</td>
<td>The interface identifier, in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>performance</td>
<td>Displays performance statistics.</td>
</tr>
<tr>
<td>performance history</td>
<td>Displays performance history statistics.</td>
</tr>
<tr>
<td>min15x</td>
<td>Displays the local statistics for the current 15 minutes and the previous 15 minutes.</td>
</tr>
<tr>
<td>remotemin15x</td>
<td>Displays the remote statistics for the current 15 minutes and the previous 15 minutes.</td>
</tr>
</tbody>
</table>
CLI Commands

status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cur24hr</td>
<td>Displays the local statistics for the current 24 hours.</td>
</tr>
<tr>
<td>cur48hr</td>
<td>Displays the local statistics for the current 48 hours.</td>
</tr>
<tr>
<td>cur72hr</td>
<td>Displays the local statistics for the current 72 hours.</td>
</tr>
</tbody>
</table>

Example: /edit-config[1]# status 1101 performance history cur24hr

Local Statistics for DS1 1:

<table>
<thead>
<tr>
<th>Interval</th>
<th>EE</th>
<th>ES</th>
<th>UAS</th>
<th>SES</th>
<th>BES</th>
<th>CSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cur 24-hr</td>
<td>9000</td>
<td>1</td>
<td>9000</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
V.35 Interface Commands

The commands listed below are available in the edit-config mode for the V.35 interface. Each command in the following list is a hyperlink to the detailed definition for the command.

- BertStatus
- PortBertStart
- PortBertStop
- set clk
- set cts
- set dcd
- set dsr
- set rate
- show v35

BertStatus

Use this command to display the BERT information for V.35 interface.

Mode: edit-config
Syntax: BertStatus {V35 interface-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V35 interface-name</td>
<td>The V.35 interface identifier, in the form {slot-number}P{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

Example: /edit-config[12]# BertStatus 2P01

State   Sync   Sync Lost   Bit Errors   Lapsed Time
INACTIVE    OUT           0           0             0 min

PortBertStart

Use this command to start a BERT on the specified V.35 port to run a test with the selected parameters (direction, pattern, and timeout). BERT status is updated every five seconds.

NOTE: If a BERT is currently running on any other link or port on this module, the following message displays:
BERT BUSY xxx where xxx indicates the interface name (for example, 1P01).
**CLI Commands**

**PortBertStop**

Mode: edit-config

**Syntax:**

```
PortBertStop {V35 interface-name} [direction {ToPort}] [pattern {MARKS|SPACES|511|2047|2^15-1|QRSS}] [timeout {value}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V35 interface-name</td>
<td>The V.35 interface identifier, in the form {slot-number}P{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>direction</td>
<td>ToPort. The BERT is connected to a port in place of the TSI. The BERT data is not cross-connected through the TSI. The full bandwidth allocated to the port is used for the BERT. Changing the baud rate automatically provides more or less BERT bandwidth per frame. This requires an external loopback at the port.</td>
</tr>
<tr>
<td>pattern</td>
<td>Select from one of the following patterns for the BErT: MARKS – Repetitive pattern of 1’s, SPACES – Repetitive pattern of 0’s, 511 – Pseudorandom pattern of length 511 bits, 2047 – Pseudorandom pattern of length 2047 bits, 2^15-1 – Pseudorandom pattern of length 2^15-1 bits, QRSS – Quasi random signal - 2^20-1.</td>
</tr>
<tr>
<td>timeout</td>
<td>Specify the number of minutes for the loopback test to run. Range is 0 – 1440 minutes. Entering 0 causes the loopback to run indefinitely.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]# PortBertStart 1p01
PortBert Updated Successfully
```

**PortBertStop**

Use this command to disable BERT, which stops the currently running test on the specified V.35 port.

Mode: edit-config

**Syntax:**

```
PortBertStop {V35 interface-name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V35 interface-name</td>
<td>The V.35 port identifier, in the form {slot-number}P{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[12]# PortBertStop 2p01
PortBert stopped Successfully
```
CLI Commands

**edit-config**

---

### set clk

Use this command to set the data port clock source for the selected V.35 port.

**NOTE:** To view the current settings for the specified V.35 port, issue the `show v35` command described on page 11-158.

**Mode:** edit-config

**Syntax:**

```
set {v35-addr} clck {internal|external}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>internal</td>
<td>Default. The system supplies a clock synchronized to the network.</td>
</tr>
<tr>
<td>external</td>
<td>The clock is supplied by an external CPE device (sometimes called 306 mode in other devices).</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[6]# set 1P01 clck external
Clock value set successfully
```

---

### set cts

Use this command to configure the Clear To Send (CTS) operation mode for specified V.35 port.

**NOTE:** To view the current settings for the specified V.35 port, issue the `show v35` command described on page 11-158.

**Mode:** edit-config

**Syntax:**

```
set {v35-addr} cts {on|auto}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>on</td>
<td>Sets CTS to on mode. Signal is forced high</td>
</tr>
<tr>
<td>auto</td>
<td>Default. Follows RTS (Request To Send).</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[6]# set 3p01 cts on
CTS value set successfully
```
set dcd

Use this command to configure the Data Carrier Detect (DCD) operation mode for specified V.35 port.

**NOTE:** To view the current settings for the specified V.35 port, issue the `show v35` command described on page 11-158.

**Mode:** edit-config

**Syntax:** `set {v35-addr} dcd {on|auto}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>on</td>
<td>Sets DCD to on mode. Signal is forced high. If the link to which this port is connected has an alarm status of green, yellow, or minor, the DCD is on.</td>
</tr>
<tr>
<td>auto</td>
<td>Default. If the link that this port is connected to is in alarm, the DCD is turned off. If the alarm status is green, yellow, or minor the DCD is on.</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[6]# set 1P01 dcd off`  
DCD value set successfully

set dsr

Use this command to configure the Data Set Ready (DSR) operation mode for specified V.35 port.

**NOTE:** To view the current settings for the specified V.35 port, issue the `show v35` command described on page 11-158.

**Mode:** edit-config

**Syntax:** `set {v35-addr} dsr {on|auto}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>on</td>
<td>Sets DSR to on mode. Signal is forced high</td>
</tr>
<tr>
<td>auto</td>
<td>Default. Sets CTS to off mode. Follows Data Terminal Ready (DTR).</td>
</tr>
</tbody>
</table>

**Example:** `/edit-config[6]# set 1P01 dsr off`  
DSR value set successfully
**CLI Commands**

*edit-config*

---

**set rate**

Use this command to set the data rate for each DS0 to which a V.35 is cross-connected.

**NOTE:** To view the current settings for the specified V.35 port, issue the `show v35` command described on page 11-158.

**Mode:** `edit-config`

**Syntax:** `set {v35-addr} rate {56|64}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
<tr>
<td>rate</td>
<td>Set the data rate for the DS0 cross-connect: 56 – Sets the data rate to 56 kbps with bit stuffing. 64 – Default. Sets the data rate to 64 kbps.</td>
</tr>
</tbody>
</table>

**Example:**
```
edit-config[6]# set 1P01 rate 56
Rate value set successfully
```

**show v35**

Use this command to display the current configuration settings for the specified the V.35 port.

**Mode:** `edit-config`

**Syntax:** `show v35 {v35-addr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form <code>{slot-number}P{port-number}</code>. See <em>Interface Identifiers</em> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**
```
/edit-config# show v35 1P01

show v35 1p1
If Name ==>1p1
Base Rate ==>0
CTS ==>OFF
DSR ==>OFF
DCD ==>OFF
clock source ==>INTERNAL
```
status

Use this command to display the current status for the specified the V.35 port.

**Mode:** edit-config

**Syntax:** status v35 \{v35-addr\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>v35-addr</td>
<td>The V.35 port identifier, in the form {slot-number}P{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**

```
/edit-config[1]# status v35 1p1
INTERFACE : 1P01 V.35
RATE      : 0 k
LPBK      : None
BERT      : None
STATE     : Unas
DSR       : Off
DTR       : Off
DCD       : Off
CTS       : Off
RTS       : Off
```
The commands listed below are available in the firewall mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- access-list
- commit
- disable
- enable
- filter
- firewall interface
- icmp
- logs disable
- logs enable
- mail logs
- schedule access-list
- show access-lists
- show firewall config
- show firewall filters
- show firewall interface config
- show firewall interface stats
- show firewall logs
- show firewall schedule
- show firewall stats

**No Variants**

The following firewall mode commands are no variants of the corresponding affirmative command. For example, the no access-list command is the no variant of the access-list command. Descriptions of the no variants are included with the corresponding affirmative command.

- no access-list
- no filter
- no schedule access-list
**access-list**

Use this command to add an access list or rule for a particular interface. Use the `no access-list` command to delete a rule in the firewall access list table.

**NOTE:** Access lists or rules can only be created for interfaces that have been designated as “external” using the `firewall interface` command described on page 11-163.

**Mode:** firewall

**Syntax:**
```
access-list {acl name} {interface name} {in|out} {filter combination} {permit|deny} {priority val}
```

**Syntax:**
```
no access-list {acl name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>acl name</td>
<td>Name of the access list. Maximum 20 characters.</td>
</tr>
<tr>
<td>interface name</td>
<td>Name of interface, in the form <code>{slot-number}E{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>in</td>
<td>out</td>
</tr>
<tr>
<td>filter combination</td>
<td>Filters to apply on this access list. Filters are created using the <code>filter</code> command as described on page 11-162. To list more than one filter, separate with a comma (as in the example above).</td>
</tr>
<tr>
<td>permit</td>
<td>deny</td>
</tr>
<tr>
<td>priority val</td>
<td>Defines the order in which the filters are to be matched against the packets from a particular interface. The sequence number should not be zero. The sequence numbers are unique.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # cd firewall
/firewall# access-list acl1 1E2 in filter1,filter4 deny 100
```

**Example:**
```
/ # cd firewall
/firewall# no access-list acl1
```

**commit**

Use this command to commit (save) changes to the firewall configuration to the dataplane. This command is equivalent to issuing a `disable` command followed by an `enable` command.

**Mode:** firewall

**Syntax:**
```
commit
```

**Example:**
```
/ # cd firewall
/firewall# commit
```
**CLI Commands**

*firewall*

### disable

Use this command to disable firewall service.

**Mode:** firewall  
**Syntax:** disable  
**Example:**
```
#/ cd firewall  
/firewall# disable
```

### enable

Use this command to enable the firewall service.

**Mode:** firewall  
**Syntax:** enable  
**Example:**
```
#/ cd firewall  
/firewall# enable
```

### filter

Use the `filter add` command to add a firewall filter based on IP address range, protocol, and/or port. Use the `no filter` command to delete the specified firewall filter.

**Mode:** firewall  
**Syntax:** filter add {filter name} {src ip/range|any} {dest ip/range|any} [protocol|any] [srcport {range}] [destport {range}] [established]  
**Syntax:** no filter {filter name}  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>filter name</code></td>
<td>A unique name for the filter, with a maximum number of 19 characters.</td>
</tr>
<tr>
<td><code>src ip/mask</code></td>
<td>Source IP address and mask number.</td>
</tr>
<tr>
<td><code>dest ip/mask</code></td>
<td>Destination IP address and mask number.</td>
</tr>
</tbody>
</table>
CLI Commands
firewall interface

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>any</td>
<td>Default. Applies any protocol to the filter.</td>
</tr>
<tr>
<td>srcport</td>
<td>Source port.</td>
</tr>
<tr>
<td>destport</td>
<td>Destination port.</td>
</tr>
<tr>
<td>established</td>
<td>The TCP ACK bit to be checked against the packet</td>
</tr>
</tbody>
</table>

**Example:**
```
# cd firewall
/firewall# filter add filter1 10.0.0.1/24 20.0.0.1/24
```

**Example:**
```
/# cd firewall
/firewall# no filter filter1
```

**firewall interface**

Use this command to configure the firewall interface. Only external interfaces are acceptable for access lists.

**Mode:** firewall

**Syntax:** firewall interface {interface name} {internal|external}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface name</td>
<td>Name of interface to configure, in the form {slot-number}E{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>internal</td>
<td>The interface is connected to the home network</td>
</tr>
<tr>
<td>external</td>
<td>The interface is connected to the internet</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd firewall
/firewall# firewall interface 1E2 internal
```
**CLI Commands**

**firewall**

---

**icmp**

Use this command to configure ICMP messaging to generate or suppress the ICMP message when the firewall rejects a packet.

*Mode:* firewall  
*Syntax:* icmp {generate|suppress}  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>generate</td>
<td>Generate an ICMP message when firewall rejects a packet.</td>
</tr>
<tr>
<td>suppress</td>
<td>Do not generate an ICMP message when firewall rejects a packet.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd firewall  
/firewall# icmp generate
```

---

**logs disable**

Use this command to disable firewall logging.

*Mode:* firewall  
*Syntax:* logs disable  

*Example:*  
```
/# cd firewall  
/firewall# logs disable
```

---

**logs enable**

Use this command to enable firewall logging and set the log server IP address.

*Mode:* firewall  
*Syntax:* logs enable [log server IP address]  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>log server IP address</td>
<td>The IP address of the server to which log files are sent.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd firewall  
/firewall# logs enable 10.0.0.100
```
**mail logs**

Use this command to send the firewall logs to the mail server.

**Mode:** firewall

**Syntax:**
```
mail logs {mail server IP address} {sender email address}
{recipient email address}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>mail server IP address</td>
<td>The IP Address of the mail server.</td>
</tr>
<tr>
<td>sender email address</td>
<td>Email address of the sender.</td>
</tr>
<tr>
<td>recipient email address</td>
<td>Email address of the recipient.</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ cd firewall
/firewall# mail logs 10.0.0.100 address@email3.com
address@email2.com
```

**schedule access-list**

Use this command to schedule the specified access list for a specific duration of the day. Use the `no` `schedule access-list` command to remove the scheduled time from the specified access list.

**Mode:** firewall

**Syntax:**
```
schedule access-list {acl name} from {hour} {min} to {hour} {min}
```

**Syntax:**
```
no schedule access-list {acl name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>acl name</td>
<td>The name of an access list previously created using the access-list command as described on page 11-161.</td>
</tr>
<tr>
<td>from {hour} {min}</td>
<td>Start time for the scheduled access list.</td>
</tr>
<tr>
<td>to {hour} {min}</td>
<td>End time for the scheduled access list.</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ cd firewall
/firewall# schedule access-list acl1 from 10 10 to 10 30
```

**Example:**
```
#/ cd firewall
/firewall# no schedule access-list acl1
```
show access-lists

Use this command to display the current access lists.

Mode: firewall
Syntax: show access-lists
Example: /# cd firewall
      /firewall# show access lists

Firewall Access Lists

<table>
<thead>
<tr>
<th>ACL Name</th>
<th>Interface</th>
<th>Filter Combination</th>
<th>Direction</th>
<th>Action</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>acl1</td>
<td>1E2</td>
<td>f1</td>
<td>in</td>
<td>deny</td>
<td>1</td>
</tr>
</tbody>
</table>

show firewall config

Use this command to display the current firewall configuration.

Mode: firewall
Syntax: show firewall config
Example: /# cd firewall
      /firewall# show firewall config

Firewall Global Configuration

- Firewall Status: Enable
- Generate ICMP Error Message: Disable
- Examine IP Spoofing Attack: Disable
- Filtering IP Source Route option: Enable
- Examine TCP SYN packets option: Enable
- Log mechanism: Disable
- Log Server IP: 0.0.0.0
- Mail Server IP: 0.0.0.0
- Recipient Domain Name:
- Max Filters: 100
- Max Access-Lists: 50
- Sender Domain Name:
- TCP Syn. wait timeout: 1
- TCP Syn. Packets allowed: 10
- Trace Level:
show firewall filters

Use this command to display the current firewall filters.

**Mode:** firewall  
**Syntax:** `show firewall filters`  
**Example:**  
```
/# cd firewall
/firewall# show firewall filters
```

Firewall Filters

<table>
<thead>
<tr>
<th>Filter</th>
<th>Proto</th>
<th>Src Address</th>
<th>Dest Address</th>
<th>Src Port</th>
<th>Dest Port</th>
<th>Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>f1</td>
<td>any</td>
<td>10.0.0.1/24</td>
<td>20.0.0.1/24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

show firewall interface config

Use this command to display the current interface firewall configuration.

**Mode:** firewall  
**Syntax:** `show firewall interface config {interface name}`

**Example:**  
```
/# cd firewall
/firewall# show firewall interface config 1E2
```

Firewall Interface Configuration for interface 1E2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface name</td>
<td>Name of interface, in the form <code>{slot-number}E{port-number}</code>. See <strong>Interface Identifiers</strong> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Type</td>
<td>Internal</td>
</tr>
<tr>
<td>IP Option</td>
<td>None</td>
</tr>
<tr>
<td>Filter Fragments Option</td>
<td>No Fragments</td>
</tr>
<tr>
<td>ICMP Type</td>
<td>no-icmp-type</td>
</tr>
<tr>
<td>ICMP Code</td>
<td>no-icmp-code</td>
</tr>
</tbody>
</table>
**show firewall interface stats**

Use this command to display the current interface firewall statistics.

*Mode:* firewall  
*Syntax:* `show firewall interface stats {interface name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interface name</code></td>
<td>Name of interface, in the form <code>{slot-number}{port-number}</code>. See</td>
</tr>
<tr>
<td></td>
<td><code>Interface Identifiers</code> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd firewall  
/firewall# show firewall interface stats 1E2
```

Firewall Interface statistics for interface 1E2

- Number of Filters configured : 1
- Packets Dropped : 0
- Packets Accepted : 0
- SYN Packets Dropped : 0
- ICMP Packets Dropped : 0
- IP Spoofed Packets Dropped : 0
- Source Route Packets Dropped : 0
- Tiny Fragment Packets Dropped : 0
- Fragmented Packets Dropped : 0
- Packets with IP Options Dropped : 0

**show firewall logs**

Use this command to display the current firewall log.

*Mode:* firewall  
*Syntax:* `show firewall logs`  

*Example:*  
```
/# cd firewall  
/firewall# show firewall logs
```

THU JAN 01 00:30:18 2004 11.0.0.1 UDP Source : 88.88.8.8 Destination : 224.0.0.9  
Source Port : 520 Destination Port : 520 Denied : Static Filter

THU JAN 01 00:30:29 2004 11.0.0.1 UDP Source : 192.168.1.24 Destination : 224.0.1.1  
Source Port : 123 Destination Port : 123 Denied : Static Filter

THU JAN 01 00:30:32 2004 11.0.0.1 UDP Source : 192.168.1.5 Destination : 192.168.255.255  
Source Port : 138 Destination Port : 138 Denied : Static Filter
show firewall schedule

Use this command to display the current firewall schedule.

Mode: firewall
Syntax: show firewall schedule
Example: /# cd firewall
/firewall# show firewall schedule

Firewall Access Lists Schedule

<table>
<thead>
<tr>
<th>ACL Name</th>
<th>Interface</th>
<th>Direction</th>
<th>Scheduled From</th>
<th>Scheduled Till</th>
</tr>
</thead>
<tbody>
<tr>
<td>acl1</td>
<td>1E2</td>
<td>in</td>
<td>10:10 hrs</td>
<td>23:59 hrs</td>
</tr>
</tbody>
</table>

show firewall stats

Use this command to display the Firewall statistics.

Mode: firewall
Syntax: show firewall stats
Example: /# cd firewall
/firewall# show firewall stats

Firewall Global Statistics

Total Packets Inspected (CP) : 10
Total Packets Dropped (CP)   : 4
Total Packets Accepted (CP+DP): 6
ICMP Packets Dropped (CP)    : 1
SYN Packets Dropped (CP)     : 2
IP Spoofed Packets Dropped (CP) : 0
Source Route Packets Dropped (CP) : 1
Tiny Fragment Packets Dropped (CP) : 0
Fragmented Packets Dropped (CP) : 0
Packets with IP Options Dropped (CP): 0
frame-relay

The following command is available in the frame-relay mode. Frame Relay commands are not supported on ATM cards.

For more information about configuring frame-relay, see Frame Relay Configuration on page 12-4.

frame-relay trace

Sets the frame relay processing trace to the specified level. Trace messages only print to the console.

Mode: frame-relay

Syntax: frame-relay trace {all|ctpl|failure|fn-entry-exit|none|packets}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>All of the frame relay processing traces.</td>
</tr>
<tr>
<td>ctpl</td>
<td>Control plane traces.</td>
</tr>
<tr>
<td>failure</td>
<td>All failure traces.</td>
</tr>
<tr>
<td>fn-entry-exit</td>
<td>Trace messages will display when you enter and exit functions in the Frame Relay code. This can give large amounts of output depending on packet flow.</td>
</tr>
<tr>
<td>none</td>
<td>No traces are being displayed.</td>
</tr>
<tr>
<td>packets</td>
<td>Trace messages will display when Frame relay packets are transmitted/received.</td>
</tr>
</tbody>
</table>

Example: /frame-relay# frame-relay trace none
### Interface

Before you can use the commands described in this section, you must first create the desired interface (for example, ATM, IMA) if it does not already exist and enter its provisioning mode using the **root** mode **interface** command as described on page 11-31. After creating the interface you can use commands available from the corresponding mode to configure the interface.

**Example:** To create an ATM interface:
```
#/  interface 3A1
  ATM interface created

/3A1#
```

The commands available in the interface mode are grouped as follows:

- **interface:ima**
- **interface:atm and interface:ds3**
- **interface:ima, interface:atm, and interface:ds3**
- **interface:ethernet**
- **interface:frame-relay**
- **interface:dlci**
- **Interface:hdlc**
- **Interface:ppp**

Each interface port is referred to by a port identifier. All of the identifiers have the general format `{slot-number}{interface-type}{port-number}`. See **Interface Identifiers** on page 11-5 for additional information.

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Code</th>
<th>Syntax and Ranges</th>
<th>Example</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM</td>
<td>A</td>
<td>{slot-number}A{1 to 8}</td>
<td>3A1</td>
<td>Logical interface must be created.</td>
</tr>
<tr>
<td>IMA</td>
<td>B</td>
<td>{slot-number}B{01 to 03}</td>
<td>3B1</td>
<td>Logical interface must be created.</td>
</tr>
<tr>
<td>DS3 UNI</td>
<td>D</td>
<td>{slot-number}D{1 to 3}</td>
<td>2D1</td>
<td>Logical interface must be created.</td>
</tr>
<tr>
<td>Ethernet</td>
<td>E</td>
<td>{slot-number}E{1 to 2}</td>
<td>1E2</td>
<td>Physical interface.</td>
</tr>
<tr>
<td>Frame-relay</td>
<td>F</td>
<td>{slot-number}F{1 to 32}</td>
<td>1F1</td>
<td>Up to eight frame-relay interfaces are allowed, but allowable names are <code>{slot-number}F1 to </code>{slot-number}F16.</td>
</tr>
<tr>
<td>Frame-relay DLCI</td>
<td>{dlci}</td>
<td>{slot-number}F{1 to 32}-{1 to 8}</td>
<td>1F1-3</td>
<td>Logical interface must be created. Up to 32 frame-relay DLCIs are allowed on a module, with a maximum of eight on any single frame-relay interface.</td>
</tr>
<tr>
<td>HDLC (Management/ MSrv or Serial)</td>
<td>M</td>
<td>{slot-number}M{1 to 2}</td>
<td>1M1</td>
<td>Physical interface.</td>
</tr>
<tr>
<td>PPP</td>
<td>X</td>
<td>{slot-number}X{1 to 16}</td>
<td>1X6</td>
<td>Logical interface must be created. Up to eight PPP interfaces are allowed, but allowable names are <code>{slot-number}X1 to </code>{slot-number}X16.</td>
</tr>
</tbody>
</table>
CLI Commands

interface:ima

interface:ima

The following commands are only available in the interface:ima mode. Each command in the following list is a hyperlink to the detailed definition for the command.

**NOTE:** An IMA group is the same as an IMA interface. The IM group is created by using either the root mode interface command as described on page 11-31 or the atm mode ima group command as described on page 11-80.

**NOTE:** Inverse Multiplexing over ATM (IMA), which can be considered an ATM service, is also a user-to-network interface (UNI). The CLI operates on IMAs as interfaces. As with any other interface, valid port identifiers are required as described in Interface Identifiers on page 11-5.

- ima alpha
- ima beta
- ima frame
- ima gamma
- ima link
- ima maxdelay
- ima minlinks
- ima status
- ima timing
- ima txid
- show ima config

**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the **no ima alpha** command is the no variant of the **ima alpha** command. Descriptions of the no variants are included with the corresponding affirmative command.

- no ima alpha
- no ima beta
- no ima frame
- no ima gamma
- no ima link
- no ima maxdelay
- no ima minlinks
- no ima timing
- no ima txid
**ima alpha**

Use this command to set the number of consecutive invalid ICP (IMA Control Protocol) cells permitted for the current IMA group. To restore the default value, use **no ima alpha**.

**Mode:** interface:ima  
**Syntax:** ima alpha \{num\}  
**Syntax:** no ima alpha

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>num</td>
<td>Number of consecutive invalid ICP cells. Valid value is 1 or 2. The default is 2.</td>
</tr>
</tbody>
</table>

**Example:**
/atm# device 3  
Current device set to 3

/atm# ima group 3b1  
IMA interface created

cd to the IMA group from the root directory to configure.

/atm# cd ../3b1  
/3b1# ima alpha 2  
SUCCESS!

**ima beta**

Use this command to set the number of consecutive errored ICP (IMA Control Protocol) cells permitted for the current IMA group. To restore the default value, use **no ima beta**.

**Mode:** interface:ima  
**Syntax:** ima beta \{num\}  
**Syntax:** no ima beta

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>num</td>
<td>Number of consecutive errored ICP cells. Range is 1 – 5. The default is 2.</td>
</tr>
</tbody>
</table>

**Example:**
/3b1# ima beta 1  
SUCCESS!
**ima frame**

Use this command to specify the number of cells in a frame. To restore the default value, use `no ima frame`.

*Mode:* `interface:ima`

*Syntax:* `ima frame {length}`

*Syntax:* `no ima frame`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| `length` | Number of cells in a frame. Range is 1 – 4, as follows:  
1 – 32 cells  
2 – 64 cells  
3 – Default. 128 cells  
4 – 256 cells |

*Example:* `/3b1# ima frame 2
SUCCESS!`

**ima gamma**

Use this command to set the number of consecutive valid ICP (IMA Control Protocol) cells permitted for the current IMA group. To restore the default value, use `no ima gamma`.

*Mode:* `interface:ima`

*Syntax:* `ima gamma {num}`

*Syntax:* `no ima gamma`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>num</code></td>
<td>Number of consecutive valid ICP cells, from 1 to 5. The default is 1.</td>
</tr>
</tbody>
</table>

*Example:* `/3b1# ima gamma 4
SUCCESS!`
**ima link**

Use this command to add a port to the IMA group. An IMA group must have at least two ports associated with it. This command must be repeated for each port. To remove the link, use `no ima link`.

**Mode:** `interface:ima`

**Syntax:**
- `ima link {port-id}`
- `no ima link {port-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port-id</code></td>
<td>Port identifier in the form <code>{slot-number}{interface-type}{port-number}</code>. See <code>Interface Identifiers</code> on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
/3b1# ima link 3a02
success!
```

**ima maxdelay**

Use this command to set the maximum differential delay. To restore the default value, use `no ima maxdelay`.

**Mode:** `interface:ima`

**Syntax:**
- `ima maxdelay {num}`
- `no ima maxdelay`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>num</code></td>
<td>Maximum differential delay in milliseconds. Range is 1 – 99. The default is 25 milliseconds.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
/3b1# ima maxdelay 25
SUCCESS!
```
**ima minlinks**

Use this command to set the minimum number of links required for this IMA group. To restore the default value, use **no ima minlinks**.

**Mode:** interface:ima

**Syntax:** ima minlinks {num}

**Syntax:** no ima minlinks

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>num</td>
<td>Minimum number of links required to create an IMA group. Range is 2 – 16. The default is 2.</td>
</tr>
</tbody>
</table>

**Example:** /3b1# ima minlinks 4
SUCCESS!

**ima status**

Use this command to set the administrative status of the IMA group to up or down. An “up” status requires that **ima minlinks** for this IMA group is set to a valid value and that enough links have been added to the IMA group to meet the **ima minlinks** value.

**Mode:** interface:ima

**Syntax:** ima status {down|up}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>down/up</td>
<td>Sets the administrative state for the IMA group. down – Default. Inactive. up – Active.</td>
</tr>
</tbody>
</table>

**Example:** /3b1# ima status up
success!
**ima timing**

Use this command to configure IMA group timing. To restore the default value, use `no ima timing`.

*Mode:* `interface:ima`

*Syntax*: `ima timing {mode}`

*Syntax*: `no ima timing`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>mode</code></td>
<td>Specify the timing mode:</td>
</tr>
<tr>
<td></td>
<td><code>itc</code> – Independent transit clock.</td>
</tr>
</tbody>
</table>

*Example*: `/3b1# ima timing itc`

```
SUCCESS!
```

**ima txid**

Use this command to assign a transmit identifier number to the IMA group. To restore the default value, use `no ima txid`.

*NOTE:* The transmit identifier number is not the IMA group identifier string.

*Mode:* `interface:ima`

*Syntax*: `ima txid {num}`

*Syntax*: `no ima txid`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>num</code></td>
<td>Transmit identifier number. The default is 1.</td>
</tr>
</tbody>
</table>

*Example*: `/3b1# ima txid 3`

```
SUCCESS!
```
**CLI Commands**

**interface:ima**

---

### show ima config

Use this command to display the configuration information for one or more IMA (Inverse Multiplexing over ATM) groups.

**Mode:** interface:ima  
**Syntax:** show ima config

**Example:** /3B01# show ima config

<table>
<thead>
<tr>
<th>&lt;---- Group -----</th>
<th>Min</th>
<th>Frame</th>
<th>&lt;----- Timing -----</th>
<th>&lt;Ctrl&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI  TxID Symmetry  UNIs  Len  TClk  DDly  A  B  G  State</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B01  1  symOper  1  128  ctc  25  2  2  1  Up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IMA LINKS:
- 2A03
- 2A04
- 2A05
- 2A06
**CLI Commands**

**uni discard**

### interface:atm and interface:ds3

The following commands are only available in the `interface:atm` mode and `interface:ds3` mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- uni discard
- uni scramble

### No Variants

The following commands are no variants of the corresponding affirmative command. For example, the `no uni discard` command is the no variant of the `uni discard` command. Descriptions of the no variants are included with the corresponding affirmative command.

- no uni discard
- no uni scramble

### uni discard

Use this command to configure the UNI to allow discarding the ATM idle filler cells. Idle cells are inserted into the data stream to fill up to bandwidth when there is insufficient data being transmitted.

**NOTE:** To view the scramble setting for an ATM interface, use the `edit-config` mode `show` command to display the TDM link that the ATM interface is managing. See example below. In this example, 1L01 is connected to 1M01 and 2A01.

**Mode:** interface:atm, interface:ds3

**Syntax:** uni discard

**Syntax:** no uni discard

**Example:** /2A01# uni discard

```bash
#/ cd edit-config/
#/edit-config[1]# show 1L01
SLOT 1:  
Setting for DS1 1:  
Force To red :No  
Circuit ID: 
Destination:  
Up/Down:       UP  
Framing:       ESF  
Line Coding:   B8ZS  
Line Build Out: CSU attenuation for LBO of 0dB  
FDL Type:      None  
Idle Code:     55  
Scramble:      Yes  
Idl Cel Dis:   Yes  
AIS Forwarding: Disable
```
CLI Commands

interface:atm and interface:ds3

LoopupCode: 10
Performance Threshold Settings for 15 min.
unavailable seconds: Disable  errored seconds: Disable
Auto Protection Switch:
Link 1 Config: NO APS Ret: NO
Link 2 Config: NO APS Ret: NO
Link 3 Config: NO APS Ret: NO
Link 4 Config: NO APS Ret: NO
Link 5 Config: NO APS Ret: NO
Link 6 Config: NO APS Ret: NO
Link 7 Config: NO APS Ret: NO
Link 8 Config: NO APS Ret: NO
Link 9 Config: NO APS Ret: NO
Link 10 Config: NO APS Ret: NO
Link 11 Config: NO APS Ret: NO
Link 12 Config: NO APS Ret: NO
Link 13 Config: NO APS Ret: NO
Link 14 Config: NO APS Ret: NO
Link 15 Config: NO APS Ret: NO
Link 16 Config: NO APS Ret: NO

uni scramble

Use this command to configure scrambling on a UNI. This command also works for DS1 ATM.

**NOTE:** To view the scramble setting for an ATM interface, use the `edit-config` mode `show` command to display the TDM link that the ATM interface is managing. See example below. In this example, 1L01 is connected to 1M01 and 2A01.

**Mode:** interface:atm, interface:ds3

**Syntax:** uni scramble

**Syntax:** no uni scramble

**Example:** /2A01# uni scramble

```bash
/# cd edit-config/
/edit-config[1]# show 1L01
SLOT 1:
    Setting for DS1 1:
    Force To red :No
    Circuit ID:
    Destination:
    Up/Down: UP
    Framing: ESF
    Line Coding: B8ZS
    Line Build Out: CSU attenuation for LBO of 0dB
    FDL Type: None
    Idle Code: 55
    Scramble: Yes
    Idl Cel Dis: Yes
    AIS Forwarding: Disable
```
<table>
<thead>
<tr>
<th>Link</th>
<th>Config</th>
<th>APS</th>
<th>Ret.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>2</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>5</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>6</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>7</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>8</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>9</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>10</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>11</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>12</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>13</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>14</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>15</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>16</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>
CLI Commands
interface:ima, interface:atm, and interface:ds3

interface:ima, interface:atm, and interface:ds3

The commands listed below are available in the interface:ima mode, interface:atm mode, and interface:ds3 mode. Each command in the following list is a hyperlink to the detailed definition for the command.

NOTE: In release 6.01 do not use Performance Monitoring on CES connections.

- oam f4 block
- oam f4 end ccsink
- oam f4 end ccsource
- oam f4 end loopback
- oam f4 management
- oam f4 monitor
- oam f4 seg ais
- oam f4 seg ccsink
- oam f4 seg ccsource
- oam f4 seg end
- oam f4 seg loopback
- oam f5 block
- oam f5 end ccsink
- oam f5 end ccsource
- oam f5 end loopback
- oam f5 management
- oam f5 monitor
- oam f5 seg ais
- oam f5 seg ccsink
- oam f5 seg ccsource
- oam f5 seg end
- oam f5 seg loopback
- show oam f4 fault
- show oam f4 monitor
- show oam f5 fault
- show oam f5 monitor
- show vc config
- show vp config
- vc link
- vc status
CLI Commands

**oam f4 block**

- vp link
- vp status

**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the **no oam f5 block** command is the no variant of the **oam f5 block** command. Descriptions of the no variants are included with the corresponding affirmative command.

- no oam f4 block
- no oam f4 end ccsink
- no oam f4 end ccsource
- no oam f4 end loopback
- no oam f4 management
- no oam f4 monitor
- no oam f4 seg ais
- no oam f4 seg ccsink
- no oam f4 seg ccsource
- no oam f4 seg end
- no oam f4 seg loopback
- no oam f5 block
- no oam f5 end ccsink
- no oam f5 end ccsource
- no oam f5 end loopback
- no oam f5 management
- no oam f5 monitor
- no oam f5 seg ais
- no oam f5 seg ccsink
- no oam f5 seg ccsource
- no oam f5 seg end
- no oam f5 seg loopback
- no vc link
- no vp link

**oam f4 block**

This command is not supported in this release.
CLI Commands
interface:ima, interface:atm, and interface:ds3

-oam f4 end ccsink
    This command is not supported in this release.

-oam f4 end ccsource
    This command is not supported in this release.

-oam f4 end loopback
    This command is not supported in this release.

-oam f4 management
    This command is not supported in this release.

-oam f4 monitor
    This command is not supported in this release.

-oam f4 seg ais
    This command is not supported in this release.

-oam f4 seg ccsink
    This command is not supported in this release.

-oam f4 seg ccsource
    This command is not supported in this release.

-oam f4 seg end
    This command is not supported in this release.
CLI Commands

**oam f4 seg loopback**

This command is not supported in this release.

**oam f5 block**

Use this command to set the size of the performance monitoring block in an F5 flow for a virtual channel. To restore the default value, use `no oam f5 block`.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**

```
oam f5 block {vpi/vci} {size}
```

```
oam f5 block {vpi/vci}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier. 
  *vpi* – Virtual path identifier. Range is 0 – 255.  
  *vci* – Virtual channel identifier. Range is 0 – 65535. |
| size     | Number of bytes in a performance monitoring block. 
  Valid values are 128, 256, 512, 1024, 2048, 4096, 8192,16384, and 32768. 
  The default is 128. |

**Example:** `/1A1# oam f5 block 2/57 128`

**oam f5 end ccsink**

Use this command to enable continuity checking at the sink point of an end-to-end virtual channel. To disable the continuity check, use `no oam f5 end ccsink`.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**

```
oam f5 end ccsink {vpi/vci}
```

```
oam f5 end ccsink {vpi/vci}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier. 
  *vpi* – Virtual path identifier. Range is 0 – 255.  
  *vci* – Virtual channel identifier. Range is 0 – 65535. |

**Example:** `/1A1# oam f5 end ccsink 5/22`
CLI Commands
interface:ima, interface:atm, and interface:ds3

**oam f5 end ccsource**

Use this command to enable continuity checking at the source point of an end-to-end virtual channel. To disable the continuity check, use no oam f5 end ccsource.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**
- oam f5 end ccsource {vpi/vci}
- no oam f5 end ccsource {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** /1a1# oam f5 end ccsource 5/1

**oam f5 end loopback**

Use this command to enable loopback for an end-to-end virtual channel. To disable the loopback, use no oam f5 end loopback.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**
- oam f5 end loopback {vpi/vci}
- no oam f5 end loopback {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:** /1a1# oam f5 end loopback 1/44
**oam f5 management**

Use this command to enable fault management for a virtual channel. To disable fault management, use `no oam f5 management`.

*Mode:* `interface:ima, interface:atm, interface:ds3`  
*Syntax:* `oam f5 management {vpi/vci}`  
*Syntax:* `no oam f5 management {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| **vpi/vci** | Virtual path identifier/virtual channel identifier.  
  vpi – Virtual path identifier. Range is 0 – 255.  
  vci – Virtual channel identifier. Range is 0 – 65535. |

*Example:* `interface 1B1
/1B1# oam f5 management 4/55`

**oam f5 monitor**

Use this command to enable performance monitoring for a virtual channel. To disable performance monitoring, use `no oam f5 monitor`.

*Mode:* `interface:ima, interface:atm, interface:ds3`  
*Syntax:* `oam f5 monitor {vpi/vci}`  
*Syntax:* `no oam f5 monitor {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| **vpi/vci** | Virtual path identifier/virtual channel identifier.  
  vpi – Virtual path identifier. Range is 0 – 255.  
  vci – Virtual channel identifier. Range is 0 – 65535. |

*Example:* `#/ interface 1B1
/1B1# oam f5 monitor 6/42`
**CLI Commands**

*interface:ima, interface:atm, and interface:ds3*

---

### `oam f5 seg ais`

Use this command to enable AIS for a segment of a virtual channel. To disable AIS, use **no oam f5 seg ais**.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**

- `oam f5 seg ais {vpi/vci}`
- `no oam f5 seg ais {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier.</td>
</tr>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
<tr>
<td>vci</td>
<td>Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:**

```
/2a1# oam f5 seg ais 1/32
OAM F5 AIS has been enabled.
```

---

### `oam f5 seg ccsink`

Use this command to enable continuity checking at the sink point of a virtual channel segment. To disable the continuity check, use **no oam f5 seg ccsink**.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:**

- `oam f5 seg ccsink {vpi/vci}`
- `no oam f5 seg ccsink {vpi/vci}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier.</td>
</tr>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
<tr>
<td>vci</td>
<td>Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
</tbody>
</table>

**Example:**

```
/2a1# oam f5 seg ccsink 1/32
OAM F5 CCSink has been enabled.
```
CLI Commands
oam f5 seg ccsource

Use this command to enable continuity checking at the source point of a virtual channel segment. To disable the continuity check, use no oam f5 seg ccsource.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** oam f5 seg ccsource {vpi/vci}

**Syntax:** no oam f5 seg ccsource {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535. |

**Example:** /2a1# oam f5 seg ccsource 1/32  
OAM F5 CCSource has been enabled.  
Success!

---

oam f5 seg end

Use this command to enable the segment end for a virtual channel. To disable the segment end, use no oam f5 seg end.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** oam f5 seg end {vpi/vci}

**Syntax:** no oam f5 seg end {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535. |

**Example:** /2a1# oam f5 seg end 1/32  
OAM F5 Endpoint has been enabled.  
Success!
CLI Commands
interface:ima, interface:atm, and interface:ds3

**oam f5 seg loopback**

Use this command to enable loopback for a segment of a virtual channel. To disable the loopback, use no oam f5 seg loopback.

**Mode:** interface:ima, interface:atm, interface:ds3  
**Syntax:** oam f5 seg loopback {vpi/vci}  
**Syntax:** no oam f5 seg loopback {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535. |

**Example:** /2a1# oam f5 seg loopback 1/32  
OAM F5 Segment Loopback has been enabled.  
Success!

**show oam f4 fault**

This command is not supported in this release.

**show oam f4 monitor**

This command is not supported in this release.

**show oam f5 fault**

Use this command to display the status (on/off) of the F5 flow. Omitting the optional identifier displays status for all Virtual Channels.

**Mode:** interface:ima, interface:atm, interface:ds3  
**Syntax:** show oam f5 fault [vpi/vci]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535.  
|          | If no vpi/vci is specified, information for all virtual channels is displayed. |

**Example:** /2A01# show oam f5 fault 1/32
show oam f5 monitor

Use this command to display the status (on/off) of the F5 performance monitor. Omitting the optional identifier displays status for all virtual channels.

**Mode:** interface:ima, interface:atm, interface:ds3  
**Syntax:** show oam f5 monitor [vpi/vci]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535.  
|          | If no vpi/vci is specified, information for all virtual channels is displayed. |

**Example:** /2A01# show oam f5 monitor 1/32

---

show vc config

Use this command to display the PVCs configured on the interface. Omitting the optional identifier displays all of the PVCs configured on the interface.

**Mode:** interface:ima, interface:atm, interface:ds3  
**Syntax:** show vc config [vpi/vci]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| vpi/vci  | Virtual path identifier/virtual channel identifier.  
|          | vpi – Virtual path identifier. Range is 0 – 255.  
|          | vci – Virtual channel identifier. Range is 0 – 65535.  
|          | If no vpi/vci is specified, information for all virtual channels is displayed. |

**Example:** /1a1# show vc config  

<--------PVC--------> <------QoS------> <---------------UPC---------------> <---Ctrl--->  

<table>
<thead>
<tr>
<th>UNI</th>
<th>VP</th>
<th>VC</th>
<th>Class</th>
<th>Use</th>
<th>PCR</th>
<th>SCR</th>
<th>MCR</th>
<th>MBS</th>
<th>CDVT</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMA4</td>
<td>1</td>
<td>75</td>
<td>UBR</td>
<td>Unused</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
</tbody>
</table>
**CLI Commands**

*interface:ima, interface:atm, and interface:ds3*

---

**show vp config**

Use this command to display the VPs configured on the interface. Omitting the optional identifier displays all of the VPs configured on the interface.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** show vp config [vpi]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255. If no vpi is specified, information for all virtual paths is displayed.</td>
</tr>
</tbody>
</table>

**Example:** /2b01# show vp config

`<--------PVC--------> <------QoS------> <----------------UPC----------------> <Ctrl>`

<table>
<thead>
<tr>
<th>Port</th>
<th>VP</th>
<th>Class</th>
<th>Use</th>
<th>PCR</th>
<th>SCR</th>
<th>MCR</th>
<th>MBS</th>
<th>CDVT</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B01</td>
<td>20</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
<tr>
<td>2D01</td>
<td>20</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
<tr>
<td>2B01</td>
<td>30</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
<tr>
<td>2D01</td>
<td>30</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
<tr>
<td>2B01</td>
<td>40</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
<tr>
<td>2D01</td>
<td>40</td>
<td>UBR</td>
<td>UNI PVC</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>Up</td>
</tr>
</tbody>
</table>

---

**vc link**

Use this command to create a virtual channel link (VCL) on the current interface. To remove the VCL, use no vc.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** vc link {vpi/vci} {td-id}

**Syntax:** no vc link {vpi/vci}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
<tr>
<td>td-id</td>
<td>Traffic descriptor identifier string.</td>
</tr>
</tbody>
</table>

**Example:** /3a1# vc link 100/43 TD1
SUCCESS!
vc status

Use this command to set the administrative status of a virtual channel link (VCL) on the current interface to up or down.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** vc status \{vpi/vci\} \{down|up\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi/vci</td>
<td>Virtual path identifier/virtual channel identifier. vpi – Virtual path identifier. Range is 0 – 255. vci – Virtual channel identifier. Range is 0 – 65535.</td>
</tr>
<tr>
<td>down</td>
<td>up</td>
</tr>
</tbody>
</table>

**Example:** /3a1# vc status 100/43 up SUCCESS!

vp link

Use this command to create a virtual path link (VPL) on the current interface. To remove the VPL, use no vp.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** vp link \{vpi\} \{td-id\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi</td>
<td>Virtual path identifier. Range is 0 – 255.</td>
</tr>
<tr>
<td>td-id</td>
<td>Traffic descriptor identifier string.</td>
</tr>
</tbody>
</table>

**Example:** /3a1# vp link 3 TD1 SUCCESS!
**vp status**

Use this command to set the administrative status of a virtual path link (VPL) on the current interface to up or down.

**Mode:** interface:ima, interface:atm, interface:ds3

**Syntax:** vp status {vpi} {down|up}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vpi</td>
<td>Virtual path identifier.</td>
</tr>
<tr>
<td>down/up</td>
<td>Sets the administrative state for the VPL.</td>
</tr>
<tr>
<td></td>
<td>down – Default. Inactive.</td>
</tr>
<tr>
<td></td>
<td>up – Active.</td>
</tr>
</tbody>
</table>

**Example:** /3a1# vp status 3 down
SUCCESS!
**interface:ethernet**

The commands listed below are available in the **interface:ethernet** mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- address alloc
- authentication
- autoneg enable
- autoneg force
- cost
- delete interval
- encapsulation
- ip address dhcp
- ip config
- ip ospf authentication-key
- ip ospf cost
- ip ospf dead-interval
- ip ospf hello-interval
- ip ospf ifauth
- ip ospf message-digest-key
- ip ospf priority
- ip ospf retransmit-interval
- ip ospf transmit-delay
- ip rip enable
- ip rip split-horizon
- recv
- route age
- send
- show rip interface
- shutdown
- testing
- update interval
No Variants

The following commands are no variants of the corresponding affirmative command. For example, the `no uni discard` command is the no variant of the `uni discard` command. Descriptions of the no variants are included with the corresponding affirmative command.

- `no ip address dhcp`
- `no ip config`
- `no ip ospf cost`
- `no ip ospf dead-interval`
- `no ip ospf hello-interval`
- `no ip ospf ifauth`
- `no ip ospf message-digest-key`
- `no ip ospf priority`
- `no ip ospf retransmit-interval`
- `no ip ospf transmit-delay`
- `no ip rip`
- `no shutdown`

**address alloc**

Use this command to set the address allocation method for the interface. Issuing an `ip config` command resets the address allocation method to manual.

**Mode:** `interface:ethernet`

**Syntax:** `address alloc {manual|negotiated|dynamic}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dynamic</td>
<td>The interface address is obtained dynamically.</td>
</tr>
<tr>
<td>manual</td>
<td>The address for the interface is to be statically assigned.</td>
</tr>
<tr>
<td>negotiated</td>
<td>Negotiated address allocation is not supported for Ethernet interfaces.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # interface 1E1
/1E1# address alloc dynamic
```
**authentication**

Use this command to set the type of RIP authentication used on the interface.

*Mode:* interface:ethernet  

*Syntax:*  

```
authentication {ip-address} {none|simple|md5}
[key {key-string}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface</td>
</tr>
<tr>
<td>none</td>
<td>No authentication needed</td>
</tr>
<tr>
<td>simple</td>
<td>Simple authentication method</td>
</tr>
<tr>
<td>md5</td>
<td>MD5 based authentication</td>
</tr>
<tr>
<td>key-string</td>
<td>The authentication key.</td>
</tr>
</tbody>
</table>

*Example:*  

```
/# int 1E1  
/1E1# authentication 10.1.2.3 simple key 342
```

**autoneg enable**

Use this command to enables auto-negotiation. This command is related to the `autoneg force` command. If you set autoneg enable, then forced settings no longer apply. If you set forced settings, then enable no longer applies.

*Mode:* interface:ethernet  

*Syntax:* autoneg {enable}  

*Example:*  

```
/le1# autoneg enable
```
autoneg force

Use this command to force the Ethernet interface to auto-negotiate at the defined settings. This command is related to the `autoneg enable` command. If you set autoneg enable, then forced settings no longer apply. If you set forced settings, then enable no longer applies.

**Mode:** `interface:ethernet`

**Syntax:** `autoneg force {10|100} {halfduplex|fullduplex}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| force    | Force to the interface to negotiate to the specified values:  
10 – 10 MHz transfer speed  
100 – 100 MHz transfer speed  
halfduplex – Transmit data in both directions, but in only one direction at a time.  
fullduplex – Transmit data in both directions simultaneously. |

**Example:** `/1E1# autoneg admin force 100 fullduplex`

cost

Use this command to set the RIP default metric.

**Mode:** `interface:ethernet`

**Syntax:** `cost [ip-address] {value}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the RIP interface.</td>
</tr>
<tr>
<td>value</td>
<td>Value of the RIP default metric. Range is 0 – 6.</td>
</tr>
</tbody>
</table>

**Example:** `#/ int 1E1  
/1E1# cost 10.1.2.3 10`
**delete interval**

Use this command to set the time interval required before a RIP entry is deleted after not hearing from it.

**Mode:** interface:ethernet  
**Syntax:** delete interval [ip-address] {time}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>time</td>
<td>The time interval between RIP updates in seconds. Range is 120 – 180 seconds.</td>
</tr>
</tbody>
</table>

**Example:**  
/# int 1e1  
/1e1# delete interval 10.1.2.3 150

**encapsulation**

Use this command to set the encapsulation type for the interface.

**Mode:** interface:ethernet  
**Syntax:** encapsulation {llcSnap(6)|enetV2(8)}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| encapsulation | Specify the encapsulation type for the interface:  
6 – Logical Link Control and Sub-Network Attachment Point Encapsulation (llcSnap).  
8 – Default. Ethernet V2 Encapsulation (enetV2). |

**Example:**  
/# interface 1E1  
/1E1# encapsulation 6  
# interface 1E1  
/1E1# encapsulation 8
**ip address dhcp**

Use this command to enable dynamic addressing on the interface. Use the **no ip address dhcp** command to disable dynamic addressing on the interface.

**NOTE:** This command only works when the link is operationally UP and it does a DHCP renew.

**Mode:** interface:ethernet

**Syntax:**
- ip address dhcp
- no ip address dhcp

**Example:**
To renew the IP address, issue the following command while the interface is operationally UP.
```
/1e2# ip address dhcp
```

To start the DHCP discovery process for the specified interfaces, issue the following series of commands.
```
/# ip address dhcp
/# cd 1e2
/1e2# shutdown
/1e2# address alloc dynamic
/1e2# no shutdown
```

**Example:**
This command sequence starts the DHCP discovery process for that interface.
```
/# cd 1e2
/1e2# shutdown
/1e2# address alloc dynamic
/1e2# no shutdown
```

**Example:**
To release the IP address, issue the following command while the interface is operationally UP.
```
/1e2# no ip address dhcp
```
**ip config**

Use this command to manually set the IP address, subnet mask, and broadcast address for the interface. Use the `no ip config` command to remove the specified secondary IP address. You cannot remove the primary IP address.

**Mode:** `interface:ethernet`

**Syntax:**

```
ip config {ip-address} [mask {subnet mask}] [secondary] [global|local]
```

**Syntax:**

```
no ip config {sec_ip_addr}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>subnet mask</td>
<td>Subnet mask for the IP address. If not specified the default address mask is assumed. Maximum length of 30 bits.</td>
</tr>
<tr>
<td>secondary</td>
<td>Sets the specified IP address as the secondary. A maximum of eight secondary addresses can be specified.</td>
</tr>
<tr>
<td>global</td>
<td>local</td>
</tr>
<tr>
<td>sec_ip_addr</td>
<td>Secondary IP address to remove.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface 1E2
/1E2# ip config 192.168.1.3 mask 255.255.255.0
```

**Example:**

```
/# interface ethernet 1E1
/1E1# no ip config 10.4.6.100
```

**ip ospf authentication-key**

Use this command to set the authentication key (AK) used when assigning a password to be used by neighboring routers that are using the OSPF’s simple password authentication.

**Mode:** `interface:ethernet`

**Syntax:**

```
ip ospf authentication-key {key}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>key</td>
<td>An authentication key, with a maximum of 9 characters.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface 1e2
/1E2# ip ospf authentication-key testkey
```
CLI Commands
interface:ethernet

**ip ospf cost**

Use this command to set the OSPF metric value to explicitly specify the cost of sending a packet on an interface. Use the `no ip ospf cost` to restore the default value for the OSPF interface metric.

**Mode:** interface:ethernet

**Syntax:**

```
ip ospf cost {cost}
```

**Syntax:**

```
no ip ospf cost
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost</td>
<td>Specify the cost of sending a packet on an interface. Range is 1 – 16777215. The default is 16777215.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface le1
ip ospf cost 100
```

**Example:**

```
/# interface le1
/1E1# no ip ospf cost
```

**ip ospf dead-interval**

Use this command to set the time interval over which hello packets are not received from the interface before its neighbors declare the router down. Use the `no ip ospf dead-interval` to restore the dead interval of an interface to its default value.

**Mode:** interface:ethernet

**Syntax:**

```
ip ospf dead-interval {interval}
```

**Syntax:**

```
no ip ospf dead-interval
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specify the dead interval for the interface. Range is 0 – 2147483647 seconds. The default is 40.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface le1
/1E1# ip ospf dead-interval 40
```

**Example:**

```
/# interface le1
/1E1# no ip ospf dead-interval
```
**ip ospf hello-interval**

Use this command to set the interval between OSPF hello packets on the interface. Use the `no ip ospf hello-interval` command to restore the default value for the hello interval of an interface.

**Mode:** `interface:ethernet`

**Syntax:** `ip ospf hello-interval {interval}`

**Syntax:** `no ip ospf hello-interval`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Specify the hello interval for the interface. Range is 0 – 65535. The default is 10.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1e1
/1E1# ip ospf hello-interval 40
```

**Example:**
```
/# interface 1e1
/1E1# no ip ospf hello-interval
```

**ip ospf ifauth**

Use this command to set the authentication type for an interface. Use the `no ip ospf ifauth` command to restore the default value for the OSPF authentication.

**Mode:** `interface:ethernet`

**Syntax:** `ip ospf ifauth {simple-password|message-digest}`

**Syntax:** `no ip ospf ifauth`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>simple-password</td>
<td>Use simple password authentication. The password is used by neighboring OSPF routers on a network segment that uses the OSPF simple password authentication.</td>
</tr>
<tr>
<td>message-digest</td>
<td>Use OSPF MD5 authentication.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1e1
/1E1# ip ospf ifauth simple-password
```

**Example:**
```
/# interface 1e1
/1E1# no ip ospf ifauth
```
**CLI Commands**

*interface:ethernet*

### ip ospf message-digest-key

Use this command to configure the MD5 authentication key for an interface. Use the `no ip ospf message-digest-key` command to turn off the Message Digest version 5 (MD5) authentication for the interface.

**Mode:** `interface:ethernet`

**Syntax:** `ip ospf message-digest-key {key-id} md5 {key}`

**Syntax:** `no ip ospf message-digest-key {key-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>key-id</td>
<td>The message digest key ID. Range is 0 – 255. The default is 1.</td>
</tr>
<tr>
<td>key</td>
<td>A MD5 key with a maximum of 17 characters.</td>
</tr>
</tbody>
</table>

**Example:**

```
# interface 1e1
/1E1# ip ospf message-digest-key 1 md5 4
```

**Example:**

```
# interface 1e1
/1E1# ip ospf message-digest-key 1
```

### ip ospf priority

Use this command to set the router priority, which helps to determine the DR for this network. Use the `no ip ospf priority` command to reset the interface router priority to its default value.

**Mode:** `interface:ethernet`

**Syntax:** `ip ospf priority {priority}`

**Syntax:** `ip ospf priority`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>priority</td>
<td>Router priority level. Range is 0 – 255. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**

```
# interface 1e1
/1E1# ip ospf priority 2
```

**Example:**

```
# interface 1e1
/1E1# no ip ospf priority
```
**ip ospf retransmit-interval**

Use this command to set the interval between LSA (Link-State Advertisements) retransmissions. Use the `no ip ospf retransmit-interval` command to return the retransmit interval to its default value.

**Mode:** `interface:ethernet`

**Syntax:**
- `ip ospf retransmit-interval {interval}`
- `no ip ospf retransmit-interval`

**Variable** | **Definition**
--- | ---
interval | LSA retransmission time interval. Range is 0 – 3600 seconds. The default is 5.

**Example:**
- # interface 1e1
  /1E1# ip ospf retransmit-interval 20
- # interface 1e1
  /1E1# no ip ospf retransmit-interval

**ip ospf transmit-delay**

Use this command to set the estimated time delay for transmitting LS update packets. Use the `no ip ospf transmit-delay` command to restore the transmission delay to its default value.

**Mode:** `interface:ethernet`

**Syntax:**
- `ip ospf transmit-delay {delay}`
- `no ip ospf transmit-delay`

**Variable** | **Definition**
--- | ---
delay | Time delay for transmitting LS update packets. Range is 0 to 3600 seconds. The default is 1.

**Example:**
- # interface 1e1
  /1E1# ip ospf transmit-delay 20
- # interface 1e1
  /1E1# no ip ospf transmit-delay
**ip rip**

Use the `ip rip enable` command to enable accepting RIP packets on the specified IP interface. Use the `no ip rip` command to reject RIP packets on the specified IP interface.

**Mode:** `interface:ethernet`

**Syntax:**
- `ip rip [ip-address] enable`
- `no ip rip [ip-address]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ int 1E1
/1E1# ip rip 10.1.2.3 enable
```

**Example:**
```
#/ int 1E1
/1E1# no ip rip 10.1.2.3
```

**ip rip split-horizon**

Use this command to set the split-horizon mode.

**Mode:** `interface:ethernet`

**Syntax:**
```
ip rip [ip-address] split-horizon {1-enable|2-poison-reverse|3-disable}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>split-horizon</td>
<td>Specify the split-horizon mode to be used:</td>
</tr>
<tr>
<td></td>
<td>1 - Enable split-horizon mode</td>
</tr>
<tr>
<td></td>
<td>2 - Enable poison reverse mode</td>
</tr>
<tr>
<td></td>
<td>3 - Default. Disable both split-horizon and poison reverse</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ int 1E1
/1E1# ip rip 10.1.2.3 split-horizon 1
```
**recv**

Use this command to set the version of RIP receive used on the interface.

**NOTE:** This command cannot be issued until RIP is enabled on the subnet using the `ip rip enable` command described on page 11-206.

**Mode:** interface:ethernet

**Syntax:** recv [ip-address] {rip1|rip2|both|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>rip1</td>
<td>Receive RIP updates using RIP version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td>rip2</td>
<td>Receive RIP updates using RIP version 2 (multicasting).</td>
</tr>
<tr>
<td>both</td>
<td>Default. Receive RIP updates using both rip1 and rip2.</td>
</tr>
<tr>
<td>none</td>
<td>Set RIP receive version to none.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # int 1E1
/1E1# recv 10.1.2.3 rip2
```

**route age**

Use this command to set the time after which the entry is put into garbage collect interval.

**Mode:** interface:ethernet

**Syntax:** route age [ip-address] {time}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>time</td>
<td>Time after which the RIP route entry is put into the garbage collect on the specified interface. Range is from 1 – 3600. The default is 180 seconds.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # int 1E1
/1E1# route age 10.1.2.3 200
```
**CLI Commands**

**interface:ethernet**

### send

Use this command to set the version of RIP send used on the interface.

**NOTE:** This command cannot be issued until RIP is enabled on the subnet using the `ip rip enable` command described on page 11-206.

**Mode:** interface:ethernet

**Syntax:** send [ip-address] {rip1|ripv1compatible|rip2|v1|v2|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>rip1</td>
<td>Send RIP updates using RIP send version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td>ripv1compatible</td>
<td>Broadcast RIP updates using RFC 1058 route sub assumption rules.</td>
</tr>
<tr>
<td>rip2</td>
<td>Send RIP updates using RIP send version 2 (multicasting).</td>
</tr>
<tr>
<td>v1</td>
<td>Use demand RIP on a WAN interface under ripversion1rules.</td>
</tr>
<tr>
<td>v2</td>
<td>Use demand RIP on a WAN interface under ripversion2rules.</td>
</tr>
<tr>
<td>none</td>
<td>Set RIP send version to none.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# int 1E1
/1E1# send 10.1.2.3 rip2
```

### show rip interface

Use this command to display the RIP provisioning.

**Mode:** interface:ethernet

**Syntax:** show rip interface [ip-address] config

**Example:**
```
/# int 1E1
/1E1# show rip interface 10.1.2.3 config
```

RIP Interface Configuration
Config Address: 11.11.11.1
Authentication:
  Type: None
  Key : 
RIP Version:
  Send : RIP Version2
  Receive: RipVersion1 Or RipVersion2
Cost: 1
RIP State: Enabled  Admin Status: Up  Operational State: Up
**shutdown**

Use this command to set administrative and operational status of the current Ethernet interface as Down (Out-of-Service). Use the `no shutdown` command to set administrative status of the designated Ethernet interface as Up (In-Service).

**Mode:** interface:ethernet

**Syntax:** shutdown

**Syntax:** no shutdown

**Example:**
```
/# interface ethernet 1E1
/1E1# shutdown
```

To confirm that the status of the interface is down, issue a `show interface config` command:
```
/1E1# cd ..
/# show int conf 1E1
```

<table>
<thead>
<tr>
<th>Interface Configuration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Index</td>
<td>1</td>
</tr>
<tr>
<td>Interface Name</td>
<td>1E1</td>
</tr>
<tr>
<td>Encapsulation Type</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>MTU</td>
<td>1500</td>
</tr>
<tr>
<td>Admin Status</td>
<td>Down</td>
</tr>
<tr>
<td>Operational Status</td>
<td>Down</td>
</tr>
<tr>
<td>Auto Negotiation Status</td>
<td>100 full-duplex</td>
</tr>
<tr>
<td>MAC Address</td>
<td>00:e0:97:10:92:c0</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1E1
/1E1# no shutdown
```

To confirm that the status of the interface is up, issue a `show interface config` command:
```
/1E1# cd ..
/# show int conf 1E1
```

<table>
<thead>
<tr>
<th>Interface Configuration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Index</td>
<td>1</td>
</tr>
<tr>
<td>Interface Name</td>
<td>1E1</td>
</tr>
<tr>
<td>Encapsulation Type</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>MTU</td>
<td>1500</td>
</tr>
<tr>
<td>Admin Status</td>
<td>Up</td>
</tr>
<tr>
<td>Operational Status</td>
<td>Up</td>
</tr>
<tr>
<td>Auto Negotiation Status</td>
<td>100 full-duplex</td>
</tr>
<tr>
<td>MAC Address</td>
<td>00:e0:97:10:92:c0</td>
</tr>
</tbody>
</table>
CLI Commands
interface:ethernet

testing

Use this command to set the administrative state of the Ethernet interface to “testing” and place the interface into loopback mode. While the interface is in the testing state, no operational packets are handled. Any packets received on the interface are discarded while in the testing state.

Mode: interface:ethernet
Syntax: testing
Example: /# interface 1E1
        /1E1# testing
**update interval**

Use this command to set the interval time between RIP updates.

**Mode:** interface:ethernet

**Syntax:** update interval [ip-address] {time}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>time</td>
<td>Interval time between RIP updates in seconds. Range is 10 – 3600 seconds.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# int 1E1
/1E1# update interval 10.1.2.3 45
```
The commands listed below are available in the interface:frame-relay mode. Before you can use these commands, you must create the frame-relay interface as described in Frame Relay Configuration on page 12-4. To use the commands, you must switch to the frame relay interface mode using cd {frame-relay name}, where frame-relay name is the frame relay interface you just created.

Each command in the following list is a hyperlink to the detailed definition for the command.

- frame-relay address-format
- frame-relay keepalive
- frame-relay lmi-n391dte
- frame-relay lmi-n392dte
- frame-relay lmi-n393dte
- frame-relay lmi-type
- show stackinterface
- shutdown
- stackinterface
- unstackinterface

No Variants

The following interface:frame-relay mode commands are no variants of the corresponding affirmative command. For example, no frame-relay keepalive is the no variant of frame-relay keepalive. Descriptions of the no variants are included with the corresponding affirmative command.

- no frame-relay keepalive
- no frame-relay lmi-n391dte
- no frame-relay lmi-n392dte
- no frame-relay lmi-n393dte
- no shutdown
**frame-relay address-format**

Use this command to set the address format and address length used on the particular Frame Relay interface.

**Mode:** interface:frame-relay  
**Syntax:** frame-relay address-format {2-octet|4-octet}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-octet</td>
<td>Default. The 10 bit DLCI address format and 2 byte length.</td>
</tr>
<tr>
<td>4-octet</td>
<td>The 13 bit DLCI address format and 4 byte length.</td>
</tr>
</tbody>
</table>

**Example:**  
/# interface 1F1  
/1F1# frame-relay address-format 2-octet

**frame-relay keepalive**

Use this command to set the number of seconds for the Transmit Poll Interval T391 for the DTE frame relay interface. The interval must be set as a positive integer that is less than interval T392 counter at the DCE side on the switch. Use the no frame-relay keepalive to reset the number of seconds for the Transmit Poll Interval T391 for the DTE frame relay interface to the default value of 10 seconds.

**Mode:** interface:frame-relay  
**Syntax:** frame-relay keepalive {seconds}  
**Syntax:** no frame-relay keepalive

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>The T391 transmit interval in seconds. Range is 5 – 30. The default is 10.</td>
</tr>
</tbody>
</table>

**Example:**  
/# interface 1F1  
/1F1# frame-relay keepalive 20  

**Example:**  
/# interface 1F1  
/1F1# no frame-relay keepalive
**CLI Commands**

**interface:frame-relay**

---

**frame-relay lmi-n391dte**

Use this command to set the number of keep alive exchanges to be performed at the DTE frame relay interface before requesting a full status message. Use the `no frame-relay lmi-n391dte` command to reset the number of keep alive exchanges to be performed to the default value of 6.

**Mode:** `interface:frame-relay`

**Syntax:** `frame-relay lmi-n391dte {count}`

**Syntax:** `no frame-relay lmi-n391dte`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>The number of keep-alive exchanges. Range is 1 – 255. The default is 6.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface 1F1
1F1# frame-relay lmi-n391dte 20
```

**Example:**

```
/# interface 1F1
1F1# no frame-relay lmi-n391dte
```

---

**frame-relay lmi-n392dte**

Use this command to set the maximum number for user side error threshold cycle counter N392 at the DTE frame relay interface. Use the `no frame-relay lmi-n392dte` command to reset the maximum number of user side error threshold cycle counter N392 at the DTE frame relay interface to the default value of 3.

**Mode:** `interface:frame-relay`

**Syntax:** `frame-relay lmi-n392dte {count}`

**Syntax:** `no frame-relay lmi-n392dte`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>The maximum value for the user-side error threshold cycle counter. Range is 1 – 10. The default is 3.</td>
</tr>
</tbody>
</table>

**Example:**

```
> interface 1F1
1F1> frame-relay lmi-n392dte 5
```

**Example:**

```
/# interface 1F1
1F1# no frame-relay lmi-n392dte
```
**frame-relay lmi-n393dte**

Use this command to set the maximum number of events for the monitored event counter N393 at the DTE frame relay interface. Use the `no frame-relay lmi-n393dte` command to reset the maximum number of monitored events for the N393 counter at the DTE frame relay interface to the default value of 4.

**Mode:** interface: frame relay

**Syntax:** `frame-relay lmi-n393dte {count}`

**Syntax:** `no frame-relay lmi-n393dte`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>The maximum number of events in the monitored event counter. Range is 1 – 10. The default is 4.</td>
</tr>
</tbody>
</table>

**Example:**

```
> interface 1F1
1F1> frame-relay lmi-n393dte 5
```

**Example:**

```
/# interface 1F1
/1F1# no frame-relay lmi-n393dte
```

---

**frame-relay lmi-type**

Use this command to set the frame relay interface link management protocol (LMI).

**Mode:** interface: frame-relay

**Syntax:** `frame-relay lmi-type {ansi|auto|none|q933a}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ansi</td>
<td>ANSI T1.617 Annex D == 3</td>
</tr>
<tr>
<td>auto</td>
<td>Automatically sense LMI protocol to use based on response to the link status enquiry messages.</td>
</tr>
<tr>
<td>none</td>
<td>Default, none == 1</td>
</tr>
<tr>
<td>q933a</td>
<td>CCITT Q933 Annex A == 5</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface 1F1
/1F1# frame-relay lmi-type q933a
```
**CLI Commands**

**interface:frame-relay**

---

### show stackinterface

Use this command to display the name of the physical interface with which the frame-relay interface is associated.

**Mode:** interface:frame-relay  
**Syntax:** show stackinterface [interface-name]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interface-name</td>
<td>Interface identifier for the frame relay interface in the form: {slot-number}F{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# interface 1F1  
/1F1# show stackinterface 1F1  
Stack interface for 1F1: 1M2
```

---

### shutdown

Use this command to set the administrative status of the specified frame relay interface to down state. Use the `no shutdown` command to return the administrative status of the interface to the up state.

**Mode:** interface: frame relay  
**Syntax:** shutdown  
**Syntax:** no shutdown  
**Example:**  
```
/# int 1F1/1F1# shutdown
```

---

### stackinterface

Use this command to create associate a frame relay interface with a physical interface. You cannot issue commands to the frame relay interface until it is activated using the `stackinterface` command. After activating the frame relay interface, you can configure all of the remaining interface parameters.

**NOTE:** When stacking a frame relay interface on an HDLC interface, the physical interface must be present before you can associate a frame relay interface with it.
**CLI Commands**

**unstackinterface**

**Mode:** interface: frame relay

**Syntax:**

```
stackinterface {interface-name}
```

**Variable** | **Definition**
--- | ---
`interface name` | Port identifier for the physical interface in the form `{slot-number}{interface-type}{port-number}`. See Interface Identifiers on page 11-5 for more information.

**Example:**

```
/# interface 1F2
/1F2# stackinterface 1M2
```

---

**Example:**

```
/# interface 1F2
/1F2# unstackinterface 1F2
/# interface 2F5
/2F5# unstackinterface
```
The commands listed below are available in the interface:dlci mode. Before you can use these commands, you must create a DLCI for the frame-relay interface as described in Frame Relay Configuration on page 12-4. There can be frame relay interfaces on up to 16 links, with 32 DLCIs on the entire system but no more than eight DLCIs per frame relay interface.

To use the commands, you must switch to the desired DLCI interface mode using cd {frame-relay}-{dlci name}, where frame-relay is the identifier for the frame relay interface on which the DLC was created and dlci name is the DLCI interface you just created.

Each command in the following list is a hyperlink to the detailed definition for the command.

- cost
- frame-relay peer-address
- ip config
- ip ospf authentication-key
- ip ospf cost
- ip ospf dead-interval
- ip ospf hello-interval
- ip ospf ifauth
- ip ospf message-digest-key
- ip ospf priority
- ip ospf retransmit-interval
- ip ospf transmit-delay
- ip rip
- ip rip split-horizon
- recv
- send
- show rip interface
- shutdown

**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the no ip ospf cost command is the no variant of the ip ospf cost command. Descriptions of the no variants are included with the corresponding affirmative command.

- no ip ospf cost
- no ip ospf dead-interval
- no ip ospf hello-interval
- no ip ospf ifauth
• no ip ospf message-digest-key
• no ip ospf priority
• no ip ospf retransmit-interval
• no ip ospf transmit-delay
• no ip rip
• no shutdown

**cost**

Use this command to set the default RIP metric.

*Mode: interface:dlci*

*Syntax: cost [ip address] {value}*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip address</td>
<td>IP address of the RIP interface.</td>
</tr>
<tr>
<td>value</td>
<td>Value for the default RIP metric. Range is 0 – 6.</td>
</tr>
</tbody>
</table>

*Example: /1F1-16# cost 10.1.2.3 10*

**frame-relay peer-address**

Use this command to enter a route into the route table for the specified peer address. The specified address specified should be the address of the router at the other end of the route.

*Mode: interface:dlci*

*Syntax: frame-relay peer-address {ip-addr}*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-addr</td>
<td>IP address of the peer.</td>
</tr>
</tbody>
</table>

*Example: /1F1-16# frame-relay peer-address 192.168.2.24*
**ip config**

Use this command to manually set the IP address and subnet mask for the interface.

There are special considerations for multiple DLCIs on the same frame relay when NAT is being used. All of the DLCIs on a given frame relay should have the same setting for NAT: either all global or all local. The recommendation configuration if you use NAT on the interface is to create only one DLCI. Creating multiple DLCIs will use up extra IP addresses and subnets unnecessarily. Because the purpose of NAT is to conserve IP addresses, creating multiple DLCIs may not make sense.

Validating this command for a DLCI type interface may have to involve checking for any other DLCI interfaces on the same frame relay interface.

**Mode:** interface:dlci

**Syntax:**

```
ip config {ip-addr} [mask {subnet-mask}] [secondary] [local|global]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-addr</td>
<td>IP address of the interface. No default</td>
</tr>
<tr>
<td>subnet-mask</td>
<td>Netmask for the IP address. If no mask is specified the default address mask will be assumed, depending on whether the address is class A or class B or class C address.</td>
</tr>
<tr>
<td>secondary</td>
<td>Indicates this as the secondary IP address. A maximum of 8 secondary addresses can be specified. No default.</td>
</tr>
<tr>
<td>local</td>
<td>global</td>
</tr>
</tbody>
</table>

**Example:**

```
> interface 1F8-1012
/1F8-1012> ip config 192.168.1.3 mask 255.255.255.0
```

**ip ospf authentication-key**

Use this command to assign the authentication key (password) to be used by neighboring routers that are using the OSPF’s simple password authentication.

**Mode:** interface:dlci

**Syntax:**

```
ip ospf authentication-key {key}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>key</td>
<td>An authentication key, with a maximum of 9 characters.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# interface 1f1-16
/1f1-16# ip ospf authentication-key testkey
```
**ip ospf cost**

Use this command to set the OSPF metric value to explicitly specify the cost of sending a packet on an interface. Use the `no ip ospf cost` command to restore the OSPF interface metric to its default value.

**Mode:** `interface:dlci`

**Syntax:**
```
ip ospf cost {cost}
```

**Syntax:** `no ip ospf cost`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cost</code></td>
<td>Specify the cost of sending a packet on an interface. Range is 1 – 16777215. The default is 16777215.</td>
</tr>
</tbody>
</table>

**Example:** /1F1-16# ip ospf cost 92
**Example:** /1f1-16# no ip ospf cost

**ip ospf dead-interval**

Use this command to set the time interval over which hello packets are not received from the interface before its neighbors declare the router down. Use the `no ip ospf dead-interval` command to restore the dead interval of an interface to its default value.

**Mode:** `interface:dlci`

**Syntax:**
```
ip ospf dead-interval {interval}
```

**Syntax:** `no ip ospf dead-interval`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>interval</code></td>
<td>Specify the dead interval for the interface. Range is 0 – 2147483647 seconds. The default is 40.</td>
</tr>
</tbody>
</table>

**Example:** /1f1-16# ip ospf dead-interval 40
**Example:** /1f1-16# no ip ospf dead-interval
**CLI Commands**

*interface:dlci*

### ip ospf hello-interval

Use this command to specify the time interval between OSPF hello packets on the interface. Use the **no** ip ospf hello-interval command to restore the hello interval of an interface to its default value.

**Mode:** interface:dlci

**Syntax:** ip ospf hello-interval {interval}

**Syntax:** no ip ospf hello-interval

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Time interval between OSPF hello packets on the interface. Range is 0 – 65535. The default is 10.</td>
</tr>
</tbody>
</table>

**Example:** /1f1-16# ip ospf hello-interval 40

**Example:** /1f1-16# no ip ospf hello-interval

### ip ospf ifauth

Use this command to specify the authentication type for an interface. Use the **no** ip ospf ifauth command to restore the OSPF authentication to its default value.

**Mode:** interface:dlci

**Syntax:** ip ospf ifauth {simple-password|message-digest}

**Syntax:** no ip ospf ifauth

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>simple-password</td>
<td>Use simple password authentication. The password is used by neighboring OSPF routers on a network segment that uses the OSPF simple password authentication.</td>
</tr>
<tr>
<td>message-digest</td>
<td>Use OSPF MD5 authentication.</td>
</tr>
</tbody>
</table>

**Example:** /1f1-16# ip ospf ifauth simple-password

**Example:** /1f1-16# no ip ospf ifauth
**ip ospf message-digest-key**

Use this command to configure the MD5 authentication key for an interface. Use the **no ip ospf message-digest-key** command to turn off the Message Digest version 5 (MD5) authentication for the interface.

**Mode:** `interface:dlci`

**Syntax:**
- `ip ospf message-digest-key {key-id} md5 {key}`
- `no ip ospf message-digest-key {key-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>key-id</code></td>
<td>Range is 0 – 255. The default is 1.</td>
</tr>
<tr>
<td><code>key</code></td>
<td>An MD5 key with a maximum of 17 characters.</td>
</tr>
</tbody>
</table>

**Example:**
- `/1f1-16# ip ospf message-digest-key 1 md5 4`
- `/1f1-16# ip ospf message-digest-key 1`

**ip ospf priority**

Use this command to set the router priority, which helps to determine the DR for this network. Use the **no ip ospf priority** command to restore the default value for the interface router priority.

**Mode:** `interface:dlci`

**Syntax:**
- `ip ospf priority {priority}`
- `no ip ospf priority`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>priority</code></td>
<td>Priority level. Range is 0 – 255. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**
- `/1f1-16# ip ospf priority 2`
- `/1f1-16# no ip ospf priority 2`
**CLI Commands**

**interface:dlci**

---

### ip ospf retransmit-interval

Use this command to set the time interval between LSA (Link-State Advertisements) retransmissions. Use the `no ip ospf retransmit-interval` command to reset the retransmit interval to its default value.

**Mode:** `interface:dlci`

**Syntax:** `ip ospf retransmit-interval {interval}`

**Syntax:** `no ip ospf retransmit-interval`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Time interval between LSA (Link-State Advertisements) retransmissions. Range is 0 – 3600 seconds. The default is 5.</td>
</tr>
</tbody>
</table>

**Example:** `/1f1-16# ip ospf retransmit-interval 20`

**Example:** `/1f1-16# no ip ospf retransmit-interval`

---

### ip ospf transmit-delay

Use this command to set the estimated time delay for transmitting LS update packets. Use the `no ip ospf transmit-delay` command to restore the transmission delay to its default value.

**Mode:** `interface:dlci`

**Syntax:** `ip ospf transmit-delay {delay}`

**Syntax:** `no ip ospf transmit-delay`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>delay</td>
<td>Time delay for transmitting LS update packets. Range is 0 – 3600 seconds. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:** `/1f1-16# ip ospf transmit-delay 20`

**Example:** `/1f1-16# no ip ospf transmit-delay`
**ip rip**

Use the **ip rip enable** command to enable accepting RIP packets on the specified IP interface. Use the **no ip rip** command to reject RIP packets on the specified IP interface.

**Mode:** interface:dlci

**Syntax:** ip rip [ip-address] enable

**Syntax:** no ip rip [ip-address]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Example:** /1f1-16# ip rip 10.1.2.3 enable

**Example:** /1f1-16# no ip rip 10.1.2.3

**ip rip split-horizon**

Use this command to set split-horizon mode.

**Mode:** interface:dlci

**Syntax:** ip rip [ip-address] split-horizon {1-enable|2-poison-reverse|3-disable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>split-horizon</td>
<td>Specify the split-horizon mode to be used:</td>
</tr>
<tr>
<td></td>
<td>1 – Enable split-horizon mode</td>
</tr>
<tr>
<td></td>
<td>2 – Enable poison reverse mode</td>
</tr>
<tr>
<td></td>
<td>3 – Default. Disable both split-horizon and poison reverse</td>
</tr>
</tbody>
</table>

**Example:** /1f1-16# ip rip 10.1.2.3 split-horizon 1-enable

**recv**

Use this command to set the version of RIP receive used on the interface.

**NOTE:** You cannot use this command until RIP is enabled on the subnet using the **ip rip** command described on page 11-239.
CLI Commands
interface:dlci

Mode: interface:dlci
Syntax: recv [ip-address] {rip1|rip2|both|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>rip1</td>
<td>Receive RIP updates using RIP version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td>rip2</td>
<td>Receive RIP updates using RIP version 2 (multicasting).</td>
</tr>
<tr>
<td>both</td>
<td>Default. Receive RIP updates using both rip1 and rip2.</td>
</tr>
<tr>
<td>none</td>
<td>Set RIP receive version to none.</td>
</tr>
</tbody>
</table>

Example: /1f1-16# recv 10.1.2.3 rip2

send

Use this command to set the version of RIP send used on the interface.

NOTE: You cannot use this command until RIP is enabled on the subnet using the ip rip command described on page 11-239.

Mode: interface:dlci
Syntax: send [ip-address] {rip1|ripv1compatible|rip2|v1|v2|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>rip1</td>
<td>Send RIP updates using RIP send version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td>ripv1compatible</td>
<td>Broadcast RIP updates using RFC 1058 route sub assumption rules.</td>
</tr>
<tr>
<td>rip2</td>
<td>Send RIP updates using RIP send version 2 (multicasting).</td>
</tr>
<tr>
<td>v1</td>
<td>Use demand RIP on a WAN interface under ripversion1rules.</td>
</tr>
<tr>
<td>v2</td>
<td>Use demand RIP on a WAN interface under ripversion2rules.</td>
</tr>
<tr>
<td>none</td>
<td>Set RIP send version to none.</td>
</tr>
</tbody>
</table>

Example: /1f1-161# send 10.1.2.3 rip2
show rip interface

Use this command to display the RIP provisioning.

**Mode:** interface:dlci

**Syntax:** show rip interface [ip-address] config

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Example:** /1f1-161# show rip interface 10.1.2.3 config

RIP Interface Configuration
Config Address: 11.11.11.1
Authentication:
  Type: None
  Key: 
RIP Version:
  Send: RIP Version2
  Receive: RipVersion1 Or RipVersion2
Cost: 1
RIP State: Enabled   Admin Status: Up   Operational State: Up
Timer Intervals:
  Update every: 30 seconds
  Garbage collect after: 120 seconds
  Route age out after: 180 seconds
Split Horizon Status: Poison Reverse
**CLI Commands**

*interface:dlci*

---

**shutdown**

Use this command to set state of the DLCI interface to down. Use the `no shutdown` command to return the interface to the up state. Use the `no shutdown` command to set the specified frame-relay dlc interface to Up (In-Service).

**Mode:** interface:dlci

**Syntax:** shutdown

**Syntax:** no shutdown

**Example:**

```
> interface 1F3-100
1F3-100> shutdown
1F3-100> exit
> show int conf 1F3-100

Interface Configuration
Interface Index : 130
Interface Name : 1F3-100
Frame Relay Interface : 1F3
DLCI Number : 100
Encapsulation Type : IP
MTU : 1500
Admin Status : Down
Operational Status : Down
```

**Example:**

```
/1f1-16# no shutdown
/1f1-16# cd ..
/# show interface config 1f1-16

Interface Configuration
-----------------------
Interface Index                : 23
Interface Name                 : 1F1-16
Frame Relay Interface          : 1F1
DLCI Number                    : 16
Encapsulation Type             : Other
MTU                            : 1500
Admin Status                   : Up
Operational Status             : Down
```
**Interface:hdlc**

The commands listed below are available in the `interface:hdlc` mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- shutdown
- testing

**No Variants**

The following command is a no variant of the corresponding affirmative command. Descriptions of the no variants are included with the corresponding affirmative command.

- no shutdown

---

**shutdown**

Use this command to set the administrative state of the interface to Down (Out of Service). Use `no shutdown` to set the administrative state of the interface to Up (In-Service).

**Mode:** `interface:hdlc`

**Syntax:** shutdown

**Syntax:** no shutdown

**Example:**
```
/# int 1M1
/1M1# shutdown
```

**Example:**
```
/# int 1M1
/1M1# no shutdown
```

---

**testing**

Use this command to set the administrative state of the hdlc interface to “testing” and place the interface into loopback mode. While the interface is in the testing state, no operational packets are handled. Any packets received on the interface are discarded while in the testing state.

**Mode:** `interface:hdlc`

**Syntax:** testing

**Example:**
```
/# interface 1m1
/1M1# testing
```
CLI Commands

Interface: ppp

The commands listed below are available in the interface: ppp mode. Before you can use these commands, you must create and configure the PPP (point-to-point) interface as described in PPP Configuration on page 12-3.

Each command in the following list is a hyperlink to the detailed definition for the command.

- address alloc
- authentication type
- authentication
- cost
- delete interval
- ip config
- ip ospf authentication-key
- ip ospf cost
- ip ospf dead-interval
- ip ospf hello-interval
- ip ospf ifauth
- ip ospf message-digest-key
- ip ospf priority
- ip ospf retransmit-interval
- ip ospf transmit-delay
- ip rip enable
- ip rip split-horizon
- keep-alive-timer
- lqr enable
- magic number
- recv
- route age
- send
- show rip interface config
- show stackinterface
- shutdown
- stackinterface
- testing
- unstackinterface
- update interval
**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the `no ip ospf cost` command is the no variant of the `ip ospf cost` command. Descriptions of the no variants are included with the corresponding affirmative command.

- `no authentication`
- `no ip ospf cost`
- `no ip ospf dead-interval`
- `no ip ospf hello-interval`
- `no ip ospf ifauth`
- `no ip ospf message-digest-key`
- `no ip ospf priority`
- `no ip ospf retransmit-interval`
- `no ip ospf transmit-delay`
- `no ip rip`
- `no keep-alive-timer`
- `no lqr`
- `no magic number`
- `no shutdown`

**address alloc**

Use this command to specify the method for setting the IP address for the PPP interface. Defaults to manual if you enter an `ip config` command.

**Mode:** `interface:ppp`

**Syntax:** `address alloc {manual|negotiated|dynamic}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>manual</td>
<td>The address for the interface is to be statically assigned</td>
</tr>
<tr>
<td>negotiated</td>
<td>The interface address will be negotiated.</td>
</tr>
<tr>
<td>dynamic</td>
<td>Dynamic address allocation is not supported on PPP interfaces.</td>
</tr>
</tbody>
</table>

**Example:**

```
/1X2# address alloc negotiated
/1X2# cd ..
/1X2# show ip interface 1x2
```

```
1X2 IP Interface Configuration
-----------------------------
Interface Index          : 6
Interface Admin Status   : Up
Interface Oper Status    : Up
```
authentication type

Use this command to set type of authentication used on the PPP link at the specified IP address.

**Mode:** interface:ppp  
**Syntax:** authentication [ip-address] {none|simple|md5} [key {string}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the PPP interface.</td>
</tr>
<tr>
<td>none</td>
<td>Do not use authentication.</td>
</tr>
<tr>
<td>simple</td>
<td>Use simple authentication.</td>
</tr>
<tr>
<td>md5</td>
<td>Use MD5-based authentication.</td>
</tr>
<tr>
<td>string</td>
<td>Authentication key.</td>
</tr>
</tbody>
</table>

**Example:**  
/# int ppp 1X1  
/1X1# authentication 10.2.2.1 simple key 342

**Example:**  
/# interface 1X1  
/1X1# no authentication 1
authentication

Use this command to select either CHAP or PAP as the authentication protocol for a PPP or MLPP link. By default no authentication is configured. Use the no authentication command to remove authentication protocol for the PPP link.

**Mode:** interface:ppp

**Syntax:**
```
authentication {PAP|CHAP} {user-name} {passwd} {Secret ID} {RemoteToLocal|LocalToRemote}
```

**Syntax:**
```
no authentication {Secret ID}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAP</td>
<td>Use the PAP authentication protocol.</td>
</tr>
<tr>
<td>CHAP</td>
<td>Use the CHAP authentication protocol.</td>
</tr>
<tr>
<td>user-name</td>
<td>Enter a user name.</td>
</tr>
<tr>
<td>passwd</td>
<td>Enter a password.</td>
</tr>
<tr>
<td>Secret ID</td>
<td>Enter secret ID index.</td>
</tr>
<tr>
<td>RemoteToLocal</td>
<td>Defines direction of authentication as Remote to Local</td>
</tr>
<tr>
<td>LocalToRemote</td>
<td>Default. Defines direction of authentication as Local to Remote.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1X1
/1X1# authentication CHAP cacs passwd cacs id 1
Enter Link Config Host Name:
```

**Example:**
```
/1X1#no authentication cacs id 1
```

cost

Use this command to set the default RIP metric.

**Mode:** interface:ppp

**Syntax:**
```
cost [ip-address] {value}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the RIP interface.</td>
</tr>
<tr>
<td>value</td>
<td>Default value for the RIP metric. Range is 0 – 6.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# int 1x1
/1x1# cost 10.1.2.3 6
```
**CLI Commands**

*Interface:ppp*

---

### delete interval

Use this command to set the time interval required before a RIP entry is deleted after not hearing from it.

**Mode:** interface:ppp

**Syntax:** delete interval [ip-address] {time}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>time</td>
<td>Set the time interval between RIP updates in seconds. Range is 120 – 180 seconds.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# int 1x1
/1x1# delete interval 10.1.2.3 150
```

### ip config

Use this command to manually set the IP address and subnet mask for the interface.

**Mode:** interface:ppp

**Syntax:** ip config {ip-address} [mask {subnet mask}] [global|local]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>subnet-mask</td>
<td>Subnet mask for the IP address. If not specified the default address mask is assumed.</td>
</tr>
</tbody>
</table>
| global|local           | Specify whether the interface uses either private (local) addresses or public (global) interfaces. The local or global designation is ignored when adding secondary addresses.  
local – The default for Ethernet.  
global – The default for WAN links.  
**NOTE:** The designation of local or global for an interface is used only for NAT. |

**Example:**

```
/# interface 1x2
/1x2# ip config 192.168.1.3 mask 255.255.255.0
```
**ip ospf authentication-key**

Use this command to assign the authentication key (password) to be used by neighboring routers that are using the OSPF’s simple password authentication.

*Mode:* `interface:ppp`

*Syntax:* `ip ospf authentication-key {key}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>key</strong></td>
<td>An authentication key, with a maximum of nine characters.</td>
</tr>
</tbody>
</table>

*Example:* `/1X1# ip ospf authentication-key testkey`

---

**ip ospf cost**

Use this command to set the value for the OSPF metric used to explicitly specify the cost of sending a packet on an interface. Use the `no ip ospf cost` command to restore the OSPF interface metric to its default value.

*Mode:* `interface:ppp`

*Syntax:* `ip ospf cost {cost}`

*Syntax:* `no ospf cost`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cost</strong></td>
<td>The cost of sending a packet on an interface. Range is 1 – 16777215. The default is 16777215.</td>
</tr>
</tbody>
</table>

*Example:* `/1F1-16# ip ospf cost 92`

*Example:* `/1F1-16# no ip ospf cost`
**CLI Commands**

*Interface: ppp*

### ip ospf dead-interval

Use this command to set the time interval over which hello packets are not received from the interface before its neighbors declare the router down. Use the `no ip ospf dead-interval` command to restore the default value for the dead interval of an interface.

**Mode:** interface:ppp  
**Syntax:** ip ospf dead-interval {interval}  
**Syntax:** no ip ospf dead-interval

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>Interval time. Range is 0 – 2147483647 seconds. The default is 40.</td>
</tr>
</tbody>
</table>

**Example:** 1X1# ip ospf dead-interval 40  
**Example:** /1X1# no ip ospf dead-interval

### ip ospf hello-interval

Use this command to specify the interval between OSPF hello packets on the interface. Use the `no ip ospf hello-interval` command to restore the default value for the hello interval of an interface.

**Mode:** interface:ppp  
**Syntax:** ip ospf hello-interval {interval}  
**Syntax:** no ip ospf hello-interval

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>The interval between OSPF hello packets on the interface. Range is 0 – 65535 seconds. The default is 10.</td>
</tr>
</tbody>
</table>

**Example:** 1X1# ip ospf hello-interval 40  
**Example:** /1X1# no ip ospf hello-interval
### CLI Commands

**ip ospf ifauth**

Use this command to specify the type of authentication used by an interface. Use the **no ip ospf ifauth** command to restore the default value for the OSPF authentication.

**Mode:** `interface:ppp`

**Syntax:** `ip ospf ifauth {simple-password|message-digest}`

**Syntax:** `no ip ospf ifauth`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>simple-password</td>
<td>Use simple password authentication. The password is used by neighboring OSPF routers on a network segment that uses the OSPF simple password authentication.</td>
</tr>
<tr>
<td>message-digest</td>
<td>Use OSPF MD5 authentication.</td>
</tr>
</tbody>
</table>

**Example:**

```plaintext
1X1# ip ospf ifauth simple-password
```

**Example:**

```plaintext
/1X1# no ip ospf ifauth
```

### ip ospf message-digest-key

Use this command to configure the MD5 authentication key for an interface. Use the **no ip ospf message-digest-key** command to turn off the specified Message Digest version 5 (MD5) authentication for an interface.

**Mode:** `interface:ppp`

**Syntax:** `ip ospf message-digest-key {key-id} md5 {key}`

**Syntax:** `no ip ospf message-digest-key {key-id}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>key-id</td>
<td>Specify an ID for the message digest key. Range is 0 – 255. The default is 1.</td>
</tr>
<tr>
<td>key</td>
<td>A MD5 key with a maximum of 17 characters.</td>
</tr>
</tbody>
</table>

**Example:**

```plaintext
1X1# ip ospf message-digest-key 1 md5 4
```

**Example:**

```plaintext
/1X1# no ip ospf message-digest-key 1
```
**CLI Commands**

**Interface:ppp**

### ip ospf priority

Use this command to set the router priority, which helps to determine the DR for this network. Use the `no ip ospf priority` command to restore the default value for the interface router priority.

**Mode:** interface:ppp  
**Syntax:** `ip ospf priority {priority}`  
**Syntax:** `no ospf priority`  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>priority</td>
<td>Priority level. Range is 0 to 255. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**  
1X1# ip ospf priority 2  
1X1# no ip ospf priority 2

### ip ospf retransmit-interval

Use this command to set the time interval between LSA (Link-State Advertisements) retransmissions. Use the `no ip ospf retransmit-interval` command to return the retransmit interval value to the default.

**Mode:** interface:ppp  
**Syntax:** `ip ospf retransmit-interval {interval}`  
**Syntax:** `no ip ospf retransmit-interval`  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interval</td>
<td>The time interval between LSA (Link-State Advertisements) retransmissions. Range is 0 – 3600 seconds. The default is 5.</td>
</tr>
</tbody>
</table>

**Example:**  
1X1# ip ospf retransmit-interval 20  
1X1# no ip ospf retransmit-interval
**ip ospf transmit-delay**

Use this command to set the estimated time delay for transmitting LS update packets. Use the `no ip ospf transmit-delay` command to restore the default transmission delay value.

**Mode:** interface:ppp

**Syntax:**
- `ip ospf transmit-delay {delay}`
- `no ip ospf transmit-delay`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>delay</code></td>
<td>Time delay for transmitting LS update packets. Range is 0 – 3600 seconds. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**
- `1X1# ip ospf transmit-delay 20`
- `/1X1# no ip ospf transmit-delay`

**ip rip**

Use the `ip rip enable` command to enable RIP packets on the specified IP interface. Use the `no ip rip` command to reject RIP packets on the specified IP interface.

**Mode:** interface:ppp

**Syntax:**
- `ip rip [ip-address] enable`
- `no ip rip [ip-address]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Example:**
- `/# int 1x1`
  `/1x1# ip rip 10.1.2.3 enable`
- `/# int 1x1`
  `/1x1# no ip rip 10.1.2.3`
CLI Commands

Interface: ppp

**ip rip split-horizon**

Use this command to set split-horizon mode for the specified PPP interface.

**Mode:** interface:ppp

**Syntax:** `ip rip [ip-address] split-horizon {1-enable|2-poison-reverse|3-disable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the interface</td>
</tr>
<tr>
<td>split-horizon</td>
<td>Specify the split-horizon mode to be used:</td>
</tr>
<tr>
<td></td>
<td>1 – Enable split-horizon mode.</td>
</tr>
<tr>
<td></td>
<td>2 – Default. Enable poison reverse mode.</td>
</tr>
<tr>
<td></td>
<td>3 – Disable both split-horizon and poison reverse.</td>
</tr>
</tbody>
</table>

**Example:**

```
/1x1# ip rip 10.1.2.3 split-horizon 1
```

**keep-alive-timer**

Use this command to set the number of seconds between LCP echo request packets from the keep-alive timer (send an echo request packet every \(n\) seconds). Use the `no keep-alive-timer` command to disable the keep-alive timer for the LCP echo request packets.

**Mode:** interface:ppp

**Syntax:** `keep-alive-timer {timer-value}`

**Syntax:** `no keep-alive-timer`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>timer-value</td>
<td>The number of seconds between LCP echo request packets.</td>
</tr>
<tr>
<td></td>
<td>Range is 10 – 300 seconds.</td>
</tr>
</tbody>
</table>

**Example:**

```
/1x2# keep-alive-timer 15
```

**Example:**

```
/1x2# no keep-alive-timer
```
### lqr enable

Use this command to enable PPP Link Quality Reporting (LQR) status and set the reporting period for the link. By default LQR negotiation is disabled. Use the `no lqr` command to disable PPP Link Quality Reporting (LQR) status and the reporting period for the link.

**Mode:** `interface:ppp`

**Syntax:** `lqr enable {timeout}`

**Syntax:** `no lqr`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>timeout</code></td>
<td>The LQR Reporting period that the local PPP entity attempts to negotiate with the remote entity, in units of hundredths of a second. <strong>NOTE:</strong> The link must be restarted before a change to the timeout value takes effect.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1X1
/1X1# lqr enable 100
```

**Example:**
```
/# interface 1X1
/1X1# no lqr
```

### magic number

Use this command to enable Magic Number negotiation on PPP link. By default Magic Number negotiation is disabled. Use the `no magic number` command to disable Magic Number negotiation on a PPP link.

**Mode:** `interface:ppp`

**Syntax:** `magic number`

**Syntax:** `no magic number`

**Example:**
```
/# interface 1X1
/1X1# magic number
```

**Example:**
```
/# interface 1X1
/1X1# no magic number
```
**CLI Commands**

*Interface: ppp*

### recv

Use this command to set the version of RIP receive used on the interface.

**NOTE:** This command cannot be issued until RIP is enabled on the subnet using the `ip rip` command as described on page 11-239.

**Mode:** interface: ppp  
**Syntax:** `recv [ip-address] {rip1|rip2|both|none}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td><code>rip1</code></td>
<td>Receive RIP updates using RIP version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td><code>rip2</code></td>
<td>Receive RIP updates using RIP version 2 (multicasting).</td>
</tr>
<tr>
<td><code>both</code></td>
<td>Default. Receive RIP updates using both <code>rip1</code> and <code>rip2</code>.</td>
</tr>
<tr>
<td><code>none</code></td>
<td>Set RIP receive version to none.</td>
</tr>
</tbody>
</table>

**Example:**  
/ # int 1x1  
/1x1# recv 10.1.2.3 rip2

### route age

Use this command to set the time interval after which the entry is put into garbage collect.

**Mode:** interface: ppp  
**Syntax:** `route age [ip-address] {time}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td><code>time</code></td>
<td>Time after which the RIP route entry is put into the garbage collect on the given interface. Range is 1 – 3600. The default is 180 seconds.</td>
</tr>
</tbody>
</table>

**Example:**  
/ # int 1x1  
/1x1# route age 10.1.2.3 200
**CLI Commands**

### send

Use this command to set the version of RIP send used on the interface.

**NOTE:** This command cannot be issued until RIP is enabled on the subnet using the `ip rip` command as described on page 11-239.

**Mode:** interface:ppp

**Syntax:** `send [ip-address] {rip1|ripv1compatible|rip2|v1|v2|none}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td><code>rip1</code></td>
<td>Default. Send RIP updates using RIP send version 1 (compliant with RFC 1058).</td>
</tr>
<tr>
<td><code>ripv1compatible</code></td>
<td>Broadcast RIP updates using RFC 1058 route sub assumption rules.</td>
</tr>
<tr>
<td><code>rip2</code></td>
<td>Send RIP updates using RIP send version 2 (multicasting).</td>
</tr>
<tr>
<td><code>v1</code></td>
<td>Use demand RIP on a WAN interface under ripversion1rules.</td>
</tr>
<tr>
<td><code>v2</code></td>
<td>Use demand RIP on a WAN interface under ripversion2rules.</td>
</tr>
<tr>
<td><code>none</code></td>
<td>Set RIP send version to none.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# int 1x1
/1x1# send 10.1.2.3 rip2
```

### show rip interface config

Use this command to display the RIP configuration for the PPP interface.

**Mode:** interface:ppp

**Syntax:** `show rip interface {ip-address} config`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-address</code></td>
<td>IP address of the interface.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# int 1x1
/1x1# show rip interface config

RIP Interface Configuration

Config Address: 11.11.11.1

Authentication:  
  Type: None  
  Key: 
```
**CLI Commands**

*Interface: ppp*

RIP Version:
- Send: RIP Version2
- Receive: RipVersion1 Or RipVersion2

Cost: 1

RIP State: Enabled  Admin Status: Up  Operational State: Up

Timer Intervals:
- Update every: 30 seconds
- Garbage collect after: 120 seconds
- Route age out after: 180 seconds

Split Horizon Status: Poison Reverse

---

**show stackinterface**

Use this command to display the stack interface information for the specified point-to-point (PPP) interface.

**Mode:** interface: ppp

**Syntax:** show stackinterface [ppp interface-name]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ppp interface-name</td>
<td>The name of the PPP interface in the form {slot-number}X{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# interface 1X2
/1X1# show stackinterface 1X2
Stack interface for 1X2: 1M2
```
**shutdown**

Use this command to set the administrative state of the specified PPP interface to down (out-of-service). Use the **no shutdown** command to set administrative status of the specified point-to-point (PPP) interface to up (in-service).

**NOTE:** Issuing the “no shutdown” command on a PPP interface before you set an IP address for the interface, creates an un-numbered PPP interface. You must then use an interface name instead of an IP address when specifying the interface in subsequent commands.

**Syntax:** shutdown

**Syntax:** no shutdown

**Example:**

```bash
/1X2# shutdown

To confirm that the status of the interface is now down:
```

```bash
/1X2# cd /
/1X2# show interface config 1x2
Interface Configuration
-----------------------
Interface Index : 6
Interface Name   : 1X2
Encapsulation Type : PPP
MTU              : 1500
Admin Status    : Down
Operational Status : Other
```

**Example:**

```bash
/1x1# no shutdown

To confirm that the status of the interface is now up:
```

```bash
/1x1# cd ..
/1x1# show interface config 1x1
Interface Configuration
-----------------------
Interface Index : 5
Interface Name   : 1X1
Encapsulation Type : PPP
MTU              : 1500
Admin Status    : Up
Operational Status : Up
```
**CLI Commands**

*Interface: ppp*

---

**stackinterface**

Use this command to stack a PPP interface over a physical interface. You must use the `stackinterface` command to link the PPP interface to an enabled physical interface before you can configure the PPP interface parameters.

**Mode:** interface:ppp

**Syntax:**

```
stackinterface [ppp interface-name]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ppp interface-name</strong></td>
<td>The name of the PPP interface to stack in the form {slot-number}X{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

The following example shows the series of steps required to stack a PPP interface.

**Example:**

```
/# interface 1X2
/1X2#
/1X2# stackinterface 1m2
   Please enable the port before adding the link.
/1X2# cd ..
/# interface 1m2
/1M2# cd ..
/# interface 1x2
/1X2# stackinterface 1m2
   Layering successful
```

---

**testing**

The `testing` command is not supported for PPP interfaces.

**Mode:** interface:ppp

**Syntax:** testing
**unstackinterface**

Use this command to unstack a PPP interface.

**Mode:** interface:ppp  
**Syntax:** unstackinterface [ppp interface-name]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ppp interface-name</td>
<td>The name of the PPP interface to unstack in the form {(slot-number)X(port-number)}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
</tbody>
</table>

The following example shows the series of steps required to unstack a PPP interface.

**Example:**
```
/ # interface 1x2  
  /1X2#  
  /1X2# shutdown  
  /1X2# unstackinterface 1X2  
  Cannot unstack the interface: Admin status should be down for Lower Layer  
  /1X2# cd ..  
  / # interface 1M2  
  /1M2# shutdown  
  /1M2# cd ..  
  / # interface 1x2  
  /1X2# unstackinterface 1x2  
  Successfully unstacked the PPP interface
```

**update interval**

Use this command to set the time interval between RIP updates for the PPP interface.

**Mode:** interface:ppp  
**Syntax:** update interval [ip-address] \{time\}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address of the PPP interface.</td>
</tr>
<tr>
<td>time</td>
<td>The time interval between RIP updates in seconds. Range is 10 – 3600 seconds. Default is 30.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # int 1x1  
  /1x1# update interval 10.1.2.3 45
```
CLI Commands

ip

The commands listed below are available in the ip mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- arp add
- arp max retries
- arp timeout
- icmp send echo reply
- ip aggregate route
- ip default ttl
- ip directed broadcast
- ip forwarding
- ip fragments
- ip path mtu
- ip path mtu age
- ip path mtu discover
- ip process option
- ip proxy arp
- ip reassembly
- ip redirects
- ip route add
- ip route age
- ip route del
- ip unreachables
- rarp add
- rarp del
- rarp disable
- rarp server

No Variants

The following commands are no variants of the corresponding affirmative command. For example, the no arp command is the no variant of the arp command. Descriptions of the no variants are included with the corresponding affirmative command.

- no arp
- no icmp send echo reply
- no ip directed broadcast
- no ip forwarding
- no ip path mtu
CLI Commands

arp

- no ip path mtu discover
- no ip process option
- no ip proxy arp
- no ip redirects
- no ip unreachables

Use the **arp add** command to add an ARP entry to the arp cache. This entry is permanent and does not have a timeout. It can be deleted manually. Use the **no arp** command to remove an entry in the ARP cache.

**Mode:** ip

**Syntax:**
```
arp add {phys-address} {ip-address} {interface name/index}
```

**Syntax:**
```
no arp {ip-address} {interface name/index}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>phys-address</td>
<td>The physical address (MAC address) of the FLEXmaster module (card).</td>
</tr>
<tr>
<td>ip-address</td>
<td>IP address of the interface.</td>
</tr>
<tr>
<td>interface name/index</td>
<td>Identify the name or index of the IP interface.</td>
</tr>
<tr>
<td></td>
<td>interface-name – The name of interface in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td></td>
<td>index – Determine the index number of the desired interface by issuing a root mode <strong>show interface config all</strong> command as described on page 11-45. This is an SNMP definition.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ip
/ip# arp add 00:9e:4c:57:82:6f 192.168.111.35 1X1
```

**Example:**
```
/# cd ip
/ip# no arp 192.168.111.35 1E1
```
CLI Commands

**ip**

---

### arp max retries

Use this command to specify the maximum number of retry attempts before aborting ARP resolving.

**Mode:** ip  
**Syntax:** `arp max retries {value}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>value</code></td>
<td>The maximum number of retries. Range is 2 – 10.</td>
</tr>
</tbody>
</table>

**Example:** 
```
/# cd ip  
/ip# arp max retries 10
```

---

### arp timeout

Use this command to specify the time after which the entry in ARP cache is to be deleted.

**Mode:** ip  
**Syntax:** `arp timeout {secs}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>secs</code></td>
<td>Timeout in seconds. Range is 30 – 86400 seconds. The default is 7200.</td>
</tr>
</tbody>
</table>

**Example:** 
```
/# cd ip  
/ip# arp timeout 7500
```

---

### icmp send echo reply

Use this command to enable sending ICMP echo replies for the incoming ICMP echo requests. Use the `no icmp send echo reply` command to disable sending of ICMP echo replies for the incoming ICMP echo requests.

**Mode:** ip  
**Syntax:** `icmp send echo reply`  
**Syntax:** `no icmp send echo reply`  
**Example:** 
```
/# cd ip  
/ip# icmp send echo reply
```

**Example:** 
```
/# cd ip  
/ip# no icmp send echo reply
```
**ip aggregate route**

Use this command to specify the maximum number of aggregated routes that can be configured in the system.

*Mode:* ip  

*Syntax:* `ip aggregate route {value}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>value</code></td>
<td>The number of aggregated routes that can be configured on the router. Range is 5 – 499. The default is 10 routes.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd ip  
/ip# ip aggregate route 12
```

**ip default ttl**

Use this command to set the default Time-To-Live (TTL) value for IP packets in seconds.

*Mode:* ip  

*Syntax:* `ip default ttl {value}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>value</code></td>
<td>The default TTL. Range is 1 – 255.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd ip  
/ip# ip default ttl 80
```
**CLI Commands**

*ip*

---

### ip directed broadcast

Use this command to enable IP directed broadcast forwarding on the given interface. Use the `no ip directed broadcast` command to disable IP directed broadcast forwarding on the given interface.

**Mode:** ip  
**Syntax:** `ip directed broadcast {interface name/index}`  
**Syntax:** `no ip directed broadcast {interface name/index}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| interface name/index | Specify the name or index of the Ethernet interface  
interface-name – The name of interface in the form  
[slot-number]{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.  
index – Determine the index number of the desired interface by issuing a root mode `show interface config all` command as described on page 11-45. This is an SNMP definition. |

**Example:**  
/`cd ip`  
/ip# `ip directed broadcast 1E1`

**Example:**  
/ip# `no ip directed broadcast 1el`

---

### ip forwarding

Use this command to enable IP forwarding on all interfaces of the router. When this option is enabled, IP packets are forwarded if required to the destination. IP forwarding is enabled by default.

Use the `no ip forwarding` command to disable IP forwarding globally on all interfaces of the router. Disabling IP forwarding on an interface results in packets, which are to be forwarded on that interface being dropped and ICMP error messages being generated for the packets.

**Mode:** ip  
**Syntax:** `ip forwarding`  
**Syntax:** `no ip forwarding`

**Example:**  
/`cd ip`  
/ip# `no ip forwarding`

**Example:**  
/`cd ip`  
/ip# `ip forwarding`
### ip fragments

Use this command to specify the number of IP datagrams that can be allowed in a single reassembly.

**Mode:** ip  
**Syntax:** ip fragments {value}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Number of IP datagrams that can be allowed in a single reassembly. Range is 1 – 301. The default is 10 datagrams.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd ip  
/ip# ip fragments 132
```

### ip path mtu

Use this command to set the Path MTU (Maximum Transmit Unit) and TOS (Type of Service) for a given destination IP address. Use the `no ip path mtu` command to remove the Path MTU entry for the specified destination IP address.

**Mode:** ip  
**Syntax:** ip path mtu {dest ip} {tos} {mtu}  
**Syntax:** no ip path mtu {dest ip} {tos}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest ip</td>
<td>Destination IP address of the new route</td>
</tr>
<tr>
<td>tos</td>
<td>Type of Service value. Range is 0 – 255.</td>
</tr>
<tr>
<td>mtu</td>
<td>Maximum transmission unit value. Range is 68 – 65535.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd ip  
/ip# ip path mtu 10.0.0.2 0 1200
```

**Example:**  
```
/# cd ip  
/ip# no ip path mtu 10.0.0.2 0
```
**CLI Commands**

**ip**

---

**ip path mtu age**

Use this command to specify the amount of time, after which the estimate of a PMTU (Path Maximum Transmit Unit) is considered stale. After the specified amount of time elapses, the estimate of the PMTU is increased. Setting the time to 255 disables updating the PMTU estimate.

**Mode:** ip

**Syntax:**

```
ip path mtu age {mins}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>mins</td>
<td>The PMTU age in minutes. Range is 5 – 255 minutes. The default is 10. Setting the PMTU age to 255 disables updating the PMTU estimate.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd ip
/ip# ip path mtu age 10
```

---

**ip path mtu discover**

Use this command to enable path MTU discovery on all paths. Use the `no ip path mtu discover` command to disable path MTU discovery on all paths. When path MTU discovery is disabled, PMTU-D is not done even if the application requests to do so.

**Mode:** ip

**Syntax:**

```
ip path mtu discover
```

**Example:**

```
/# cd ip
/ip# ip path mtu discover
```

**Example:**

```
/# cd ip
/ip# no ip path mtu discover
```

---

**ip process option**

Use this command to enable processing of the IP options in the received IP packets. Use the `no ip process option` command to disable processing of the IP options in the received IP packets.

**Mode:** ip

**Syntax:**

```
ip process option
```

**Syntax:**

```
o ip process option
```

**Example:**

```
/# cd ip
/ip# ip process option
```

**Example:**

```
/# cd ip
/ip# no ip process option
```
ip proxy arp

Use this command to enable proxy ARP. Use the no ip proxy arp command to disable proxy ARP.

**Mode:** ip

**Syntax:** ip proxy arp

**Syntax:** no ip proxy arp

**Example:**
```
/# cd ip
/ip# ip proxy arp
```

**Example:**
```
/# cd ip
/ip# no ip proxy arp
```

ip reassembly

Use this command to specify the number of IP datagrams waiting for reassembly and the maximum size of the fragmented IP datagrams received on the specified interface.

**Mode:** ip

**Syntax:** ip reassembly \{n\} \[size \{value\} \{interface-name/index\}\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n)</td>
<td>Number of IP datagrams waiting for reassembly. Range is 1 – 150.</td>
</tr>
<tr>
<td>(value)</td>
<td>The maximum size of the fragmented IP datagram received on the interface</td>
</tr>
<tr>
<td></td>
<td>that can be considered for reassembly. Range is 1024 – 33280.</td>
</tr>
<tr>
<td>(interface-name/index)</td>
<td>Specify the interface by name or index.</td>
</tr>
<tr>
<td></td>
<td>(interface-name) – The name of interface in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td></td>
<td>(index) – Determine the index number of the desired interface by issuing a</td>
</tr>
<tr>
<td></td>
<td>root mode show interface config all command as described on page 11-45.</td>
</tr>
<tr>
<td></td>
<td>This is an SNMP definition.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ip
/ip# ip reassembly 5 size 2000 1E1
```
### ip redirect

Use this command to enable sending of ICMP redirect messages. Use the `no ip redirects` command to disable sending of ICMP redirect messages.

**NOTE:** Even if ICMP redirects are enabled, ICMP redirect messages may not be sent.

**NOTE:** When there is a cached entry for the next hop already present in the data plane coprocessor, the packets will be forwarded at wire speed by the data plane coprocessor and no ICMP redirect message will be sent. Note that this only occurs when the firewall is disabled and the data plane already knows the MAC address of the next hop.

**NOTE:** However, if the control plane processor handles the packet, ICMP redirects will be sent as usual, such as when an ARP request must be generated for the next hop.

**Mode:** ip

**Syntax:** ip redirects

**Syntax:** no ip redirects

**Example:**
```
/# cd ip
/ip# ip redirects
```

**Example:**
```
/# cd ip
/ip# no ip redirects
```
**ip route add**

Use this command to add a route in the routing table for a given destination.

**NOTE:** Because 0.0.0.0 is not a valid next hop address, you must specify the interface name instead of the next hop address on an un-numbered PPP interface.

**Mode:** ip

**Syntax:**
```
ip route add {dest ip-addr} [mask {dest mask}] {next hop} [metric {metric}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest ip-addr</td>
<td>Destination IP address of the new route</td>
</tr>
<tr>
<td>dest mask</td>
<td>Subnet Mask of the Destination IP address</td>
</tr>
<tr>
<td>next hop</td>
<td>The next hop host to reach a route. The form may either be an IP address or an interface name on a WAN interface.</td>
</tr>
<tr>
<td>metric</td>
<td>The metric value is the “cost” of the route. May be used as number of hops to that destination but could also be given a larger value to indicate a slower link therefore a less desirable route to choose. Used in comparison to other routes to determine the smallest cost of getting to the same destination</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ip
/ip# ip route add 101.255.0.0 mask 255.255.0.0 1X2 1
```

**ip route age**

Use this command to set the ageout time after which an IP route will be deleted.

**Mode:** ip

**Syntax:**
```
ip route age {ageout}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ageout</td>
<td>The ageout time. Range is 1 – 3600 seconds. The default is 180.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ip
/ip# ip route age 200
```
**CLI Commands**

*ip*

---

**ip route del**

Use this command to delete the route for a given destination from the routing table.

**NOTE:** Because 0.0.0.0 is not a valid next hop address, you must specify the interface name instead of the next hop address on an un-numbered PPP interface.

**Mode:** ip

**Syntax:**

```
ip route del {dest ip-addr} [dest mask] {next hop | interface name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest ip-addr</td>
<td>The destination IP address to be deleted from the routing table.</td>
</tr>
<tr>
<td>dest mask</td>
<td>Subnet Mask of the Destination IP address</td>
</tr>
<tr>
<td>next hop</td>
<td>IP address of the next hop host to reach in the route.</td>
</tr>
<tr>
<td>interface name</td>
<td>The name of interface in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information. Because there is no “next hop” on un-numbered PPP interfaces, you must use the interface name.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ip# cd ip
/ip# ip route del 200.111.153.140 255.0.0.1 192.168.1.1
```

---

**ip unreachables**

Use this command to enable sending of ICMP unreachable messages. Use the **no ip unreachables** command to disable sending of ICMP unreachable messages.

**Mode:** ip

**Syntax:**

```
ip unreachables
```

```
no ip unreachables
```

**Example:**

```
/ip# cd ip
/ip# ip unreachables
```

```
/ip# no ip unreachables
```
**rarp add**

Use this command to add a Reverse Address Resolution Protocol (RARP) entry for the specified client to the DHCP server.

*Mode:* ip  
*Syntax:* `rarp add {hwaddr} {ipaddr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>hwaddr</td>
<td>The physical address (MAC address) of the DHCP server client.</td>
</tr>
<tr>
<td>ipaddr</td>
<td>IP address of the DHCP server client.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd ip  
/ip# rarp add 00:11:22:33:44:55 10.0.0.11
```

**rarp del**

Use this command to delete a Reverse Address Resolution Protocol (RARP) entry for the specified client from the DHCP server.

*Mode:* ip  
*Syntax:* `rarp del {hwaddr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>hwaddr</td>
<td>The physical address (MAC address) of the client.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/# cd ip  
/ip# rarp del 00:11:22:33:44:55
```

**rarp disable**

Use this command to disable the Reverse Address Resolution Protocol (RARP) protocol.

*Mode:* ip  
*Syntax:* `rarp disable`  
*Example:*  
```
/# config ip  
/ip# rarp disable
```
CLI Commands

ip

rarp server

Use this command to enable Reverse Address Resolution Protocol (RARP) and specify the number of RARP entries to display.

Mode: ip
Syntax: rarp server [entries]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>entries</td>
<td>Number of entries to be displayed. Range is 1-25.</td>
</tr>
</tbody>
</table>

Example:  
```
  /# cd ip
  /ip# rarp server 10
```
nat

The commands listed below are available in the nat mode. NAT (network address translation) allows a LAN to use one set of IP addresses for internal traffic and a different set for external traffic. NAT translates the internal addresses to globally unique IP addresses before sending packets to the outside network.

Each command in the following list is a hyperlink to the detailed definition for the command.

- config
- free port
- global nat
- idle timeout
- ip nat
- local nat
- static nat
- tcp timeout
- udp timeout
- virtual server

No Variants

The following commands are no variants of the corresponding affirmative command. For example, the no global nat command is the no variant of the global nat command. Descriptions of the no variants are included with the corresponding affirmative command.

- no global nat
- no ip nat
- no local nat
- no static nat
- no virtual server
CLI Commands

nat

config

Use this command to configure NAT and NAPT on the specified global (public) interface.

**NOTE:** Currently, the only supported configuration is setting NAT, NAPT, and two-way NAP to up (enabled). This configuration provides both address and port translation

**Mode:** nat

**Syntax:**

```
config {global interface name} nat {up|down} napt {up|down}
two way nat {up|down}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>global interface name</td>
<td>The name of global interface being used for the session in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>nat up</td>
<td>down</td>
</tr>
<tr>
<td>up – NAT is enabled on this interface. Only the inside host can initiate connections. Translation will be done on outbound packets only.</td>
<td></td>
</tr>
<tr>
<td>down – NAT is disabled on this interface. NAT can only be disabled if NAPT is set to up.</td>
<td></td>
</tr>
<tr>
<td>napt up</td>
<td>down</td>
</tr>
<tr>
<td>up – NAPT is enabled on this interface. The same global IP address is loaded and can be used for many local host by translating the port number.</td>
<td></td>
</tr>
<tr>
<td>down – NAT is disabled on this interface.</td>
<td></td>
</tr>
<tr>
<td>two way nat up</td>
<td>down</td>
</tr>
<tr>
<td>up – Two way NAT is enabled on this interface.</td>
<td></td>
</tr>
<tr>
<td>down – Two way NAT is disabled on this interface.</td>
<td></td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd nat
/nat# config 1X2 nat up napt up two way nat up
```

free port

Use this command to set the next free port number to be used by NAPT.

**Mode:** nat

**Syntax:**

```
free port {port number}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>port number</td>
<td>Range is 5000 – 65535.</td>
</tr>
</tbody>
</table>
CLI Commands

global nat

Example:  
```
/# cd nat
/nat# free port 9000
```

global nat

Use this command to add a list of global addresses to be used by NAT on the specified interface. Use the `no global nat` command to delete the given global address from the list of global addresses on the specified interface.

**Mode:** nat

**Syntax:**
```
global nat {global interface name} {translated local ip} {number of translated ip addresses}
```

**Syntax:**
```
no global nat {global interface name} {translated local ip}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>global interface name</td>
<td>The name of global interface being used for the session in the form `{slot-number}[interface-type]</td>
</tr>
<tr>
<td>translated local ip</td>
<td>The IP address that should be used in the packets going out from the given Local IP host to the outside network. In the opposite direction this mapping will be used along with the NAT entry to reverse translation. <strong>NOTE:</strong> This address should not be used by any host on the public side except the FLEXmaster.</td>
</tr>
<tr>
<td>number of translated ip addresses</td>
<td>Specifies the number of global IP addresses that can be used by the NAT module to translate the local IP address whose packets are transmitted on the given interface.</td>
</tr>
</tbody>
</table>

**Example:**  
```
/# cd nat
/nat# global nat 1E2 192.168.5.100 255.255.255.0
```

**Example:**  
```
/# cd nat
/nat# no global nat 1E2 192.168.5.100
```

idle timeout

Use this command to set the amount of time a connection can stay idle before a timeout.

**Mode:** nat

**Syntax:** idle timeout `{secs}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>secs</td>
<td>The connection timeout in seconds. Range is 1 – 60.</td>
</tr>
</tbody>
</table>
CLI Commands

nat

Example:  
  /# cd nat  
  /nat# idle timeout 30

ip nat

Use this command to enable NAT globally. Issuing this command triggers a series of internal configuration operations required to support NAT and starts the NAT translation function. Use the no ip nat command to disable NAT globally.

  Mode: nat  
  Syntax: ip nat  
  Syntax: no ip nat  

Example:  
  /# cd nat  
  /nat# ip nat  
  /nat# no ip nat

local nat

Use this command to add a list of addresses that need translation. Use the no local nat command to delete the specified local IP address from the list of configured addresses for the specified interface.

NOTE: DO NOT ISSUE a no local nat command before issuing a static nat command. It is not necessary to remove the local address of the static nat host from the local nat pool. The local address does not need to be in the local pool.

Only use the no local nat command to remove an entire local pool previously added using the local nat command. When you issue a no local nat command, you must include the same IP address for the local host that was used in the local nat command.

  Mode: nat  
  Syntax: local nat {local interface name} {local ip} {mask}  
  Syntax: no local nat {local interface name} {local ip}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>local interface name</td>
<td>The name of local interface being used for the session in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>local ip</td>
<td>The IP address of the local host connected to the inside network</td>
</tr>
<tr>
<td>mask</td>
<td>Subnet mask of the local IP address. Using the subnet mask with the local IP address identifies a range of local hosts that can contact outside.</td>
</tr>
</tbody>
</table>
**static nat**

Use this command to create a static mapping between local and global address on the specified interface. Use the **no static nat** command to delete the static mapping between the IP address of the local host and the specified global interface.

**Mode:** nat

**Syntax:**

- `static nat {global interface name} {local ip} {translated local ip}`
- `no static nat {global interface name} {local ip}`

**Variable**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>global interface name</td>
<td>The name of interface in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td>local ip</td>
<td>The IP address of the host connected to the inside network</td>
</tr>
<tr>
<td>translated local ip</td>
<td>The IP address used in the packets going out from the specified Local IP host to the outside network. In the opposite direction this mapping is used along with the NAT entry to reverse translation. <strong>NOTE:</strong> This address should only be assigned to the FLEXmaster.</td>
</tr>
</tbody>
</table>

**Example:**

```
Example:  /# cd nat
/nat# static nat 1E2 10.0.0.1 192.168.5.100
```

```
Example:  /# cd nat
/nat# no static nat 1E2 10.0.0.1
```

**tcp timeout**

Use this command to set the amount of time an established TCP connection can stay idle.

**Mode:** nat

**Syntax:**

- `tcp timeout {secs}`

**Variable**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>secs</td>
<td>The timeout in seconds. Range is 0 – 86400.</td>
</tr>
</tbody>
</table>

**Example:**

```
Example:  /# cd nat
/nat# tcp timeout 100
```
**CLI Commands**

**nat**

---

**udp timeout**

Use this command to set the amount of time an established UDP (User Datagram Protocol) connection can stay idle.

**Mode:** nat

**Syntax:** udp timeout {secs}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>secs</td>
<td>The timeout in seconds. Range is 1 – 65535.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd nat
/nat# udp timeout 100
```

---

**virtual server**

Use this command to configure a virtual server. Use the no virtual server command to delete a virtual server configuration.

**Mode:** nat

**Syntax:** virtual server {global interface name} {local ip} {ftp|telnet| smtp|whois|dns|tftp|gopher|finger|http|pop3|news|irc|pptp|other} [{Local Server Port} [{Translated IP} {Translated Port}]]

**Syntax:** no virtual server {global interface name} {local ip} {ftp|telnet|smtp|whois|dns|tftp|gopher|finger|http|pop3|news|irc|pptp|other} [local port]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>global interface name</td>
<td>The name of the global interface in the form {slot-number}{interface-type}{port-number}. See Interface Identifiers on page 11-5 for more information. This interface hosts the virtual server session.</td>
</tr>
<tr>
<td>local ip</td>
<td>The IP address of the host connected to the inside network</td>
</tr>
<tr>
<td>ftp</td>
<td>File Transfer Protocol</td>
</tr>
<tr>
<td>telnet</td>
<td>User interface to a remote unit</td>
</tr>
<tr>
<td>smtp</td>
<td>Simple Mail Transfer</td>
</tr>
<tr>
<td>whois</td>
<td>Whois protocol</td>
</tr>
<tr>
<td>dns</td>
<td>Domain Name Server</td>
</tr>
<tr>
<td>tftp</td>
<td>Trivial File Transfer Protocol</td>
</tr>
<tr>
<td>gopher</td>
<td>Document search and retrieval</td>
</tr>
<tr>
<td>finger</td>
<td>Display information about users</td>
</tr>
<tr>
<td>http</td>
<td>World Wide Web</td>
</tr>
</tbody>
</table>
### CLI Commands

**virtual server**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pop3</code></td>
<td>Post Office Protocol version 3</td>
</tr>
<tr>
<td><code>news</code></td>
<td>News protocol</td>
</tr>
<tr>
<td><code>irc</code></td>
<td>Internet Relay Chat</td>
</tr>
<tr>
<td><code>pptp</code></td>
<td>Point to Point Tunneling Protocol</td>
</tr>
<tr>
<td><code>other</code></td>
<td></td>
</tr>
</tbody>
</table>

| **Local Server Port** | The port of the host present in the inside network.                     |
| **Translated IP**     | The IP address that should be used in the packets going out from the given Local IP host to the outside network. In the opposite direction this mapping will be used along with the NAT entry to reverse translation. No host on the public side, other than the FLEXmaster, should be using this address. |
| **Translated Port**   | The Port that should be used in the packets going out from the given Local IP host to the outside network. In the opposite direction this mapping will be used along with the NAT entry to reverse translation |
| **Local Port**        | The port of the host present in the inside network.                      |

**Example:**

```
/# cd nat
/nat# virtual server 1E2 10.0.0.1 ftp 6003
```

**Example:**

```
/# cd nat
/nat# no virtual server 1E2 10.0.0.1 ftp 6003
```
CLI Commands

ospf

The commands listed below are available in the ospf mode. For more information about OSPF, see OSPF Configuration on page 12-12.

Each command in the following list is a hyperlink to the detailed definition for the command.

- abr-type
- area
- area default-cost
- area default-metricType
- area stability-interval
- area translation-role
- area virtual-link
- asbr router
- compatible rfc1583
- default-information originate always metric
- exit-overflow interval
- external-summary address
- max-lsa
- neighbor
- network
- nssaAsbrDfRtTrans
- passive-interface
- redist-config
- redistribute
- router ospf
- summary-address
- trace level
- trace module
- trace pkt

No Variants

The following commands are no variants of the corresponding affirmative command. For example, the no area command is the no variant of the area command. Descriptions of the no variants are included with the corresponding affirmative command.

- no area
- no asbr router
- no compatible rfc1583
- no external-summary address
abr-type

Use this command to set the alternative Area Border Router ABR type.

Mode: ospf
Syntax: abr-type {standard|cisco|ibm}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>standard</td>
<td>Standard Area Border Router.</td>
</tr>
<tr>
<td>cisco</td>
<td>Cisco router.</td>
</tr>
<tr>
<td>ibm</td>
<td>IBM router.</td>
</tr>
</tbody>
</table>

Example: /# cd ospf
          /ospf# abr-type standard

area

Use this command to define an area as either a stub area or an NSSA area. Use the no area command to remove an area, convert a stub or NSSA area to a normal area, remove a virtual link, delete the stub cost for a specific TOS, and .

NOTE: The stub cost, virtual link, authentication key, and message digest ID cleared in the no area command are set in the area default-cost and area virtual-link commands, respectively.
**CLI Commands**

### ospf

**Mode:** ospf

**Syntax:** area {area-ip-addr} {stub|nssa[no-summary]}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>stub</td>
<td>Areas that do not receive LSAs.</td>
</tr>
<tr>
<td>nssa</td>
<td>NSSAs are similar to the existing OSPF stub area configuration option but have the additional capability of importing AS external routes in a limited fashion.</td>
</tr>
<tr>
<td>no-summary</td>
<td>Prevents an Area Border Router (ABR) from sending summary link advertisements into the stub area</td>
</tr>
</tbody>
</table>

**Syntax:** no area {area-ip-addr} [type{stub|nssa}][virtual-link {router-ip-addr}] [default-cost] [authentication-key {key}] [message-digest-key {key}]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>type</td>
<td>Specify the type of area to be removed:</td>
</tr>
<tr>
<td></td>
<td>stub – Areas that do not receive LSAs.</td>
</tr>
<tr>
<td></td>
<td>nssa – NSSAs are similar to the existing OSPF stub area configuration option but have the additional capability of importing AS external routes in a limited fashion.</td>
</tr>
<tr>
<td>virtual link {router-ip-addr}</td>
<td>The IP address of the router for the virtual link.</td>
</tr>
<tr>
<td>default-cost</td>
<td>Enables the default cost configuration for the area.</td>
</tr>
<tr>
<td>authentication-key {key}</td>
<td>The simple password authentication on the particular interface.</td>
</tr>
<tr>
<td></td>
<td>key – An alphanumeric key (password) with a maximum of 17 characters.</td>
</tr>
<tr>
<td></td>
<td>NOTE: The authentication key is set using the area virtual-link command as described on page 11-272.</td>
</tr>
<tr>
<td>message-digest-key {key}</td>
<td>The ID for the message digest. Range is 0 – 255.</td>
</tr>
<tr>
<td></td>
<td>NOTE: The authentication key is set using the area virtual-link command as described on page 11-272.</td>
</tr>
</tbody>
</table>

**Example:**  
```bash  
/# cd ospf  
/ospf# area 1.1.1.1 stub
```

**Example:**  
```bash  
/# cd ospf  
/ospf# no area 1.1.1.1 stub
```
area default-cost

Use this command to set the default cost for an area.

**Mode:** ospf

**Syntax:** area {area-ip-addr} default-cost {value}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>value</td>
<td>Range is 0 – 16777215.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ # cd ospf
/ospf# area 1.1.1.1 default-cost 35
```

area default-metricType

Use this command to set the default metric type for an area. This metric type is applicable only for an NSSA area.

**Mode:** ospf

**Syntax:** area {area-ip-addr} default-metricType {metricType}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>metricType</td>
<td>Range is 0 – 16777215. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ # cd ospf
/ospf# area 1.1.1.1 default-metric-type 1
```

area stability-interval

Use this command to configure the stability interval for the NSSA area.

**Mode:** ospf

**Syntax:** area {area-ip-addr} stability-interval {seconds}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>seconds</td>
<td>Range 0 – 2147483647 seconds. The default is 40.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ # cd ospf
/ospf# area 1.1.1.1 stability-interval 20
```
CLI Commands

**ospf**

### area translation-role

Use this command to configure if and how an NSSA’s border router performs translation. When multiple NSSA ABRs exist in the area, you should use this command to specify how each router participates in the translations. If all routers are set to participate in the translations, the translator for the NSSA is determined through negotiation (based on the numerical value of the router ID).

**Mode:** ospf

**Syntax:**

```
area {area-ip-addr} translation-role {always|candidate}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>always</td>
<td>Unconditionally translates all the type-7 LSAs.</td>
</tr>
<tr>
<td>candidate</td>
<td>Participates in the negotiation.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd ospf
/ospf# area 1.1.1.1 translation-role always
```

### area virtual-link

Use this command to create a virtual link between the areas.

**Mode:** ospf

**Syntax:**

```
area {area-ip-addr} virtual-link {router-ip-addr}
{HelloInt|deadInt|TransDelay|RetransInt {value}}
{authentication-key {key}}{message-digest-key {key-id}}
md5 {key}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>router-ip-addr</td>
<td>IP address of the specified router.</td>
</tr>
<tr>
<td>HelloInt</td>
<td>Enables time interval between the OSPF hello packets on an interface. Range is 0 – 65535. The default is 10.</td>
</tr>
<tr>
<td>deadInt</td>
<td>Disables the hello packets before the neighbors declare the router down. Range is 0 – 2147483647 seconds. The default is 40.</td>
</tr>
<tr>
<td>TransDelay</td>
<td>Estimated time taken to transmit an LS update packet over the interface. Range is 0 – 3600. The default is 1.</td>
</tr>
<tr>
<td>RetransInt {value}</td>
<td>The default is 5.</td>
</tr>
<tr>
<td>authentication-key {key}</td>
<td>Enables simple password authentication on the particular interface.</td>
</tr>
<tr>
<td>key</td>
<td>An alphanumeric key (password) with a maximum of 17 characters.</td>
</tr>
</tbody>
</table>
**CLI Commands**

**asbr router**

Use this command to enable the router as an Autonomous System Boundary Router (ASBR). Use the `no asbr Router` command to disable asbr status of the router.

**Mode:** ospf

**Syntax:** asbr router

**Syntax:** no as br router

**Example:**
```
/# cd ospf
/ospf# area 1.1.1.1 virtual-link 10.0.0.1
```

**compatible rfc1583**

Use this command to restore the method used to calculate summary route costs per RFC 1583. Use the `no compatible rfc1583` command to disable the RFC 1583 compatibility and adopt RFC 2178 rules.

**Mode:** ospf

**Syntax:** compatible rfc1583

**Syntax:** no compatible rfc1583

**Example:**
```
/# cd ospf
/ospf# compatible rfc1583
```

**Example:**
```
/# cd ospf
/ospf# no compatible rfc1583
```
**default-information originate always metric**

Use this command to set the default cost and routing table metric used in the routing table.

**Mode:** ospf

**Syntax:**
```
default-information originate always metric {cost}
metric-type {type}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost</td>
<td>Range is 0 – 16777215. The default is 16777215.</td>
</tr>
<tr>
<td>type</td>
<td>The type of routing table metric used.</td>
</tr>
<tr>
<td></td>
<td>1 – OSPF metric.</td>
</tr>
<tr>
<td></td>
<td>2 – Default. External Type 1.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ospf
/ospf# default-information originate always metric 34
metric-type 1
```

**exit-overflow interval**

Use this command to specify how often the router checks to see if an IP OSPF overflow condition has been eliminated.

**Mode:** ospf

**Syntax:**
```
exit-overflow-interval {seconds}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>Interval in seconds. Range is 0 – 2147483647.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ospf# exit-overflow-interval 56
```
**external-summary address**

Use this command to set the external summary address. Use the **no external-summary-address** command to delete the external summary address.

**Mode:** ospf

**Syntax:**
```plaintext
external-summary-address {network-ip-addr} {mask} {area-ip-addr} [{allowAll|denyAll|advertiseMatching|doNotAdvertiseMatching}] [Translation {enabled|disabled}]
```

**Syntax:**
```plaintext
no external-summary-address {network-ip-addr} {mask} {area-ip-addr}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>network-ip-addr</td>
<td>IP address of the network.</td>
</tr>
<tr>
<td>mask</td>
<td>Subnet mask of the network IP address.</td>
</tr>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>allowAll</td>
<td>Aggregated Type-5 LSAs are generated for the specified range. In addition aggregated Type-7 LSAs are generated in all attached NSSA areas, for the specified range. <strong>NOTE:</strong> The area IP address is 0.0.0.0.</td>
</tr>
<tr>
<td>denyAll</td>
<td>Neither Type-5 LSAs nor Type-7 LSAs will be generated for the specified range. <strong>NOTE:</strong> The Area IP address is other than 0.0.0.0</td>
</tr>
</tbody>
</table>
| advertiseMatching | • If the area IP address is 0.0.0.0, aggregated Type-5 LSAs are generated.  
|                   | • If the area IP address is other than 0.0.0.0, aggregated Type-7 LSAs are generated in NSSA area. |
| doNotAdvertiseMatching | • If the area IP address is 0.0.0.0, Type-5 LSAs are not generated for the specified range. Instead aggregated Type-7 LSAs are generated in all attached NSSA areas.  
|                   | • If the area IP address is other than 0.0.0.0, Type-7 LSAs are not generated in NSSA area. |
| Translation       | disabled – Translation of LSAs type-7 into type-5 at the ABR, by setting the P-bit to 0 in the LSAs type-7 generated by the SSBR.  
|                   | enable – Default. Translation of LSAs type-7 into type-5 at the ABR, by setting the P-bit to 1 in the LSAs type-7 generated by the ASBR. |

**Example:**
```
/# cd ospf
/ospf# external-summary-address 10.4.128.1 255.0.0.0 1.1.1.1 allow-all
```

**Example:**
```
/# cd ospf
/ospf# no external-summary-address 10.4.128.1 255.0.0.0 1.1.1.1
```
**CLI Commands**

**ospf**

---

**max-lsa**

Use this command to set the maximum number of LSAs allowed in the database. Use the `no max-lsa` command to remove the maximum limit for LSAs in the database.

**Mode:** ospf

**Syntax:** `max-lsa {maximum-number}`

**Syntax:** `no max-lsa`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>maximum-number</code></td>
<td>Range is 0 – 2147483647. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ospf
/ospf# max-lsa 200
```

**Example:**
```
no max-lsa
```

---

**neighbor**

Use this command to set the router priority of the neighbor associated with the IP address. Use the `no neighbor` command to delete the neighbor at the specified IP address.

**Mode:** ospf

**Syntax:** `neighbor {ip-addr} [priority {level}]`

**Syntax:** `no neighbor {ip-addr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-addr</code></td>
<td>IP address of the neighbor.</td>
</tr>
<tr>
<td><code>level</code></td>
<td>Range is 0 – 255. The default is 1.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd ospf
/ospf# neighbor 10.6.4.21 priority 20
```

**Example:**
```
/# cd ospf
/ospf# no neighbor 10.6.4.21
```
**CLI Commands**

**network**

Use this command to define the interfaces on which OSPF runs and define an area identifier for the specified interfaces. Use the **no network** command to disable OSPF routing on an IP interface.

**Mode:** `ospf`

**Syntax:**

```
network {ip-addr} area {area-ip-addr} 
[unnum{interface-name}]
```

**Syntax:**

```
no network {network-ip-addr} [unnum{interface-name}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ip-addr</code></td>
<td>IP address of the network.</td>
</tr>
<tr>
<td>or <code>network-ip-addr</code></td>
<td>NOTE: When adding an unnumbered interface, the network IP address is 0.0.0.0 (unnumbered).</td>
</tr>
<tr>
<td><code>area-ip-addr</code></td>
<td>IP address of the desired area.</td>
</tr>
<tr>
<td><code>unnum {interface-name}</code></td>
<td>Adds an unnumbered interface that uses the IP address of the interface specified by the name or index.</td>
</tr>
<tr>
<td><strong>name</strong></td>
<td>The name of interface in the form <code>{slot-number}{interface-type}{port-number}</code>. See Interface Identifiers on page 11-5 for more information.</td>
</tr>
<tr>
<td><strong>index</strong></td>
<td>Determine the index number of the desired interface by issuing a root mode <strong>show interface config all</strong> command as described on page 11-45. This is an SNMP definition.</td>
</tr>
</tbody>
</table>

**Example:**

```
#/ cd ospf
/ospf# network 10.6.4.211 area 1.1.1.1
```

**Example:**

```
#/ cd ospf
/ospf# network 0.0.0.0 area 0.0.0.1 unnum 1X1
```

**Example:**

```
#/ cd ospf
/ospf# no network 10.6.4.211 area 1.1.1.1
```
**CLI Commands**

**ospf**

**nssaAsbrDfRtTrans**

Use this command to enable setting the P bit in the default Type 7 LSA generated by NSSA internal ASBR. Use the `no nssaAsbrDfRtTrans` command to disable setting of the P bit in the default LSA type 7 generated by an NSSA internal ASBR.

**Mode:** ospf  
**Syntax:** nssaAsbrDfRtTrans  
**Syntax:** no nssaAsbrDfRtTrans  
**Example:**  
```
/# cd ospf  
/ospf# nssaAsbrDfRtTrans
```

**Example:**  
```
/# cd ospf  
/ospf# no nssaAsbrDfRtTrans
```

**passive-interface**

Use the `passive-interface default` command to configure the current OSPF interface as passive or to configure all the interfaces created after this command is issued as passive by default.

Use the `no passive-interface` command to configure the current OSPF interface as non-passive or to set all interfaces created after this command is issued as non-passive by default. When the interface is configured as non-passive, it actively exchanges OSPF information with neighbors.

The `no passive-interface` command is typically used after a `passive-interface default` command is issued to set the default for all subsequently created interfaces to passive. You can then use the `no passive-interface` command to configure an individual interface as non-passive where adjacencies are desired.

**Mode:** ospf  
**Syntax:** passive-interface [default] [interface-name]  
**Syntax:** no passive-interface [default] [interface-name]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
</table>
| default           | • When used in the `passive-interface` command, an interface will be configured as passive when it becomes a part of the OSPF area.  
                   • When used in the `no passive-interface` command, an interface will be configured as non-passive when it becomes a part of the OSPF area. |
| interface-name    | Name or index of the interface to be made passive or non-passive.  
                   name – The name of interface in the form `{slot-number}{interface-type}{port-number}`. See Interface Identifiers on page 11-5 for more information.  
                   index – Determine the index number of the desired interface by issuing a root mode `show interface config all` command as described on page 11-45. This is an SNMP definition. |
CLI Commands

redist-config

Use this command to configure the information to be applied to routes learned from RTM. Use the no redist-config command to delete the information applied to routes learned from RTM.

**Mode:** ospf

**Syntax:**

```
redist-config {network-ip-addr} {mask}
{metric-value {metric}|metric-type {asExttype1|asExttype2}|tag {tag-value}}
```

**Syntax:**

```
no redist-config {network-ip-addr} {mask}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>network-ip-addr</td>
<td>IP address of the network</td>
</tr>
<tr>
<td>mask</td>
<td>Subnet mask of the network IP address</td>
</tr>
<tr>
<td>metric-value {value}</td>
<td>Range is 0 – 2147483647. The default is 10.</td>
</tr>
<tr>
<td>metric-type</td>
<td>asExttype1 – Default. Use the Type 1 external metric.</td>
</tr>
<tr>
<td></td>
<td>asExttype2 – Use the Type 2 external metric.</td>
</tr>
<tr>
<td></td>
<td>NOTE: The Type 2 external metric type is larger (more costly) than the Type 1 metric.</td>
</tr>
<tr>
<td>tag-value</td>
<td>Tags are used to communicate information between AS boundary routers. Range is 0 to 2147483647. The default is 0.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd ospf
/ospf# redist-config 110.20.1.5 255.255.0.0 metric-value 1
```

**Example:**

```
/# cd ospf
/ospf# no redist-config 10.4.6.1 255.0.0.0
```
CLI Commands

**ospf**

### redistribute

Use this command to configure the protocol from which the routes have to be redistributed into OSPF. Use the `no redistribute` command to disable the redistribution of routes from the given protocol into OSPF.

**Mode:** ospf

**Syntax:** redistribute {static|connected|rip}

**Syntax:** no redistribute {static|connected|rip}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>static</td>
<td>Enables redistribution of static routes.</td>
</tr>
<tr>
<td>connected</td>
<td>Enables redistribution of the routes learned via the router’s connected interfaces.</td>
</tr>
<tr>
<td>rip</td>
<td>Enables redistribution of RIP routes.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # cd ospf
/ ospf# redistribute static
```

**Example:**
```
/ # cd ospf
/ ospf# no redistribute static
```

### router ospf

Use this command to enable the OSPF routing process and set the OSPF global administrative status to UP (in-service). Use the `no router ospf` command to disable OSPF routing.

**Mode:** ospf

**Syntax:** router ospf

**Syntax:** no router ospf

**Example:**
```
/ # cd ospf
/ ospf# router ospf
```

**Example:**
```
/ # cd ospf
/ ospf# no router ospf
```
**summary-address**

Use this command to set the summary address. Use the **no summary-address** command to delete the summary address.

**Mode:** ospf

**Syntax:**
```
summary-address {network-ip-addr} {mask} {area-ip-addr} {summary|Type7} [doNotAdvertiseMatching] [tag {tag-value}]
```

**Syntax:**
```
no summary-address {network-ip-addr} {mask} {area-ip-addr}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>network-ip-addr</td>
<td>IP address of the network</td>
</tr>
<tr>
<td>mask</td>
<td>Subnet mask of the network IP address</td>
</tr>
<tr>
<td>area-ip-addr</td>
<td>IP address of the specified area.</td>
</tr>
<tr>
<td>summary</td>
<td>If the destination address range matches for the route to ASBR path (learned in OSPF), then the ASBR summary (type-4) will be sent, otherwise Network summary (type-3) is sent.</td>
</tr>
</tbody>
</table>

**Type7**

- **Not Advertised** – Type-7 LSAs may be originated by and advertised throughout an NSSA. As with stub areas, NSSAs do not receive or originate type-5 LSAs.
- **Advertised** – Type-7 LSAs are advertised only within a single NSSA. They are not flooded into the backbone area or any other area by border routers although the information they contain can be propagated into the backbone area.

**doNotAdvertiseMatching**

This is an optional parameter on the command, but if it is not entered, “advertise” will be sent along with the other configured parameters. It is like having a default command parameter of “advertise”.

- If the area IP address is 0.0.0.0, Type-5 LSAs are not generated for the specified range. Instead aggregated Type-7 LSAs are generated in all attached NSSA areas.
- If the area IP address is other than 0.0.0.0, Type-7 LSAs are not generated in NSSA area.

**tag {tag-value}**

Tags are not used within the OSPF. Tags may be used to communicate information between AS boundary routers. Range is 0 – 2147483647. The default is 0.

**Example:**
```
/# cd ospf
/ospf# summary-address 10.0.0.1 255.0.0.0 1.1.1.1 summary
```

**Example:**
```
/# cd ospf
/ospf# no summary-address 10.0.0.1 255.0.0.0 1.1.1.1
```
**CLI Commands**

`ospf`  

---

**trace level**

Use this command to configure trace messages for OSFP. The variables specify the type of trace messages to print. Trace messages only print to the console. Use the `no trace level` command to turn off printing of trace messages.

**NOTE:** Do not leaving these traces turned on for extended periods. They can affect system performance when performing a large number of debug operations.

**Mode:** `ospf`  

**Syntax:**
```
trace level {[fn_entry][fn_exit][critical]
[mem_alloc_succ][mem_alloc_fail]}
```

**Syntax:**
```
no trace level {[fn_entry] [fn_exit][critical]
[mem_alloc_succ][mem_alloc_fail]}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>fn_entry</td>
<td>Enable/disable sending a trace message when entering an OSPF function.</td>
</tr>
<tr>
<td>fn_exit</td>
<td>Enable/disable sending a trace message when leaving an OSPF function.</td>
</tr>
<tr>
<td>critical</td>
<td>Enable/disable sending a trace message when OSFP is critical.</td>
</tr>
<tr>
<td>mem_alloc_succ</td>
<td>Enable/disable sending a trace message when memory allocation succeeds.</td>
</tr>
<tr>
<td>mem_alloc_fail</td>
<td>Enable/disable sending a trace message when memory allocation fails.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ospf# trace level fn_entry  
current trace: Function-Entry
```

**Example:**
```
/ospf# no trace level fn_entry  
current trace: Packet-Low-Level-Dump PPP
```
**CLI Commands**

**trace module**

Use this command to configure trace messages for the modules (cards). The variables specify the type of trace messages to print. Trace messages only print to the console. Use the `no trace module` command to turn on printing of trace messages.

**Mode:** ospf

**Syntax:**
```
trace module {
[ppp] [rtm] [nssa] [rt_aggrg] [adj_formation]
[lsdb] [ism] [nsm] [rt_calc] [interface] [config]}
```

**Syntax:**
```
no trace module {
[ppp] [rtm] [nssa] [rt_aggrg]
[adj_formation][lsdb] [ism] [nsm] [rt_calc]
[interface][config]}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ppp</td>
<td>Enable/disable sending a trace message when sending/receiving OSPF packets on PPP interface.</td>
</tr>
<tr>
<td>rtm</td>
<td>Enable/disable sending a trace message when sending/receiving updates to/from the route table manager task.</td>
</tr>
<tr>
<td>nssa</td>
<td>Enable/disable sending a trace message when dealing with not so stubby area functions.</td>
</tr>
<tr>
<td>rt_aggrg</td>
<td>Enable/disable sending a trace message during route aggregation.</td>
</tr>
<tr>
<td>adj_formation</td>
<td>Enable/disable sending a trace message when dealing with adjacency formations between routers.</td>
</tr>
<tr>
<td>lsdb</td>
<td>Enable/disable sending a trace message when dealing with link state database updates/actions.</td>
</tr>
<tr>
<td>ism</td>
<td>Interface state machine.</td>
</tr>
<tr>
<td>nsm</td>
<td>Network services module.</td>
</tr>
<tr>
<td>rt_calc</td>
<td>Enable/disable sending a trace message when calculating new routes in algorithm.</td>
</tr>
<tr>
<td>interface</td>
<td></td>
</tr>
<tr>
<td>config</td>
<td>Enable/disable sending a trace message when a configuration changes.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ospf# trace module ppp
current trace: Function-Entry PPP
```

**Example:**
```
/ospf# no trace module ppp
current trace: Packet-Low-Level-Dump
```
CLI Commands

ospf

**trace pkt**

Use this command configure printing of trace messages for packets. The variables specify the type of trace messages to print. Trace messages only print to the console. Use the `no trace pkt` command to turn off printing of trace messages.

**Mode:** ospf

**Syntax:**

```
trace pkt {[high][low][hex][hp][ddp][lrq][lsu][lsa]}
```

**Syntax:**

```
no trace pkt {[high][low][hex][hp][ddp][lrq][lsu][lsa]}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>Enable/disable sending a packet high level trace (dump of pkt).</td>
</tr>
<tr>
<td>low</td>
<td>Enable/disable sending a packet low level trace (dump of pkt).</td>
</tr>
<tr>
<td>hex</td>
<td>Enable/disable sending a packet hex trace (dump of pkt).</td>
</tr>
<tr>
<td>hp</td>
<td>Enable/disable sending a High Priority trace.</td>
</tr>
<tr>
<td>ddp</td>
<td>Enable/disable sending a Database description packets.</td>
</tr>
<tr>
<td>lrq</td>
<td>Enable/disable sending a Location request.</td>
</tr>
<tr>
<td>lsu</td>
<td>Enable/disable sending a Link-state update.</td>
</tr>
<tr>
<td>lsa</td>
<td>Enable/disable sending a Link-state acknowledgement.</td>
</tr>
</tbody>
</table>

**Example:**

```
/ospf# trace pkt low
current trace: Packet-Low-Level-Dump Function-Entry PPP
```

**Example:**

```
/ospf# no trace pkt low
current trace: none
```
**ppp**

The commands listed below are available in the **ppp** mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- ip address local-pool
- ppp authentication aaa
- ppp trace
- show ip address local-pool
- show ppp interface config

**No Variants**

The following command is a no variant of the corresponding affirmative command. Descriptions of the no variants are included with the corresponding affirmative command.

- no ip address local-pool

---

**ip address local-pool**

Use this command to create a local IP address pool with the specified range. The local IP address pool is used to provide an IP address for the peer on the other end. Use **no ip address local-pool** to delete the Local IP address pool with the specified index.

**Mode:** **ppp**

**Syntax:**

```
ip address local-pool {pool-index} {start-ip-addr} {end-ip-addr}
```

**Syntax:**

```
o ip address local-pool {pool-index}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>pool-index</strong></td>
<td>An integer value that uniquely identifies the address pool.</td>
</tr>
<tr>
<td><strong>start-ip-addr</strong></td>
<td>Specify start of IP pool</td>
</tr>
<tr>
<td><strong>end-ip-addr</strong></td>
<td>Specify end of IP pool</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd ppp
/ppp# ip address local-pool 1 10.0.0.10 10.0.0.100
```

**Example:**

```
/# cd ppp
/ppp# no ip address local-pool 1
```
**CLI Commands**

**ppp**

**ppp authentication aaa**

Use this command to set the authentication method for user authentication.

*Mode:* **ppp**

*Syntax:* `ppp authentication aaa {local|radius}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>local</td>
<td>Default. Set authentication method to local.</td>
</tr>
<tr>
<td>radius</td>
<td>Set authentication method to RADIUS.</td>
</tr>
</tbody>
</table>

*Example:* /# cd ppp  
/ppp# ppp authentication aaa local

**ppp trace**

Use this command to configure trace messages for the PPP module. The variables specify the type of trace messages to print. Trace messages print to the console only.

*Mode:* **ppp**

*Syntax:* `ppp trace {all|initshut|mgmt|data|ctpl|dump|os|failall|buffer|none}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>all the traces.</td>
</tr>
<tr>
<td>buffer</td>
<td>Buffer traces.</td>
</tr>
<tr>
<td>ctpl</td>
<td>Control Plane traces.</td>
</tr>
<tr>
<td>data</td>
<td>Data path traces.</td>
</tr>
<tr>
<td>dump</td>
<td>Packet dump traces.</td>
</tr>
<tr>
<td>failall</td>
<td>all failure traces.</td>
</tr>
<tr>
<td>initshut</td>
<td>Initialize and shutdown traces.</td>
</tr>
<tr>
<td>mgmt</td>
<td>Management traces.</td>
</tr>
<tr>
<td>os</td>
<td>Traces related to all resources except buffers.</td>
</tr>
<tr>
<td>none</td>
<td>No tracing for PPP.</td>
</tr>
</tbody>
</table>

*Example:* /# cd ppp  
/ppp# ppp trace dump
**show ip address local-pool**

Use this command to display all Local IP address pools.

**Mode:** ppp

**Syntax:** show ip address local-pool

**Example:**

```
/# cd ppp
/ppp# show ip address local-pool
```

<table>
<thead>
<tr>
<th>Pool Index</th>
<th>Start Address</th>
<th>End Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.0.0.10</td>
<td>10.0.0.100</td>
</tr>
</tbody>
</table>

**show ppp interface config**

Use this command to display the PPP interface details.

**Mode:** ppp

**Syntax:** show ppp interface config

**Example:**

```
/# cd ppp
/ppp# show ppp interface config
```

**Interface Configuration**

```
Interface Index : 5
Interface Name  : 1X1
Encap type      : PPP
Admin Status    : Down
Oper Status     : Down

AAA Authentication Method : Local
Magic Number Negotiation : Enabled
Magic Number Value : 1
LQR Reporting Period  : 0
IPCP Admin Status   : Closed
PPP Keep-Alive-Timer Period : 10

Interface Index : 6
Interface Name  : 1X2
Encap type      : PPP
Admin Status    : Up
Oper Status     : Up

AAA Authentication Method : Local
Magic Number Negotiation : Enabled
Magic Number Value : 1
LQR Reporting Period  : 0
IPCP Admin Status   : Closed
PPP Keep-Alive-Timer Period : 10
```
CLI Commands
radius

radius

The commands listed below are available in the radius mode. The Radius mode provides remote authentication. Each command in the following list is a hyperlink to the detailed definition for the command.

NOTE: Issuing radius commands will overwrite any existing configuration. To display the details of the existing configuration issue the command show radius general config from root mode as described on page 11-60.

- radius max-user
- radius trace
- radius-server host

No Variants

The following command is a no variant of the corresponding affirmative command. Descriptions of the no variants are included with the corresponding affirmative command.

- no radius-server host

radius max-user

Use this command to set the maximum number of RADIUS user entries.

Mode: radius

Syntax: radius max-user {1-100}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100</td>
<td>Maximum number of user entries stored. Range is 1 – 100. The default is 1.</td>
</tr>
</tbody>
</table>

Example:  
/ # cd radius  
/radius# radius max-user 3
**radius trace**

Use this command to enable RADIUS trace messages. The variables specify the type of trace messages to print. Trace messages print to the console only.

- **Mode:** radius
- **Syntax:**

```
radius trace {all|events|packets|failure|response|timer|none}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>all the traces</td>
</tr>
<tr>
<td>events</td>
<td>Traces RADIUS events</td>
</tr>
<tr>
<td>failure</td>
<td>Traces failures</td>
</tr>
<tr>
<td>response</td>
<td>Traces RADIUS responses</td>
</tr>
<tr>
<td>packets</td>
<td>Traces packets</td>
</tr>
<tr>
<td>timer</td>
<td>Traces timer events</td>
</tr>
<tr>
<td>none</td>
<td>Turns off all RADIUS traces</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd radius
/radius# radius trace all
```

**radius-server host**

Use this command to configure the RADIUS server parameters. Use `no radius-server host` to remove the configuration of RADIUS server.

**NOTE:** You must set the type option as `both` in order for the system mode command `login authentication`, described on page 11-322, to work correctly.

- **Mode:** radius
- **Syntax:**

```
radius-server host {ip-address} key {secret} [type {auth|acct|both}] [timeout {sec (1-120)}] [retransmit {retry count (1-254)}]
```

**Syntax:**
```
no radius-server host {ip-addr}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address or ip addr</td>
<td>The IP address of the RADIUS server.</td>
</tr>
<tr>
<td>secret</td>
<td>A secret password (key) of up to 46 characters.</td>
</tr>
</tbody>
</table>
| type     | auth – Authentication  
|          | acct – Accounting  
|          | both – Default. Accounting and authentication.  |
CLI Commands

radius

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>timeout</td>
<td>Set timeout in seconds. Range is 1 to 120. The default is 10.</td>
</tr>
<tr>
<td>retransmit retry count</td>
<td>Set the retry count. Range is 1 to 254. The default is 3.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd radius
/radius# radius-server host 10.10.10.1 key a1#5-2x00 type
auth timeout sec 60 retransmit retry count 5
```

**Example:**
```
/# cd radius
/radius# no radius-server host 10.0.0.10
```
relay

The commands listed below are available in the relay mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- dns relay cache ttl
- dns relay default-nameserver
- dns relay maxCacheEntries
- dns relay maxNameServer
- dns relay maxQueries
- dns relay maxUrlFilters
- dns relay port type
- dns relay primary-nameserver
- dns relay query timeout
- dns relay trace
- relay cache
- relay disable
- relay enable
- show dns relay cache
- show dns relay message info
- show dns relay name-server table

**dns relay cache ttl**

Use this command to configure the length of TTL for cache entries.

Mode: relay

Syntax: dns relay cache ttl {number}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>number</td>
<td>The length of TTL cache entries. Range is 10 – 604800 minutes.</td>
</tr>
</tbody>
</table>

Example:  
/
# cd relay  
/relay# dns relay cache ttl 123
CLI Commands
relay

dns relay default-nameserver

Use this command to configure the default DNS Relay server.

**Mode:** relay

**Syntax:**
```
dns relay default-nameserver {ip-address} {domain-name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>The IP address of the name server. The default is 0.0.0.0</td>
</tr>
<tr>
<td>domain-name</td>
<td>The domain name for the default name server. The default is “none”</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd relay
/relay# dns relay default-nameserver 192.168.0.100 boulder
```

dns relay maxCacheEntries

Use this command to set the maximum number of cache entries.

**Mode:** relay

**Syntax:**
```
dns relay maxCacheEntries {number}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>number</td>
<td>The maximum number of cache entries. Range is 1 – 5000. The default is 10 entries.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd relay
/relay# dns relay maxCacheEntries 100
```

dns relay maxNameServer

Use this command to set the maximum number of name server entries.

**Mode:** relay

**Syntax:**
```
dns relay maxNameServer {number}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>number</td>
<td>The maximum number of name server entries. Range is 1 – 2000.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd relay
/relay# dns relay maxNameServer 10
```
**dns relay maxQueries**

Use this command to set the maximum number of queries.

*Mode:* relay  
*Syntax:* `dns relay maxQueries {number}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>number</code></td>
<td>The maximum number of queries. Range is 1 – 1000.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/ # cd relay  
/relay# dns relay maxQueries 10
```

**dns relay maxUrlFilters**

Use this command to set the maximum number of URL filters.

*Mode:* relay  
*Syntax:* `dns relay maxUrlFilters {number}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>number</code></td>
<td>The maximum number of URL filters. Range is 1 – 1000.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/ # cd relay  
/relay# dns relay maxUrlFilters 100
```

**dns relay port type**

Use this command to specify the port type.

*Mode:* relay  
*Syntax:* `dns relay port type {number}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>number</code></td>
<td>The port type identifier. Range is 1 – 65535.</td>
</tr>
</tbody>
</table>

*Example:*  
```
/ # cd relay  
/relay# dns relay port type 100
```
**CLI Commands**

*relay*

**dns relay primary-nameserver**

Use this command to set the IP address and domain name of the primary name server.

**Mode:** relay

**Syntax:**

```
dns relay primary-nameserver {server-address}
domain {domain-name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>server-address</td>
<td>IP address of the name server.</td>
</tr>
<tr>
<td>domain-name</td>
<td>The domain name.</td>
</tr>
</tbody>
</table>

**Example:**

```
/relay# dns relay default-nameserver 10.10.10.1 boulder
```

**dns relay query timeout**

Use this command to set the timeout for a query in seconds.

**Mode:** relay

**Syntax:**

```
dns relay query timeout {number}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>number</td>
<td>The timeout for a query in seconds. Range is 3 – 29 seconds. The default is 10 seconds.</td>
</tr>
</tbody>
</table>

**Example:**

```
/relay# dns relay query timeout
```

**dns relay trace**

Use this command to enable or disable trace messages for the relay. Trace messages print to the console only.

**Mode:** relay

**Syntax:**

```
dns relay trace {on{trace-value}|off}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>on {trace-value}</td>
<td>The number of the trace to turn on. Range is 0 – 6.</td>
</tr>
<tr>
<td>off</td>
<td>Disables the trace.</td>
</tr>
</tbody>
</table>

**Example:**

```
/relay# dns relay trace off
```
**relay cache**

Use this command to configure the relay cache.

**Mode:** relay

**Syntax:** `relay cache {enable|disable|clear}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>Enables the relay cache</td>
</tr>
<tr>
<td>disable</td>
<td>Default. Disables the relay cache.</td>
</tr>
<tr>
<td>clear</td>
<td>Clears the relay cache</td>
</tr>
</tbody>
</table>

**Example:** `/relay# relay cache enable`

**relay disable**

Use this command to shutdown the relay and remove all related dependencies.

**Mode:** relay

**Syntax:** `relay disable`

**Example:** `#/ cd relay
/relay# relay disable`

**relay enable**

Use this command to initialize the relay and start the relay agent.

**Mode:** relay

**Syntax:** `relay enable`

**Example:** `#/ cd relay
/relay# relay enable`
**show dns relay cache**

Use this command to display DNS relay cache information.

**Mode:** relay

**Syntax:** show dns relay cache

**Example:**
```
#/ cd relay
/relay# show dns relay cache
```

```
Cache Status : Disable
Max Cache Entries : 10
Max Cache TTL : 3600
Good caches : 0
Bad caches : 0
Cache overflows : 0
```

**show dns relay message info**

Use this command to display the query information, the number of queries answered, and other information about messages to the relay.

**Mode:** relay

**Syntax:** show dns relay message info

**Example:**
```
#/ cd relay
/relay# show dns message info
```

```
Retransmits  Responses  Pending  TimeOut
0            0         0       10
```

**show dns relay name-server table**

Use this command to display information about all DNS relay name servers.

**Mode:** relay

**Syntax:** show dns relay name-server table

**Example:**
```
#/ cd relay
/relay# show dns relay name-server table
```

Default relay name-server info :

```
Max.No : 10
DefaultNS : 10.50.1.1
```
show dns relay name-server table

DomainName       : domainname.com
Relay Status     : Enabled

Primary Relay Servers Info :
DomainName       : domainname.com
NSAddress        : 10.50.1.1
QueriesSent      : 0
Responses        : 0
RowStatus        : ACTIVE
CLI Commands
resolver

resolver

The commands listed below are available in the resolver mode. These commands are only supported on the local FLEXmaster. The resolver translates DNS names of local host computers into IP addresses. Each command in the following list is a hyperlink to the detailed definition for the command.

- dns-resolver trace
- resolver cache
- resolver cache ttl
- resolver clear query info
- resolver
- resolver nameserver
- resolver safetybelt addr
- resolver safetybelt delete domain
- show resolver cache
- show resolver config
- show resolver name-server table
- show resolver queries
- show resolver statistics

dns-resolver trace

Use this command to configure trace messages for the DNS resolver. The variables specify the type of trace messages to print. Trace messages print to the console only.

**Mode:** resolver

**Syntax:** dns-resolver trace {all|packets|failure|none}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>Print all trace messages related to any operation for DNS resolver.</td>
</tr>
<tr>
<td>packets</td>
<td>Print trace messages related to packets (received/transmitted) specific to DNS resolver.</td>
</tr>
<tr>
<td>failure</td>
<td>Print trace messages associated with failure conditions in DNS resolver.</td>
</tr>
<tr>
<td>none</td>
<td>Turns off tracing.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
/# cd resolver
/resolver# dns-resolver trace all
```
**resolver cache**

Use this command to configure the caching in the DNS Resolver.

**Mode:** resolver

**Syntax:** resolver cache {clear|disable|enable}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear</td>
<td>Clears the DNS resolver cache</td>
</tr>
<tr>
<td>disable</td>
<td>Disables the DNS resolver cache</td>
</tr>
<tr>
<td>enable</td>
<td>Enable the DNS resolver cache</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd resolver
/resolver# resolver cache clear
/resolver# show resolver cache

No cache entry found
```

**resolver cache ttl**

Use this command to configure the Time-To-Live (TTL) for cache entries.

**Mode:** resolver

**Syntax:** resolver cache ttl {ttl}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ttl</td>
<td>Range is 10 – 604800 minutes. The default is 60 minutes.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd resolver
/resolver# resolver cache ttl 123
```

**resolver clear query info**

Use this command to clear the query information table.

**Mode:** resolver

**Syntax:** resolver clear query info

**Example:**

```
/# cd resolver
/resolver# resolver clear query info
Cleared query info table
```
CLI Commands

resolver

Use this command to enable or disable the Domain Name Server (DNS) Resolver.

**Mode:** resolver

**Syntax:** resolver {enable|disable}

**Example:**
```
/# cd resolver
/resolver# resolver enable
```

resolver nameserver

Use this command to configure a default name server.

**Mode:** resolver

**Syntax:** resolver nameserver {server-address} domain {domain-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>server-address</td>
<td>The IP address of the default name server. The default address is 0.0.0.0.</td>
</tr>
<tr>
<td>domain-name</td>
<td>The domain name.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd resolver
/resolver# resolver nameserver paris domain suburb
```

resolver safetybelt addr

Use this command to add a name server entry.

**Mode:** resolver

**Syntax:** resolver safetybelt addr {ip-address} domain {domain-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>The IP address of the name server. The default address is 0.0.0.0.</td>
</tr>
<tr>
<td>domain-name</td>
<td>The domain name.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd resolver
/resolver# resolver safetybelt addr 10.1.2.3 domain suburb
```
**resolver safetybelt delete domain**

Use this command to add a name-server entry.

**Mode:** resolver  
**Syntax:** resolver safetybelt delete domain {domain-name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>domain-name</td>
<td>The domain name.</td>
</tr>
</tbody>
</table>

**Example:**  
/# cd resolver  
/resolver# resolver safetybelt delete domain suburb

**show resolver cache**

Use this command to display the DNS Resolver cache entries.

**NOTE:** This command will not work unless you previously enabled the resolver cache using the **resolver cache** command as described on page 11-299.

**Mode:** resolver  
**Syntax:** show resolver cache

**Example:**  
/# cd resolver  
/resolver# show resolver cache

<table>
<thead>
<tr>
<th>Domain Name</th>
<th>IP-Address</th>
<th>RRType</th>
<th>RRClass</th>
</tr>
</thead>
<tbody>
<tr>
<td>dom1.privatenet.com</td>
<td>10.4.1.60</td>
<td>Host Addr</td>
<td>Internet</td>
</tr>
<tr>
<td>dom2.privatenet.com</td>
<td>10.1.3.11</td>
<td>Host Addr</td>
<td>Internet</td>
</tr>
<tr>
<td>intranet.privatenet.com</td>
<td>10.5.1.23</td>
<td>Host Addr</td>
<td>Internet</td>
</tr>
</tbody>
</table>
**CLI Commands**

**resolver**

### show resolver config

Use this command to display the DNS Resolver configuration.

**Mode:** resolver

**Syntax:** `show resolver config`

**Example:**
```
/# cd resolver
/resolver# show resolver config
```

- Version Name : Dns Resolv Version 1.0.0.0
- Resolver Service : Enabled
- Cache Status : Disabled
- UDP Local Port : 7000
- TCP Local Port : 7000
- Default NameServer : 0.0.0.0
- Default Domain Name :
- Cache Purge Interval : 3600sec
- Query Timeout Interval : 10sec
- Cache TTL : 60mins

### show resolver name-server table

Use this command to display the name-server table as configured by user.

**Mode:** resolver

**Syntax:** `show resolver name-server table`

**Example:**
```
/# cd resolver
/resolver# show resolver name-server table
```

- Default Resolver Name Server Info :
  - Max.No : 0
  - DefaultNS : 10.50.1.23
  - DomainName : privatenet.com

- Primary Resolver Servers Info :
show resolver queries

Use this command to display the DNS Resolver queries.

**Mode:** resolver

**Syntax:** show resolver queries

**Example:**
```
#/ cd resolver
/resolver# show resolver queries

No queries in table
```

show resolver statistics

Use this command to display the DNS Resolver statistics.

**Mode:** resolver

**Syntax:** show resolver statistics

**Example:**
```
#/ cd resolver
/resolver# show resolver statistics

Queries Received : 0
Stan Queries Received : 0
I Queries Received : 0
Queries Responded : 0
Queries Sent to Default NameServer : 0
Queries Retransmission : 0
Queries Responses : 0
Unknown Responses : 0
Auth Data Responses : 0
Auth No Data Responses : 0
Non Auth Data Responses : 0
Cache Overflows : 0
Good Cache : 0
Bad Cache : 0
Queries Filtered : 0
```
CLI Commands

**rip**

The commands listed below are available in the **rip** (routing information protocol) mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- **neighbor add**
- **neighbor del**
- **neighbor disable**
- **neighbor enable**
- **redistribute**
- **re-transmit**
- **rip trace**
- **router rip**
- **security**
- **show neighbor**
- **spacing**

**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the **no redistribute** command is the no variant of the **redistribute** command. Descriptions of the no variants are included with the corresponding affirmative command.

- **no redistribute**
- **no router rip**
- **no spacing**

---

**neighbor add**

Use this command to specify the router at the specified IP address as a trusted neighbor. RIP will accept the RIP packets from this router.

**NOTE:** This command will not work unless you previously issues a **neighbor enable** command.

---

**Mode:** **rip**

**Syntax:** `neighbor add {Nbr addr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Nbr addr</code></td>
<td>IP address of the trusted neighbor.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rip
/rip# neighbor add 10.0.0.35
```
**neighbor del**

Use this command to delete the specified trusted neighbor.

**NOTE:** This command will not work unless you previously issues a `neighbor enable` command.

**Mode:** rip

**Syntax:** `neighbor del {Nbr addr}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nbr addr</td>
<td>IP address of the trusted neighbor.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rip
/rip# neighbor del 10.0.0.35
```

**neighbor disable**

Use this command to disable the Trusted Neighbor feature. RIP packets from all the routers will be processed.

**Mode:** rip

**Syntax:** `neighbor disable`

**Example:**
```
/# cd rip
/rip# neighbor disable
```

**neighbor enable**

Use this command to enable the Trusted Neighbor feature. This feature allows the IP addresses for a list of routers to be configured via the `neighbor add` command as described on page 11-304. RIP packets from those routers are processed by RIP while packets from other Routers will be dropped.

**Mode:** rip

**Syntax:** `neighbor enable`

**Example:**
```
/# cd rip
/rip# neighbor enable
```
CLI Commands

**rip**

### redistribute

Use this command to enable redistribution of routes into RIP. Use the `no redistribute` command to disable redistribution of routes into RIP.

**Mode:** rip

**Syntax:** redistribute {direct|static|ospf|all}

**Syntax:** no redistribute {direct|static|ospf|all}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct</td>
<td>For direct routes.</td>
</tr>
<tr>
<td>static</td>
<td>For static routes.</td>
</tr>
<tr>
<td>ospf</td>
<td>OSPF routes are routes learned through OSPF.</td>
</tr>
<tr>
<td>all</td>
<td>All types of routes</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd rip
/rip# redistribute static
```

**Example:**

```
/# cd rip
/rip# no redistribute static
```

### re-transmit

Use this command to set the retransmit time-out interval for the update request packet or an unacknowledged update response packet.

**Mode:** rip

**Syntax:** re-transmit {timeout}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>timeout</td>
<td>Range is 5 – 10 seconds. The default is 5 seconds.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd rip
/rip# re-transmit 8
```
CLI Commands

**rip trace**

Use this command to configure trace messages for the DNS Resolver. The variables specify the type of trace messages to print. Combining levels is allowed. For example, if you specify both `initshut` and `mgmt`, then the traces related to Init-Shutdown and Management are enabled. Trace messages print to the console only.

**Mode:** rip

**Syntax:**
```
rip trace {initshut - 1, mgmt - 2, data - 4, ctpl - 8, dump - 16, OS - 32, failall - 64, buffer - 128, All - 255, Disable - 0}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>initshut-1</td>
<td>1 – Initialize and Shutdown Traces</td>
</tr>
<tr>
<td>mgmt-2</td>
<td>2 – Management Traces</td>
</tr>
<tr>
<td>data-4</td>
<td>4 – Data Path Traces</td>
</tr>
<tr>
<td>ctpl-8</td>
<td>8 – Control Plane Traces</td>
</tr>
<tr>
<td>dump-16</td>
<td>16 – Packet Dump Traces</td>
</tr>
<tr>
<td>os-32</td>
<td>32 – Traces related to all Resources except Buffers</td>
</tr>
<tr>
<td>failall-64</td>
<td>64 – All Failure Traces</td>
</tr>
<tr>
<td>buffer-128</td>
<td>128 – Buffer Traces</td>
</tr>
<tr>
<td>all-255</td>
<td>255 – All Traces</td>
</tr>
<tr>
<td>disable-0</td>
<td>0 – Traces related to all Resources except Buffers</td>
</tr>
</tbody>
</table>

**Example:**
```
#/ cd rip
/rip# rip trace 64
```

**router rip**

Use this command to enable the RIP feature. This is a global command to enable RIP for all modes using the RIP feature. Use the `no router rip` command to disable the RIP feature (no RIP packets are sent even if turned on an interface).

**Mode:** rip

**Syntax:** router rip

**Syntax:** no router rip

**Example:**
```
#/ cd rip
/rip# router rip
```

**Example:**
```
#/ cd rip
/rip# no router rip
```
CLI Commands

**security**

Use this command to set the security level of Routing Information Protocol (RIP).

**Mode:** rip

**Syntax:** `security {min|max}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>min</td>
<td>Minimum security – The RIP1 packets will be accepted even when authentication is in use.</td>
</tr>
<tr>
<td>max</td>
<td>Maximum security – <strong>Default.</strong> The RIP1 packets will be ignored when authentication is in use.</td>
</tr>
</tbody>
</table>

**Example:**
```
/ # cd rip
/rip# security min
```

**show neighbor**

Use this command to display the current neighbors.

**Mode:** rip

**Syntax:** `show neighbor`

**Example:**
```
/ # cd rip
/rip# show neighbor
```

```
Neighbor list: Enabled
Neighbor(s):
-----------
10.10.2.205
```
**spacing**

Use this command to enable spacing of multiple RIP update packets throughout the update period rather than sending all update packets at the same time. This only has effect when the routing table becomes so large that multiple RIP packets must be sent to convey the full routing table.

Use the `no spacing` command to disable spacing of multiple RIP update packets throughout the update period, allowing all update packets to be sent at the same time. This only has effect when the routing table becomes so large that multiple RIP packets must be sent to convey the full routing table.

- **Mode:** rip
- **Syntax:** spacing
- **Syntax:** no spacing

**Example:**

```
#/ cd rip
/rip# spacing
```

**Example:**

```
#/ cd rip
/rip# no spacing
```
CLI Commands

rtm

The commands listed below are available in the RTM (routing table management) mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- as-num
- deny add
- deny all
- deny del
- permit add
- permit all
- permit del
- router-id

as-num

Use this command to set the Autonomous System (AS) number for the router. The AS number specifies the maximum number of autonomous systems that the network manager can create for a large network.

**NOTE:** When routing in larger networks, a network manager may break the network into autonomous systems. Breaking the network into autonomous systems creates more manageable portions and limits the amount of routing information both within the autonomous system and external to that system.

**Mode:** rtm

**Syntax:** as-num {val}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>val</td>
<td>Set a value for the AS number. Range is 0 – 65536. The default is 0. <strong>NOTE:</strong> Setting the value to 0 typically indicates a non-routed network.</td>
</tr>
</tbody>
</table>

**Example:**
```bash
#/ cd rtm
/rtm# as-num 256
```
deny add

Use this command to add a “deny” entry to the RRD control table. Use the `show rrd deny routes` described on page 11-63 to display a list of the current deny entries.

**Mode:** rtm

**Syntax:**
```
deny add {dest-ip-addr} {dest-mask} {static|rip|ospf|any} {rip|ospf|all}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest-ip-addr</td>
<td>The IP address of the destination.</td>
</tr>
<tr>
<td>dest-mask</td>
<td>Enter the subnet mask of the destination.</td>
</tr>
<tr>
<td>static</td>
<td>rip</td>
</tr>
<tr>
<td></td>
<td>static – Use static addressing</td>
</tr>
<tr>
<td></td>
<td>rip – Use RIP addressing</td>
</tr>
<tr>
<td></td>
<td>ospf – OSPF route.</td>
</tr>
<tr>
<td></td>
<td>any – Use any routing protocol.</td>
</tr>
<tr>
<td>rip</td>
<td>ospf</td>
</tr>
<tr>
<td></td>
<td>rip – Use RIP addressing</td>
</tr>
<tr>
<td></td>
<td>ospf – OSPF route.</td>
</tr>
<tr>
<td></td>
<td>all – Use any routing protocol.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rtm
/rtm# deny add 192.168.2.243 255.255.255.0 static rip
```

deny all

Use this command to set the default route redistribution to denied. Use the `permit add` command described on page 11-312 to configure specific routes as Permit and allow routing to them. See also `permit all` on page 11-313.

**Mode:** rtm

**Syntax:**
deny all

**Example:**
```
/# cd rtm
/rtm# deny all
```
### CLI Commands

#### rtm

---

## deny del

Use this command to remove a “deny” entry from the RRD control table. Use the `show rrd deny routes` described on page 11-63 to display a list of the current deny entries.

**Mode:** `rtm`

**Syntax:** `deny del {dest-ip} {dest-mask}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest-ip</td>
<td>IP address of the destination.</td>
</tr>
<tr>
<td>dest-mask</td>
<td>The subnet mask of the destination.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rtm
/rtm# deny del 192.168.2.243 255.255.255.0
```

## permit add

Use this command to add a “permit” entry to the RRD control table. Use the `show rrd permit routes` described on page 11-63 to display a list of the current permit entries.

**Mode:** `rtm`

**Syntax:**
```
permit add {dest-ip} {dest-mask} {static|rip|ospf|any}
{rip|ospf|all}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest-ip-addr</td>
<td>The IP address of the destination.</td>
</tr>
<tr>
<td>dest-mask</td>
<td>Enter the subnet mask of the destination.</td>
</tr>
<tr>
<td>static</td>
<td>rip</td>
</tr>
<tr>
<td>static</td>
<td>Use static addressing.</td>
</tr>
<tr>
<td>rip</td>
<td>Use RIP addressing.</td>
</tr>
<tr>
<td>ospf</td>
<td>Use OSPF routing.</td>
</tr>
<tr>
<td>any</td>
<td>Use any routing protocol.</td>
</tr>
<tr>
<td>rip</td>
<td>ospf</td>
</tr>
<tr>
<td>rip</td>
<td>Use RIP addressing.</td>
</tr>
<tr>
<td>ospf</td>
<td>Use OSPF routing.</td>
</tr>
<tr>
<td>all</td>
<td>Use any routing protocol.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rtm
/rtm# permit add 10.0.0.10 24 static rip
```
**CLI Commands**

**permit all**

Use this command to set the default route redistribution to permitted. Use the `deny add` command described on page 11-311 to configure specific routes as Deny and prevent routing to them. See also `deny all` on page 11-311. Use the `show rrd permit routes` described on page 11-63 to display a list of the current permit entries.

**Mode:** rtm

**Syntax:** permit all

**Example:**
```
/# cd rtm
/rtm# permit all
```

**permit del**

Use this command to delete the permit entry in the RRD control table.

**Mode:** rtm

**Syntax:** permit del {dest-ip} {dest-mask}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest-ip</td>
<td>IP address of the destination.</td>
</tr>
<tr>
<td>dest-mask</td>
<td>Enter the subnet mask of the destination.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rtm
/rtm# permit del
```

**router-id**

Use this command to set the IP address for the router.

**Mode:** rtm

**Syntax:** router-id {ip-address}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-address</td>
<td>IP address assigned to the router.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd rtm
/rtm# router-id 192.168.2.200
```
The commands listed below are available in the SNMP (simple network management protocol) mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- snmp-community
- snmp-shutdown
- snmp-trap

**No Variants**
The following commands are no variants of the corresponding affirmative command. For example, the `no snmp-community` command is the no variant of the `snmp-community` command. Descriptions of the no variants are included with the corresponding affirmative command.

- no snmp-community
- no snmp-shutdown
- no snmp-trap

**snmp-community**

Use this command to configure the SNMP community string used by the SNMP manager and set its access privileges. Use the `no snmp-community` command to delete the specific community information.

**Mode:** snmp

**Syntax:**
```
snmp-community {index} community-name {name} ipaddr {ip-address} privilege {readonly|readwrite}
```

**Syntax:**
```
no snmp-community {index}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>index</td>
<td>The SNMP-community index.</td>
</tr>
<tr>
<td>name</td>
<td>Define a name for the group to which the devices and management station running SNMP belong. Community names must be unique.</td>
</tr>
<tr>
<td>ip-address</td>
<td>The IP address of the network management station (the SNMP manager).</td>
</tr>
<tr>
<td>readonly</td>
<td>Sets the access privilege level to Read-Only (Public).</td>
</tr>
<tr>
<td>readwrite</td>
<td>Sets the access privilege level to Read-Write (Private).</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd snmp
/snmp# snmp-community 2 community-name NETMAN ipaddr 10.6.4.232 privilege readonly
```

**Example:**
```
/# cd snmp
/snmp# no snmp-community 2
```
**snmp-shutdown**

Use this command to set the administrative state of the SNMP agent down (disabled). When you disable the agent, SNMP requests are not processed. Use the **no snmp-shutdown** command to reset the administrative status of the SNMP Agent to up after previously setting it to down. SNMP requests will be processed.

**Mode:** snmp  
**Syntax:** snmp-shutdown  
**Syntax:** no snmp-shutdown  
**Example:** /snmp# snmp-shutdown  
**Example:** /# cd snmp  
   /snmp# no snmp-shutdown

**snmp-trap**

Use this command to configure a SNMP trap manager that receives and processes SNMP traps. Up to ten trap managers entries can be configured. Use the **no snmp-trap** command to delete the specified trap manager configuration.

**Mode:** snmp  
**Syntax:** snmp-trap {index} mgr-addr {ip-address} community {name}  
version {v1|v2|both} trap-port {port-number}  
**Syntax:** no snmp-trap {index}  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>index</td>
<td>Specify a number to identify the trap manager configuration.</td>
</tr>
<tr>
<td>ip-address</td>
<td>Specifies the IP address of the trap manager.</td>
</tr>
<tr>
<td>name</td>
<td>Specify the community name for which the trap manager is being configured.</td>
</tr>
<tr>
<td>v1</td>
<td>v2</td>
</tr>
<tr>
<td>v1</td>
<td>SNMP version 1</td>
</tr>
<tr>
<td>v2</td>
<td>SNMP version 2</td>
</tr>
<tr>
<td>both</td>
<td>SNMP version 1 and version 2</td>
</tr>
<tr>
<td>port-number</td>
<td>Trap port number.</td>
</tr>
</tbody>
</table>

**Example:** /snmp# snmp-trap 2 mgr-addr 10.6.4.212 community NETMAN  
version v1 trap-port 1  
**Example:** /# cd snmp  
   /snmp# no snmp-trap 2
The commands listed below are available in the SNTP (simple network time protocol) mode. Each command in the following list is a hyperlink to the detailed definition for the command.

- `clock timezone`
- `show sntp config`
- `show time`
- `sntp enable|disable`
- `sntp poll-interval`
- `sntp server`

**No Variants**

The following commands are no variants of the corresponding affirmative command. For example, the `no clock timezone` command is the no variant of the `clock timezone` command. Descriptions of the no variants are included with the corresponding affirmative command.

- `no clock timezone`
- `no sntp poll-interval`
- `no sntp server`

### clock timezone

Use this command to set the Simple Network Time Protocol (SNTP) timezone offset. Use the `no clock timezone` command to remove the timezone offset.

**Mode:** sntp

**Syntax:**

```plaintext
clock timezone {name} hours {hours} minutes {minutes}
{before_UTC|after_UTC}
```

**Syntax:**

```plaintext
no clock timezone
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Specify a name for the timezone.</td>
</tr>
<tr>
<td>hours</td>
<td>Set the number of hours difference from the Universal Time Clock.</td>
</tr>
<tr>
<td>minutes</td>
<td>Set the minutes difference from the Universal Time Clock</td>
</tr>
<tr>
<td>before_UTC</td>
<td>Subtract the set time from the Universal Time clock (sets the time earlier).</td>
</tr>
<tr>
<td>after_UTC</td>
<td>Add the set time to the Universal Time clock (sets the time later).</td>
</tr>
</tbody>
</table>

**Example:**

```plaintext
#/ cd sntp
/sntp# clock timezone Tulsa hours 1 minutes 10 before_utc
```

**Example:**

```plaintext
#/ cd sntp
/sntp# no clock timezone
```
**show sntp config**

Use this command to display the SNTP configuration.

*Mode:* `sntp`

*Syntax:* `show sntp config`

*Example:*  
```
/# cd sntp
/sntp# show sntp config

SNTP status : Disabled  
Server      : NULL  
Server Mode : UNICAST  
Poll Interval: 14 seconds  
Timezone    : Tulsa:1 hour 20 minutes before UTC
```

**show time**

Use this command to display the system current time.

*Mode:* `sntp`

*Syntax:* `show time`

*Example:*  
```
/sntp# show time  

Current Time : 01:33:39
```

**sntp enable|disable**

Use this command to enable or disable Simple Network Time Protocol (SNTP) on the system.

*Mode:* `sntp`

*Syntax:* `sntp {enable|disable}`

*Example:*  
```
/# cd sntp
/sntp# sntp enable
```
**sntp poll-interval**

Use this command to configure the Simple Network Time Protocol (SNTP) poll interval. Use the `no sntp poll-interval` command to reset the Simple Network Time Protocol (SNTP) polling interval to its default value.

**Mode:** sntp

**Syntax:** `sntp poll-interval {seconds}`

**Syntax:** `no sntp poll-interval`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>The polling interval for SNTP. Range is 16 – 1024. The default is 14 seconds.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd sntp
/sntp# sntp poll-interval 14
```

**Example:**
```
/# cd sntp
/sntp# no sntp poll-interval
```

**sntp server**

Use this command to configure a Simple Network Time Protocol (SNTP) server. Use the `no sntp server` command to remove a Simple Network Time Protocol (SNTP) server.

**Mode:** sntp

**Syntax:** `sntp server {unicast|multicast|anycast} [ip-address]`

**Syntax:** `no sntp server {unicast|multicast|anycast} [ip-address]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>unicast</td>
<td>To one device.</td>
</tr>
<tr>
<td>multicast</td>
<td>To a selected group.</td>
</tr>
<tr>
<td>anycast</td>
<td>To the closest member of a group, which then performs the removal from the group.</td>
</tr>
<tr>
<td>ip-address</td>
<td>Specifies the IP address assigned to the SNTP server.</td>
</tr>
</tbody>
</table>

**Example:**
```
/# cd sntp
/sntp# sntp server unicast
```

**Example:**
```
/# cd sntp
/sntp# no sntp server unicast
```
The commands listed below are available in the **system** mode. These commands provide system level functions, including file management and setting system information.

Each command in the following list is a hyperlink to the detailed definition for the command.

- file-delete
- file-download
- file-rename
- file-timeout
- file-upload
- linklog-clear
- login authentication
- reset
- send
- set syscontact
- set syslocation
- set sysname
- set upgrade
- show clk status
- show files
- show file-timeout
- show syscontact
- show syslocation
- show sysname
- syslog-clear
- xferto card

---

**file-delete**

Use this command to delete the specified file from the chassis system directory. To display a list of the files in the system directory, use the **show files** command as described on page 11-325.

**Mode:** system

**Syntax:** `file-delete {file-name}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>file-name</code></td>
<td>The name of the file you want to delete.</td>
</tr>
</tbody>
</table>

**Example:**

```
/# cd system
/system# file-delete flash
```
**CLI Commands**

**system**

---

### file-download

Use this command to retrieve a file (for example, a configuration file or an application file) from a remote PC at the specified IP address and upload it into the system directory for the chassis. The file must be located in the base directory selected in the TFTP utility running on the PC.

**NOTE:** The TFTP utility must be running on the remote PC before you use this command.

**Mode:** system

**Syntax:**

```
file-download {file-name} ipaddr {ip-address}
[destfile {name}]
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>file-name</td>
<td>Name of the file to be downloaded from the remote PC to the chassis system directory. May be up to 28 characters.</td>
</tr>
<tr>
<td>ip-address</td>
<td>The IP address of the remote PC acting as the TFTP server.</td>
</tr>
<tr>
<td>destfile {name}</td>
<td>Name of the system file to be created as a result of the download if it needs to be different from the name of the file being downloaded. Follows the DOS 8.3 file naming convention. The extension is optional.</td>
</tr>
</tbody>
</table>

**Example:**

```
/system# file-download commands.txt ipaddr 192.168.1.158
Downloading commands.txt from 192.168.1.158
.
Download Complete
/system#
```

---

### file-rename

 Use this command to rename a file stored in the system directory of the chassis.

**Mode:** system

**Syntax:**

```
file-rename {old-name} {new-name}
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>old-name</td>
<td>The current file name.</td>
</tr>
<tr>
<td>new-name</td>
<td>New name for the file.</td>
</tr>
</tbody>
</table>

**Example:**

```
/system# file-rename ppc.txt prcfg.txt
Renamed file ppc.txt to prcfg.txt
```

---
file-timeout

Use this command to set the file transfer timeout.

**Mode:** system

**Syntax:** `file-timeout {time in secs}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>time in secs</td>
<td>The elapsed time before a file transfer times out. Range is 30 – 3600 seconds. The default is 300 seconds.</td>
</tr>
</tbody>
</table>

**Example:** `/system# file-timeout 500`

file-upload

Use this command to upload a file from the chassis system directory to the base directory on the specified TFTP server.

**NOTE:** The TFTP utility must be running on the remote PC before you use this command. The base directory is specified in the TFTP utility.

**Mode:** system

**Syntax:** `file-upload {file-name} ipaddr {ip-address} [destfile {name}]`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>file-name</td>
<td>Name of the system file to be uploaded to the remote PC acting as the TFTP server. Follows the DOS 8.3 file naming convention. The three-character extension is optional.</td>
</tr>
<tr>
<td>ip-address</td>
<td>The IP address of the TFTP server.</td>
</tr>
<tr>
<td>destfile {name}</td>
<td>Name of the file to be created on the remote PC as a result of the upload if it needs to be different from the name of the file being uploaded. Maximum of 28 characters.</td>
</tr>
</tbody>
</table>

**Example:** `file-upload almsys.txt ipaddr 192.168.1.160`

linklog-clear

Use this command to clear the linklog.

**Mode:** system

**Syntax:** `linklog-clear`
CLI Commands
system

Example: /system# linklog-clear
/system#

login authentication

Use this command to specific the authentication mode for the CLI. When the system comes up for the first time the default authentication mode is LOCAL.

NOTE: For this command to work correctly, use the radius-server host command to set the type value to both as described on page 11-289.

Mode: system
Syntax: login authentication {local|radius}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>local</td>
<td>Default. Users are authenticated locally.</td>
</tr>
<tr>
<td>radius</td>
<td>Users are authenticated from the Radius server.</td>
</tr>
</tbody>
</table>

Example: /system# login authentication local

reset

Use this command to reboot a FLEXmaster module (card).

Mode: system
Syntax: reset {card_num}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>card_num</td>
<td>Slot number of the module (card) you want to reset. If the module is the master, then the entire chassis reboots.</td>
</tr>
</tbody>
</table>

Example: /system# reset 1

Warning: You are Restarting the Master Card.
It will Reboot the Entire Chassis
Do you really want to reset (y/n) ?

Example: /system# reset 3

Warning: Access to FM card will be lost.
Do you really want to reset (y/n) ?
**send**

This command is not supported in release 6.0.
For the equivalent command in the TUI, see *Saving Configuration Files* on page 16-28.
For the equivalent command in the GUI, see *Import or Export a Saved Configuration* on page 19-4.

**set syscontact**

Use this command to set the contact information.

*Mode:* system  
*Syntax:* `set syscontact {System Contact}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Contact</td>
<td>The name of the contact person for this system. Maximum 64 characters. To include spaces in the system contact, enclose the string in quotes.</td>
</tr>
</tbody>
</table>

*Example:* `/system# set syscontact Administrator`  
*Example:* `/system# set syscontact "John Q Admin"`

**set syslocation**

Use this command to set the system location information.

*Mode:* system  
*Syntax:* `set syslocation {System Location}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Location</td>
<td>The physical location of the chassis. Maximum 64 characters. To include spaces in the system location, enclose the string in quotes.</td>
</tr>
</tbody>
</table>

*Example:* `/system# set syslocation Chicago`

Use the `show syslocation` command to confirm that the system location is set.  
`/system# show syslocation`  
Chicago
**set sysname**

Use this command to set the system name for the chassis.

*Mode:* system

*Syntax:* `set sysname {System Name}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Name</td>
<td>A user-friendly name of the chassis. Maximum 64 characters. To include spaces in the system name, enclose the string in quotes.</td>
</tr>
</tbody>
</table>

*Example:* `/system# set sysname "Green Mountain"

Use the `show sysname` command to confirm that the system name is set.

`/system# show sysname
Green Mountain`

**set upgrade**

Use this command to upgrade a FLEXmaster16 TDM, FLEXmaster8A TDM, or FLEXmaster8 TDM module to support ATM. Upgrade keys are unique to the card with a particular MAC address. After the upgrade key is validated, the system reboots to complete the upgrade.

For information about how to obtain an upgrade key, see Converting a FLEXmaster TDM Module to ATM on page 16-43.

*CAUTION! ISSUING THIS COMMAND IS SERVICE-AFFECTING. WHEN A MODULE IS CONVERTED FROM TDM TO ATM, THE CONFIGURATION IS ERASED.*

*Mode:* system

*Syntax:* `set upgrade {cardNo} {upgrade-key}`

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cardNo</td>
<td>Slot number of the module (card) you want to upgrade.</td>
</tr>
<tr>
<td>upgrade-key</td>
<td>The upgrade key for the module. The key is a 34-character alphanumeric string (including dashes)</td>
</tr>
</tbody>
</table>

*Example:* `/system# set upgrade 2 fbce1453-cde4853-f0e70b29-fef28d90
REBOOTING DEVICE... Please Wait`
**show clk status**

Use this command to display the status of the clock.

**Mode:** system

**Syntax:** show clk status

**Example:** /system# show clk status

INT

**show files**

Use this command to display the files in the system directory. Omitting the optional parameter lists all of the files in the system directory.

**Mode:** system

**Syntax:** show [cfg|appl] files

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfg</td>
<td>Show the current configuration file.</td>
</tr>
<tr>
<td>appl</td>
<td>Show the current firmware application file.</td>
</tr>
</tbody>
</table>

**Example:** /system# show files

<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexGUI.jar</td>
<td>351692 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>278104 bytes</td>
</tr>
<tr>
<td>forctrap.txt</td>
<td>1089 bytes</td>
</tr>
<tr>
<td>index.htm</td>
<td>914 bytes</td>
</tr>
<tr>
<td>cacLogo.gif</td>
<td>3166 bytes</td>
</tr>
<tr>
<td>blank.jpg</td>
<td>888 bytes</td>
</tr>
<tr>
<td>ds3Front.jpg</td>
<td>12125 bytes</td>
</tr>
<tr>
<td>fm8aFrnt.jpg</td>
<td>13357 bytes</td>
</tr>
<tr>
<td>fm8Front.jpg</td>
<td>12577 bytes</td>
</tr>
<tr>
<td>fm16Frnt.jpg</td>
<td>13330 bytes</td>
</tr>
<tr>
<td>psFront.jpg</td>
<td>5368 bytes</td>
</tr>
<tr>
<td>laconfig.txt</td>
<td>61414 bytes</td>
</tr>
<tr>
<td>ver6xx.pgl</td>
<td>3954695 bytes</td>
</tr>
<tr>
<td>chassis.cfg</td>
<td>278110 bytes</td>
</tr>
</tbody>
</table>
**CLI Commands**

*system*

---

**show file-timeout**

Use this command to display the current file transfer timeout. To set the file transfer timeout, use the `file-timeout` command as described on page 11-321.

**Mode:** system

**Syntax:** `show file-timeout`

**Example:** `/system# show file-timeout
File Transfer Timeout is 700 seconds`

---

**show syscontact**

Use this command to display the system contact. To set the system contact, use the `set syscontact` command as described on page 11-323.

**Mode:** system

**Syntax:** `show syscontact`

**Example:** `/system# show syscontact
John Q Admin`

**Example:** `/system# show syscontact
/system#`

If the system contact has not been set, command returns a blank and returns to the system mode prompt.

---

**show syslocation**

Use this command to display the system location. To set the location, use the `set syslocation` command as described on page 11-323.

**Mode:** system

**Syntax:** `show syslocation`

**Example:** `/system# show syslocation
Boulder`

**Example:** `/system# show syslocation
/system#`

If the system location has not been set, command returns a blank and returns to the system mode prompt.
**show sysname**

Use this command to display the system name. To set the system name, use the `set sysname` command as described on page 11-324.

*Mode:* system  
*Syntax:* `show sysname`  
*Example:* `/system# show sysname`  
  Green Mountain  
*Example:* `/system# show sysname`  
  /system#  
If the system name has not been set, command returns a blank and returns to the system mode prompt.

**syslog-clear**

Use this command to clear the system log.

*Mode:* system  
*Syntax:* `syslog-clear`  
*Example:* `/system# syslog-clear`  
  /system#
**xferto card**

Use this command to copy an image or configuration file from the master to other card(s) in the chassis. This command can only be issued from the master.

**Mode:** system

**Syntax:** xferto card {[1-8]|all} {img|cfg} {filename}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td>Enter the slot number of the card to which the file will be transferred. Range is 1 – 8.</td>
</tr>
<tr>
<td>all</td>
<td>Transfer the specified file to all cards.</td>
</tr>
<tr>
<td>img</td>
<td>Transfer a firmware image file. Image files end with the extension .pgl.</td>
</tr>
<tr>
<td>cfg</td>
<td>Transfer the configuration file. Configuration files end with the extension .cfg</td>
</tr>
<tr>
<td>filename</td>
<td>Name of the file to be transferred.</td>
</tr>
</tbody>
</table>

**Example:** /system# xferto card 3 img ver5xx.pgl
Transfer to card 3 started ............................ completed.
The TUI mode allows you to launch the text user interface (TUI). See Chapter 5, TUI Configuration for information about using the TUI.

**tui**

Launches the TUI. To return to the CLI from the TUI, press Q to quit.

**Mode:** tui

**Syntax:** tui

**Example:** /# cd tui

To start the TUI, type 'tui' followed by enter key.
To return to the CLI, use the Quit selection in the top level TUI menu.
To use other modes in the CLI, type 'cd ..' followed by enter key.
/tui#
/tui# tui

01 MASTER        CARRIER ACCESS MASTERseries         Ver 6.00
------------------------------- Green Mountain -------------------------------
Alarms sTat Diag pOrt Link tImeslot clK Connect coMmit aPs Setup Flex Quit
----- EDIT: CFG 3 ----------- RUN: CFG 1 -----

<table>
<thead>
<tr>
<th>LINK</th>
<th>DS3</th>
<th>PORT</th>
<th>ETH</th>
<th>MGMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Tn</td>
<td>ABCD</td>
<td>111</td>
<td>1111</td>
<td>EFGH</td>
</tr>
</tbody>
</table>

# S En MODULE TYPE 1234 5678 9012 3456 1234 12 1234 5678 9012 3456
- - -- --------------- ---- ---- ---- ----  ---  ----  --   ---- ---- ---- ----
1 M T1 FLEXmaster8[uuuu uuuu] u UD uuu uuu uuu uuu uuu
2 -
3 S T1 FLEXmaster8ATM[uuuu uuuu] u DD Duuu uuu uuu uuu uuu
4 -
5 -
6 -
7 -
8 -

Power Supply 1 Up Fans None
Power Supply 2 Down

u=Unassigned U=Up D=Down I=Init d=Diag O=Off (Disabled)

Alarms: 01 03 Clk: INT Jul 12, 2006 12:53
Router and CLI Configuration

In this Chapter

- Accessing the CLI
- Saving Configurations
- Basic Configurations
  - Setting Ethernet Interfaces
  - Interface Stacking
  - PPP Configuration
  - RIP Configuration
  - Frame Relay Configuration
  - Remote Access to MASTERseries
  - Remote Access over PPP
  - Remote Access over Frame-Relay
  - OSPF Configuration
  - ATM Command Sequences
  - Common MASTERview Commands
- Viewing System Information
Accessing the CLI

When you log in to the MASTERseries, you are in the root mode of the CLI. For more information about logging in, see *Logging in to the MASTERseries* on page 4-2.

Saving Configurations

**NOTE:** In order to save configuration changes made through the CLI, you must first open an edit buffer. If you open the edit-buffer after making changes, your changes will be lost.

Save your changes made through the CLI with the using the `saveconfig` command. For more information about the `saveconfig` command, see *saveconfig* on page 11-34.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd edit-config/</td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td>/edit-config[13]# edit 13</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>Config #13 is opened for edit</td>
<td></td>
</tr>
<tr>
<td>Now you can change modes and</td>
<td></td>
</tr>
<tr>
<td>make configuration changes.</td>
<td></td>
</tr>
<tr>
<td>When you have finished making</td>
<td></td>
</tr>
<tr>
<td>changes, you can save the</td>
<td></td>
</tr>
<tr>
<td>configuration.</td>
<td></td>
</tr>
<tr>
<td>/edit-config[1]# save</td>
<td>Save the configuration.</td>
</tr>
<tr>
<td>Config #1 saved.</td>
<td></td>
</tr>
</tbody>
</table>

Basic Configurations

1. Setting Ethernet Interfaces

Use the following commands to configure Ethernet interfaces. For more information regarding the commands, see *Chapter 11, CLI Commands*.

**NOTE:** This procedure will work only if you are connected over the NMS cable. If you Telnet to the MASTERseries over 1E1, when you shut it down, you will lose connectivity.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ cd 1E1</td>
<td>Change mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# shutdown</td>
<td>Set 1E1 as out-of-service</td>
</tr>
<tr>
<td>/1E1# ip config 11.0.0.1 mask 255.0.0.0</td>
<td>Set the IP address and subnet mask for the interface</td>
</tr>
<tr>
<td>/1E1# no shutdown</td>
<td>Set 1E1 as in-service</td>
</tr>
</tbody>
</table>
2. **Interface Stacking**

Before stacking a ppp interface over an hdlc interface, configure the cross connects in the Connect screen. Save and activate the cross connects in the Commit screen. For more information about cross connects, see *Configuring Internal Timeslot Connections on page 5-16.*

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1X1</td>
<td>Create the interface</td>
</tr>
<tr>
<td>/# cd ..</td>
<td>Change to root mode</td>
</tr>
<tr>
<td>/# cd 1M1</td>
<td>Change mode to interface 1M1</td>
</tr>
<tr>
<td>/1M1# no shutdown</td>
<td>Set 1M1 as in-service</td>
</tr>
<tr>
<td>/# cd /1X1</td>
<td>Change mode to 1X1.</td>
</tr>
<tr>
<td>/1X1# no shutdown</td>
<td>Set 1X1 as in-service</td>
</tr>
<tr>
<td>/1X1# stackinterface 1M1 Layering successful /1X1#</td>
<td>Stack interface 1X1 over 1M1</td>
</tr>
</tbody>
</table>

There are a number of commands you can enter at this point, depending on what PPP parameters you need. Some examples are:

/1X1# magic number
/1X1# keep-alive-timer 10

3. **PPP Configuration**

Use the following commands to configure PPP interfaces.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1m1</td>
<td>Change mode to interface 1M1</td>
</tr>
<tr>
<td>/1m1# no shutdown</td>
<td>Set 1M1 as in-service</td>
</tr>
<tr>
<td>/1m1# cd ..</td>
<td>Change mode to root</td>
</tr>
<tr>
<td>/# interface 1xl</td>
<td>Create the interface 1x1 and change mode to it</td>
</tr>
<tr>
<td>/1xl# stackinterface 1m1</td>
<td>Stack interface 1X1 over 1M1</td>
</tr>
<tr>
<td>/1xl# magic number</td>
<td>Enable PPP Magic Number negotiation on 1X1</td>
</tr>
<tr>
<td>/1xl# keep-alive-timer 30</td>
<td>Set the keep-alive timer to 30 seconds</td>
</tr>
<tr>
<td>/1xl# ip config</td>
<td>ip config .... (if not un-numbered)</td>
</tr>
</tbody>
</table>
4. RIP Configuration

Use the following commands to configure RIP. The following commands are for numbered and unnumbered interfaces.

For more information regarding the commands, see Chapter 11, CLI Commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1x1</td>
<td>Create interface 1X1 and change mode to 1X1</td>
</tr>
<tr>
<td>/1X1# ip rip enable</td>
<td>Enable rip on 1X1</td>
</tr>
<tr>
<td>/1X1# send rip2</td>
<td>Set the RIP version send method</td>
</tr>
<tr>
<td>/1X1# recv both</td>
<td>Set the RIP receive version method</td>
</tr>
<tr>
<td>/1X1# cd /</td>
<td>Change mode to root</td>
</tr>
<tr>
<td>/1# interface 1e1</td>
<td>Change mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# ip rip enable</td>
<td>Enable rip on 1E1</td>
</tr>
<tr>
<td>/1E1# send rip2</td>
<td>Set the RIP version send method</td>
</tr>
<tr>
<td>/1E1# recv both</td>
<td>Set the RIP receive version method</td>
</tr>
<tr>
<td>/1E1# cd /</td>
<td>Change mode to root</td>
</tr>
<tr>
<td>/# cd rip</td>
<td>Change mode to RIP</td>
</tr>
<tr>
<td>/rip# router rip</td>
<td>Enables the RIP protocol</td>
</tr>
<tr>
<td>/rip# redistribute direct</td>
<td>Enables redistribution of direct routes into RIP</td>
</tr>
<tr>
<td>/rip# redistribute static</td>
<td>Enables redistribution of static routes into RIP</td>
</tr>
</tbody>
</table>

5. Frame Relay Configuration

Use the following commands for a basic frame-relay configuration. For more information regarding the commands, see Chapter 11, CLI Commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1m1</td>
<td>Create the interface 1M1 on the Management/ MSrv port.</td>
</tr>
<tr>
<td>/1M1# no shutdown</td>
<td>Set interface 1M1 as in-service.</td>
</tr>
<tr>
<td>/1M1# cd /</td>
<td>Return to root mode.</td>
</tr>
<tr>
<td>/# interface 1f1</td>
<td>Create the frame-relay interface 1F1.</td>
</tr>
<tr>
<td>/1F1# stackinterface 1ml</td>
<td>Stack interface 1F1 over 1M1</td>
</tr>
<tr>
<td>Layering successful</td>
<td></td>
</tr>
<tr>
<td>/1F1# no shutdown</td>
<td>Set interface 1F1 as in-service</td>
</tr>
<tr>
<td>or /1F1# no shut</td>
<td></td>
</tr>
<tr>
<td>/1F1# /</td>
<td>Return to root mode.</td>
</tr>
<tr>
<td>/# interface 1f1-16</td>
<td>Create the DLCI interface 1F1-16.</td>
</tr>
<tr>
<td>/1F1-16# ip config 172.16.1.2 mask 255.255.255.252</td>
<td>Set the IP address and subnet mask for the DLCI interface.</td>
</tr>
</tbody>
</table>
6. Remote Access to MASTERseries

MASTERseries modules support remote management, that is two-way communications from the cell site to the NOC.

- The Network Operations Center (NOC) can remotely configure the equipment if the T-1 to the site is in service. They can troubleshoot alarms, use the on-board diagnostics and look at performance monitoring data. In addition they can manage external Ethernet devices such as microwave antennas or power generators.
- The cell tech can reach other sites on the network, retrieve e-mail and browse the web from a remote site.

**Procedures**

This following sections describe how to

- Create a Management Channel
- Change the IP address of the MASTERseries
- Add the MASTERseries to a DHCP pool

Assumptions: you are communicating with the MASTERseries over NMS cable.

**Creating a Management Channel**

Use the following commands to assign an MSRV to a DS0 for management.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/#/ cd edit-config</td>
<td>Change mode to edit-config.</td>
</tr>
<tr>
<td>edit-config[1]#/ edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>edit-config[1]#/ connect tdm 1L1:24 1M1</td>
<td>Connect 1L1, timeslot 24 to 1m1.</td>
</tr>
<tr>
<td>edit-config[1]#/ save 1</td>
<td>Save the configuration.</td>
</tr>
<tr>
<td>edit-config[1]#/ activate 1</td>
<td>Activate the configuration.</td>
</tr>
<tr>
<td>edit-config[1]#/ cd /</td>
<td>Return to root mode.</td>
</tr>
</tbody>
</table>

To create a fatter channel, you can add more timeslots. For example:

```
edit-config[1]#/ connect tdm 1L1:20-24 1M1
```

will connect 1L1, timeslots 20-24 to 1m1.
**Changing the IP Address**

Use the following commands to change the IP address on 1E1. If you are connecting directly from your PC, connect a crossover Ethernet cable from your NIC to Ethernet 1.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ cd 1E1</td>
<td>Change mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# shutdown</td>
<td>Set 1E1 as out-of-service</td>
</tr>
<tr>
<td>/1E1# ip config 10.186.109.12 mask 255.255.255.240</td>
<td>Set the IP address and subnet mask for the interface</td>
</tr>
<tr>
<td>/1E1# no shutdown</td>
<td>Set 1E1 as in-service</td>
</tr>
<tr>
<td>/1E1# cd ..</td>
<td>Change to root mode</td>
</tr>
<tr>
<td>/# show ip interface 1e1</td>
<td>Verify the IP address change and that the interface is up.</td>
</tr>
</tbody>
</table>

**Creating a DHCP Pool**

This may be useful if administrative settings prevent you from changing the IP address of your PC. Follow this procedure and the MASTERseries will obtain a valid IP address from the router at the cell site.

1. Verify that the DHCP pool table and subnet option table are empty.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# show dhcpsrv pools</td>
<td>Displays the DHCP Server pool configuration.</td>
</tr>
<tr>
<td>/# show dhcpsrv subnet options</td>
<td>Displays the DHCP Server subnet options.</td>
</tr>
</tbody>
</table>

2. If the DHCP pool table and subnet option table are not empty, use the following 2 steps to delete DHCP pool table and subnet option table.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd dhcp</td>
<td>Change from root mode to dhcp mode</td>
</tr>
<tr>
<td>/dhcp# delete pool 1</td>
<td>Deletes DHCP Pool Index 1’s DHCP pool table and subnet option table</td>
</tr>
</tbody>
</table>

3. Add the pool.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dhcp# service dhcp</td>
<td>Enable dhcp service.</td>
</tr>
<tr>
<td>/dhcp# add pool 1 le1 192.168.2.0 255.255.255.0 192.168.2.182 192.168.2.198</td>
<td>Define the dhcp server pool. This needs to be valid IP range on network. Consult your network administrator for address ranges.</td>
</tr>
<tr>
<td>/dhcp# subnet option 1 3 4 192.168.2.180</td>
<td>Set the subnet options for the pool created in the previous line.</td>
</tr>
<tr>
<td>/dhcp# /</td>
<td>Return to root mode.</td>
</tr>
<tr>
<td>/# show dhcpsrv pools</td>
<td>This command displays the currently configured dhcp pools.</td>
</tr>
</tbody>
</table>
4. Verify that the DHCP server functionality is working.
   - Connect the Ethernet crossover cable from your PC’s Ethernet port to Ethernet 1 on the master module.
   - Open a Command Window (Start > Run, type `cmd`)
   - In the command window, type `ipconfig` and press enter to display the Ethernet address provided by the FLEXmaster DHCP Server and the Default Gateway

```
C:\>ipconfig
Windows 2000 IP Configuration
Ethernet adapter Local Area Connection:
   Connection-specific DNS Suffix . :
   IP Address. . . . . . . . . . . . : 192.168.2.182
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
```

## Optional Settings

Use the following commands to set up internet and email access. For more information about these options and others, see the list options command in the CLI chapter (*list options* on page 11-114).

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dhcp# subnet option 1 6 4 11.11.11.11</td>
<td>This will tell the client what IP the DNS server is.</td>
</tr>
<tr>
<td>/dhcp# subnet option 1 44 4 23.23.23.23</td>
<td>Tell the client where the WINS server is.</td>
</tr>
<tr>
<td>/dhcp# subnet option 2 46 1 8</td>
<td>This sets the WINS node type to Hybrid.</td>
</tr>
</tbody>
</table>

7. **Remote Access over PPP**

## Creating a Management Channel

Use the following commands to assign an MSRV to a DS0 for management.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd edit-config</td>
<td>Change mode to edit-config.</td>
</tr>
<tr>
<td>edit-config[1]/# edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>edit-config[1]/# connect tdm 1L1:24 1M1</td>
<td>Connect 1L1, timeslot 24 to 1m1.</td>
</tr>
</tbody>
</table>
Router and CLI Configuration
Basic Configurations

Changing the IP Address

Use the following commands to change the IP address on 1E1. If you are connecting directly from your PC, connect a crossover Ethernet cable from your NIC to Ethernet 1.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>edit-config[1]/# save 1</td>
<td>Save the configuration.</td>
</tr>
<tr>
<td>edit-config[1]/# activate 1</td>
<td>Activate the configuration.</td>
</tr>
<tr>
<td>edit-config[1]/# cd /</td>
<td>Return to root mode.</td>
</tr>
</tbody>
</table>

Depending on your network, you many need to enable DHCP and create a pool. For details about this, see Creating a DHCP Pool on page 12-6.

Stacking the PPP interface on the Management Interface

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ cd 1E1</td>
<td>Change mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# shutdown</td>
<td>Set 1E1 as out-of-service</td>
</tr>
<tr>
<td>/1E1# ip config 10.186.109.12 mask 255.0.0.0</td>
<td>Set the IP address and subnet mask for the interface</td>
</tr>
<tr>
<td>/1E1# no shutdown</td>
<td>Set 1E1 as in-service</td>
</tr>
<tr>
<td>/1E1# cd ..</td>
<td>Change to root mode</td>
</tr>
<tr>
<td>/# show ip interface 1e1</td>
<td>Verify the IP address change and that the interface is up.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1m1</td>
<td>Create interface 1M1</td>
</tr>
<tr>
<td>/1M1# no shutdown</td>
<td>Set interface 1M1 as in-service</td>
</tr>
<tr>
<td>/1M1# cd /</td>
<td>Return to root mode</td>
</tr>
<tr>
<td>/# interface 1X1</td>
<td>Create the interface 1X1</td>
</tr>
<tr>
<td>/1X1# stackinterface 1ml Layering successful</td>
<td>Stack interface 1X1 over 1M1</td>
</tr>
<tr>
<td>/1X1# ip config 172.16.1.2 mask 255.255.255.252</td>
<td>Set an IP address on interface 1X1</td>
</tr>
<tr>
<td>/1X1# no shut</td>
<td>Set 1X1 as in-service</td>
</tr>
<tr>
<td>/1X1# /</td>
<td>Return to root mode.</td>
</tr>
</tbody>
</table>

To verify that you have configured the interfaces correctly, issue the command show interface config all. Interfaces 1E1, 1M1 and 1X1 should be up.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# show interface config all</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Ethernet V2</td>
</tr>
</tbody>
</table>
### Router and CLI Configuration

**Basic Configurations**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Protocol</th>
<th>Speed</th>
<th>Status 1</th>
<th>Status 2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>3</td>
<td>1M1</td>
<td>HDLC</td>
<td>1504</td>
<td>Up</td>
<td>Up</td>
</tr>
<tr>
<td>4</td>
<td>1M2</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>5</td>
<td>1M3</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>6</td>
<td>1M4</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>7</td>
<td>1M5</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>8</td>
<td>1M6</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>9</td>
<td>1M7</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td>10</td>
<td>1M8</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>11</td>
<td>1M9</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>12</td>
<td>1M10</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>13</td>
<td>1M11</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>14</td>
<td>1M12</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>15</td>
<td>1M13</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>16</td>
<td>1M14</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>17</td>
<td>1M15</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>18</td>
<td>1M16</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>19</td>
<td>1X1</td>
<td>PPP</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
</tr>
</tbody>
</table>

---

**Adding a Route**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd ip</td>
<td>Change to ip mode.</td>
</tr>
<tr>
<td>/ip# ip route add 192.168.2.0 mask 255.255.255.0 1X1</td>
<td>Add a route to tell traffic how to reach the IP world out our default gateway 1X1.</td>
</tr>
<tr>
<td>/ip# cd /</td>
<td>Change to the root directory.</td>
</tr>
</tbody>
</table>

---

**8. Remote Access over Frame-Relay**

**Creating a Management Channel**

Use the following commands to assign an MSRV to a DS0 for management.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd edit-config</td>
<td>Change mode to edit-config.</td>
</tr>
<tr>
<td>edit-config[1]/# edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>edit-config[1]/# connect tdm 1L1:24 1M1</td>
<td>Connect 1L1, timeslot 24 to 1m1.</td>
</tr>
<tr>
<td>edit-config[1]/# save 1</td>
<td>Save the configuration.</td>
</tr>
<tr>
<td>edit-config[1]/# activate 1</td>
<td>Activate the configuration.</td>
</tr>
<tr>
<td>edit-config[1]/# cd /</td>
<td>Return to root mode.</td>
</tr>
</tbody>
</table>
**Changing the IP Address**

Use the following commands to change the IP address on 1E1. If you are connecting directly from your PC, connect a crossover Ethernet cable from your NIC to Ethernet 1.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ cd 1E1</td>
<td>Change mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# shutdown</td>
<td>Set 1E1 as out-of-service</td>
</tr>
<tr>
<td>/1E1# ip config 10.186.109.12 mask 255.0.0.0</td>
<td>Set the IP address and subnet mask for the interface</td>
</tr>
<tr>
<td>/1E1# no shutdown</td>
<td>Set 1E1 as in-service</td>
</tr>
<tr>
<td>/1E1# show ip interface 1e1</td>
<td>Verify the IP address change and that the interface is up.</td>
</tr>
</tbody>
</table>

Depending on your network, you may need to enable DHCP and create a pool. For details about this, see *Creating a DHCP Pool* on page 12-6.

**Stacking the Frame-Relay Interface on the Management Interface**

Conceptually, the interfaces are stacked like this:

```
1F1-16
  1F1
  1M01
  1L01
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1m1</td>
<td>Create interface 1M1</td>
</tr>
<tr>
<td>/1M1# no shutdown</td>
<td>Set interface 1M1 as in-service</td>
</tr>
<tr>
<td>/1M1# cd /</td>
<td>Return to root mode</td>
</tr>
<tr>
<td>/# interface 1F1</td>
<td>Create the interface</td>
</tr>
<tr>
<td>/1F1# stackinterface 1m1</td>
<td>Stack interface 1F1 over 1M1</td>
</tr>
<tr>
<td>Layering successful</td>
<td></td>
</tr>
<tr>
<td>/1F1# no shutdown</td>
<td>Set interface 1F1 as in-service</td>
</tr>
<tr>
<td>/1F1# no shut</td>
<td>Set 1F1 as in-service</td>
</tr>
<tr>
<td>/1F1# /</td>
<td>Return to root mode</td>
</tr>
<tr>
<td>/# interface 1F1-16</td>
<td>Create the interface 1F1-16</td>
</tr>
<tr>
<td>/1F1-16# ip config 172.16.1.2 mask 255.255.255.255</td>
<td>Set the IP address and subnet mask for the DLCI</td>
</tr>
<tr>
<td>/1F1-16# frame-relay peer-address 172.16.1.1</td>
<td>Define a peer.</td>
</tr>
<tr>
<td>/1F1-16# no shutdown</td>
<td>Set interface 1F1-16 as in-service</td>
</tr>
</tbody>
</table>
To verify that you have configured the interfaces correctly, issue the command `show interface config all`. Interfaces 1E1, 1M1, 1F1 and 1F1-16 should be up.

```bash
/# show interface config all
```

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>3</td>
<td>1M1</td>
<td>HDLC</td>
<td>1504</td>
<td>Up</td>
<td>Up</td>
<td>Other</td>
</tr>
<tr>
<td>4</td>
<td>1M2</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>5</td>
<td>1M3</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>6</td>
<td>1M4</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>7</td>
<td>1M5</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>8</td>
<td>1M6</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>9</td>
<td>1M7</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>10</td>
<td>1M8</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>11</td>
<td>1M9</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>12</td>
<td>1M10</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>13</td>
<td>1M11</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>14</td>
<td>1M12</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>15</td>
<td>1M13</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>16</td>
<td>1M14</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>17</td>
<td>1M15</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>18</td>
<td>1M16</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>19</td>
<td>1F1</td>
<td>FR</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>NLPID</td>
</tr>
<tr>
<td>20</td>
<td>1F1-16</td>
<td>FR</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Other</td>
</tr>
</tbody>
</table>

**Adding a Route**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/# cd ip</code></td>
<td>Change to ip mode.</td>
</tr>
<tr>
<td>`/ip# ip route add 192.168.2.0</td>
<td>Add a route to tell traffic how to reach the IP world out our default</td>
</tr>
<tr>
<td>mask 255.255.255.0 1F1-16</td>
<td>gateway 1F1-16.</td>
</tr>
<tr>
<td><code>/ip# cd /</code></td>
<td>Change to the root directory.</td>
</tr>
</tbody>
</table>
9. OSPF Configuration

OSPF is a protocol based on the link-states of routers within a network. OSPF supports hierarchical routing by segmenting a larger network into smaller more manageable smaller networks called areas. Typically OSPF is used to backhaul IP traffic from the MASTERseries platform located at the cell site. This IP traffic will typically be management traffic from all devices, including the MASTERseries, at the cell site.

**OSPF Terminology**

Below are some common OSPF terms and definitions.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>area border router (ABR)</td>
<td>A router that attaches to multiple areas.</td>
</tr>
<tr>
<td>autonomous system (AS)</td>
<td>A group of routers exchanging routing information via a common routing protocol.</td>
</tr>
<tr>
<td>autonomous system boundary router</td>
<td>Also known as an AS boundary router. A router that exchanges routing information with routers belonging to other Autonomous Systems. AS boundary routers advertise AS external routing information throughout the Autonomous System.</td>
</tr>
<tr>
<td>cost</td>
<td>The link state cost of the path to the destination.</td>
</tr>
<tr>
<td>exit-overflow interval</td>
<td>This is the amount of time that the router will stay in the overflow state until it resets to a non-overflow state. If the router database is still an overflow condition after the time set, it will reactivate the overflow state and restart the time again.</td>
</tr>
<tr>
<td>external-summary-address</td>
<td>A summarization of an address external to the Autonomous system</td>
</tr>
<tr>
<td>link state advertisement (LSA)</td>
<td>LSAs are used to calculate inter-area and external routes</td>
</tr>
<tr>
<td>LSDB</td>
<td>Link State Database</td>
</tr>
<tr>
<td>metric type</td>
<td>Specifies the type of external link associated with the default route advertised into the OSPF routing domain</td>
</tr>
<tr>
<td>neighbor</td>
<td>An adjacent router with a common link that is used to communicate and exchange link state advertisements</td>
</tr>
<tr>
<td>RRD</td>
<td>Route Redistribution</td>
</tr>
<tr>
<td>RTM</td>
<td>Route Table Manager</td>
</tr>
</tbody>
</table>

**Types of OSPF routers**

- **internal router (IR)**: a router that has all of its interfaces within the same area but not in Area 0.
- **backbone router (BR)**: a router that has at least one of its interfaces within Area 0.
- **area border router**: a router with multiple interfaces that may belong to two or more areas. These routers interconnect the backbone area and its area members.
**Types of OSPF Areas**

By default, all router interfaces (Ethernet, serial, etc.) belong to Area 0.

- **normal**
  Normal OSPF areas can be placed anywhere in the network but might require virtual links to attach to area 0.

- **stub**
  Area configured so that it does not receive AS external advertisements.

- **not-so-stubby (NSSA)**
  Not-so-stubby areas allow external routes to be advertised into the OSPF autonomous system while retaining the characteristics of a stub area to the rest of the autonomous system.

**Configuration Examples**

The following diagram represents an OSPF application. The following configuration sequences describe how to configure a network like this.

The following is a basic CLI configuration of the OSPF setup.

- **Router 1**
  - OSPF on Router #1
- **Router 2**
  - OSPF on Router #2
- **Router 3**
  - OSPF on Router #3
- **Router 4**
  - OSPF on Router #4
- **Router #5**
  - Configure RIP (Router #5)
**Router 1**

Use the following command sequence to set up the interfaces on router 1 before using the OSPF commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/# cd edit-config/</code></td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td><code>/edit-config[1]# edit 1</code></td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td><code>Config #1 is opened for edit</code></td>
<td></td>
</tr>
<tr>
<td><code>/edit-config[1]# set clk int</code></td>
<td>Set the clock to internal.</td>
</tr>
<tr>
<td><code>Updated Successfully</code></td>
<td></td>
</tr>
<tr>
<td><code>/edit-config[1]# set clk pri intf 1L01</code></td>
<td>Set the primary clock to 1L01.</td>
</tr>
<tr>
<td><code>Updated Successfully</code></td>
<td></td>
</tr>
<tr>
<td><code>/edit-config[1]# disconnect tdm 1L01:1-24</code></td>
<td>Disconnect connections 1-24 on 1L01</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L01 up</code></td>
<td>Set 1L01 to in-service</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L01 fdl none</code></td>
<td>Set 1L01 FDL to none</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L01 framing esf</code></td>
<td>Set 1L01 framing to ESF</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L01 encoding b8zs</code></td>
<td>Set 1L01 encoding to B8ZS</td>
</tr>
<tr>
<td><code>/edit-config[1]# connect tdm 1L01:17-24 1M1</code></td>
<td>Connect 1L01 channels 17-24 to 1M1</td>
</tr>
<tr>
<td><code>/# interface 1M1</code></td>
<td>Exit edit-config mode</td>
</tr>
<tr>
<td><code>/1M1# no shutdown</code></td>
<td>Change from root to interface 1M1</td>
</tr>
<tr>
<td><code>/ 1M1# /</code></td>
<td>Set 1M1 to in-service</td>
</tr>
<tr>
<td><code>/# interface 1X1</code></td>
<td>Exit interface 1M1</td>
</tr>
<tr>
<td><code>/1X1# stackinterface 1M1</code></td>
<td>Change from root to interface 1X1</td>
</tr>
<tr>
<td><code>/1X1# ip config 44.44.44.53 mask 255.255.255.252</code></td>
<td>Set IP address on 1X1</td>
</tr>
<tr>
<td><code>/1X1# no shutdown</code></td>
<td>Set 1X1 to in-service</td>
</tr>
<tr>
<td><code>/1X1# /</code></td>
<td>Exit 1X1 mode</td>
</tr>
<tr>
<td><code>/# cd 1E1</code></td>
<td>Change from root mode to interface 1E1</td>
</tr>
<tr>
<td><code>/1E1# shutdown</code></td>
<td>Set 1E1 to Out-of-Service (down)</td>
</tr>
<tr>
<td><code>/1E1# ip config 11.11.121.35 mask 255.255.255.240</code></td>
<td>Set IP address on 1E1</td>
</tr>
<tr>
<td><code>/1E1# ip config 11.11.121.49 mask 255.255.255.252 secondary</code></td>
<td>Set Secondary IP address on 1E1</td>
</tr>
<tr>
<td><code>/1E1# no shutdown</code></td>
<td>Set 1E1 to in-service (up)</td>
</tr>
<tr>
<td><code>/1E1# /</code></td>
<td>Exit interface 1E1</td>
</tr>
</tbody>
</table>
OSPF on Router #1

Use the following command sequence to set up OSPF on router #1

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd ospf</td>
<td>Change from root to OSPF mode</td>
</tr>
<tr>
<td>/ospf# router ospf</td>
<td>Enable the OSPF routing process and set the OSPF global status to UP (in-service)</td>
</tr>
<tr>
<td>/ospf# network 11.11.121.35 area 0.0.0.1</td>
<td>Define the interfaces on which OSPF runs and define the area identifier of the interfaces</td>
</tr>
<tr>
<td>/ospf# network 44.44.44.53 area 0.0.0.1</td>
<td></td>
</tr>
<tr>
<td>/ospf# /</td>
<td>Exit OSPF mode</td>
</tr>
<tr>
<td>/# cd rtm</td>
<td>Change from root to interface RTM mode</td>
</tr>
<tr>
<td>/rtm# router-id 11.11.121.35</td>
<td>Set router identifier</td>
</tr>
<tr>
<td>/rtm# /</td>
<td>Exit RTM mode</td>
</tr>
<tr>
<td>/# cd 1E1</td>
<td>Change from root mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# ip ospf cost 100</td>
<td>Set OSPF cost on 1E1</td>
</tr>
<tr>
<td>/1E1# /</td>
<td>Exit 1E1 mode</td>
</tr>
<tr>
<td>/# interface 1X1</td>
<td>Change from ROOT mode to interface 1X1 mode</td>
</tr>
<tr>
<td>/1X1# ip ospf cost 50</td>
<td>Set OSPF cost on 1X1</td>
</tr>
<tr>
<td>/1X1# ip ospf message-digest-key 1 md5</td>
<td>Set Message Digest version 5 (MD5) authentication for the interface</td>
</tr>
<tr>
<td>/1X1# ip ospf ifauth message-digest</td>
<td>Enable OSPF MD5 authentication.</td>
</tr>
<tr>
<td>/1X1# /</td>
<td>Exit 1X1 mode</td>
</tr>
</tbody>
</table>

Router 2

Use the following command sequence to set up the interfaces on router 1 before using the OSPF commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/edit-config[1]# edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>Config #1 is opened for edit</td>
<td></td>
</tr>
<tr>
<td>/edit-config[1]# set clk pri intf 1L02 Updated Successfully</td>
<td>Set the primary clock to 1L02.</td>
</tr>
<tr>
<td>/# cd edit-config/</td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td>/edit-config[1]# edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L01</td>
<td>Disconnect connections 1-24 on 1L01</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L02</td>
<td>Disconnect connections 1-24 on 1L02</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L03</td>
<td>Disconnect connections 1-24 on 1L03</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L04</td>
<td>Disconnect connections 1-24 on 1L04</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L01 up</td>
<td>Set 1L01 to in-service</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L01 fd1 none</td>
<td>Set 1L01 FDL to none</td>
</tr>
</tbody>
</table>
Router and CLI Configuration
Basic Configurations

<table>
<thead>
<tr>
<th>Command (Continued)</th>
<th>Definition (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/edit-config[1]# set 1L01 framing esf</td>
<td>Set 1L01 framing to ESF</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L01 encoding b8zs</td>
<td>Set 1L01 encoding to B8ZS</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 up</td>
<td>Set 1L02 to in-service</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 fdl none</td>
<td>Set 1L02 FDL to none</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 framing esf</td>
<td>Set 1L02 framing to ESF</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 encoding b8zs</td>
<td>Set 1L02 encoding to B8ZS</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 up</td>
<td>Set 1L03 to in-service</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 fdl none</td>
<td>Set 1L03 FDL to none</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 framing esf</td>
<td>Set 1L03 framing to ESF</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 encoding b8zs</td>
<td>Set 1L03 encoding to B8ZS</td>
</tr>
<tr>
<td>/edit-config[1]# connect tdm 1L01:17-24 1m1</td>
<td>Connect 1L01 channels 17-24 to 1M1</td>
</tr>
<tr>
<td>/edit-config[1]# connect tdm 1L02:1-8 1m2</td>
<td>Connect 1L02 channels 1-8 to 1M2</td>
</tr>
<tr>
<td>/edit-config[1]# connect tdm 1L03:1-24 1m3</td>
<td>Connect 1L03 channels 1-8 to 1M3</td>
</tr>
<tr>
<td>/edit-config[1]# /</td>
<td>Change from edit-config mode to root</td>
</tr>
<tr>
<td>/ cd 1M1</td>
<td>Change from root to interface 1M1</td>
</tr>
<tr>
<td>/1M1# no shutdown</td>
<td>Set 1M1 to in-service</td>
</tr>
<tr>
<td>/1M1# /</td>
<td>Exit interface 1M1</td>
</tr>
<tr>
<td>/# interface 1X1</td>
<td>Change from root to interface 1X1</td>
</tr>
<tr>
<td>/1X1# stackinterface 1m1</td>
<td>Set stack interface</td>
</tr>
<tr>
<td>/1X1# ip config 44.44.44.54 mask 255.255.255.252</td>
<td>Set IP address on 1X1</td>
</tr>
<tr>
<td>/1X1# no shutdown</td>
<td>Set 1X1 to in-service</td>
</tr>
<tr>
<td>/1X1# /</td>
<td>Exit interface 1X1</td>
</tr>
<tr>
<td>/# interface 1M2</td>
<td>Change from root to interface 1M2</td>
</tr>
<tr>
<td>/1M2# no shutdown</td>
<td>Set1M2 to in-service</td>
</tr>
<tr>
<td>/1M2# /</td>
<td>Exit 1M2 mode</td>
</tr>
<tr>
<td>/# interface 1X2</td>
<td>Change from root to interface1X2</td>
</tr>
<tr>
<td>/ 1X2# stackinterface 1M2</td>
<td>Set stack interface</td>
</tr>
<tr>
<td>/ 1X2# ip config 23.23.23.121 mask 255.255.255.252</td>
<td>Set IP address on 1X2</td>
</tr>
<tr>
<td>/ 1X2# no shutdown</td>
<td>Set 1X2 to in-service</td>
</tr>
<tr>
<td>/ 1X2# /</td>
<td>Exit interface 1X2</td>
</tr>
<tr>
<td>/# cd 1M3</td>
<td>Change from root to interface 1M3 mode</td>
</tr>
<tr>
<td>/ 1M3# no shutdown</td>
<td>Set 1M3 to in-service</td>
</tr>
<tr>
<td>/ 1M3# /</td>
<td>Exit 1M3 mode</td>
</tr>
<tr>
<td>/# interface 1X3</td>
<td>Change from root to interface 1X3 mode</td>
</tr>
<tr>
<td>/1X3# stackinterface 1M3</td>
<td>Set stack interface</td>
</tr>
<tr>
<td>/ 1X3# ip config 100.100.100.1 mask 255.255.255.252</td>
<td>Set IP address on 1X3</td>
</tr>
</tbody>
</table>
### Command (Continued) | Definition (Continued)
--- | ---
/ 1X3# no shutdown | Set 1X3 to in-service
/ 1X3# / | Exit 1X3 mode
/# cd 1E1 | Change from root to interface 1E1 mode
/ 1E1# shutdown | Set 1E1 to Out-of-Service (down)
/ 1E1# ip config 20.20.20.97 mask 255.255.255.224 | Set IP address on 1E1
/ 1E1# ip config 210.20.21.21 mask 255.255.255.224 secondary | Set Secondary IP address on 1E1
/ 1E1# ip config 21.21.21.167 mask 255.255.255.240 secondary | Set Secondary IP address on 1E1
/ 1E1# ip config 210.20.21.21 mask 255.255.255.224 secondary | Set Secondary IP address on 1E1
/ 1E1# ip config 21.21.21.178 mask 255.255.255.248 secondary | Set Secondary IP address on 1E1
/ 1E1# no shutdown | Set 1E1 to in-service (up)
/ 1E1# / | Exit 1E1 mode

### OSPF on Router #2

Use the following command sequence to set up OSPF on router #2.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd ospf</td>
<td>Change from root to OSPF mode</td>
</tr>
<tr>
<td>/ospf# router ospf</td>
<td>Enable the OSPF routing process and set the OSPF global status to UP (in-service).</td>
</tr>
<tr>
<td>/ospf# network 44.44.44.54 area 0.0.0.1</td>
<td>Define the interfaces on which OSPF runs and define the area identifier of the interfaces</td>
</tr>
<tr>
<td>/ospf# network 100.100.100.1 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 23.23.23.121 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 20.20.20.97 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 210.20.21.21 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 21.21.21.167 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 21.21.21.178 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 21.21.21.190 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# abr-type standard</td>
<td>Set the alternative ABR type</td>
</tr>
<tr>
<td>/ospf# /</td>
<td>Exit OSPF mode</td>
</tr>
<tr>
<td>/# cd rtm</td>
<td>Change from root mode to RTM mode</td>
</tr>
<tr>
<td>/rtm# router-id 20.20.20.97</td>
<td>Set router identifier</td>
</tr>
<tr>
<td>/rtm# /</td>
<td>Exit RTM mode</td>
</tr>
<tr>
<td>/# interface 1E1</td>
<td>Change from root mode to interface ethernet 1.</td>
</tr>
<tr>
<td>/1E1# ip ospf cost 100</td>
<td>Set OSPF cost on ethernet 1</td>
</tr>
<tr>
<td>/1E1# /</td>
<td>Exit interface ethernet 1 mode</td>
</tr>
<tr>
<td>/# interface 1x1</td>
<td>Change from root mode to interface 1X1</td>
</tr>
</tbody>
</table>
## Router and CLI Configuration

### Basic Configurations

**Router 3**

Use the following command sequence to set up the interfaces on router 3 before using the OSPF commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1X1# ip ospf cost 50</td>
<td>Set OSPF cost on 1X1</td>
</tr>
<tr>
<td>/1X1# ip ospf message-digest-key 1 md5 R1R2pass</td>
<td>Set the Message Digest version 5 (MD5) authentication for the interface</td>
</tr>
<tr>
<td>/1X1# ip ospf ifauth message-digest</td>
<td>Enable OSPF MD5 authentication.</td>
</tr>
<tr>
<td>/1X1# /</td>
<td>Exit 1X1 mode</td>
</tr>
<tr>
<td># interface 1X2</td>
<td>Change from root mode to interface 1X2</td>
</tr>
<tr>
<td>/1X2# ip ospf cost 50</td>
<td>Set OSPF cost on 1X2</td>
</tr>
<tr>
<td>/1X2# ip ospf message-digest-key 150 md5 R2R3pass</td>
<td>Set the Message Digest version 5 (MD5) authentication for the interface</td>
</tr>
<tr>
<td>/1X2# ip ospf ifauth message-digest</td>
<td>Enable OSPF MD5 authentication.</td>
</tr>
<tr>
<td>/1X2# /</td>
<td>Exit interface 1X2 mode</td>
</tr>
<tr>
<td># interface 1X3</td>
<td>Change from mode to interface 1X3</td>
</tr>
<tr>
<td>/1X3# ip ospf cost 49</td>
<td>Set OSPF cost on 1X3</td>
</tr>
<tr>
<td>/1X3# ip ospf ifauth simple-password</td>
<td>Set OSPF simple password authentication</td>
</tr>
<tr>
<td>/1X3# ip ospf authentication-key R2R4pass</td>
<td>Set authentication key used to assign a password to be used by neighboring routers that are using the OSPF’s simple password authentication</td>
</tr>
<tr>
<td>/1X3# /</td>
<td>Exit 1X3 mode</td>
</tr>
</tbody>
</table>

**Table 1**

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd edit-config/</td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td>/edit-config[1]# edit 1 Config #1 is opened for edit</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>/edit-config[1]# set clk int Updated Successfully</td>
<td>Set the clock to internal.</td>
</tr>
<tr>
<td>/edit-config[1]# set clk pri intf 1L01 Updated Successfully</td>
<td>Set the primary clock to 1L01.</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L01</td>
<td>Disconnect connections 1-24 on 1L01</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L02</td>
<td>Disconnect connections 1-24 on 1L02</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L03</td>
<td>Disconnect connections 1-24 on 1L03</td>
</tr>
<tr>
<td>/edit-config[1]# disconnect tdm 1L04</td>
<td>Disconnect connections 1-24 on 1L04</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 up</td>
<td>Set 1L02 to in-service</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 fd1 none</td>
<td>Set 1L02 FDL to none</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 framing esf</td>
<td>Set 1L02 framing to ESF</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L02 encoding b8zs</td>
<td>Set 1L02 encoding to B8ZS</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 up</td>
<td>Set 1L03 to in-service</td>
</tr>
<tr>
<td>/edit-config[1]# set 1L03 fd1 none</td>
<td>Set 1L03 FDL to none</td>
</tr>
</tbody>
</table>
### Basic Configurations

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/edit-config[1]# set 1L03 framing esf</code></td>
<td>Set 1L03 framing to ESF</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L03 encoding b8zs</code></td>
<td>Set 1L03 encoding to B8ZS</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L04 up</code></td>
<td>Set 1L04 to in-service</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L04 fdl none</code></td>
<td>Set 1L04 FDL to none</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L04 framing esf</code></td>
<td>Set 1L04 framing to ESF</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L04 encoding b8zs</code></td>
<td>Set 1L04 encoding to B8ZS</td>
</tr>
<tr>
<td><code>/edit-config[1]# connect tdm 1L02:1-8 1m2</code></td>
<td>Connect 1L02 channels 1-8 to 1M2</td>
</tr>
<tr>
<td><code>/edit-config[1]# connect tdm 1L03:1-12 1m3</code></td>
<td>Connect 1L03 channels 1-12 to 1M3</td>
</tr>
<tr>
<td><code>/edit-config[1]# connect tdm 1L04:13-24 1m4</code></td>
<td>Connect 1L04 channels 13-24 to 1M4</td>
</tr>
<tr>
<td><code>/edit-config[1]# /</code></td>
<td>Change from edit-config mode to root</td>
</tr>
<tr>
<td><code>/ # cd 1M2</code></td>
<td>Change from root to interface 1M2 mode</td>
</tr>
<tr>
<td><code>/ 1M2# no shutdown</code></td>
<td>Set 1M2 to in-service</td>
</tr>
<tr>
<td><code>/ 1M2# /</code></td>
<td>Exit 1M2 mode</td>
</tr>
<tr>
<td><code>/ # interface 1X2</code></td>
<td>Change from root to interface 1X2 mode</td>
</tr>
<tr>
<td><code>/ 1X2# stackinterface 1M2</code></td>
<td>Set stack interface</td>
</tr>
<tr>
<td><code>/ 1X2# ip config 23.23.23.122 mask 255.255.255.252</code></td>
<td>Set IP address on 1X2</td>
</tr>
<tr>
<td><code>/ 1X2# no shutdown</code></td>
<td>Set 1X2 to in-service</td>
</tr>
<tr>
<td><code>/ 1X2# /</code></td>
<td>Exit 1X2 mode</td>
</tr>
<tr>
<td><code>/ # cd 1M3</code></td>
<td>Change from root to interface 1M3 mode</td>
</tr>
<tr>
<td><code>/ 1M3# no shutdown</code></td>
<td>Set 1M3 to in-service</td>
</tr>
<tr>
<td><code>/ 1M3# /</code></td>
<td>Exit 1M3 mode</td>
</tr>
<tr>
<td><code>/ # interface 1X3</code></td>
<td>Change from root to interface 1X3 mode</td>
</tr>
<tr>
<td><code>/ 1X3# stackinterface 1M3</code></td>
<td>Set stack interface</td>
</tr>
<tr>
<td><code>/ 1X3# ip config 55.55.5.117 mask 255.255.255.252</code></td>
<td>Set IP address on 1X3</td>
</tr>
<tr>
<td><code>/ 1X3# no shutdown</code></td>
<td>Set 1X3 to in-service</td>
</tr>
<tr>
<td><code>/ 1X3# /</code></td>
<td>Exit 1X3 mode</td>
</tr>
<tr>
<td><code>/ # cd 1M4</code></td>
<td>Change from root to interface 1M4 mode</td>
</tr>
<tr>
<td><code>/ 1M4# no shutdown</code></td>
<td>Set 1M4 to in-service</td>
</tr>
<tr>
<td><code>/ 1M4# /</code></td>
<td>Exit 1M4 mode</td>
</tr>
<tr>
<td><code>/ # interface 1X4</code></td>
<td>Change from root to interface 1X4 mode</td>
</tr>
<tr>
<td><code>/ 1X4# stackinterface 1M4</code></td>
<td>Set stack interface</td>
</tr>
<tr>
<td><code>/ 1X4# ip config 34.34.34.2 mask 255.255.255.252</code></td>
<td>Set IP address on 1X4</td>
</tr>
<tr>
<td><code>/ 1X4# no shutdown</code></td>
<td>Set 1X4 to in-service</td>
</tr>
<tr>
<td><code>/ 1X4# /</code></td>
<td>Exit 1X4 mode</td>
</tr>
</tbody>
</table>
**Router and CLI Configuration**  
**Basic Configurations**

### OSPF on Router #3

Use the following command sequence to set up OSPF on router #3.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd ospf</td>
<td>Change from root to OSPF mode</td>
</tr>
<tr>
<td>/ospf# router ospf</td>
<td>Enable the OSPF routing process and set the OSPF global status to UP (in-service)</td>
</tr>
<tr>
<td>/ospf# network 23.23.23.122 area 0.0.0.0</td>
<td>Define the interfaces on which OSPF runs and define the area identifier of the interfaces</td>
</tr>
<tr>
<td>/ospf# network 34.34.34.2 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# network 33.33.1.97 area 0.0.0.0</td>
<td></td>
</tr>
<tr>
<td>/ospf# ASBR router</td>
<td>Sets router as an ASBR</td>
</tr>
<tr>
<td>/ospf# redistribute rip</td>
<td>Define the protocol from which the routes have to be redistributed into OSPF.</td>
</tr>
<tr>
<td>/ospf# redistribute static</td>
<td></td>
</tr>
<tr>
<td>/ospf# /</td>
<td>Exit OSPF mode</td>
</tr>
<tr>
<td>/# cd rtm</td>
<td>Change from root mode to RTM mode</td>
</tr>
<tr>
<td>/rtm# router-id 33.33.1.97</td>
<td>Set router identifier</td>
</tr>
<tr>
<td>/rtm# /</td>
<td>Exit RTM mode</td>
</tr>
<tr>
<td>/# cd 1E1</td>
<td>Change from root mode to interface 1E1</td>
</tr>
<tr>
<td>/1E1# ip ospf cost 100</td>
<td>Set OSPF cost on 1E1</td>
</tr>
<tr>
<td>/1E1# /</td>
<td>Exit interface ethernet1</td>
</tr>
<tr>
<td>/# interface 1X2</td>
<td>Change from root to interface 1X2 mode</td>
</tr>
<tr>
<td>/1X2# ip ospf cost 50</td>
<td>Set OSPF cost on 1X2</td>
</tr>
<tr>
<td>/1X2# ip ospf message-digest-key 150 md5 R2R3pass</td>
<td>Set the Message Digest version 5 (MD5) authentication for the interface</td>
</tr>
<tr>
<td>/1X2# ip ospf ifauth message-digest</td>
<td>Enable OSPF MD5 authentication.</td>
</tr>
<tr>
<td>/1X2# /</td>
<td>Exit 1X2 mode</td>
</tr>
<tr>
<td>/# interface 1X4</td>
<td>Change from root to interface 1X4 mode</td>
</tr>
</tbody>
</table>
Router and CLI Configuration
Basic Configurations

**Router 4**

Use the following command sequence to set up the interfaces on router 4 before using the OSPF commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1X4# ip ospf cost 25</td>
<td>Set OSPF cost on 1X4</td>
</tr>
<tr>
<td>/1X4# ip ospf ifauth simple-password</td>
<td>Set OSPF simple password authentication</td>
</tr>
<tr>
<td>/1X4# ip ospf authentication-key R3R4pass</td>
<td>Set authentication key used to assign a password to be used by neighboring routers that are using the OSPF’s simple password authentication</td>
</tr>
<tr>
<td>/1X4# /</td>
<td>Exit interface 1X4</td>
</tr>
<tr>
<td>/interface 1X3</td>
<td>Change from root mode to interface 1X3</td>
</tr>
<tr>
<td>/1X3# ip rip 55.55.5.117 enable</td>
<td>Configures interface to accept RIP packets.</td>
</tr>
<tr>
<td>/1X3# send 55.55.5.117 rip2</td>
<td>Set RIP send version method on the interface.</td>
</tr>
<tr>
<td>/1X3# recv 55.55.5.117 rip2</td>
<td>Set RIP receive version method on the interface.</td>
</tr>
<tr>
<td>/1X3# /</td>
<td>Exit interface 1X3</td>
</tr>
<tr>
<td>/# cd rip</td>
<td>Change from root to RIP mode.</td>
</tr>
<tr>
<td>/rip# redistribute ospf</td>
<td>Enables redistribution of routes into RIP.</td>
</tr>
<tr>
<td>/rip# /</td>
<td>Exit interface 1X3</td>
</tr>
</tbody>
</table>
## OSPF on Router #4

Use the following command sequence to set up OSPF on router #4.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/edit-config[1]# connect tdm 1L03:1-8 1M3</td>
<td>Connect 1L03 channels 1-8 to 1M3</td>
</tr>
<tr>
<td>/edit-config[1]# connect tdm 1L04:13-24 1M4</td>
<td>Connect 1L04 channels 13-24 to 1M4</td>
</tr>
<tr>
<td>/# cd 1M3</td>
<td>Change from root to interface 1M3 mode</td>
</tr>
<tr>
<td>/ 1M3# no shutdown</td>
<td>Set 1M3 to in-service</td>
</tr>
<tr>
<td>/ 1M3# /</td>
<td>Exit 1M3 mode</td>
</tr>
<tr>
<td>/# interface 1X3</td>
<td>Change from root to interface 1X3 mode</td>
</tr>
<tr>
<td>/ 1X3# stackinterface 1M3</td>
<td>Set stack interface</td>
</tr>
<tr>
<td>/ 1X3# ip config 100.100.100.2 mask 255.255.255.252</td>
<td>Set IP address on 1X3</td>
</tr>
<tr>
<td>/ 1X3# no shutdown</td>
<td>Set 1X3 to in-service</td>
</tr>
<tr>
<td>/ 1X3# /</td>
<td>Exit 1X3 mode</td>
</tr>
<tr>
<td>/# cd 1M4</td>
<td>Change from root to interface 1M4 mode</td>
</tr>
<tr>
<td>/ 1M4# no shutdown</td>
<td>Set 1M4 to in-service</td>
</tr>
<tr>
<td>/ 1M4# /</td>
<td>Exit 1M4 mode</td>
</tr>
<tr>
<td>/# interface 1X4</td>
<td>Change from root to interface 1X4 mode</td>
</tr>
<tr>
<td>/ 1X4# stackinterface 1M4</td>
<td>Set stack interface</td>
</tr>
<tr>
<td>/ 1X4# ip config 34.34.34.1 mask 255.255.255.252</td>
<td>Set IP address on 1X4</td>
</tr>
<tr>
<td>/ 1X4# no shutdown</td>
<td>Set 1X4 to in-service</td>
</tr>
<tr>
<td>/ 1X4# /</td>
<td>Exit 1X4 mode</td>
</tr>
<tr>
<td>/# cd 1E1</td>
<td>Change from root to interface 1E1 mode</td>
</tr>
<tr>
<td>/ 1E1# shutdown</td>
<td>Set 1E1 to Out-of-Service (down)</td>
</tr>
<tr>
<td>/ 1E1# ip config 4.4.4.4 Mask 255.255.255.0</td>
<td>Set IP address on 1E1</td>
</tr>
<tr>
<td>/ 1E1# no shutdown</td>
<td>Set 1E1 to in-service.</td>
</tr>
<tr>
<td>/ 1E1# /</td>
<td>Exit 1E1 mode</td>
</tr>
</tbody>
</table>

### Command

```
 Command               | Definition |
-----------------------|------------|
 /# cd ospf            | Change from root to OSPF mode |
 /ospf# router ospf    | Enable the OSPF routing process and set the OSPF global status to UP (in-service) |
 /ospf# network 100.100.100.2 area 0.0.0.0 | Define the interfaces on which OSPF runs and define the area identifier of the interfaces |
 /ospf# network 34.34.34.1 area 0.0.0.0 | Exit OSPF mode |
 /# cd rtm             | Change from root to interface RTM mode |
 /rtm# router-id 4.4.4.4 | Set router identifier |
```
**Basic Configurations**

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/rtm#</code> /</td>
<td>Exit RTM mode</td>
</tr>
<tr>
<td><code>/# interface 1X3</code></td>
<td>Change from root to interface 1X3 mode</td>
</tr>
<tr>
<td><code>/1X3# ip ospf cost 10</code></td>
<td>Set OSPF cost on 1X3</td>
</tr>
<tr>
<td><code>/1X3# ip ospf ifauth simple-password</code></td>
<td>Set OSPF simple password authentication</td>
</tr>
<tr>
<td><code>/1X3# ip ospf authentication-key R2R4pass</code></td>
<td>Set authentication key used to assign a password to be used by neighboring routers that are using the OSPF’s simple password authentication</td>
</tr>
<tr>
<td><code>/1X3#</code> /</td>
<td>Exit interface 1X3</td>
</tr>
<tr>
<td><code>/# interface 1X4</code></td>
<td>Change from root to interface 1X4 mode</td>
</tr>
<tr>
<td><code>/1X4# ip ospf cost 25</code></td>
<td>Set OSPF cost on 1X4</td>
</tr>
<tr>
<td><code>/1X4# ip ospf ifauth simple-password</code></td>
<td>Set OSPF simple password authentication</td>
</tr>
<tr>
<td><code>/1X4# ip ospf authentication-key R3R4pass</code></td>
<td>Set authentication key used to assign a password to be used by neighboring routers that are using the OSPF’s simple password authentication</td>
</tr>
<tr>
<td><code>/1X4#</code> /</td>
<td>Exit 1X4 mode</td>
</tr>
</tbody>
</table>

### Router #5

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/# cd edit-config/</code></td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td><code>/edit-config[1]# edit 1</code></td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td><code>/edit-config[1]# set clk pri intf 1L03</code></td>
<td>Set the clock to 1L03.</td>
</tr>
<tr>
<td><code>/edit-config[1]# set clk pri intf 1L01</code></td>
<td>Set the primary clock to 1L01.</td>
</tr>
<tr>
<td><code>/edit-config[1]# disconnect tdm 1L01</code></td>
<td>Disconnect connections 1-24 on 1L01</td>
</tr>
<tr>
<td><code>/edit-config[1]# disconnect tdm 1L02</code></td>
<td>Disconnect connections 1-24 on 1L02</td>
</tr>
<tr>
<td><code>/edit-config[1]# disconnect tdm 1L03</code></td>
<td>Disconnect connections 1-24 on 1L03</td>
</tr>
<tr>
<td><code>/edit-config[1]# disconnect tdm 1L04</code></td>
<td>Disconnect connections 1-24 on 1L04</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L03 up</code></td>
<td>Set 1L03 to in-service</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L03 fd1 none</code></td>
<td>Set 1L03 FDL to none</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L03 framing esf</code></td>
<td>Set 1L03 framing to ESF</td>
</tr>
<tr>
<td><code>/edit-config[1]# set 1L03 encoding b8zs</code></td>
<td>Set 1L03 encoding to B8ZS</td>
</tr>
<tr>
<td><code>/edit-config[1]# connect tdm 1L03:1-12 1m3</code></td>
<td>Connect 1L03 channels 1-12 to 1M3</td>
</tr>
<tr>
<td><code>/# cd 1M3</code></td>
<td>Change from root to interface 1M3 mode</td>
</tr>
<tr>
<td><code>/1M3# no shutdown</code></td>
<td>Set 1M3 to in-service</td>
</tr>
<tr>
<td><code>/1M3#</code> /</td>
<td>Exit 1M3 mode</td>
</tr>
<tr>
<td><code>/# interface 1X3</code></td>
<td>Change from root to interface 1X3 mode</td>
</tr>
</tbody>
</table>
## Router and CLI Configuration

### Basic Configurations

#### Configure RIP (Router #5)

Use the following command sequence to set up the interfaces on router 1 before using the OSPF commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1X3</td>
<td>Change from root mode to interface 1X3 mode</td>
</tr>
<tr>
<td>/1X3# ip rip 16.16.16.1 enable</td>
<td>Configures interface to accept RIP packets.</td>
</tr>
<tr>
<td>/1X3# ip rip 88.88.8.8 enable</td>
<td></td>
</tr>
<tr>
<td>/1X3# ip rip 55.55.5.107 enable</td>
<td></td>
</tr>
<tr>
<td>/1X3# ip rip 55.55.5.118 enable</td>
<td></td>
</tr>
<tr>
<td>/1X3# ip rip 55.55.5.121 enable</td>
<td></td>
</tr>
<tr>
<td>/1X3# send 16.16.16.1 rip2</td>
<td>Set RIP send version method on the interface.</td>
</tr>
<tr>
<td>/1X3# send 88.88.8.8 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# send 55.55.5.107 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# send 55.55.5.118 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# send 55.55.5.121 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# recv 16.16.16.1 rip2</td>
<td>Set RIP receive version method on the interface.</td>
</tr>
<tr>
<td>/1X3# recv 88.88.8.8 rip2</td>
<td></td>
</tr>
</tbody>
</table>
## Command Definition

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1X3# recv 55.55.5.107 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# recv 55.55.5.121 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# recv 88.88.8.8 rip2</td>
<td></td>
</tr>
<tr>
<td>/1X3# /</td>
<td>Exit 1X3 mode</td>
</tr>
</tbody>
</table>
10. ATM Command Sequences

This section describes some ATM configuration command sequences using the CLI.

**Creating a CES Group and associated VC**

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/atm# ces group CES1 2A01 1 6 2D01 1/32 1</td>
<td>Create a CES group</td>
</tr>
<tr>
<td>/atm# ces status CES1 up</td>
<td>Set the CES group to up.</td>
</tr>
</tbody>
</table>

**Deleting a CES Group and associated VC**

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/atm# ces status CES1 down</td>
<td>Set the CES group to down.</td>
</tr>
<tr>
<td>/atm# no ces group CES1</td>
<td>Delete the CES group</td>
</tr>
<tr>
<td>/atm# cd /</td>
<td>Change mode to root.</td>
</tr>
<tr>
<td>/# interface 2D01</td>
<td>Change mode to the interface where the VC is configured.</td>
</tr>
<tr>
<td>/2D01# vc status 1/32 down</td>
<td>Set the VC down.</td>
</tr>
<tr>
<td>/2D01# no vc link 1/32</td>
<td>Delete the VC.</td>
</tr>
</tbody>
</table>

11. ATM Bridging

This section describes how to configure the ATM Bridge port and map it to a DS3c BNC port. Setup assumes 8 slot chassis with FM TDM Master in slot 1 and FM DS3c ATM slave in slot 3.

<table>
<thead>
<tr>
<th>Command</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd edit-config/</td>
<td>Change from root to edit-config mode.</td>
</tr>
<tr>
<td>/edit-config[1]# edit 1</td>
<td>Open the edit buffer.</td>
</tr>
<tr>
<td>Config #1 is opened for edit</td>
<td>Return to root mode.</td>
</tr>
<tr>
<td>/edit-config[1]# cd ..</td>
<td>Change to ATM mode</td>
</tr>
<tr>
<td>/# cd atm</td>
<td>Enter the ATM device’s slot number.</td>
</tr>
<tr>
<td>/atm# device 3</td>
<td>Create a traffic descriptor.</td>
</tr>
<tr>
<td>/atm# ubr UBR 10000 75 0</td>
<td>Create a bridge group ID.</td>
</tr>
<tr>
<td>/atm# bridge group BRDG1</td>
<td>Create a PVC on the Bridge Group and attach it to DS3 port 1.</td>
</tr>
<tr>
<td>/atm# bridge pvc BRDG1 3D01 10/100 UBR</td>
<td></td>
</tr>
<tr>
<td>/atm# ..../edit-config/</td>
<td>Return to edit config.</td>
</tr>
<tr>
<td>/edit-config[1]# save 1</td>
<td>Save the configuration.</td>
</tr>
<tr>
<td>/edit-config[1]# activate 1</td>
<td>Activate the configuration.</td>
</tr>
</tbody>
</table>

Connect the ENET2 jack on the front of the DS3c card with an Ethernet turnover cable to ENET1 on the TDM "master" card. The Ethernet on the master card is configured for the LAN extension.
application. For more details about creating a DHCP pool and stacking the interface among other options based on the customer requirements, see Creating a DHCP Pool on page 12-6 and Remote Access to MASTERseries on page 12-5.

12. Common MASTERview Commands

Setting the Trap Destination

The trap destination is where FLEXmaster should send SNMP traps. For example, this might be the IP address of the MASTERview server

```
/snmp
/snmp# snmp-trap 1 mgr-addr 10.124.8.251 community public ver v1 trap-port 162
```

Adding the route to the MASTERview address

```
/snmp# cd /ip
ip route add {dest ip addr} [mask {dest mask}] {next hop|interface name} [metric {metric}]
```

Change the address of the MASTERview Server

```
/snmp# no snmp-trap 1
/snmp# snmp-trap 1 mgr-addr 10.124.8.31 community public ver v1 trap-port 162
Ip route add 0.0.0.0 mask 0.0.0.0 1X1
```

Viewing System Information

To display basic system information use the following commands:

- `show version`
- `show ip interface`
- `show interface config all`
- `show route`
- `print packet config`

```
show version
  # show version
  CARD: 1    Version Information
  Platform Software Version:  6.00
  Packet Software Version:    1.0.0.107
  ATM Software Version:       6.0.12.9
```
Router and CLI Configuration
Viewing System Information

**show ip interface**

```
#/ show ip interface
IP Interface Configuration

<table>
<thead>
<tr>
<th>Interface Index</th>
<th>Interface Name</th>
<th>Interface Type</th>
<th>Interface Admin Status</th>
<th>Interface Oper Status</th>
<th>IP Address</th>
<th>Subnet Mask</th>
<th>Broadcast Address</th>
<th>Address Allocation</th>
<th>Interface MTU</th>
<th>MAC Address</th>
<th>NAT Address Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>Up</td>
<td>Up</td>
<td>192.168.1.160</td>
<td>255.255.255.0</td>
<td>192.168.1.255</td>
<td>Manual</td>
<td>1500</td>
<td>00:e0:97:10:95:7e</td>
<td>Local</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>Down</td>
<td>Down</td>
<td>0.0.0.0</td>
<td>0.0.0.0</td>
<td>255.255.255.255</td>
<td>Manual</td>
<td>1500</td>
<td>00:e0:97:10:95:7f</td>
<td>None</td>
</tr>
</tbody>
</table>
```

**show interface config all**

```
#/ show interface config all

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>IfaceType</th>
<th>MTU</th>
<th>AdminStatus</th>
<th>OperStatus</th>
<th>EncapType</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E1</td>
<td>ENET</td>
<td>1500</td>
<td>Up</td>
<td>Up</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>2</td>
<td>1E2</td>
<td>ENET</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>Ethernet V2</td>
</tr>
<tr>
<td>3</td>
<td>1M1</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>4</td>
<td>1M2</td>
<td>HDLC</td>
<td>1504</td>
<td>Down</td>
<td>Down</td>
<td>Other</td>
</tr>
<tr>
<td>5</td>
<td>1X1</td>
<td>PPP</td>
<td>1500</td>
<td>Down</td>
<td>Down</td>
<td>PFP</td>
</tr>
</tbody>
</table>
show route

/# show route
Codes: St - Route Status, UA - Up and Active, UI - Up and Inactive, Dn - Down

<table>
<thead>
<tr>
<th>Destination</th>
<th>Genmask</th>
<th>Gateway</th>
<th>proto</th>
<th>Iface</th>
<th>Metric</th>
<th>Pref</th>
<th>St</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0.0.0</td>
<td>255.0.0.0</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1E2</td>
<td>1</td>
<td>0</td>
<td>Dn</td>
</tr>
<tr>
<td>11.11.121.32</td>
<td>255.255.255.240</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>185</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>11.11.121.48</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>185</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>16.0.0.0</td>
<td>255.0.0.0</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td>UA</td>
</tr>
<tr>
<td>20.20.20.96</td>
<td>255.255.255.224</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>21.21.21.160</td>
<td>255.255.255.240</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>21.21.21.176</td>
<td>255.255.255.248</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>21.21.21.184</td>
<td>255.255.255.248</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>23.23.23.120</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X2</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>23.23.23.120</td>
<td>255.255.255.252</td>
<td>23.23.23.121</td>
<td>ospf</td>
<td>1X2</td>
<td>50</td>
<td>121</td>
<td>UI</td>
</tr>
<tr>
<td>23.23.23.121</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X2</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>33.33.1.96</td>
<td>255.255.255.240</td>
<td>0.0.0.0</td>
<td>ospf</td>
<td>1E1</td>
<td>100</td>
<td>121</td>
<td>UI</td>
</tr>
<tr>
<td>34.34.34.0</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X3</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>34.34.34.0</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>25</td>
<td>121</td>
<td>UI</td>
</tr>
<tr>
<td>34.34.34.1</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X3</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>44.44.44.52</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>85</td>
<td>121</td>
<td>UI</td>
</tr>
<tr>
<td>55.55.5.96</td>
<td>255.255.255.240</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td>UA</td>
</tr>
<tr>
<td>55.55.5.116</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X1</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>55.55.5.116</td>
<td>255.255.255.252</td>
<td>0.0.0.0</td>
<td>rip</td>
<td>1X1</td>
<td>1</td>
<td>119</td>
<td>UI</td>
</tr>
<tr>
<td>55.55.5.118</td>
<td>255.255.255.255</td>
<td>0.0.0.0</td>
<td>local</td>
<td>1X1</td>
<td>1</td>
<td>0</td>
<td>UA</td>
</tr>
<tr>
<td>55.55.5.120</td>
<td>255.255.255.252</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td>UA</td>
</tr>
<tr>
<td>88.0.0.0</td>
<td>255.0.0.0</td>
<td>55.55.5.118</td>
<td>rip</td>
<td>1X1</td>
<td>2</td>
<td>119</td>
<td>UA</td>
</tr>
<tr>
<td>100.100.100.0</td>
<td>255.255.255.252</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>35</td>
<td>121</td>
<td>UA</td>
</tr>
<tr>
<td>192.168.0.0</td>
<td>255.255.0.0</td>
<td>0.0.0.0</td>
<td>static</td>
<td>1X3</td>
<td>1</td>
<td>1</td>
<td>UA</td>
</tr>
<tr>
<td>210.20.21.0</td>
<td>255.255.255.224</td>
<td>34.34.34.1</td>
<td>ospf</td>
<td>1X3</td>
<td>135</td>
<td>121</td>
<td>UA</td>
</tr>
</tbody>
</table>

print packet config

/# print packet config
Building configuration............
***************************************************************************
ASSUMPTION:This configuration will work only on a fresh reboot
***************************************************************************

cd /
##### ETHERNET INTERFACES CONFIGURATION #####
interface 1E1
shutdown
ip config 192.168.2.101 mask 255.255.255.0 local
no shutdown
cd ..

interface 1E2
shutdown
cd ..

##### HDLC INTERFACES CONFIGURATION #####
/1M1/no shutdown
/1M2/shutdown
/1M3/shutdown
/1M4/shutdown
/1M5/shutdown
/1M6/shutdown
/1M7/shutdown
/1M8/shutdown
/1M9/shutdown
/1M10/shutdown
/1M11/shutdown
/1M12/shutdown
/1M13/shutdown
/1M14/shutdown
/1M15/shutdown
/1M16/shutdown

##### FRAME RELAY INTERFACES CONFIGURATION #####
interface 1F1
stackinterface 1M1
no shutdown
cd ..

##### FR DLCI INTERFACES CONFIGURATION #####
interface 1F1-16
shutdown
cd ..

 print config
 /# print   config

  ######### Start: System Information #########
  
cd /system/
cd ..

  ######### End: System Information ##########

  set aco enable
cd edit-config

######### Start: Config #1 #########

edit 1
set default 1

set 1L01 framing esf
set 1L01 encoding b8zs
set 1L01 ftoRed No
set 1L01 fd1 none
set 1L01 ais disable

<screen capture truncated, as it continues for many screens, including all 16 configuration profiles>
CHAPTER 13

ATM Interworking Software

In this Chapter

- Overview
- Using the Flex Menu
- Configuration
  - Setting UNI Link Parameters
  - Creating Traffic Descriptors
  - Creating Permanent Virtual Paths
  - Creating Permanent Virtual Circuits
  - Creating Connections
  - Inverse Multiplexing over ATM (IMA)
  - Configuring Circuit Emulation Services
  - Configuring Bridging
- Diagnostics
  - Operations and Management
  - Performance Monitoring
Overview

ATM functionality is supported on the following modules:

- FLEXmaster8 ATM
- FLEXmaster16 ATM
- FLEXmaster8A ATM
- FLEXmasterDS3c-3

Setup

Before you begin configuring the ATM functionality, confirm that you have the required modules installed. For a 2-slot chassis, see Supported Configurations on page 2-4 and for an 8-slot chassis see Supported Configurations on page 3-4.
**Using the Flex Menu**

To access the Flex menu in the TUI, from the main menu, press F (Flex). For more information about navigating the user interface see *Navigating the Screens* on page 4-7.

**NOTE:** The Flex menu is available only when ATM modules are installed. ATM supporting modules include: FLEXmaster8 ATM, FLEXmaster16 ATM, FLEXmaster8A ATM and FLEXmasterDS3c-3

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Navigation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uni</td>
<td>Flex &gt; Uni</td>
<td>Configuring ATM-specific parameters on ATM links, including cell-scrambling.</td>
</tr>
<tr>
<td>Td</td>
<td>Flex &gt; Td</td>
<td>Traffic Descriptor Configuration.</td>
</tr>
<tr>
<td>Vc</td>
<td>Flex &gt; Vc</td>
<td>Virtual circuit configuration.</td>
</tr>
<tr>
<td>vP</td>
<td>Flex &gt; vP</td>
<td>Virtual Path Configuration.</td>
</tr>
<tr>
<td>sWitch</td>
<td>Flex &gt; sWitch</td>
<td>VC cross-connect configuration.</td>
</tr>
<tr>
<td>Ima</td>
<td>Flex &gt; Ima</td>
<td>IMA (Inverse multiplexing over ATM) configuration.</td>
</tr>
<tr>
<td>cEs</td>
<td>Flex &gt; cEs</td>
<td>Circuit Emulation Service (CES) configuration.</td>
</tr>
<tr>
<td>Bridge</td>
<td>Flex &gt; Bridge</td>
<td>PVC (permanent virtual circuit) bridge configuration.</td>
</tr>
<tr>
<td>Oam</td>
<td>Flex &gt; Oam</td>
<td>OAM (operations and maintenance) configuration. This includes alarm indication signal (AIS) and remote defect indication (RDI) fault management (FM) support, and performance monitoring (PM) for F5 ATM flows.</td>
</tr>
<tr>
<td>Stats</td>
<td>Flex &gt; Stats</td>
<td>Displays the number of transmitted and received ATM cells in addition to error reporting stats such as discarded or non-conforming ATM cells</td>
</tr>
</tbody>
</table>
Configuration

This section describes each of the menus available under the Flex menu, how to use the ATM functionality. A detailed example of configuration is described in Chapter 14, ATM Configuration.

Setting UNI Link Parameters

Use this screen to set parameters for ATM UNI links and DS3-ATM UNI Links. To access the Uni screen, from the main menu, press the F key (Flex), then U (Uni).

The following example shows a T1-ATM UNI Link

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
Uni Td Vc vP sWitch Ima cEs Bridge Oam Stats
----- EDIT: CFG 2 ------------------------------------------ RUN: CFG 2 -------
No => 2A01     T1-ATM UNI_LINK
Scramble => Yes
Idl Cel Dis=> Yes
Ports speed: 3622 Cells/sec
```

The following example shows a DS3-ATM UNI Link

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
Uni Td Vc vP sWitch Ima cEs Bridge Oam Stats
----- EDIT: CFG 2 ------------------------------------------ RUN: CFG 2 -------
No => 2D01     DS3-ATM UNI_LINK
Name =>
Dest =>
Frame => CBit
LBO => < 255 ft
Scramble => Yes
Disable => No
Tx Clock => Internal
Mapping => Direct
Loopback => None
FEAC LB Enb=> No
FEAC LB Req=> No
Ports speed: 104268 Cells/sec
```
The fields on the Uni screen are described in the following table.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Available for ATM link types</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No (Number)</td>
<td>x</td>
<td>This four-character field represents a link. The first digit indicates the slot number. The second character can be A for ATM UNI link, or D for a DS3-ATM UNI LINK. The third and fourth characters indicate the link number ID. Use the N/P keys to cycle through the selections, then press enter to move to the next field.</td>
</tr>
<tr>
<td>Name</td>
<td>x</td>
<td>Type a name for the local side of this DS3 UNI Link. Valid names can be up to 11 characters.</td>
</tr>
<tr>
<td>Dest (Destination)</td>
<td>x</td>
<td>Type a name for the destination side of this DS3 UNI Link. Valid names can be up to 11 characters.</td>
</tr>
<tr>
<td>Frame</td>
<td>x</td>
<td>This field specifies the link framing format. <strong>CBit</strong> – C-Bit parity framing format. Stuffing is always present. <strong>M23</strong> – Multiplex 2-to-3 (also known as M13). All three C-bits in a subframe are set to 1 if stuffing occurs or to 0 (zero) if stuffing does not occur.</td>
</tr>
<tr>
<td>LBO (Line Build Out)</td>
<td>x</td>
<td>Select a value to sets the output attenuation level of the link. (This prevents overdriving and cross-talk on short lines.) Possible values: &gt; 255 feet, &lt; 255 feet</td>
</tr>
<tr>
<td>Scramble</td>
<td>x</td>
<td>Enables or Disables ATM Cell Payload Scrambling.</td>
</tr>
<tr>
<td>Disable</td>
<td>x</td>
<td>This field enables or disables the selected link. Prior to disabling a link, you should remove any configured traffic including management channels and clock sources associated with that link. <strong>Yes</strong> – Use if the link is not being used and you want to prevent alarms from being reported on the link. <strong>No</strong> – (default) Enables alarm reporting for the specified link.</td>
</tr>
<tr>
<td>Tx Clock (Transmit Clock)</td>
<td>x</td>
<td><strong>Internal</strong> – this link uses the chassis clock, selected on the clK screen. This is the recommended mode of operation when a synchronous network is desired - like when running CES. <strong>Loop</strong> – clocking derived from the incoming link.</td>
</tr>
<tr>
<td>Mapping</td>
<td>x</td>
<td><strong>Direct</strong> – ATM data is mapped to ATM cell boundaries based on the HEC field in the ATM cell header. <strong>PLCP</strong> – cells are mapped into the DS3 data stream using the ATM Physical Layer Convergence Protocol (PLCP) The PLCP mapping is a high overhead protocol and reduces the DS3 bandwidth from 104,268 CPS to about 96,000 CPS. It also allows users to transmit an independent clock reference through the DS3 link.</td>
</tr>
</tbody>
</table>
### ATM Interworking Software

#### Configuration

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Available for ATM link types</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>DS3</td>
</tr>
<tr>
<td>Loopback</td>
<td></td>
<td>None – no loopback, or normal operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Line – Line Loopback.</strong> causes the receive signal at the DS3 interface to be internally routed to the transmitter of the module.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Loc – Local Loopback.</strong> The local loopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Pyld – Payload Loopback.</strong> The payload loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module. with the exception that the framing and CRC-6 bits are reinserted to the transmit signal stream. The receive signal to the module is not affected by the loopback.</td>
</tr>
<tr>
<td>FEAC LB Enb</td>
<td></td>
<td>Enables/Disables the Far End Alarm and Control (FEAC) Loopback function. If this function is enabled and the DS3 receives a FEAC loopback code, the DS3 data will be looped back to the remote end.</td>
</tr>
<tr>
<td>FEAC LB Req</td>
<td></td>
<td>Forces the sending of a FEAC Loopback code to the remote end which should cause the data to be looped back (if the remote end has FEAC enabled).</td>
</tr>
<tr>
<td>Idl Cel Dis</td>
<td></td>
<td>Allows the UNI to discard the ATM idle filler cells. Idle cells are inserted into the data stream to fill up to bandwidth when there is insufficient data being transmitted.</td>
</tr>
<tr>
<td>Port Speed</td>
<td></td>
<td>Displays the port speed based on the values set above.</td>
</tr>
</tbody>
</table>
Creating Traffic Descriptors

Traffic descriptors associate traffic service categories with specific quality of service (QoS) parameters to create unique performance characteristic combinations. Once you define traffic descriptors, you can use them in the creation of permanent virtual paths and permanent virtual circuits. The elements of a traffic descriptor are described below.

### Name

You can define a name for the TD or the system will assign a default name (TD1, TD2 and so on).

### Class

- **Constant bit rate (CBR)** – CBR supports applications that require a highly predictable transmission rate with minimal delay and low loss. With CBR, a connection is provided with a guaranteed amount of bandwidth. Example applications include real-time interactive voice (telephone call) and video (video conferencing). Circuit emulation services (CES) for TDM circuits may also use CBR service.

- **Variable bit rate - real time (rt-VBR)** – rt-VBR supports applications that are bursty in nature and that require minimal delay and low loss. Examples include voice coders with compression and silence suppression, and other applications that generate variable frame sizes.

- **Variable bit rate - non-real time (nrt-VBR)** – nrt-VBR supports applications that are bursty in nature and that tolerate delay but require low loss. Examples include airline reservations, banking transactions, and store-and-forward video.

- **Unspecified bit rate (UBR)** – UBR is a “best-effort” service that supports applications that have no specific performance requirements. Many Internet applications that have no specific requirements regarding delay and low loss use UBR service.

### Shaping

When you create traffic descriptors, you have the option of enabling traffic shaping (disabled by default). Traffic shaping allows MASTERSeries to modify the rate that cells are transmitted over the associated connection to meet the specified QoS parameters. If necessary, MASTERSeries temporarily buffers cells to avoid exceeding the expected transmission rate into the network. For CBR and UBR connections, traffic shaping is based on the peak cell rate (PCR). For VBR connections, traffic shaping can be based on the peak cell rate (PCR) alone or on the peak cell rate (PCR) and sustained cell rate (SCR).
ATM Interworking Software
Configuration

**UPC Contracts**
Usage Parameter Control settings monitor and control traffic.

<table>
<thead>
<tr>
<th>UPC Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCR</td>
<td><strong>Peak cell rate</strong> – PCR specifies the maximum rate at which information can be transmitted into the ATM network over a connection. For a CBR connection, PCR indicates the rate of transmission. For a VBR or UBR connection, PCR indicates the maximum burst rate. The value cannot be set higher than the port’s actual connection speed (line rate). The value is specified as number of cells per second. Range is 150 up to the full link or bundle rate in cells per second.</td>
</tr>
<tr>
<td>SCR</td>
<td><strong>Sustained cell rate</strong> – SCR is the floor for a VBR connection. Traffic rates can vary between SCR and PCR - but increasing only at a MBS at a time. MCR is only used for UBR+ applications. <strong>NOTE</strong>: Unspecified Bit Rate (does not need a Sustained Cell Rate (SCR) attribute. If you enter an SCR value for a UBR class traffic descriptor, it will be ignored.</td>
</tr>
<tr>
<td>MCR</td>
<td><strong>Minimum Cell Rate</strong> – the minimum guaranteed rate on a given VC or VP. <strong>NOTE</strong>: This parameter is only used for rt-VBR and nrt-VBR.</td>
</tr>
<tr>
<td>MBS</td>
<td><strong>Maximum Burst Size</strong> – the maximum number of cells that can be transmitted at the peak cell rate (PCR). Recommended range is 1 – 32 in number of cells. <strong>NOTE</strong>: This parameter is only used for rt-VBR and nrt-VBR.</td>
</tr>
<tr>
<td>CDVT</td>
<td><strong>Cell Delay Variation Tolerance</strong> – This sets the limit for delivery delay, which may be caused by traffic, overhead or randomness. In MASTERseries, CDVT with the value 27 equates to a 270 microsecond delay. The 270 microsecond delay is the time it takes to transmit one cell of data at T1 line speed. At the faster DS3 line rate it takes 9.5 microseconds to transmit one cell of data and the default CDVT setting of 75 for DS3 VCs equates to a buffer of about 79 cells. How you set the CDVT depends on the QoS settings and will vary based on network behavior.</td>
</tr>
</tbody>
</table>

### Creating a Traffic Descriptor

To create a traffic descriptor:

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
Uni   Td  Vc  vP  sWitch  Ima  cEs  Bridge  Oam  Stats
----- EDIT: CFG 1 ------------------------------------------ RUN: CFG 1 -------
Showing all Traffic Descriptors on Card 2
Card: 2
<--------ID--------><-------QoS--------><------------------UPC------------------><-Ctrl->
#  Name   Class    Shaping    PCR    SCR    MCR    MBS    CDVT  State
2   TD2  CBR   Disabled    150    0    0    0     75    Up
```

Access the Td screen from the main menu, press the F key (Flex), then T (Td).
1. From the Td menu, select a card, using the N/P keys, and press enter.
2. Select the action **Add**. Press enter. A traffic descriptor with default settings is created.
3. Select the action **Edit.** At each field, edit the values per your network requirements.
   For the QoS fields, use the N/P keys to display the available values, and press enter to move to the next field.
   For the UPC fields, key in the numerical values, and press enter to move to the next field.
4. At the Control State field, use the N/P keys to set the TD to up or down and press enter.
Creating Permanent Virtual Paths

A Permanent Virtual Path (PVP) is a data connection between two points on a network that may be carried over a variety of real circuit configurations during a single period of communication.

Accessing the PVP screen

To access the VP screen, from the main menu, press the F key (Flex), then P (vP). The fields on the VP screen are described in the following table.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **PVP**    | Uni
|            | Displays the UNI link where you are creating a PVP. This value is selected when you enter the screen. Use the N/P keys to select a different UNI, and press enter. |
|            | VP
|            | Virtual Path Identifier (VPI) for the PVP. Range is 0 – 255. |
| **QoS**    | Class
| Quality of Service | This field is read-only. It is automatically populated depending on the TD you assign to this PVP. |
|            | CBR – constant bit rate |
|            | nrt-VBR – non-real time variable bit rate |
|            | rt-VBR – real time variable bit rate |
|            | UBR – unspecified bit rate |
|            | Use
|            | Indicates if the PVP is connected to something. |
Viewing the Screen

If there are more than 14 VPs, press the down arrow key on the last entry line to scroll the VP list down one screen and display the next set of VP entries. Press the up arrow key on the first entry line to scroll the VP list up one screen and display the previous VC entries.

Creating a PVP

The following steps describe how to create a permanent virtual path.

NOTE: You cannot use the same Port/VPI combination in both the vP screen and the Vc screen. That is, if a VP is in-use on a given port for a PVP, it is not available for use in a PVC on that same port. Conversely, if a port is in use for a VC, it is not available for use in a VP.

To access the vP screen, from the main menu, press the F key (Flex), then P (vP).
1. From the vP menu, select a card and press enter.
2. With the cursor on the UNI field, use the N/P keys to select the link where the permanent virtual path will be created, and press Enter.
3. When the Action field is displayed, use the N/P keys to select the Add, and press Enter.
4. A permanent virtual path with default parameters is created and displayed on the screen.
   The new permanent virtual path appears in the lower part of the screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPC Usage Parameter Control – These settings monitor and control traffic.</td>
<td>TD</td>
</tr>
<tr>
<td></td>
<td>Stats</td>
</tr>
<tr>
<td>Ctrl State</td>
<td>Control State - Indicates the current status of the PVP. Use the N/P keys to cycle from down to up.</td>
</tr>
</tbody>
</table>
Editing a PVP

NOTE: A permanent virtual path with a status of Up cannot be edited. Set the status to down before making any changes. Also, a permanent virtual path which is in an active connection cannot be edited. Before attempting to edit a permanent virtual path, remove it from the connection.

The following steps describe how to edit a permanent virtual path.
1. From the vP menu, select a port.
2. Select the action Edit
3. Press enter.
   The cursor is now in the VP area. Arrow to the VP you want to edit.
4. Edit the values of the VP. For information about each of these fields, see Accessing the PVP screen on page 13-10.

Deleting a PVP

The following steps describe how to delete a permanent virtual path.
1. From the VP menu, press enter to select a card, then press enter to move to the UNI field.
2. Use the N/P keys to select a UNI.
3. Press enter to display the Action menu.
4. Use the N/P keys to select the action Delete and press enter.
5. Select the VP to delete, using the N/P keys.
6. Press enter to complete the deletion.
Creating Permanent Virtual Circuits

A Permanent Virtual Circuit (PVC) is a permanent channel connection between two ATM devices, used for dedicated long-term transport between locations. MASTERseries supports up to 256VCs, that is: T1 link, IMA group, DS3 link as well as an ATM IMA group.

Create PVCs using the VC screen.

---

Accessing the PVC screen

To access the PVC screen, from the main menu, press the **F** key (Flex), then **V** (Vc).

Below is a sample view of the Vc screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>Displays the UNI link where you are creating a PVC. This value is selected when you enter the screen. Use the N/P keys to select a different UNI, and press enter.</td>
</tr>
<tr>
<td>VP</td>
<td>Determines the virtual path for the PVC. VPI range: 0 - 255</td>
</tr>
<tr>
<td>VC</td>
<td>Determines the virtual channel for the PVC. VCI range: 32 - 65535</td>
</tr>
</tbody>
</table>
### Field Name | Description
--- | ---
**QoS**
Quality of Service | Class
This field is read-only. It is automatically populated depending on the TD you assign to this VC.  
CBR - constant bit rate  
nrt-VBR - non-real time variable bit rate  
rt-VBR - real time variable bit rate  
UBR - unspecified bit rate

**Use**
Indicates if the PVC is connected to something.

**UPC**
Usage Parameter Control
These settings monitor and control traffic.

**TD**
Select a Traffic descriptor. Traffic descriptors are user-defined sets of UPC settings. For more information about traffic descriptors, see *Creating a Traffic Descriptor* on page 13-8.

**Stats**
Stats field enables/disables statistics gathering for a given VC connection.

**Ctrl State**
Control State - Indicates the current status of the PVC.  
Use the N/P keys to cycle from down to up.

---

**Viewing the Screen**

If there are more than 14 VCs, press the down arrow key on the last entry line to scroll the VC list down one screen and display the next set of VC entries. Press the up arrow key on the first entry line to scroll the VC list up one screen and display the previous VC entries.

**Creating a PVC**

The following steps describe how to create a PVC.

To access the PVC screen, from the main menu, press the F key (Flex), then V (Vc).

1. From the Vc menu, select a card and press enter.
2. With the cursor on the UNI field, use the N/P keys to select the link where the Vc will be created, and press Enter.
3. When the Action field is displayed, use the N/P keys to select the Add, and press Enter.
4. A PVC with default parameters is created and displayed on the screen.  
The new PVC appears in the lower part of the screen.
**Editing a PVC**

The following steps describe how to edit a PVC.

**NOTE:** A PVC with a status of *Up* cannot be edited. Set the status to down before making any changes. Also, a PVC which is in an active connection, CES or bridge cannot be edited. Before attempting to edit the associated PVC, remove the PVC from the connection, put the CES circuit in the Down state or delete the bridge configuration.

1. From the Vc menu, select a port.
2. Select the action **Edit**

   
<table>
<thead>
<tr>
<th>Uni</th>
<th>Td</th>
<th>Vc</th>
<th>vP</th>
<th>sWitch</th>
<th>Ima</th>
<th>cEs</th>
<th>Bridge</th>
<th>Oam</th>
<th>Stats</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI</td>
<td>VP</td>
<td>VC</td>
<td>Class</td>
<td>Use</td>
<td>TD</td>
<td>Stats</td>
<td>State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B01</td>
<td>1</td>
<td>32</td>
<td>rt-VBR</td>
<td>UNI PVC</td>
<td>rtVBR</td>
<td>Enabled</td>
<td>Up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Press enter.
4. The cursor is now in the PVC area. Arrow to the PVC you want to edit.
5. Edit the values of the PVC. For information about each of these fields, see *Accessing the PVC screen* on page 13-13.

**Deleting a PVC**

The following steps describe how to delete a PVC.

1. From the Vc menu, press enter to select a card, then press enter to move to the UNI field.
2. Use the N/P keys to select a UNI.
3. Press enter to display the Action menu.
4. Use the N/P keys to select the action **Delete** and press enter.
5. Select the PVC to delete, using the N/P keys.
6. Press enter to complete the deletion.
**Creating Connections**

A connection is the concatenation of ATM Layer links in order to provide an end-to-end information transfer capability to access points. Join two PVCs to create a VC connection. Join two VPs to create a VP connection. Before attempting to create an ATM cross-connect, create the component PVCs using the Vc screen, or create the component VPs from the VP screen. For more information about PVCs, see *Creating Permanent Virtual Circuits* on page 13-13. For more information about VPs, see *Creating Permanent Virtual Paths* on page 13-10.

**Accessing the sWitch Screen**

To access the sWitch screen, from the main menu press the F key (Flex), then W (sWitch).

The sWitch screen is divided into two columns. They are arranged this way to take advantage of the screen space. There is no difference in function between the two columns.
Creating a VC Connection

NOTE: Before attempting to create an ATM connection, first create the PVCs or VPs to be included. For more information, see Creating a PVC on page 13-14 or Creating Permanent Virtual Paths on page 13-10. PVCs and VPs must have a status of up to be available for selection.

The following steps describe how to create a VC connection.

1. From the sWitch menu, select the action Add VC Connection. Press enter.
2. At the A: prompt, use the N key to cycle through the available PVCs. Press enter to accept the selection.
3. At the B: prompt, use the N key to cycle through the available PVCs. Press enter to accept the selection.
4. The connection is created and is displayed in the lower part of the screen.
**Deleting a VC Connection**

The following steps describe how to delete a connection.

1. From the sWitch menu, select a card.
2. Press enter to display the Action menu.
3. Use the N/P keys to select the action **Delete VC Connection**. Press enter.

4. Select the connection to delete. Press enter.
Creating a VP Connection

NOTE: Before attempting to create an ATM connection, first create the VPs to be included. For more information, see Creating Permanent Virtual Paths on page 13-10. PVPs must have a status of up to be available for selection.

The following steps describe how to create a VP connection.

1. From the sWitch menu, select the action **Add VP Connection**. Press enter.

2. At the **A**; prompt, use the **N** key to cycle through the available VPs. Press enter to accept the selection.

3. At the **B**; prompt, use the **N** key to cycle through the available VPs. Press enter to accept the selection.

4. The connection is created and is displayed in the lower part of the screen.
**Deleting a VP Connection**

The following steps describe how to delete a connection.

1. From the sWitch menu, select a card.
2. Press enter to display the Action menu.
3. Use the N/P keys to select the action **Delete VP Connection**. Press enter.

```
| Card: 2 Action: Delete VP Connection Entry:2B01 20 <=> 2D01 20 |
|---------- Column 1 ---------- Column 2 ----------|
| 2B01 20 2D01 20 | 2B01 40 2D01 40 |
| 2B01 50 2D01 50 | 2B01 60 2D01 60 |
| 2B01 70 2D01 70 | 2B01 90 2D01 90 |
| 2B01 30 2D01 30 | 2B01 1/32 2D01 1/32 |
| 2B01 1/34 2D01 1/34 | 2B01 1/35 2D01 1/35 |
```

4. Use the N/P keys to select the connection to delete. Press enter to delete the connection.
**Inverse Multiplexing over ATM (IMA)**

Use inverse multiplexing over ATM (IMA) to group together lower-speed links into a single high-speed link. On MASTERseries, IMA groups are single entities composed of 1-16 links.

**IMA Basics**

Multiple smaller links... ...are joined into one fat, virtual pipe

**Accessing the IMA screen**

To access the IMA screen, from the main menu, select F (Flex), then I (Ima).

**IMA Screen**

The following is a sample of the IMA screen.

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
Uni Td Vc vP sWitch Ima cEs Bridge Oam Stats
----- EDIT: CFG 1 -------------------------- RUN: CFG 1 -------
      Showing IMA Groups
Card: 2
<---- Group -----> UNIs       111 1111 Min   Frame <----- Timing -----><-Ctrl->
UNI   TxID Symmetry  1234 5678 9012 3456 UNIs   Len   TClk   DDly  A B G   State
2B01   1 symOper XX XCCC             1    m64    ctc    25   2 2 1 Up
```
Creating an IMA Group

To create an IMA group, fill in the fields as described in the following table.

**NOTE:** A T1 link must be designated as an ATM link before it can be included in an IMA group. For more information about ATM links, see *Step 1 - Designate ATM Links* on page 14-4.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>UNI IMA group identifier.</td>
</tr>
<tr>
<td></td>
<td>TxID</td>
</tr>
<tr>
<td></td>
<td>Symmetry</td>
</tr>
<tr>
<td>UNIs</td>
<td>1 - 16</td>
</tr>
<tr>
<td>Min UNIs</td>
<td></td>
</tr>
<tr>
<td>Frame Len</td>
<td></td>
</tr>
</tbody>
</table>
**Modifying IMA Groups**

**NOTE:** An IMA group must be down in order to modify any of the parameters of the IMA group, including adding or deleting T1 UNI links.

To modify an IMA group:

1. From the IMA screen, use the N/P keys to select the card. Press enter.

2. At the Action field, use the N/P keys to select Edit Groups.

3. Arrow to the group you want to modify. Change the fields as needed. If the group is down, change the Ctrl State to down.
Deleting IMA Groups

**NOTE:** An IMA Group must be in the down state in order to be deleted.

**NOTE:** To delete an IMA group all connections for the virtual circuits configured on the IMA group must deleted. This is done from the sWitch screen (for more information see Deleting a VC Connection on page 13-18 and Deleting a VP Connection on page 13-20. Also, the virtual circuits in the IMA group to be deleted must be removed from any CES groups or bridges. See Editing a CES Bundle on page 13-27 and Deleting a PVC on page 13-29 for more information.

<table>
<thead>
<tr>
<th>UNI MASTER</th>
<th>CARRIER ACCESS MASTERseries</th>
<th>Ver 5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uni Vc Switch</td>
<td>CES Bridge Dam Stats</td>
<td>EDIT: CFG 1</td>
</tr>
<tr>
<td>Card: 5 Action: Delete Group</td>
<td>Showing IMA Groups</td>
<td></td>
</tr>
<tr>
<td>(--- Group -----) UNIS</td>
<td>111 1111 Min</td>
<td>Frame (----- Timing -----)&lt;-Ctrl-&gt;</td>
</tr>
<tr>
<td>UNI TID Symmetry</td>
<td>1234 5678 9012 3456 UNIS</td>
<td>Len TClk DDly A B G State</td>
</tr>
<tr>
<td>IMA1 1 syncOper</td>
<td>1 m128 etc 25 2 2 1 Down</td>
<td></td>
</tr>
</tbody>
</table>

Troubleshooting IMA Groups

**Problem:** Can’t add links to an IMA group

**Cause:** Links must be designated as ATM links before they can added to an IMA group. See Step 1 - Designate ATM Links on page 14-4

**Problem:** The IMA group is reporting something other than Operational for the near-end or far-end state.

**Suggested action:** Force the restart of synchronization for the selected IMA group. For more information about Restart, see IMA Statistics on page 13-40.
**Configuring Circuit Emulation Services**

Circuit Emulation Services (CES) is an ATM specification which supports emulation of existing TDM circuits over ATM networks.

GSM traffic is transported with Node B ATM traffic over the ATM network using CES

The following sections describe CES configuration in FLEXmaster8. Use the CES screen to create and edit CES bundles.

**Accessing the CES screen**

To access the CES screen, from the main menu select F (Flex), then E (cEs).
Creating a CES Bundle

A CES bundle is the connecting of specific contiguous DS0s to a virtual circuit in an ATM data stream in order to move traffic from multiple T1 streams and combine them into a single T1 stream.

NOTE: Before you create a CES, you should first create a traffic descriptor and a VC.

- If the partial cell fill (PCF) is equal to 0 or 47, the TD must have a CBR QoS and the PCR must be equal to 171 times the number of DS0s in the CES bundle.
- If the PCF is greater than 0, then the PCR should be: \((\frac{8000 \times \text{number of DS0s}}{\text{PCF}})\).

For more information, see Creating a Traffic Descriptor on page 13-8 and Creating Permanent Virtual Circuits on page 13-13. PVCs must have a status of up to be available for selection.

To create a CES bundle, fill in the fields as described in the following table.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service #C E S I D</td>
<td>Output PVC used to select a configured PVC.</td>
</tr>
<tr>
<td>Output PVC</td>
<td>Press N/P to select a configured PVC.</td>
</tr>
<tr>
<td>Mode</td>
<td>Linemode.</td>
</tr>
<tr>
<td></td>
<td>Struct-No CAS - Structured without CAS.</td>
</tr>
<tr>
<td>Timing</td>
<td>Sync. - synchronous.</td>
</tr>
<tr>
<td>Partial Cell Fill</td>
<td>The number of user bytes to install into the ATM payload. Set at 0 or 47 equals full cell payload.</td>
</tr>
<tr>
<td>TDM Port</td>
<td>Port identifier (ATM network side) for the second virtual channel link.</td>
</tr>
<tr>
<td>Timeslots</td>
<td>Enter the starting and ending timeslots (1 - 24).</td>
</tr>
<tr>
<td>Ctrl State</td>
<td>Administrative Status</td>
</tr>
<tr>
<td></td>
<td>Up</td>
</tr>
<tr>
<td></td>
<td>Down</td>
</tr>
</tbody>
</table>

Adding a CES Bundle

To add a CES bundle, press N or P on the Action field until Add is displayed and press Enter. A CES bundle is created with default data. A maximum of four CES bundles can be configured on any CES capable T1 link.
**Editing a CES Bundle**

To edit a CES bundle, press N or P on the Action field until Edit is displayed and press Enter. The cursor will be placed on the first displayed bundle. Use the arrow keys to move to a field, and the Enter key to commit data.

**Deleting a CES Bundle**

To delete a CES bundle, press N or P on the Action field until Delete is displayed and press Enter. Press N or P on the Delete Service field until the desired CES bundle is displayed and press Enter to delete the bundle.

**NOTE:** A CES bundle must be in the Down state in order to delete it.
**Configuring Bridging**

A Bridge connects two like-traffic data types across a third that is not. In our case, we have an ATM Layer 2 Bridge. Layer 2 means the bridging function is performed at the MAC layer (not IP). There is no IP address for a bridge. Any ethernet traffic that appears on the bridged ethernet port is encapsulated in an RFC 1483 protocol header and sent as AAL5 cells across an ATM network. At some point, the AAL5 cells are terminated, stripped of their header, and converted back to ethernet packets, thus making a "bridge" between two ethernet networks.

By using FLEXmaster ATM Interworking software and hardware modules you can bridge two separated LAN networks across an ATM network.

The following sections describe Bridging configuration in FLEXmaster modules. Use the Bridging screen to create and delete PVC bridges.

**Accessing the Bridging Screen**

To access the Bridge menu, from the main menu, select **F** (Flex), then **B** (Bridge).

```
Uni Td Vc vP sWitch Ima cEs Bridge Oam Stats
----- EDIT: CFG 3 ------------------------------- RUN: CFG 3 -------
Card: 2   Action: Add PVC
                      Global Bridge Options ------------------------------
                      | Packet Discard: None    Aging: 300     |
                      | Bridge Entry List        |
                      <---PVC/Port---><-Encaps-><-RemoveFCS->,<-----PVC------><-Encaps-><-RemoveFCS->
                      | ENET2     N/A    Enabled     |
                      | 2B01      1/32      LLC   Enabled    |
```

From the Bridge screen, you can
- Add or delete PVCs to a bridge
- Add or delete Ethernet ports
- Set Global Bridge Options

All of these actions are available from the action field. To access the action field.

1. Press enter to enter the bridge screen. At the Card field, select a card, using the N/P keys.
2. Press enter to move to the action field
Adding a PVC
To add a PVC:

1. Access the Bridge menu from the main menu (select F (Flex) > B (Bridge). Press enter to enter the screen.
2. At the Card field, select a card, using the N/P keys. Press enter to move to the action field. Add PVC appears by default.
3. Press enter to move to the PVC field. Use the N/P keys to select from the configured PVCs. Press enter.
4. At the AAL5 encapsulation field select LLC or VcMux. Press enter.
5. At the Remove Frame Check Sequence field select enabled or disabled. Press enter to add the PVC.

   The new entry appears in the Bridge Entry List in the lower part of the screen.

Deleting a PVC
To delete a PVC:

1. Access the Bridge menu from the main menu, select F (Flex) > B (Bridge). Press enter to enter the screen.
2. At the Card field, select a card, using the N/P keys. Press enter to move to the action field.
3. Using the N/P keys, select Delete PVC. Press enter.
4. Use the N/P keys to display the PVC you want to delete, and press enter.
**Adding an Ethernet Port**

1. Access the Bridge menu from the main menu (select F (Flex) > B (Bridge). Press enter to enter the screen.
2. At the Card field, select a card, using the N/P keys. Press enter to move to the action field.
3. Use the N/P keys to display Add Eth. Press enter to select.
4. Press enter to move to the Eth: field. Select Eth1 or Eth 2 using the N/P keys. Press enter to select.
5. At Remove Frame Check Sequence field select enabled or disabled. Press enter.
6. Press enter to add the Ethernet port.

The new entry appears in the Bridge Entry List in the lower part of the screen.

**Deleting an Ethernet Port**

To delete an Ethernet port:

1. Access the Bridge menu from the main menu, select F (Flex) > B (Bridge). Press enter to enter the screen.
2. At the Card field, select a card, using the N/P keys. Press enter to move to the action field.
3. Using the N/P keys, select Delete Eth. Press enter.
4. Use the N/P keys to display the port you want to delete, and press enter.

**Setting Global Bridge Options**

1. Access the Bridge menu from the main menu, select F (Flex) > B (Bridge). Press enter to enter the screen.
2. At the Card field, select a card, using the N/P keys. Press enter to move to the action field.
3. Using the N/P keys, select Set Globals. Press enter.

4. At the Packet Discard field, use the N/P keys to select from none, partial, early and partial. Press enter.

5. At the aging field, key in a value from 5-65536.

6. To exit the Global Bridge Options area, press ESC.
Diagnostics

The following sections describe the diagnostic features available on the ATM modules.

Operations and Management

The Operations and Management screen (OAM) provides VC/VP integrity and fault and performance management. Use the Oam screen to enable or disable fault management. The following sections describe Oam configuration in MASTERseries.

Accessing the Oam Menu

To access the Oam menu, from the main menu select F (Flex), then O (Oam).
Fault-f5 Screen

To access the Fault-f5 menu, from the main menu select F (Flex), then O (Oam), then F (Fault-f5).

<table>
<thead>
<tr>
<th>PVC Info</th>
<th>UNI</th>
<th>UNI Link designation for this PVC.</th>
<th>These read-only values are set on the PVC screen (see Accessing the PVC screen on page 13-13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP</td>
<td>VP</td>
<td>Virtual path designation for this PVC.</td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>VC</td>
<td>Virtual channel designation for this PVC.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FM</th>
<th>Fault Management. Yes to enable, No to disable. Use the N/P keys to make a selection</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Segment</th>
<th>SegEnd</th>
<th>Segment endpoint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS</td>
<td>AIS</td>
<td>Alarm Indicator Signal</td>
</tr>
<tr>
<td>CC_SINK</td>
<td>CC_SINK</td>
<td>Continuity Check Sink - Possible values: yes or no. Monitors connection to the designated site (site designation is determined according to which VP/VC is being monitored)</td>
</tr>
<tr>
<td>CC_SRC</td>
<td>CC_SRC</td>
<td>Continuity Check Source - Monitors connection from the designated site (site designation is determined according to which VP/VC is being monitored)</td>
</tr>
<tr>
<td>LB</td>
<td>LB</td>
<td>Loopback - monitors the VP/VC for loopback OAM traffic and returns a specified comment back to the sender</td>
</tr>
</tbody>
</table>
To access the Performance menu, from the main menu select F (Flex), then O (Oam), then P (Performance).

### Field Name   | Description
--- | ---
**End to End** | CC_SINK
| CC cells provide continual monitoring of a connection on a segment or end-to-end basis. To check the integrity of the link, you can set up a VP or VC to regularly send or receive CC cells at either the segment level or at the end-to-end level.
The CC cell source generates the CC cells, and the sink receives and processes the cells. You can set up a VP or VC as the source, the sink, or both the source and the sink. If you enable a VP or VC as a CC cell source, it generates CC cells. The VP or VC counts CC cells whether or not CC cell flow is enabled. You can enable CC cells only on data circuits, not on control circuits, such as ILMI or signalling circuits.
CC_SRC | Continuity Check Source - Possible values: yes or no.
LB | Loopback

### Performance Menu

The following table describes the fields on the Performance screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| PVC Info | UNI
| UNI Link designation for this PVC. |
| | VP
| Virtual path designation for this PVC. |
| | VC
| Virtual channel designation for this PVC. |
| PM Enable | Use the N/P keys to enable or disable performance monitoring. The default is no (disabled). |
| Block Size | Possible Values: 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768. |

**NOTE:** In release 6.01 do not use Performance Monitoring on CES connections.
**Llid Menu**

To access the Llid menu, from the main menu select F (Flex), then O (Oam), then L (Llid).

```
F (Flex)
O (Oam)
L (Llid)
```

The following table describes the fields on the Llid screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Identifies the ATM module.</td>
</tr>
<tr>
<td>Llid</td>
<td>Loopback Location ID.</td>
</tr>
</tbody>
</table>
Performance Monitoring

The Stats menu provides 7 submenus of statistics:
- Virtual Channel Statistics
- Virtual Path Statistics
- ATM Statistics
- IMA Statistics
- CES Statistics
- Bridge Statistics
- DS3 Statistics - this menu appears only when a DS3 module is in the chassis

Virtual Channel Statistics

The vcStats screen displays ATM cell statistics for the PVCs such as Rx/Tx cell counts, tagged cells, discarded cells, and nonconforming (to UPC) cell counts.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>Indicates the PVC’s VPI and VCI.</td>
</tr>
<tr>
<td>Tx</td>
<td>Number of cells transmitted of priority 0 / priority 1.</td>
</tr>
</tbody>
</table>
The vpStats screen displays ATM cell statistics for PVPs such as Rx/Tx cell counts, tagged cells, discarded cells, and nonconforming (to UPC) cell counts.

**Virtual Path Statistics**

The vpStats screen displays ATM cell statistics for PVPs such as Rx/Tx cell counts, tagged cells, discarded cells, and nonconforming (to UPC) cell counts.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx</td>
<td>Number of lost cells received of priority 0 / priority 1</td>
</tr>
<tr>
<td>Tagged</td>
<td>Number of tagged cells.</td>
</tr>
<tr>
<td>Discard</td>
<td>Number of discarded cells.</td>
</tr>
<tr>
<td>Nonconform</td>
<td>Number of nonconforming cells</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVP</td>
<td>Indicates the PVC’s port and VPI.</td>
</tr>
<tr>
<td>Tx</td>
<td>Number of cells transmitted of priority 0 / priority 1.</td>
</tr>
<tr>
<td>Rx</td>
<td>Number of lost cells received of priority 0 / priority 1</td>
</tr>
<tr>
<td>Tagged</td>
<td>Number of tagged cells.</td>
</tr>
<tr>
<td>Discard</td>
<td>Number of discarded cells.</td>
</tr>
<tr>
<td>Nonconform</td>
<td>Number of nonconforming cells</td>
</tr>
</tbody>
</table>
ATM Interworking Software
Diagnostics

### ATM Statistics

UNIstats screen displays ATM cell statistics for the ports (both logical [IMA] and physical) such as ATM header errors, buffer under/overruns, and receive out-of/enter synchronization errors.

Use the arrow keys to display a range of links, (1-8, 9-16), or IMA.

```
vcStats vFstats Unistats Ima_states Ces_stats Bridge_stats Ds3
----- EDIT: CFG 1 ----------------------------- RUN: CFG 1 -------
Showing UNI Statistics on Card 3
Card: 3
UNIs 1-8 UNIs 9-16 IMA
<UNI-><---- Header --------> Buffers --------> Sync -------->
  | HEC Err | Addr Msmtn | Rx Overrun | Tx Underrun | Rx OOS | Rx Ent Sync |
 3A01 | 10  | 0  | 0  | 0  | 2  | 2  |
3A02 | 0  | 0  | 0  | 0  | 0  | 0  |
3A03 | 0  | 0  | 0  | 0  | 0  | 0  |
3A04 | 0  | 0  | 0  | 0  | 0  | 0  |
3A05 | 0  | 0  | 0  | 0  | 0  | 0  |
3A06 | 0  | 0  | 0  | 0  | 0  | 0  |
3A07 | 0  | 0  | 0  | 0  | 0  | 0  |
```

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI</td>
<td>Identifies the UNI link.</td>
</tr>
<tr>
<td>Header</td>
<td></td>
</tr>
<tr>
<td>HEC Err</td>
<td>Number of HEC errors.</td>
</tr>
<tr>
<td>Addr Msmtn</td>
<td>Number of address mismatch errors.</td>
</tr>
<tr>
<td>Buffers</td>
<td></td>
</tr>
<tr>
<td>Rx Overrun</td>
<td>Number of received overrun errors.</td>
</tr>
<tr>
<td>Tx Underrun</td>
<td>Number of transmit underrun errors.</td>
</tr>
<tr>
<td>Sync</td>
<td></td>
</tr>
<tr>
<td>Rx OOS</td>
<td>Number of times the UNI has lost cell delineation.</td>
</tr>
<tr>
<td>Rx Ent Sync</td>
<td>Number of times the UNI has entered/achieved cell delineation.</td>
</tr>
</tbody>
</table>
Unistats for an IMA Group.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Identifies the IMA group</td>
</tr>
<tr>
<td>State Trans Alarm</td>
<td>This is the number of Near End and Far End alarms received or transmitted</td>
</tr>
<tr>
<td></td>
<td>since the inception of the PVC.</td>
</tr>
<tr>
<td>Tx Cells</td>
<td>This is the number of ATM cells transmitted out of that PVC</td>
</tr>
<tr>
<td>Rx Cells</td>
<td>This is the number of ATM cells the unit has received on that PVC</td>
</tr>
</tbody>
</table>

```
01 MASTER                  CARRIER ACCESS MASTERseries     Ver 6.01
-----------------------------------------------------------------------------------------------
vStats vPstats Unistats Ima_states Ces_stats Bridge_stats Ds3
------ EDIT: CFG 1 --------------- SHOWING UNI STATISTICS ON CARD 1 --------------------
Card: 1  Option:  Reset All
UNIs 1-8  UNIs 9-16  DS3/IMA
<Group>< State Trans Alarm -><-------- Tx --------------><-------- Rx -------->
     NE Fault  FE Fault     Cells     Cells
1B01:   20   21  35779  35636

<UNI-><----------------------------------Cells----------------------------------->
   Tx    Rx    Idle     Errored
1D01   0     0  130576718    1
1D02   0     0  130573671    0
1D03   0  130571114    0    0
```
**IMA Statistics**
This is a sample IMA statistics screen.

The following table describes the types of data displayed on the IMA Group States screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Displays the card (module) where the IMA groups are configured.</td>
</tr>
<tr>
<td>Option</td>
<td>Refresh - refreshes the IMA group states display. Restart - used to force the restart of synchronization for a selected IMA group. You may want to use this if the IMA group is reporting anything other than Operational for the near-end or far-end state.</td>
</tr>
<tr>
<td>#</td>
<td>Indicates the IMA group ID</td>
</tr>
<tr>
<td>Near End</td>
<td>Possible values: Start-Up, Start-Up Acknowledge, Configuration Aborted, Insufficient Links</td>
</tr>
<tr>
<td>State</td>
<td>Possible Alarm States: No Alarm, Failure, Alarm</td>
</tr>
<tr>
<td>Alarms</td>
<td>Possible Alarm Types: Startup, Clk Mismatch, Cfg Aborted, Insufficient Links, Blocked</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F (Flex)</td>
<td></td>
</tr>
<tr>
<td>S (Stats)</td>
<td></td>
</tr>
<tr>
<td>I (Ima_states)</td>
<td></td>
</tr>
</tbody>
</table>
### CES Statistics

This is a sample of the CES statistics screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Far End</td>
<td>State</td>
</tr>
<tr>
<td></td>
<td>Possible values:</td>
</tr>
<tr>
<td></td>
<td>Start-Up</td>
</tr>
<tr>
<td></td>
<td>Start-Up Acknowledge</td>
</tr>
<tr>
<td></td>
<td>Configuration Aborted</td>
</tr>
<tr>
<td></td>
<td>Configuration Aborted M</td>
</tr>
<tr>
<td></td>
<td>Configuration Aborted Sym</td>
</tr>
<tr>
<td></td>
<td>Configuration Aborted Version</td>
</tr>
<tr>
<td></td>
<td>Insufficient Links</td>
</tr>
<tr>
<td>Alarms</td>
<td>State/Type</td>
</tr>
<tr>
<td></td>
<td>Possible Alarms States:</td>
</tr>
<tr>
<td></td>
<td>No Alarm</td>
</tr>
<tr>
<td></td>
<td>Failure</td>
</tr>
<tr>
<td></td>
<td>Alarm</td>
</tr>
<tr>
<td></td>
<td>Possible Alarm Types:</td>
</tr>
<tr>
<td></td>
<td>Startup</td>
</tr>
<tr>
<td></td>
<td>Clk Mismatch</td>
</tr>
<tr>
<td></td>
<td>Cfg Aborted</td>
</tr>
<tr>
<td></td>
<td>Insufficient Links</td>
</tr>
<tr>
<td></td>
<td>Blocked</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAL1</td>
<td># CES ID</td>
</tr>
<tr>
<td>Tx</td>
<td>Cells transmitted</td>
</tr>
<tr>
<td>Rx</td>
<td>Cells received</td>
</tr>
<tr>
<td>Discard</td>
<td>Cells discarded</td>
</tr>
<tr>
<td>Overrun</td>
<td>Number of cells that came in faster than the TDM side could process them</td>
</tr>
<tr>
<td>SNP</td>
<td>Sequence Number Protection errors. SNP is made up of the CRC (cyclic redundancy check and parity bit fields.</td>
</tr>
<tr>
<td>TDM</td>
<td>Underrun Number of underruns. An underrun is the number of times the TDM input buffer indicates that the data is entering the buffer more slowly than the AAL1 function is removing the data and converting it to ATM cells.</td>
</tr>
<tr>
<td></td>
<td>Overrun Number or overruns.</td>
</tr>
</tbody>
</table>
**Bridge Statistics**

The following table describes the fields on the Bridge Stats screen.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bport</strong></td>
<td>Bridge Port - This port handles the bridge traffic coming from the Ethernet port. Typically, the associated VP/VC will be configured with a UBR contract.</td>
</tr>
<tr>
<td><strong>Rx Pkts</strong></td>
<td>Received packets</td>
</tr>
<tr>
<td>Valid</td>
<td>Number of valid packets received.</td>
</tr>
<tr>
<td>BC</td>
<td>Number of broadcast packets received.</td>
</tr>
<tr>
<td>MC</td>
<td>Number of multicast packets received.</td>
</tr>
<tr>
<td><strong>Discard Pkts</strong></td>
<td>Discarded Packets</td>
</tr>
<tr>
<td>Ingrs</td>
<td>Number of packets discarded by the bridge on the Ethernet ingress (received by the port)</td>
</tr>
<tr>
<td>Brg</td>
<td>Number of bridge classifier (DFC) packets discarded on the ethernet port (Flex doesn't use DFC, will always be zero.)</td>
</tr>
<tr>
<td>Unk</td>
<td>Number of packets with an unknown MAC source address discarded on the ethernet port</td>
</tr>
<tr>
<td><strong>Deny Pkts</strong></td>
<td>Denied Packets</td>
</tr>
<tr>
<td>Src</td>
<td>Number of packets denied on the ethernet port based on the source MAC address</td>
</tr>
<tr>
<td>Dest</td>
<td>Number of packets denied on the ethernet port based on the destination MAC address</td>
</tr>
<tr>
<td><strong>Forward Pkts</strong></td>
<td></td>
</tr>
<tr>
<td>UC</td>
<td>Number of Unicast packets forwarded to the bridge interworking system</td>
</tr>
<tr>
<td>BC</td>
<td>Number of Broadcast packets forwarded to the bridge interworking system</td>
</tr>
<tr>
<td>MC</td>
<td>Number of Multicast packets forwarded to the bridge interworking system</td>
</tr>
</tbody>
</table>
**DS3 Statistics**

The Ds3 menu only appears when a FLEXmaster DS3c-ATM module is installed. The Ds3 menu has two sub-menus - States and sTat. Each of these is described below.

---

**DS3 States**

The following table describes the fields on the Ds3 States screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Displays the slot number of the DS3 module.</td>
</tr>
<tr>
<td>LPBK</td>
<td>Loopback. Shows the current loopback status for each link in the module. Possible values: Line, Local, Payld, None.</td>
</tr>
<tr>
<td>BERT</td>
<td>Indicates BERT status</td>
</tr>
<tr>
<td>STATE</td>
<td>Displays the current alarm state of each link. See Interpreting Alarm Indications on page 17-2 for information about alarm states. Possible values: RED, GREEN, YELLOW, BLUE, or Minor.</td>
</tr>
<tr>
<td>RxD</td>
<td>Displays the alarm condition being received on each link. See RXD Values on page 16-7 for a list of the possible alarm conditions.</td>
</tr>
<tr>
<td>TxD</td>
<td>Displays the alarm condition being transmitted on each link. See TXD on page 16-8 for a list of the possible alarm conditions.</td>
</tr>
</tbody>
</table>

---

**Example Output**

```
01 MASTER                 CARRIER ACCESS MASTERseries               Ver 6.01
-------------------------------------------------------------------------------
States sTat
---- EDIT: CFG 1 ------------------------------------------ RUN: CFG 1 -------
Card   5                     FLEXmaster
DS3/E3 1  2  3
LPBK   Non Non Non
BERT   Non Non Non
STATE  Grn Red Red
TxD    Nor Yel Yel
RxD    Nor Los Los
```
DS3 Stats

The following is a sample of the DS3 Stats screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Displays the slot number of the DS3 module.</td>
</tr>
<tr>
<td>Option</td>
<td></td>
</tr>
<tr>
<td>Update</td>
<td>Refreshes the counters on the screen.</td>
</tr>
<tr>
<td>Reset</td>
<td>Resets the counters on the screen.</td>
</tr>
<tr>
<td>Cells</td>
<td></td>
</tr>
<tr>
<td>Tx</td>
<td>Number of cells transmitted.</td>
</tr>
<tr>
<td>Rx</td>
<td>Number of cells received.</td>
</tr>
<tr>
<td>Idle</td>
<td>Number of idle cells received.</td>
</tr>
<tr>
<td>Errored</td>
<td>Number of errored cells.</td>
</tr>
<tr>
<td>PLCP</td>
<td></td>
</tr>
<tr>
<td>Fr Errs</td>
<td>Number of PLCP (Physical Layer Convergence Procedure) framing errors.</td>
</tr>
<tr>
<td>Bip Errs</td>
<td>Number of PLCP Bipolar errors.</td>
</tr>
<tr>
<td>Febe Errs</td>
<td>Number of Far-End Block Errors (FEBE).</td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCV</td>
<td>Number of Line Code Violation (BPVs + EXZS)</td>
</tr>
<tr>
<td>Fr Errs</td>
<td>Number of framing errors.</td>
</tr>
<tr>
<td>Parity Errs</td>
<td>Number of Parity errors.</td>
</tr>
<tr>
<td>PParity Errs</td>
<td>Number of Path Parity errors.</td>
</tr>
<tr>
<td>Febe Errs</td>
<td>Number of Far-End Block Error (FEBE).</td>
</tr>
<tr>
<td>Exzs Errs</td>
<td>Excessive zeros.</td>
</tr>
</tbody>
</table>
In this Chapter

- Overview
- Recommended Configuration Sequence
- Sample Configuration
  - Step 1 - Designate ATM Links
  - Step 2 - Map the Physical Ports to Virtual Ports
  - Step 3 - Create IMA groups
  - Step 4 - Define Traffic Descriptors (TDs)
  - Step 5 - Create Virtual Connections (VCs)
  - Step 6 - Create ATM Cross Connects
  - Step 7 - Create 2 CES mappings
Overview

This chapter presents a model of configuration. For details about the menus, see Chapter 13, ATM Interworking Software.

ATM functionality is supported on the following modules:
- FLEXmaster8 ATM
- FLEXmaster16 ATM
- FLEXmaster8A ATM
- FLEXmasterDS3c-3

Recommended Configuration Sequence

Carrier Access recommends the following sequence for configuring ATM options on your MASTERseries. These steps provide an overview of the configuration sequence. Each step is described in detail in the following sections.

Setup

Before you begin configuring, confirm that you have the required modules installed. For a 2-slot chassis, see Supported Configurations on page 2-4 and for an 8-slot chassis see Supported Configurations on page 3-4. For more information about installation, see Chapter 2, 2-Slot Chassis Installation or Chapter 3, 8-Slot Chassis Installation.

Steps

1. Decide which T1 links you want configure as ATM links.
2. Decide which T1 links will be TDM inputs (ATM/CES).
   These CES links must be connected to M01 - M08 on your ATM card.
3. Configure the links selected in step 1 as ATM links.
4. Connect the remaining ATM input links to unused M09 through M16 on the ATM card.
5. Create IMA groups.
6. Create PVCs as needed.
7. Create CES bundles as needed.
8. Create connections as needed (switch screen).
9. Create bridge circuits as needed.

NOTE: Configuration changes will not take effect until the changes have been committed to the running configuration. For more information about saving see Saving Configurations on page 5-29.
Sample Configuration

T1 connection between the CO and the MASTERseries

Setup
- 8-Slot chassis
- FM8 TDM in Slot 1
- FM8 ATM in Slot 3

Assumptions
- User has logged in with sufficient privileges.
- Starting with blank configuration.

Overview
This example demonstrates how to configure the MASTERseries so that traffic will:
1. Come in the IMA and out the IMA.
2. Full pipe CES - 1L05 TDM with the CES ATM output located on the IMA.
3. Single Timeslot CES - 1P01 (v.35) connected to msrv 3M08 and transported out the ATM IMA.
   What this achieves is taking a timeslot from an atm backhaul VC dropped to a port.
**Step 1 - Designate ATM Links**

Links on the MASTERseries are by default TDM links. Designate links as ATM via the Connect screen.

In this configuration, map

| 1L01 to 3M01 | In our example, we are using 4 T1s for the IMA group. |
| 1L02 to 3M02 | CES can be used only on MSRV links #M01 - #M08. 1 - 8 |
| 1L03 to 3M03 |
| 1L04 to 3M04 |
| 1L05 to 3M05 |
| 1L06 to 3M06 |
| 1L07 to 3M07 |

*Note – 1L08 is skipped

| 3L01 to 3M09 |
| 3L02 to 3M10 |
| 3L03 to 3M11 |
| 3L04 to 3M12 |
| 3L05 to 3M13 |
| 3L06 to 3M14 |
| 3L07 to 3M15 |
| 3L08 to 3M16 |

**Step 2 - Map the Physical Ports to Virtual Ports**

The following describes how to map physical port 1L01 to ATM Virtual Port 3M01 (on the Wintegra) using all 24 TS (Timeslots)

1. From the main screen, press the C key to go to the Connect screen. Press enter.
2. At the No. prompt select link 1L01. Press enter.
3. Select timeslot TS01 and press enter to move to the Type column.
4. Use the N/P keys to cycle to MSrv, and press enter to select.

5. The cursor moves to the Port column. In the Port field, type 3M01 and press enter.

6. Copy the values from timeslot 01 through timeslot 24.
   a. Return the cursor to the TS column, timeslot 01.
   b. Place the cursor in the timeslot you want to copy (01).
   c. Type C24, and press enter.

   The values set for TS 01 should now be copied to all 24 timeslots. The cursor should be on MSrv of TS 24. The rate indicated for all timeslots should be 1536000. This indicates that all 24 timeslots have been properly connected

7. Press ESC, and verify that the No: field is highlighted.

Repeat steps 2 through 7 for the following mappings:

1L02 to 3M02     3L01 to 3M09
1L03 to 3M03     3L02 to 3M10
1L04 to 3M04     3L03 to 3M11
1L05 to 3M05     3L04 to 3M12
1L06 to 3M06     3L05 to 3M13
1L07 to 3M07     3L06 to 3M14
*NOTE - SKIP 1L08 3L07 to 3M15
            3L08 to 3M16
**ATM Configuration**

**Sample Configuration**

**Step 3 - Create IMA groups**

IMA groups (Inverse Multiplexing over ATM) create a "fat pipe" of data across the WAN link. Instead of several small discrete lines, we create one or more data pipes that have resiliency in the case of a loss of one of the components (T1s). In our example we are creating two IMA groups with 4 T1s each: 3B01 and 3B02

**Create Two 4-link IMA groups.**

From the Flex > IMA screen, create an IMA group and designate which T1 links to include in the IMA group. This will create the IMA group with the links indicated in the diagram below.

1. Flex -> Ima -> Add Group
2. Edit the configuration per the Network's required settings.

![IMA Group Configuration](image)

The first IMA group (3B01) is made up of links 3M01-3M04. This is the TDM traffic coming in from the GSM radio.

The second IMA group (3B02) is made up of links 3M09-3M12. This is the ATM traffic coming in from the UMTS radio.
**Step 4 - Define Traffic Descriptors (TDs)**

Traffic descriptors associate traffic service categories with specific quality of service (QoS) parameters to create unique performance characteristic combinations. To create a traffic descriptor, you need to know what kind of input will be coming in VCs.

TDs are referred to by the user-defined name. You can assign names that reflect the function and will be easy to remember.

![Traffic Descriptors](image1)

**Step 5 - Create Virtual Connections (VCs)**

Virtual Connections (VC) and Virtual Paths (VP) are used in ATM to assign different classes of service to a connection. These connections are distinguished by the VPI + VCI combination (Virtual Path Identifier and the Virtual Connection Identifier). The class of service is especially important in the case where the connections are facing a congestion situation; where the connections are close to or at 100% of their capacity. The higher class of service will get priority for its traffic before the lower class of service.

The VPI/VCI entries depend on how your network is configured.

In this case, 3B02 5/55 and 3B02 5/56 will be used for CES.

![Virtual Connections](image2)
Step 6 - Create ATM Cross Connects

ATM cross-connects connect input to output. The following steps describe how to create a connection.

1. From the sWitch menu, select the action Add Connection. Press enter.
2. Use the N key to cycle through the available PVCs. Press enter to accept the selection.
3. The connection is created and is displayed in the lower part of the screen.

Drop One DS0 to the LMU

Map 3M08 to 1P01. Go to the port menu: pOrt > Msrv > Card 3.
**Step 7 - Create 2 CES mappings**

Circuit Emulation Services allow the emulation of TDM services over the ATM circuit. This type of circuit must use the CBR (constant bit rate) traffic descriptor.

![Image of ATM Configuration interface]

**Clock Settings**

Modify clock settings as desired. Generally, the primary source should be a T1 from the network, coming in on slot 1.
Save and Activate the Configuration

Save and activate the configuration from the Commit screen.

M (coMmit)

Cabling

1L01 4 Port IMA in from the customer
1L02
1L03
1L04
1L05 24 TS feeding into the Flex and then converted to ATM and out the ATM IMA.
1P01 v35 Port mapped to management on the 8th virtual port on Wintegra (3M08) and then transported out ATM IMA. This is the one channel dropped for LMU.
3L01
3L02 4 Port IMA out to the CO
3L03
3L04
TUI Diagnostics

In this Chapter

- Overview
- Diagnostics Menu
- Performing Diagnostics on Links
- Performing Diagnostics on Ports
- Resetting the Modules
Overview

This chapter covers the diagnostic screens. Be sure that you have completed the basic setup described in Chapter 5, TUI Configuration.

Diagnostics Menu

Use the diagnostics menu option to enter the diagnostics submenu screen. The password is a 12-character editable field (superuser or maintenance access only). Type your password and press enter.

Note: loopback operations in diag menus apply to the running config, (not the edit config), and will take effect immediately.
Performing Diagnostics on Links

Use the link diagnostics (Linkdiag) screen to control the diagnostic loopback and BERT functions of any links in the MASTERseries unit.

The following diagnostic tests are available.

- Power on self test of hardware
- Local data port loopback (toward DTE) activation
- Remote data port loopback (toward DCE) activation
- Payload loopback activation (T1)
- Local loopback activation (T1)
- Local AIS Loopback
- Remote line loopback (T1) using in-band code, T1.403, or 54016
- Remote payload loopback activation (T1) using 54016 request
- Reset of loopbacks using menu selection, in-band code, universal code
- Line loopback activation for T1
- Timed loopbacks for loopback types except fractional
- User programmable in-band loop-up/down codes are available
- Bit Error Rate Testing (BERT) for all applications modules except the DATAmaster

**NOTE:** An inactive BERT screen is presented if no BERT is connected, and no test is being run. After you select the required link, the link parameters are displayed. If a BERT is active, the BERT section of the Linkdiag screen displays the current BERT results on that link. Default BERT parameters are displayed if the test is not active. The **State** field indicates the ACTIVE or INACTIVE state of the BERT. BERT operations are independent of the loopback operations and can be performed in conjunction with the loopback operations.
# Link Loopback Diagrams

The following diagrams describe the link loopbacks.

<table>
<thead>
<tr>
<th>Loopback Diagram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>None</strong> – No loopback (normal operation). This setting is also used to abort an active loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>Local</strong> – Local Loopback. The local loopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.</td>
<td></td>
</tr>
<tr>
<td><strong>LocAIS (T1)</strong> – Local AIS Loopback. This loopback is the same as a local loopback except that AIS is sent to the far end while the loopback is activated.</td>
<td></td>
</tr>
<tr>
<td><strong>Line</strong> – Line Loopback. The line loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, allowing the line connected to the interface to be tested independently of the module. The receive signal to the module is not affected by the loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>Payld</strong> – Payload Loopback. The payload loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, with the exception that the framing and CRC-6 bits are reinserted to the transmit signal stream. The receive signal to the module is not affected by the loopback. Multiframe alignment of signaling is not guaranteed during the payload loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>RemLL</strong> – Remote Line Loopback. The remote line loopback is a loopback sent to the far end of the link. It is the same as a Line Loopback described above.</td>
<td></td>
</tr>
</tbody>
</table>
Performing Diagnostics on Links

**Linkdiag Screen**

The fields on the link diagnostics screen are described below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>This field lists the slot and link ID of modules installed in the chassis. Cycle through the field with the N/P keys and press enter to select a link.</td>
</tr>
<tr>
<td>Frame</td>
<td>This read-only field is configured on the link screen. It refers to the frame format on the selected link.</td>
</tr>
<tr>
<td>Code</td>
<td>This read-only field is configured on the link screen. It refers to the code type on the selected link.</td>
</tr>
<tr>
<td>Disabled</td>
<td>This read-only field is configured on the link screen. It refers to the disable option on the selected link.</td>
</tr>
<tr>
<td>Protocol</td>
<td>This read-only field is configured on the link screen. It refers to the performance monitoring option on the selected link.</td>
</tr>
</tbody>
</table>

**RemPL** (ESF only) – *Remote Payload Loopback*. The remote payload loopback is a loopback sent to the far end of the link. It is the same as a Payload Loopback described above.
TUI Diagnostics
Performing Diagnostics on Links

For more information about the Link Screen, see Setting Link Parameters on page 5-8.

Loopback Functions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback Type</td>
<td>Select the loopback type, using the N/P keys. Press enter to select. The choices are: <strong>Local, Locais, Line, Payld, Remll, Rempl</strong> These loopbacks conform to ANSI T1.403, TR 54106, and PUB 62411. Whenever a loopback is active on a network interface, the front panel LED for that link flashes yellow (approximately once per second) to provide a visual indication that a loopback test condition is present.</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>After you selected a loopback type, this three digit editable field is displayed. Enter the number of minutes you would like this loopback to run (1–999). Entering 0 will allow the loopback to run indefinitely. Timed loopbacks of up to 30 minutes are allowed through Telnet.</td>
</tr>
</tbody>
</table>

NOTE: Diagnostics for the DS3c-3 Module, including Loopbacks, are found under the Flex > Uni menu. For more information, see Setting UNI Link Parameters on page 13-4
**BERT Function**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BERT Direction</td>
<td>Static field. Only one direction is available:</td>
</tr>
<tr>
<td></td>
<td><strong>To Network</strong> - Egress BERT only, out the link toward the T1 circuit (Network) not ingress toward the Time Slot Interchanger (TSI). The BERT will only work if all of the timeslots on the link under test are being used and the type field is populated with a value other than idle.</td>
</tr>
<tr>
<td></td>
<td>If all timeslots are dropped to a port or assigned as MSrv the state will be ACTIVE and the SYNC will be IN and the BERT will run. If the link under test is a full bypass to another link, the link not being tested must not be in alarm for the state to become ACTIVE and IN SYNC.</td>
</tr>
<tr>
<td>BERT Pattern</td>
<td>This selectable field provides the patterns described below.</td>
</tr>
<tr>
<td>BERT Pattern</td>
<td>Description</td>
</tr>
<tr>
<td>Marks</td>
<td>Repetitive pattern of 1’s</td>
</tr>
<tr>
<td>1_In_8</td>
<td>Repetitive pattern of 1 in 8</td>
</tr>
<tr>
<td>Spaces</td>
<td>Repetitive pattern of 0’s</td>
</tr>
<tr>
<td>511</td>
<td>Pseudorandom pattern of length 511 bits</td>
</tr>
<tr>
<td>2047</td>
<td>Pseudorandom pattern of length 2047 bits</td>
</tr>
<tr>
<td>2E15-1</td>
<td>Pseudorandom pattern of length $2^{15}$-1 bits</td>
</tr>
<tr>
<td>QRSS</td>
<td>Quasi random signal - $2^{20}$-1</td>
</tr>
</tbody>
</table>
**Bert Timeout**

The BERT Timeout field appears after you start the BERT operation. This is a four-digit editable field used to set the duration of BERT. Enter 0 and BERT will run indefinitely. The maximum duration is 24 hours.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BERT Operation</td>
<td>Provides the following selections:</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>Start</td>
<td>BERT enabled to run test with the selected parameters (direction, pattern and timeout). BERT status is updated every five seconds. You must configure the path management for connections, loopbacks, and so on. If a BERT is currently running on any other link or port on this module, the following message is displayed: <strong>BERT is in progress on xxx</strong> where xxx indicates the card and link number (for example, 1L01).</td>
</tr>
<tr>
<td>Stop</td>
<td>Disables BERT to stop running the test.</td>
</tr>
<tr>
<td>Clear</td>
<td>The counts are zeroed, and if a first timeout of 10 minutes, for example, was specified, the test will finish in 10 minutes from the time it was first started. This option is available when BERT is running on the selected interface. The following message will be logged to the Linklog screen: “00:05:11 15, Jun 2005: BERT Counts Cleared 1L01”</td>
</tr>
<tr>
<td>Inject_ERR</td>
<td>Available when the test is already in progress. You can insert a single error bit into the data path of a currently running BERT. This action, intentionally corrupts the generated pattern. You will be navigated to the <strong>Err Inject Rate</strong> field to provide the error rate. Error injection begins when you select the error rate. You can perform this option when the test is already in progress.</td>
</tr>
</tbody>
</table>

**Err Inject Rate**

This is a cyclical field where you can select error rates only when **InjectErr** is selected. The following choices are offered:

<table>
<thead>
<tr>
<th>Error Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>Insert a single error bit.</td>
</tr>
<tr>
<td>10x10-1</td>
<td>Insert 1 error bit per 10 bits.</td>
</tr>
<tr>
<td>10x10-2</td>
<td>Insert 1 error bit per 100 bits.</td>
</tr>
<tr>
<td>10x10-6</td>
<td>Insert 1 error bit per 1 million bits.</td>
</tr>
</tbody>
</table>

Link signaling and BERT - If a link is configured to be:

| T1 Robbed bit | All timeslots are BERT’ed using seven bit mode. |
### Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td>BERT results are gathered every five seconds during a BERT test. The screen is updated with the last results. This field is not editable and indicates the ongoing progress of the test. Possible values: <strong>ACTIVE</strong> - BERT test is in progress. <strong>INACTIVE</strong> - BERT is not connected.</td>
</tr>
<tr>
<td><strong>Sync</strong></td>
<td>State of synchronization of the interface. Pseudorandom patterns synchronized after 34 +n bits are received without error. Repetitive patterns synchronized when a received pattern of the same length matches the transmitted pattern. Possible values: <strong>IN</strong> - The interface is in sync. <strong>OUT</strong> - The interface is out of sync.</td>
</tr>
<tr>
<td><strong>Sync Lost</strong></td>
<td>Number of times the interface has lost sync after gaining initial sync. (Initial sync, in this manual indicates the first time the interface under test gains sync. All BERT counts, Sync lost, Bit count, Bit errors, and Error rate are reset when BERT is started. Incrementing the count begins only after the interface gains initial sync.)</td>
</tr>
<tr>
<td><strong>Bit Errors</strong></td>
<td>Number of error bits received after gaining initial sync.</td>
</tr>
<tr>
<td><strong>Lapsed Time</strong></td>
<td>Number of minutes elapsed since test was started.</td>
</tr>
</tbody>
</table>
Performing Diagnostics on Ports

Use the portdiag screen to control the diagnostic loopback and BERT functions of any ports in the MASTERseries unit.

NOTE: If a BERT is active, the BERT section of the portdiag screen displays the current BERT results on that port. Default BERT parameters are displayed if the test is not active. The state field indicates whether the BERT is running on this port.

The following table describes the fields on the port diagnostics screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>This field lists the slots and port ID of modules installed in the chassis. Use the N/P keys to cycle through the ports, and press enter to select.</td>
</tr>
<tr>
<td>Type</td>
<td>This is a system populated field. It refers to the associated port type.</td>
</tr>
<tr>
<td>Interface</td>
<td>This is a system populated field. It refers to the configured interface setting.</td>
</tr>
<tr>
<td>Rate</td>
<td>This read-only field shows the amount of configured bandwidth assigned to the selected port. This information is configured on the connect screen.</td>
</tr>
<tr>
<td>Loopback Type</td>
<td>Use the N/P keys to cycle through the port loopback options. When you have displayed the required loopback type, press enter.</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>This is a three-position editable field. Enter the number of minutes you would like this loopback to run (1-999). Entering 0 will allow the loopback to run until stopped by you or activate (Y) is selected on the commit (see Saving Configurations on page 5-29) screen. Timed loopbacks of up to 30 minutes are allowed through Telnet.</td>
</tr>
</tbody>
</table>
The following diagrams show the port loopbacks:

<table>
<thead>
<tr>
<th>Loopback Diagram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>None</strong> - No loopback (normal operation). This setting is also used to abort an active loopback.</td>
<td></td>
</tr>
</tbody>
</table>

**Local** – Loopback towards DTE at port interface.

**Remote** – Loopback toward the DCE at the port interface.

**NOTE:** The Carddiag feature is currently not available. Self test card diagnostic functions are only performed during powerup.
Resetting the Modules

Use the warm reset screen to reset a specified module in the chassis. A reset is typically performed after loading new versions of software or changing the IP address of the system. This function will not affect the time and date settings.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card to Reset</td>
<td>Select the card you want to reset using the N/P keys, and press enter.</td>
</tr>
<tr>
<td></td>
<td>If you warm reset the master module (which is typically the module in slot #1 of the chassis), the units installed in the chassis will be reset.</td>
</tr>
<tr>
<td>Confirm</td>
<td>Press Y or N.</td>
</tr>
</tbody>
</table>

---

**Restarting the Master Card Will Reboot the Entire Chassis**

The following table describes the fields on the warm reset screen:
In this Chapter

- Overview
- Alarms Screen
- Link and Port Status
- Alarm Contact Configuration
- Link Alarm History
- History Events
- Displaying the Version Screen
- Performance Monitoring
- Saving Configuration Files
- Uploading Files
- Downloading Files
- Restoring a Configuration
- TFTP Utility
- Transferring Program Files
- Upgrading a FLEXmaster
- Converting a FLEXmaster TDM Module to ATM
Overview

This chapter covers the maintenance screens. Be sure that you have completed the basic setup outlined in Chapter 5, TUI Configuration.

Alarms Screen

Use the alarms screen to list the current status of each link, port and power supply installed in the chassis. None of the fields on this screen are editable. At the bottom of the screen is an alarm status summary for the entire chassis and a listing of slots currently in alarm. The interface will be shown as Diag when loopback or BERT or both are active.

The following tables describe the fields on the Alarms screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>This column displays the slot number of the module (1-8). It is automatically populated by the system.</td>
</tr>
<tr>
<td>M S</td>
<td>This column displays an M for a master module and an S for a slave module.</td>
</tr>
<tr>
<td>Tn En</td>
<td>Displays the module type. Possible values: T1 or T3.</td>
</tr>
<tr>
<td>Module Type</td>
<td>This is a protected field that indicates the type of module installed in this slot. It is automatically populated by the system. Possible Values: FLEXmaster8, FLEXmaster8ATM, FLEXmaster ATM.</td>
</tr>
</tbody>
</table>
### Field | Description
--- | ---
**Link** | This field is split into columns for each link on the module, numbered 1 through 16. Each link automatically shows one of the status values below.<br><br>**d** | Diag | A diagnostic function is in operation.<br><br>**D** | Down | The link is in an alarm state.<br><br>**I** | Init | The link is initializing.<br><br>**O** | Off | Link is disabled.<br><br>**U** | Up | The link is up and functioning.<br><br>**DS3** | This field represents the status of the DS3 links.<br><br>**d** | Diag | A diagnostic function is in operation.<br><br>**D** | Down | The link is in an alarm state.<br><br>**I** | Init | The link is initializing.<br><br>**O** | Off | Link is disabled.<br><br>**U** | Up | The link is up and functioning.<br><br>**Port** | This field is split into port columns labeled E/1, F/2, G/3, and H/4. Each column represents a port on each module installed in the chassis. Each port automatically shows one of the following selections:<br><br>**U** | Up | The port is configured and operational.<br><br>**D** | Down | The port is in an alarm condition.<br><br>**u** | Unassigned | The port has not been assigned<br><br>**Eth** | This field represents the status of the Ethernet ports on each module.<br><br>**U** | Up | The port is up and functioning.<br><br>**D** | Down | The port is in an alarm condition.
TUI Maintenance
Alarms Screen

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSRv</td>
<td>This field is split into port columns labeled 1 through 16. Each column represents an msrv/management port for each module installed in the chassis. Each port automatically shows one of the following selections:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TDM</th>
<th>ATM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U</strong> Up</td>
<td>PPP is configured and operational. For the PPP you need a management 1M01 - 1M16 on the master card and the interface must be stacked.</td>
</tr>
<tr>
<td><strong>D</strong> Down</td>
<td>The port is in an alarm condition or PPP is not established.</td>
</tr>
<tr>
<td><strong>u</strong> Unassigned</td>
<td>The port has not been assigned.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>Displays the current status of the power supplies. <strong>Note</strong>: Power Supply 1 is the outermost supply in each chassis. For more information, see 2-Slot Chassis on page 2-3 or 8-Slot Chassis on page 3-3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Supply 1</th>
<th>Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply 2</td>
<td>Down</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays the current status of the fans for a 2-slot chassis.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan Status</th>
<th>2-Slot Power Supply part number</th>
<th>8-slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>003-1131-0009 or lower</td>
<td>003-1131-0010 or greater</td>
</tr>
<tr>
<td>Up</td>
<td>No Alarm</td>
<td>Alarm</td>
</tr>
<tr>
<td>Down</td>
<td>No Alarm</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>Displays the current status of the power supplies. <strong>Note</strong>: Power Supply 1 is the outermost supply in each chassis. For more information, see 2-Slot Chassis on page 2-3 or 8-Slot Chassis on page 3-3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Supply 1</th>
<th>Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply 2</td>
<td>Down</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays the current status of the fans for a 2-slot chassis.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan Status</th>
<th>2-Slot Power Supply part number</th>
<th>8-slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>003-1131-0009 or lower</td>
<td>003-1131-0010 or greater</td>
</tr>
<tr>
<td>Up</td>
<td>No Alarm</td>
<td>Alarm</td>
</tr>
<tr>
<td>Down</td>
<td>No Alarm</td>
<td>Alarm</td>
</tr>
</tbody>
</table>
**Alarm Contacts**

The alarm power entry panel has two sets of form C alarm relay contacts, one for major and one for minor alarms. Both normally open and normally closed contacts are supported.

The following table shows the available alarm contacts:

<table>
<thead>
<tr>
<th>Alarm Conditions</th>
<th>Major Alarm Contacts</th>
<th>Minor Alarm Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Conditions</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Power Loss</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>No Alarms</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Red Alarm</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Yellow Alarm</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PSU Failure</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Threshold Red</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Threshold</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Minor</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Slave Failure</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Link and Port Status

Use the status screen to display the detailed status of the links and ports for each module individually. This screen is related to the alarms screen. If the alarms screen indicates an alarm on a particular module, you can go to the status screen to view the alarm details.

T1 FLEXmaster

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Use the N/P keys to cycle through the slot numbers of modules installed in the chassis.</td>
</tr>
<tr>
<td>LPBK</td>
<td>Loopback. Shows the current loopback status for each link in the module. Possible values: Local, Payld, RemLL, RemPL, None.</td>
</tr>
<tr>
<td>BERT</td>
<td>Indicates BERT status</td>
</tr>
<tr>
<td>STATE</td>
<td>Displays the current alarm state of each link. See Interpreting Alarm Indications on page 17-2 for information about alarm states. Possible values: RED, GREEN, YELLOW, BLUE, or Minor.</td>
</tr>
<tr>
<td>RxD</td>
<td>Displays the alarm condition being received on each link. See RXD Values on page 16-7 for a list of the possible alarm conditions.</td>
</tr>
<tr>
<td>TxD</td>
<td>Displays the alarm condition being transmitted on each link. See TXD on page 16-8 for a list of the possible alarm conditions.</td>
</tr>
</tbody>
</table>

NOTE: The DS3 states for the physical interfaces are not displayed in the sTat screen, but under the Flex menu, at Flex > Stats > Unistats. See DS3 Statistics on page 13-43 for more information.

The fields on the status screen are described below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card</td>
<td>Use the N/P keys to cycle through the slot numbers of modules installed in the chassis.</td>
</tr>
<tr>
<td>LPBK</td>
<td>Loopback. Shows the current loopback status for each link in the module. Possible values: Local, Payld, RemLL, RemPL, None.</td>
</tr>
<tr>
<td>BERT</td>
<td>Indicates BERT status</td>
</tr>
<tr>
<td>STATE</td>
<td>Displays the current alarm state of each link. See Interpreting Alarm Indications on page 17-2 for information about alarm states. Possible values: RED, GREEN, YELLOW, BLUE, or Minor.</td>
</tr>
<tr>
<td>RxD</td>
<td>Displays the alarm condition being received on each link. See RXD Values on page 16-7 for a list of the possible alarm conditions.</td>
</tr>
<tr>
<td>TxD</td>
<td>Displays the alarm condition being transmitted on each link. See TXD on page 16-8 for a list of the possible alarm conditions.</td>
</tr>
</tbody>
</table>
**RXD Values**

Displays the alarm condition being received on each link. A list of the possible alarm conditions and states follows:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS</td>
<td>Alarm indication signal</td>
</tr>
<tr>
<td>B8ZS</td>
<td>B8ZS signature detected (T1)</td>
</tr>
<tr>
<td>CRC</td>
<td>CRC error detected</td>
</tr>
<tr>
<td>CZR</td>
<td>Eight consecutive zeros received (T1)</td>
</tr>
<tr>
<td>DB3</td>
<td>HDB3 signature detected (E1) *</td>
</tr>
<tr>
<td>ES</td>
<td>Errored second</td>
</tr>
<tr>
<td>INIT</td>
<td>Initialization</td>
</tr>
<tr>
<td>LAD</td>
<td>Inband loop-up activate detected (T1 D4/ERIC)</td>
</tr>
<tr>
<td>LCV</td>
<td>Line code violation</td>
</tr>
<tr>
<td>LDD</td>
<td>Inband loop-down activate detected (T1 D4/ERIC)</td>
</tr>
<tr>
<td>LOS</td>
<td>Loss of signal</td>
</tr>
<tr>
<td>MAIS</td>
<td>Multiframe alarm indication signal (E1 CAS)*</td>
</tr>
<tr>
<td>MRAI</td>
<td>Multiframe remote alarm indication signal (E1 CAS)*</td>
</tr>
<tr>
<td>NORM</td>
<td>Good signal</td>
</tr>
<tr>
<td>NSL</td>
<td>Uncontrolled bit slip (E1)*</td>
</tr>
<tr>
<td>OOF</td>
<td>Out of frame</td>
</tr>
<tr>
<td>OOMF</td>
<td>Out of multiframe (E1 CAS) *</td>
</tr>
<tr>
<td>PDV</td>
<td>Pulse density violation</td>
</tr>
<tr>
<td>RAI</td>
<td>Remote alarm indication signal (E1 G.704)*</td>
</tr>
<tr>
<td>REBE</td>
<td>Remote end block error (E1)*</td>
</tr>
<tr>
<td>SESF</td>
<td>Severely errored superframe</td>
</tr>
<tr>
<td>SLP</td>
<td>Bit slip detected (E1)*</td>
</tr>
<tr>
<td>UAS</td>
<td>Unavailable second</td>
</tr>
<tr>
<td>YEL</td>
<td>Yellow alarm (T1)</td>
</tr>
</tbody>
</table>

* E1 is not supported in MASTERSeries 6.01

**NOTE:** Minor def alarms are not supported in release 6.01.
**TXD**

Displays the alarm condition being transmitted on each link. A list of the possible alarm conditions and states follows:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS</td>
<td>Alarm indication signal</td>
</tr>
<tr>
<td>AisA</td>
<td>Transmitted a timeslot 0 AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>AisB</td>
<td>Transmitted a timeslot 0 AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>MAISA</td>
<td>Transmitted a timeslot 0 multiframe AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>MAISB</td>
<td>Transmitted a timeslot 0 multiframe AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>MRAIA</td>
<td>Transmitted a timeslot 0 multiframe remote AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>MRAIB</td>
<td>Transmitted a timeslot 0 multiframe remote AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>NORM</td>
<td>Normal operation</td>
</tr>
<tr>
<td>RAIA</td>
<td>Transmitted a timeslot 0 remote AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>RAIB</td>
<td>Transmitted a timeslot 0 remote AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>Yel</td>
<td>Yellow alarm</td>
</tr>
</tbody>
</table>

**Management**

<table>
<thead>
<tr>
<th>MSRV</th>
<th>PORT</th>
<th>RATE</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>u=unas U=Up D=Down</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
<td>u u u u u u u u u u u u u u</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PORT</th>
<th>RATE</th>
<th>LPBK</th>
<th>BERT</th>
<th>STATE</th>
<th>DSR</th>
<th>DTR</th>
<th>DCD</th>
<th>CTS</th>
<th>RTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P01 V.35</td>
<td>0</td>
<td>None</td>
<td>None</td>
<td>Unas</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>

**Field**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
</tr>
<tr>
<td>Rate</td>
</tr>
<tr>
<td>State</td>
</tr>
</tbody>
</table>
## Port Status

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>This column lists each port for modules in the chassis.</td>
</tr>
<tr>
<td>Rate</td>
<td>This is the configured clock rate of the port. To view the actual rate of IMUX ports that have automatically rate adapted, see <em>Chapter 5, TUI Configuration</em>, which shows displays of both the configured and actual port rates.</td>
</tr>
<tr>
<td>LPBK</td>
<td>Loopback. This shows the current loopback status. Possible values: <strong>LOC</strong>, <strong>RMT</strong>, <strong>None</strong>.</td>
</tr>
<tr>
<td>BERT</td>
<td>Displays current status of BERT.</td>
</tr>
<tr>
<td>STATE</td>
<td>This is the current state of the port. The port states are:</td>
</tr>
<tr>
<td></td>
<td><strong>Up</strong> - Port is configured and DTR is asserted.</td>
</tr>
<tr>
<td></td>
<td><strong>Down</strong> - Port is configured but DTR is not asserted. If DTE is connected data can pass (no port conditioning).</td>
</tr>
<tr>
<td></td>
<td><strong>unas</strong> - Port is not configured.</td>
</tr>
<tr>
<td>DSR</td>
<td>Shows the status of Data Set Ready (Off or On).</td>
</tr>
<tr>
<td>DTR</td>
<td>Shows the status of Data Terminal Ready (Off or On).</td>
</tr>
<tr>
<td>DCD</td>
<td>Shows the status of Data Carrier Detect (Off or On).</td>
</tr>
<tr>
<td>CTS</td>
<td>Shows the status of Clear To Send (Off or On).</td>
</tr>
<tr>
<td>RTS</td>
<td>Shows the status of Ready To Send (Off or On).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PORT</th>
<th>RATE</th>
<th>LPBK</th>
<th>BERT</th>
<th>STATE</th>
<th>DSR</th>
<th>DTR</th>
<th>DCD</th>
<th>CTS</th>
<th>RTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P01 V.35</td>
<td>0</td>
<td>None</td>
<td>None</td>
<td>unas</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>
**Alarm Contact Configuration**

Use the alarm cutoff screen to configure the operation of the external alarm contact closures at the rear of the chassis. This screen allows you to reset, enable, or disable the external alarm contacts.

To configure the Alarm cut-off:

1. Type your password and press enter. If the password is not entered correctly, entry is not allowed.
2. Use the N/P keys to make your selection and press ESC.
3. This change will not take effect until you commit it to the configuration. (For information about committing changes to your configuration, see *Saving Configurations on page 5-29*.)

**Alarm Cut Off Mode**

This field configures the external alarm contact mode of operation. The possible values are described in this table:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled (default)</td>
<td>External alarm feature is active and alarms will activate the external alarm relays.</td>
</tr>
<tr>
<td>Disabled</td>
<td>External alarm feature is inactive and alarm conditions will not activate the external alarm relays.</td>
</tr>
<tr>
<td>Reset</td>
<td>Use this setting to deactivate the external alarm relays for the current alarm condition. If a new alarm condition is subsequently detected, the external alarm relay will be activated again.</td>
</tr>
</tbody>
</table>
Link Alarm History

The link alarm log screen displays an alarm history log for the selected link. The alarm history log is a circular buffer containing a maximum of 400 entries.

To display a link, press the N/P keys to cycle through the entries, and press enter to select.

To exit the screen, press ESC. You will prompted with “Erase Alarm History Log n/y?” If you select Y (yes), you must provide the superuser password. Select N to exit the screen without erasing the entries.

NOTE: Refresh (pressing the R key) will not update the information in the linklog screen. You must exit and re-enter the screen to see the updates.

The table below describes the fields on the link alarm log screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link Number</td>
<td>This field displays the slot and link ID of modules installed in the chassis. Use the N/P keys to cycle through the links.</td>
</tr>
<tr>
<td>Name</td>
<td>This is a protected field that contains the user-specified name for the link. (this name is configured on the link screen. For more information about the link screen, see Setting Link Parameters on page 5-8.). The remainder of this screen displays a history log of alarm changes for the specified link.</td>
</tr>
</tbody>
</table>
Log Messages

On occasion, you may see a log entry like the one below. INIT indicates that alarm state machine was re-initialized. This happens when you hot-swap a module.

<table>
<thead>
<tr>
<th>Time</th>
<th>Status</th>
<th>TxD</th>
<th>RxD</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:58:06 26 Jul 2006</td>
<td>GREEN</td>
<td>Norm</td>
<td>Norm</td>
</tr>
<tr>
<td>15:58:05 26 Jul 2006</td>
<td>INIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:57:14 26 Jul 2006</td>
<td>RED</td>
<td>Yel</td>
<td>Los</td>
</tr>
<tr>
<td>14:14:03 26 Jul 2006</td>
<td>GREEN</td>
<td>Norm</td>
<td>Norm</td>
</tr>
<tr>
<td>14:13:35 26 Jul 2006</td>
<td>RED</td>
<td>Yel</td>
<td>Los</td>
</tr>
<tr>
<td>14:13:33 26 Jul 2006</td>
<td>YELLOW</td>
<td>Norm</td>
<td>Yel</td>
</tr>
<tr>
<td>17:39:54 24 Jul 2006</td>
<td>GREEN</td>
<td>Norm</td>
<td>Norm</td>
</tr>
<tr>
<td>13:24:17 24 Jul 2006</td>
<td>RED</td>
<td>Yel</td>
<td>Los</td>
</tr>
<tr>
<td>13:24:09 24 Jul 2006</td>
<td>GREEN</td>
<td>Norm</td>
<td>Los</td>
</tr>
<tr>
<td>13:24:09 24 Jul 2006</td>
<td>*****</td>
<td>End of Log</td>
<td>*****</td>
</tr>
</tbody>
</table>
**DS3 Link Alarm History**

The DS3 link alarm log screen displays an alarm history log for the selected DS3 link. The alarm history log is a circular buffer containing a maximum of 400 entries.

- To display a link, press the N/P keys to cycle through the entries.
- To exit the screen, press ESC. You will be prompted with “Erase Alarm History Log n/y?” If you select Y (yes), you must provide the superuser password. Select N to exit the screen without erasing the entries.

**NOTE:** To delete the log entry for a DS3 link, press enter to enter into the log, then ESC and press Y to erase. If you do not fully enter the log, you may delete the wrong DS3 link log.

**NOTE:** Refresh (pressing the R key) will not update the information in the linklog screen. You must exit and re-enter the screen to see the updates.

The table below describes the fields on the link alarm log screen.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link Number</strong></td>
<td>This field displays the slot and link ID of modules installed in the chassis. Use the N/P keys to cycle through the links.</td>
</tr>
<tr>
<td><strong>Name</strong></td>
<td>This is a protected field that contains the user-specified name for the link. (This name is configured on the link screen. See <em>Setting Link Parameters</em> on page 5-8.). The remainder of this screen displays a history log of alarm changes for the specified link.</td>
</tr>
</tbody>
</table>

The table below describes the fields on the link alarm log screen.
The system event history log (Syslog) screen displays a history of system events, including configuration changes and error conditions. The system event history log is a circular buffer containing a maximum of 400 entries. Press N/P keys to scroll up or down.

To exit the screen, press ESC. You will be prompted with “Erase Alarm History Log n/y?”. If you select Y (yes), you must provide the superuser password. Select N to exit the screen without erasing the entries.

**Error Messages**

A comprehensive list of error messages you may find in the history log follows.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>******** No Framer Chip Detected ********</td>
<td>This message is generated to indicate a module failure. If this message occurs, contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td>Aps Failed (card#) Has Wrong Signature</td>
<td>This message is generated when a card has been configured in one system then placed into a new system with the previous system’s configuration stored, and an APS is performed on the new system. <strong>Solution:</strong> Verify that the new card(s) are configured appropriately and perform an activate on the commit screen.</td>
</tr>
<tr>
<td>Aps Failed (card#) Timed Out</td>
<td>This message is generated when a card has been instructed to perform APS but does not respond to the master card. <strong>Solution:</strong> Contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td>Aps Occurred: (link ID) change config from (config#) to (config#)</td>
<td>This message is generated when a card has been instructed to perform APS due to a failure on link #.</td>
</tr>
<tr>
<td>Aps Restore: (link ID) change config back to (config#)</td>
<td>This message is generated when a card has been instructed to perform APS due to a failure on link #.</td>
</tr>
<tr>
<td>Can't allocate more than one time slot to Mgmt Port (port ID)</td>
<td>This message is generated when you attempt to connect more than 64 kbps to the same management port. <strong>Solution:</strong> Remove all but one of the time slots.</td>
</tr>
<tr>
<td>Error Message</td>
<td>Description and Solution (Continued)</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Clock Switch Occurred</td>
<td>This message is generated to identify a clock switch event that has altered the system clock.</td>
</tr>
<tr>
<td>Commit Configuration Failed</td>
<td>Refer to related messages in the syslog, then re-commit.</td>
</tr>
<tr>
<td>Commit Failed (card#) Has Wrong Signature</td>
<td>This message is generated when a card has been configured in one system and placed into another system with the previous systems configuration stored. The message is generated during the card(s) power up initialization. Solution: Display the configuration to be activated on the configuration screen to verify the configuration and perform an activate on the commit screen again.</td>
</tr>
<tr>
<td>Commit Failed (card#) Timed Out</td>
<td>This message is generated when a card has been instructed to save and/or activate a configuration but does not respond to the master card. Solution: Contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td>Committed Configuration #</td>
<td>This message is used to identify which configurations have been activated and at what time they occurred.</td>
</tr>
<tr>
<td>Configuration did not match system setup</td>
<td>This message is generated when module has been configured for a specific slot and is subsequently moved to a different slot in the same chassis.</td>
</tr>
<tr>
<td>Crossconnect Link (link ID) Slot (slot#) failed</td>
<td>This message is generated when the source and destination crossconnects do not match. Solution: Check the crossconnection tables carefully on the connect screen.</td>
</tr>
<tr>
<td>Database File Card Locations (#)</td>
<td>This message is generated when a database conversion is performed and specific card locations have not been converted to the new database. Solution: Upload the card(s) configuration to a PC and perform the database conversion program and then reload those configurations.</td>
</tr>
<tr>
<td>Download Failed</td>
<td>This message is generated when a configuration file older than version 2.0 is downloaded to a master module which is running version 2.0 software, and an activate is performed from the commit screen. Solution: Upload the card(s) configuration to a PC, execute the database conversion program and then reload those configurations.</td>
</tr>
<tr>
<td>File receive ended, card (#)</td>
<td>This message is generated when a file has been received properly by the unit.</td>
</tr>
<tr>
<td>File Send ended</td>
<td>This message is generated when a file has been sent from the unit and is completed.</td>
</tr>
<tr>
<td>File Send started</td>
<td>This message is generated when a file send (upload) from the unit has been initiated.</td>
</tr>
<tr>
<td>Invalid Passwd Entered</td>
<td>This message is generated when an invalid password is entered.</td>
</tr>
<tr>
<td>Link (link ID) and link (link ID) are Dropped to port (port ID)</td>
<td>This message is generated when more than one link on a single card is being dropped to a single port. Solution: Remove or reconfigure the drops from one of the links in error.</td>
</tr>
<tr>
<td>Error Message</td>
<td>Description and Solution (Continued)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Link</strong> (link ID) <strong>Slot</strong> (slot#) is connected to a missing card (card#)</td>
<td>This message appears if a card you previously connected to was pulled from the chassis.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Return the card to the chassis, or idle the crossconnects to</td>
<td>the missing card.</td>
</tr>
<tr>
<td><strong>Links in cards</strong> (card#) and (card#) are dropped to port (port ID)</td>
<td>This message is generated when more than one link on multiple cards are being dropped to a single port.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Remove the drops from all but one of the links in error.</td>
<td></td>
</tr>
<tr>
<td><strong>Mixed DROPs and IMUX on Port</strong> (port ID)</td>
<td>This message is generated when more than one IMUX link has Dacs drops from a single port.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Only configure one IMUX link to handle those Dacs drops.</td>
<td></td>
</tr>
<tr>
<td><strong>Port</strong> (port ID) <strong>Assigned to Mgmt Port</strong> (port ID) and (port ID)</td>
<td>This message appears when a management port is connected to a management port and timeslot.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Choose a connection to either a management port or a timeslot.</td>
<td></td>
</tr>
<tr>
<td><strong>Port</strong> (port ID) is configured for IMUX with only one link</td>
<td>This message is generated when only one link is defined as an IMUX.</td>
</tr>
<tr>
<td><strong>Solution:</strong> A minimum of one DS0 on two different links must be configured</td>
<td>for IMUX mode.</td>
</tr>
<tr>
<td><strong>Power Supply Up/Down</strong></td>
<td>This message is generated to identify power supply failures or vacancies.</td>
</tr>
<tr>
<td><strong>Rack Master Switched from</strong> (card#) to (card#)</td>
<td>This message is generated when a master redundancy toggle has occurred.</td>
</tr>
<tr>
<td><strong>Receive MS3 Image Sanity Failure!</strong></td>
<td>This message is generated when a receipt of version 2.x software is made to a version 3.0 card.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Only configure one IMUX link to handle those Dacs drops.</td>
<td>Only 3.x software will be saved to flash memory.</td>
</tr>
<tr>
<td><strong>Resource Allocation conflict for Bps Link</strong> (link ID) <strong>Slot</strong> (slot#)</td>
<td>This message is generated when you exceed the allocated resources (128 connections) across the syncus.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Eliminate connections until a commit can be activated.</td>
<td>Suggestion: move inter-card (the syncus connections between two cards) drops to local drops.</td>
</tr>
<tr>
<td><strong>Resource Allocation Conflict for Drop</strong> (drop#)</td>
<td>This message appears on the drop table when the drops are incorrectly mapped.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Check the drops and remap them.</td>
<td></td>
</tr>
<tr>
<td><strong>Resource Allocation Conflict for Drop</strong> (link ID) <strong>Slot</strong> (slot#)</td>
<td>Syncus drops are assigned by link/timeslot. This message is generated when a connection is attempted to a link/timeslot across the syncus that has already been assigned.</td>
</tr>
<tr>
<td><strong>Resource Allocation conflict for Mgmt</strong> (mgmt ID) <strong>slot</strong> (slot#)</td>
<td>This message is generated when a conflict occurs in the management tables.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Remap the management connections.</td>
<td></td>
</tr>
<tr>
<td><strong>Resource Allocation Shortage in card</strong> (card#)</td>
<td>This message is generated when the cross connect table is full.</td>
</tr>
<tr>
<td><strong>Solution:</strong> Reduce the amount of connections on the card(s) in question.</td>
<td>If problem continues, contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td><strong>Since link</strong> (link ID) <strong>is used for IMUX channel 1</strong> (for E1) <strong>or 2</strong></td>
<td>This message is generated when you idle out timeslot 1 (for E1) or</td>
</tr>
<tr>
<td><strong>(for T1)</strong> <strong>must be configured as type IMUX</strong></td>
<td>timeslot 2 (for T1) on IMUX defined links. Solution: Make this timeslot an IMUX channel on IMUX defined links</td>
</tr>
<tr>
<td>Error Message</td>
<td>Description and Solution (Continued)</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Slave card (card#) disappeared</td>
<td>This message is generated when a slave card is removed from a chassis or has stopped communicating with the master module, indicating that the slave module is no longer available. If the module appears to be operational but can not been seen on the master module, contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td>Slave card (card#) moved into slot (#)</td>
<td>This message is generated when more than one link is dropped to a single port. <strong>Solution:</strong> Remove the drops from one of the links in error.</td>
</tr>
<tr>
<td>Slave card (card#) registered</td>
<td>This message is generated when a slave card is initially installed in a chassis. It indicates that the slave module is now active and ready for configuration.</td>
</tr>
<tr>
<td>Slave module (card#) is absent</td>
<td>This message is generated when a slave module has failed. It can also be caused by a slave module that has been removed from the system and you have not removed the syncbus connections to that module. In both cases this message is generated on a system reset or power cycle. <strong>Solution:</strong> Investigate reason for module failure or remove the syncbus connections from the connect screen if the module is to be removed permanently.</td>
</tr>
<tr>
<td>Telnet Session Allowed From x.x.x.x</td>
<td>This message is generated to track what IP addresses have been allowed Telnet access to the local system and what time it occurred.</td>
</tr>
<tr>
<td>Telnet Session Closed</td>
<td>This message is generated when you issue a control C (Ctrl C) or performs an exit Telnet function.</td>
</tr>
<tr>
<td>Telnet Session Denied From x.x.x.x</td>
<td>This message is generated when the disable Telnet option is active on the Telnet screen. This message tracks what IP addresses have attempted access to the local system and what time it occurred.</td>
</tr>
<tr>
<td>Telnet Session Terminated by Local User</td>
<td>This message is generated when a Telnet session is terminated.</td>
</tr>
<tr>
<td>Telnet Session Timed out</td>
<td>This message is generated when a Telnet session times out on its own after 10 minutes of keyboard inactivity.</td>
</tr>
<tr>
<td>Too Many Timeslots Assigned to Fxs Port (port ID)</td>
<td>This message is generated when more than one timeslot is allotted to the FXS voice port. <strong>Solution:</strong> Remove all but one of the time slots.</td>
</tr>
<tr>
<td>Too Many Timeslots Assigned to Port (port ID)</td>
<td>This message is generated when more than the allotted bandwidth is being dropped to a single port. <strong>Solution:</strong> Remove drops until the bandwidth is equal to the port speed.</td>
</tr>
<tr>
<td>Too Many TimeSlots Assigned to Port (port ID)</td>
<td>This message is generated when too many destinations are assigned to a single port. <strong>Solution:</strong> Calculate the appropriate bandwidth for the port and assign only what is allowable.</td>
</tr>
<tr>
<td>Transfer Failed on Card (card#) after (# of bytes) error (error code)</td>
<td>If this message appears, you must repeat the file transfer.</td>
</tr>
<tr>
<td>Transfer Rx Failed card (card#) timed out</td>
<td>This message is generated when the receiver of the transfer has timed out.</td>
</tr>
<tr>
<td>Transfer to card (card#) completed successfully</td>
<td>This message is generated with a successful transfer to the specific card number.</td>
</tr>
</tbody>
</table>
TUI Maintenance
Displaying the Version Screen

Use the version screen to display information about the software, hardware and firmware installed in the MASTERseries application module. This information is useful when seeking technical support or upgrading the software in your system.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Tx Failed card (card#) timed out</td>
<td>This message is generated when the transmitter of the file selected has timed out.</td>
</tr>
<tr>
<td>Transfer type file (filename.ext) to card (card#) started</td>
<td>This message is generated when a file transfer from the master to a slave card is activated. It indicates the specific file being sent.</td>
</tr>
<tr>
<td>Warm reset of card (card#) Performed</td>
<td>This message is generated when a card in the system has been instructed to warm reset.</td>
</tr>
</tbody>
</table>

Displaying the Version Screen

<table>
<thead>
<tr>
<th>01 MASTER</th>
<th>CARRIER ACCESS MASTERseries</th>
<th>Ver 6.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>------------</td>
<td>-------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Maint Consol Time</td>
<td>saveL Send receivE Xfer Passwds c0nfig Abcd mGmt moDe Vers</td>
<td></td>
</tr>
<tr>
<td>----- EDIT: CFG 1</td>
<td>----------------------------------------</td>
<td>RUN: CFG 1</td>
</tr>
<tr>
<td>CARD: 1</td>
<td></td>
<td>Version Information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MANUFACTURE</th>
<th>BOARDS</th>
<th>SERIAL NUMBER</th>
<th>REV</th>
<th>MAC ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00/00/0000</td>
<td>Model #</td>
<td>0000/</td>
<td></td>
<td>00:E0:97:10:9A:B9</td>
</tr>
<tr>
<td>Engine</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>Base</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>Processor</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>Link</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>Compression</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>Part #</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOAD IMAGES</td>
<td>Boot Loader</td>
<td>1.0 Nov 16 2006</td>
<td>Software</td>
<td>Rel 6.0 Nov 15 2006</td>
</tr>
<tr>
<td>Link</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imux</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To select the card to view, cycle to the desired card using the N/P keys and press enter. The remaining fields on this screen are protected fields and are automatically populated by the system.
Performance Monitoring

The MASTERseries application modules support both near and far end performance monitoring (PMON) capabilities on T1 ESF links compliant using the ANSI T1.403 protocol. Near end performance monitoring capabilities are also implemented on T1 SF (D4) and E1 links.

NOTE: Performance monitoring is disabled by default. Enable it from the link screen. For more information about the link screen refer to Setting Link Parameters on page 5-8. The performance monitoring software collects performance parameters in one-second increments. The performance data is organized and stored for the following intervals:

- Current second
- Previous second
- Current 15 minutes
- Previous 15 minutes
- Current 24 hours
- Current 48 hours
- Current 72 hours

The current second and previous second displays provide a dynamic view of errors as they occur. These errors then move into the current 15-minute period (900 seconds).

The current 15-min display dynamically updates as performance data is being collected in the current interval. When the interval is complete the data moves to the Previous 15-min display and the most recent 15-minute interval and the current interval restart.

The current 24-hr, current 48-hr, and current 72-hr summary displays have a maximum count of 65,535 errors and are based on a sliding window of 15-minute intervals. So the current 24-hr report is an accumulation of the previous ninety-six 15-minute intervals, current 48-hr is an accumulation of the previous 192 intervals, and current 72-hr is an accumulation of the previous 288 intervals. The long report shows the same information as the short report and also includes the performance data for each complete 15-minute interval in the current 24 hour window. Each time an interval is completed previous intervals scroll down one in the list.

NOTE: Performance monitoring statistics for ATM modules are displayed under the Flex menu. For more information, see Performance Monitoring on page 13-36.

NOTE: AT&T TR 54016 Protocol is not supported in release 6.01.
**Performance Monitoring Statistics**

For each interval, six types of performance statistics are measured. These statistics are described in the following table.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE</td>
<td>This field shows the number of Error Events (EE) that have occurred up to a maximum of 65,535. If a link uses ESF framing, the following error conditions cause a single EE to be counted: a transition to an LOS, or OOF, or AIS condition, a CRC-6 error, or a controlled slip (also referred to as a frame slip). If a link uses SF framing then an EE is a BPV or a transition to an LOS, or OOF or CSS condition. If a link is E1-CRC4 then an EE is a CRC-4 error or a transition to an LOS, or OOF condition. <strong>NOTE:</strong> A single LOS, AIS, or OOF condition counts as a single EE, independent of how long it lasts.</td>
</tr>
<tr>
<td>ES</td>
<td>An Errored Second (ES) is a second that is not a UAS, with one or more EEs.</td>
</tr>
<tr>
<td>UAS</td>
<td>The Unavailable Seconds (UAS) field is a count of one-second intervals during which service is unavailable. A UAS is declared when ten consecutive SESs occur. The ten SESs are subtracted from the SES count and added to the UAS count. Subsequent seconds are added to the UAS count until the UAS state is cleared. The UAS state is cleared when ten consecutive non-SESs occur. When the UAS state clears, the ten consecutive non-SESs are subtracted from the UAS count.</td>
</tr>
<tr>
<td>SES</td>
<td>A Severely Errored Second (SES) for an ESF link is a second that is not a UAS with 320 or more EEs, or one or more LOS, AIS, or OOF conditions. An SES for an SF link is a second that is not a UAS with 1540 or more EEs, or one or more LOS, AIS, or OOF conditions. An SES for an E1 link is a second that is not a UAS with 320 or more EEs, or one or more LOS, AIS, or OOF conditions.</td>
</tr>
<tr>
<td>BES</td>
<td>A Bursty Errored Second (BES) for an ESF link is a second that is not a UAS, and contains more than one but less than 320 CRC-6 errors and NO LOS, AIS or OOF conditions. A BES for an SF link is a second that is not a UAS, and contains more than one but less than 1540 BPVs and NO LOS, AIS or OOF conditions. A BES for an E1 link is a second that is not a UAS, and contains more than one but less than 320 CRC-4 errors and NO LOS, AIS or OOF conditions.</td>
</tr>
<tr>
<td>CSS</td>
<td>A Controlled Slip Second (CSS) is any second that is not a UAS that contains one or more controlled slips. A CSS (also referred to as a frame slip) occurs when there is a difference of exactly one frame between the transmitted and received data streams, resulting in the replication or deletion of a DS1 frame by the receiving terminal.</td>
</tr>
</tbody>
</table>

**NOTE:** If pressing the R key does not refresh the screen, press ESC once or twice. The PMON screen does not refresh the Current 24, 48, and 72 hour summaries. Press ESC to exit the screen and re-enter.
Displaying the Local Performance Statistics

Use the local performance statistics screen to display performance monitoring statistics for links with performance monitoring enabled. Performance monitoring is enabled using the protocol field on the link screen menu.

To View the Local_stats report:

1. Verify that performance monitoring is enabled. Performance monitoring is enabled on the link screen. (For more information about the link screen refer to Setting Link Parameters on page 5-8.)
   - **T1.403** - the unit operates in PRM mode, updating local and remote statistics every second.
   - **54016** - this protocol is not supported in release 6.01.
   - **PMON_D4** - performance collection operates in SF mode, local statistics only.

2. Select the link ID by typing the ID or using the N/P keys, then enter.

3. Select **UNSR** or **UNLR** and press enter. (For descriptions of these reports, see the table below.)

4. Press ESC to leave the screen. The *Erase Near End PM Data n/y?* prompt appears. To erase the local performance monitoring statistics counters of the specified link press Y for yes. To exit the screen without erasing performance monitoring data press N or ESC. If yes is selected, you must enter the superuser password.
The following table describes the fields on the local performance statistics screen:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>Identifies the link. Cycle through using the N/P keys.</td>
</tr>
<tr>
<td>Report Type</td>
<td>Use the N/P keys to select the type.</td>
</tr>
<tr>
<td>UNSR</td>
<td>(User Network Short Report) Displays statistics for the following intervals: current second, previous second, current 15-minute, previous 15-minute, current 24 hour, current 48 hour and current 72 hour summaries.</td>
</tr>
<tr>
<td>UNLR</td>
<td>(User Network Long Report) Displays statistics for a running 24 hour period in ninety six 15-minute intervals. (T1 ESF only.)</td>
</tr>
<tr>
<td>Protocol Name</td>
<td>These are protected fields which reflect the configuration in the link screen.</td>
</tr>
<tr>
<td>Completed Intervals (Comp Intv)</td>
<td>This is a protected field that displays the number of 15-minute performance monitoring intervals that have been completed. Unless the MASTERseries unit was restarted within the last 24 hours, the completed intervals field will count up to 96 and remain at 96.</td>
</tr>
<tr>
<td>15-Minute Intervals</td>
<td>Four 15-minute intervals are displayed at the bottom of the long report screen (UNLR). Each 15-minute interval has an interval number and a time stamp.</td>
</tr>
</tbody>
</table>

**Remote Performance Statistics**

Use the remote performance statistics screen to show the performance monitoring statistics for the far end of a link that has been configured for T1_ESF framing and the performance monitoring protocol set to T1_403. Both of these fields are found in the link screen. This screen is updated every second for links configured for T1_403.

The AT&T 54016 protocol is not supported in release 6.01

```plaintext
A (Alarms)  P (Performance)  M (reMote_stats)  S (Show_remote_stats)
```

To View the show_remote_stats report:
1. Select the link ID in the link field by typing the ID or using the N/P keys, then press enter.
2. Select FESR or FELR, and press enter.
3. To clear the performance monitoring data: select the desired link and press ESC. Erase Far End PM Data: n (no) / y (yes) is presented at the bottom of the screen. Press N or Y, then enter. If yes is selected, you must enter the superuser password.

The fields on the remote performance statistics screen are described in the following table.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>Identifies the link. Cycle through using the N/P keys.</td>
</tr>
<tr>
<td>Report Type</td>
<td>Use the N/P keys to select the type.</td>
</tr>
<tr>
<td></td>
<td><strong>FELR</strong> - (Far End Long Report) Displays the 96 far end interval statistics and totals.</td>
</tr>
<tr>
<td>Protocol Frame Name</td>
<td>These are protected fields which reflect the configuration in the link screen.</td>
</tr>
<tr>
<td>Far End Completed Intervals (Far Intv)</td>
<td>This is a protected field that displays the number of far end 15 minute intervals that have been completed.</td>
</tr>
<tr>
<td>Performance Report Message (PRM) Loss</td>
<td>This is a protected field that is displayed when the T1.403 protocol has been selected on the link screen. The PRM is received once per second from the reporting far end. If the message is not received this counter will advance by one.</td>
</tr>
</tbody>
</table>
Missed Polling Statistics - T1.403 missed PRM count

On occasion a polling interval may be missed, and will as a mismatch between the local stats and the remote stats. This can occur due to a conflict when FLEXmaster is receiving errors and polling for the remote stats at the same time.

The missed count is indicated by an M in the right margin of the screen.
**Individual Performance Statistics**

Use the remote performance statistics request screen to send a message to the far end to request individual statistics.

**NOTE:** The AT&T_54016 protocol is not supported in release 6.01.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>This is a cyclical field which contains the slot and link ID of the modules installed in the chassis. When you have displayed the desired link, press enter.</td>
</tr>
<tr>
<td>Protocol</td>
<td>These are protected fields which reflect the configuration in the link screen.</td>
</tr>
<tr>
<td>Frame Name</td>
<td></td>
</tr>
<tr>
<td>Send Message</td>
<td>This is a cyclical field (Yes/No) which controls sending the message. The message is sent each time you press enter if yes is selected. No message is sent if no is selected.</td>
</tr>
</tbody>
</table>
**Saving Files**

You can save two kinds of files from your MASTERseries to your PC: log files and configuration files. Saving files is a 2-step process.

1. Save the file to the system directory.
2. Tftp the file from the MASTERseries to your PC.

The following sections describe these steps:

- Saving a Copy of the System and Alarm Events on page 16-26
- Saving Configuration Files on page 16-28
- Uploading Files on page 16-29

**Saving a Copy of the System and Alarm Events**

Downloading logs is helpful for troubleshooting or technical support. The `saveL` screen saves a copy of the system log and the link log to the system directory. The file saved is named `almsys.txt`. The alarm information in this text file is sorted in the order that the alarms were generated, starting with the most recent.

To save a copy of the linklog and syslog to a text file:

1. In the `saveL` screen press enter and type your password. Super user access is required. If the password is not entered correctly, read-only access is provided.
2. Press enter to get the Confirm prompt. Choose Y to save the file log (or to cancel press N) and press enter.
3. After you have confirmed the file upload, a second screen appears to confirm the successful save. Press ESC to leave this screen.

![Screen showing file creation is over]

4. For details on how to upload this file to your PC, see *Uploading Files* on page 16-29.
**Saving Configuration Files**

You can save a single configuration file for all the modules in the chassis. The file is saved to the system directory. Typically, this file is used to restore a known, good configuration.

**NOTE:** The information saved in this file is specific, and includes slot location and module type. Keep a record of the modules and locations used in the configuration you save.

**Saving Configuration Files - TUI**

To save the configuration file:

1. In the **Send** screen press enter and type in your password. Super user access is required. If the password is not entered correctly, read-only access is provided.

   ![](image1)

   2. The File and Protocol fields are automatically populated.

   3. Press enter and the **Confirm** prompt displays. Choose **Y** to save the configuration file or **N** to cancel, and then press enter.

   ![](image2)

   4. The file is saved to flash as **chassis.cfg**.

   **NOTE:** If the save fails, verify that the same version of code is running on all modules in the chassis.

5. For information on uploading this file to your PC, see **Uploading Files** on the next page.


**Saving Configuration Files - CLI**

The following procedure describes how to save a configuration file through the CLI.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd system</td>
<td>Change from Root mode to System mode</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Display the current running and backup files. If there is already a file named chassis.cfg, it will be overwritten by the send command. Use the file-rename command to rename it or save it to your PC if you want to save it.</td>
</tr>
<tr>
<td>/system# send</td>
<td>Issue the send command. See the next procedure for detailed information about uploading this cfg file to your PC.</td>
</tr>
</tbody>
</table>

**Uploading Files**

Two types of files can be uploaded to a PC: log files and configuration files. Use the file-upload command to upload these files from a MASTERseries chassis to a PC.

This section assumes you are familiar with the CLI and with the TFTP utility.

- For more information about TFTP see *Basic TFTP Operation* on page 16-34.
- For more information about using the CLI see *Chapter 11, CLI Commands*.

To upload files:

1. Connect a crossover Ethernet cable to the ENET1 port on the master module.
2. Plug the other end of the cable into the Ethernet port of your PC.
3. Open your TFTP program, and leave it running in the background.
4. Issue the following commands in the CLI.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd system</td>
<td>Change from Root mode to System mode</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Displays the current running and backup files.</td>
</tr>
<tr>
<td>/system# file-upload {name} ipaddr {ip addr} [destfile {name}]</td>
<td>Initiates a file upload of the log file.</td>
</tr>
</tbody>
</table>
TUI Maintenance
Saving Files

**Uploading a Log File**

In this example, the `almsys.txt` file is uploaded.

```bash
#!/ system
/system# show files
File Name                      Size (bytes)
----------------               -------------
directory                          1760 bytes
ver6xx.pgl                      3194355 bytes
almsys.txt                         7957 bytes
flash                            276561 bytes
chassis.cfg
/system#
/system# file-upload almsys.txt ipaddr 192.168.2.158
Uploading almsys.txt to TFTP server 192.168.2.158
# bytes transmitted to TFTP server:       7957
Upload Complete
/system#
```

**Uploading a Configuration File**

In this example, the `chassis.cfg` file is uploaded.

```bash
#!/ system
/system# show files
File Name                      Size (bytes)
----------------               -------------
directory                          1760 bytes
ver600.pgl                      3194355 bytes
almsys.txt                         7957 bytes
flash                            276561 bytes
chassis.cfg
/system#
/system# file-upload chassis.cfg ipaddr 192.168.2.158
Uploading chassis.cfg to TFTP server 192.168.2.158
# bytes transmitted to TFTP server:       7957
Upload Complete
/system#
```
**Downloading Files**

Two types of files can be downloaded to the MASTERseries from a PC: configuration files, and program files (new software releases). Files on the PC must have the appropriate extension (.cfg, or .pgl) to be downloaded.

This section assumes you are familiar with the CLI and with the TFTP utility.

- For more information about TFTP see *Basic TFTP Operation* on page 16-34.
- For more information about using the CLI see *Chapter 11, CLI Commands*.

**Downloading Application Files**

**NOTE:** The application file on the software CD is named ver600.pgl. Rename this file ver6xx.pgl before attempting the download.

1. Connect a crossover Ethernet cable to the ENET1 port on the master module.
2. Plug the other end of the cable into the Ethernet port of your PC.
3. Open your TFTP program, and leave it running in the background.
4. Issue the following commands in the CLI.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/# cd system</code></td>
<td>Change from Root mode to System mode</td>
</tr>
<tr>
<td><code>/system# show files</code></td>
<td>Display the current running and backup files.</td>
</tr>
<tr>
<td><code>/system# file-delete ver6xx.pgl</code></td>
<td>Delete the previous application file.</td>
</tr>
<tr>
<td><code>/system# file-download ver6xx.pgl ipaddr 192.168.2.158</code></td>
<td>Initiate a file download of the application file.</td>
</tr>
<tr>
<td><code>/system# xferto card all img ver6xx.pgl</code></td>
<td>Transfer the application file to all other cards in the chassis.</td>
</tr>
<tr>
<td><code>/system# reset 1</code></td>
<td>Reset the master module.</td>
</tr>
</tbody>
</table>
## TUI Maintenance

### Downloading Files

#### Example

1. From the CLI issue the following commands

   ```
   /# cd system
   /system# show files
   
<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>ver6xx.pgl</td>
<td>3207918 bytes</td>
</tr>
<tr>
<td>almsys.txt</td>
<td>6231 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>276561 bytes</td>
</tr>
<tr>
<td>forcetrap.txt</td>
<td>726 bytes</td>
</tr>
<tr>
<td>chassis.cfg</td>
<td>1202267 bytes</td>
</tr>
</tbody>
</table>
   
   /system# file-delete ver6xx.pgl
   /system# file-download ver6xx.pgl ipaddr 192.168.1.158
   / Downloading ver6xx.pgl from 192.168.1.158
   
   Download Complete
   /system# show files
   
<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>ver6xx.pgl</td>
<td>3207918 bytes</td>
</tr>
<tr>
<td>almsys.txt</td>
<td>6231 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>276561 bytes</td>
</tr>
<tr>
<td>forcetrap.txt</td>
<td>726 bytes</td>
</tr>
<tr>
<td>chassis.cfg</td>
<td>1202267 bytes</td>
</tr>
</tbody>
</table>
   
   /system# xferto card 2 img ver6xx.pgl
   Transfer to card 2 started ......................... completed.
   /system#
   /system# reset 1
   ```

2. Log in to the master module. You can verify that the version is running.

   ```
   /# version
   
   CARD: 1    Version Information
   Platform Software Version:  6.01
   Packet Software Version:    1.0.0.106
   ATM Software Version:       6.0.12.8
   ```

#### Downloading Configuration Files

Use the file-download command to download configuration files. The following is the recommended process for loading configurations.

1. Connect a crossover Ethernet cable to the ENET1 port on the master module.
2. Plug the other end of the cable into the Ethernet port of your PC.
3. Open your TFTP program, and leave it running in the background.

4. From the CLI issue the following commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# cd system</td>
<td>Change from Root mode to System mode</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Display the current running and backup files.</td>
</tr>
<tr>
<td>/system# file-delete chassis.cfg</td>
<td>Delete the specified file from memory.</td>
</tr>
<tr>
<td>/system# file-download chassis.cfg ipaddr 192.168.2.158</td>
<td>Initiate a file download of the chassis.cfg file.</td>
</tr>
<tr>
<td>/system# reset 1</td>
<td>Reset the master module.</td>
</tr>
</tbody>
</table>

**NOTE:** Configurations for the whole chassis are stored in a single file named `chassis.cfg`.

**Example**

1. From the CLI issue the following commands

```bash
/# cd system

/system# show files
File Name                      Size (bytes)
----------------               ------------
directory                          1760 bytes
almsys.txt                         6231 bytes
flash                            276561 bytes
/system# file-download chassis.cfg ipaddr 192.168.2.158
Downloading chassis.cfg from 192.168.2.158
 # bytes written to file:    3207918
Download Complete
/system# show files
File Name                      Size (bytes)
----------------               ------------
directory                          1760 bytes
chassis.cfg 3207918 bytes
almsys.txt                         6231 bytes
flash                            276561 bytes
/system#
```

To restore this config file as the active configuration, see *Restoring a Configuration* on page 16-38.
TFTP Utility

TFTP software, TFTPd32, is provided on the MASTERseries software installation CD. This section describes how to use this software to upload and download files. You can use other TFTP server programs, but they are not described here.

This section describes

- Basic TFTP Operation
- Troubleshooting TFTP

Basic TFTP Operation

Software Setup

- Copy the TFTP directory from the software installation CD to your C:\ drive
- TFTPd32 has no installation program. To run TFTPd32 just launch the executable file tftp.exe
- For ease of use, copy the files you want to tftp into the C:\TFTP directory

**NOTE:** The TFTP server and the MASTERseries must be on the same subnet.
Establishing Connectivity

1. Insert a crossover Ethernet cable into the ENET1 port on the master module (the module with the blinking PST LED.)

2. Plug the other end of the cable into the Ethernet port of your PC.

3. From the C:\TFTP directory, start the TFTP server.
   Launch the executable file tftpd32.exe.

4. Test connectivity from the MASTERseries to the Server.

   ```bash
   # ping 192.168.2.158
   Destination unreachable
   ```

   If the Server is unreachable, make sure there is a good Layer 1 connection and check the IP address of the MASTERseries. (To change the IP address, see Setting Ethernet Interfaces on page 12-2.

5. Retest connectivity.

   ```bash
   # ping 192.168.2.158
   Reply Received From :192.168.2.158, TimeTaken : less than 0 ms
   Reply Received From :192.168.2.158, TimeTaken : less than 0 ms
   Reply Received From :192.168.2.158, TimeTaken : less than 0 ms
   --- 192.168.2.158 Ping Statistics ---
   3 Packets Transmitted, 3 Packets Received, 0% Packet Loss
   ```

   The TFTP server is now reachable from the MASTERseries.
**File Locations**

The Current Directory is indicated at the top of the tftp dialog.

- Files are downloaded from this directory to the MASTERseries
- File uploads from the MASTERseries are received here.

To change the current directory, click the Browse button.

You are now ready to use the file-upload and file-download commands, as described in *Uploading Files* on page 16-29 and *Downloading Files* on page 16-31.
Troubleshooting TFTP

These instructions assume you are using the TFTPD32 server emulation program, which Carrier Access provides on its customer support download site.

Errors

cannot bind port error message from the TFTPD32 application.

This is a TFTPD32 specific problem usually caused by:

• an inability to bind UDP port 69 to the IP address previously used, or
• there is another TFTPD32 program already running.

If there isn't another instance running, the problem can be fixed by deleting the TFTPD32 key in the registry.

To enter the registry editor:

1. Click Start, and then click Run.
2. Type Regedit and then click OK.
3. Expand HKEY_LOCAL_MACHINE, expand SOFTWARE. Locate the TFTPD32 key and delete it. Close the registry editor and restart the TFTP server. You should have no further problems with it, unless you change the IP address of the PC. This is typically when the problem occurs.

Cannot find file
- file is not in the base directory

No activity in the TFTP window
indicates no connectivity.
Restoring a Configuration

The receive menu restores the chassis.cfg file. Chassis.cfg is the file saved by the Setup > Send screen. For more information about generating this file, see Saving Configuration Files on page 16-28.

Before you Begin

- A chassis.cfg file must be in the system directory.
  
  If there is no file, the restore operation will fail. For information about moving files, see Uploading Files on page 16-29 and Downloading Files on page 16-31.

- The chassis.cfg file you are restoring must match the current physical chassis configuration.
  
  For example, if the chassis.cfg was saved from an 8-slot chassis with a FLEXmaster8 TDM in slot1 and a FLEXmasterDS3c-3 in slot 5, then only an 8-slot chassis with this configuration will accept the restore. If you attempt to restore the config file to an 8-slot chassis with FLEXmaster8 TDM in slot1 and a FLEXmasterDS3c-3 in slot 3, the restore will fail.

To restore the configuration file:

1. In the receive screen press enter and type in your password. Super user access is required. If the password is not entered correctly, read-only access is provided.

2. The File and Protocol fields are automatically populated.
3. Press enter and the **Confirm** prompt displays. Choose **Y** to restore the chassis.cfg file or **N** to cancel, and then press enter.

```
Maint Consol Time save $ Send receive Xfer
----- EDIT: CFG 1 ------------------------
Restore is complete

Press Any key ...
```

4. Rest the MASTERseries. From the Diag menu select Warmreset.
Transferring Program Files

Use the Transfer screen to transfer program files from the master module to a slave module installed in the same chassis. This screen auto updates while transfers are occurring.

**NOTE:** Regarding transfers from 4.02 modules to 6.01
The software is transferred over the backplane. 4.02 modules cannot recognize the 6.01 modules and vice versa. All of the 4.02 modules must be upgraded individually. Once they become 6.01 modules and have backplane connectivity, the transfer feature can be used. Do a warm reset on each card separately to have the upgrade take effect.

To transfer files:

1. In the Xfer screen press enter and enter the password. Super user access is required. If the password is not entered correctly, read-only access is provided.
   The Source field automatically displays the slot number of the master module.
2. At the File field, use the N/P keys to select **Program + LSI Firmware (.pgl)**. This is the System program software.
3. For Target: Use the arrow keys to select the modules to transfer the software to.
   For each module, use the N/P keys to select yes or no.
   - **Yes** - Perform the file transfer to this module
   - **No** - File transfer to this module is not currently selected

Select yes for each card located in the system.
4. You will see the following screen:. Press Y to confirm. The screen will update to indicate the status of the transfer.

![Transfer File Between Card(s) In The Rack]

- Source: 1
- File: Program + LSI Firmware (.pgl)
- Target: 1 2 3 4 5 6 7 8
- Mas -- Yes -- -- -- -- --

WARNING: Transfer will erase flash contents! Confirm

5. The Xfer screen will show the completed results. In addition, you can view the syslog screen (Alarms > Syslog) to verify the status of the file transfer. After you file transfer(s), power cycle the modules that received a transfer. Repower the unit manually, or use warmreset (Diag > Warmreset) to reset each unit or the entire chassis.
For information about upgrading a FLEXmaster, see Appendix C, Upgrades.
Converting a FLEXmaster TDM Module to ATM

FLEXmaster TDM modules can be converted to support ATM. The steps you will follow depend on the hardware and software version installed.

**Supported Modules**

The following modules can be converted from TDM to ATM.

- FLEXmaster8 TDM
- FLEXmaster16 TDM
- FLEXmaster8A TDM

**FLEXmaster8 Modules**

Some early FLEXmaster8 modules are not hardware-ready to support ATM. To determine if your module is eligible:

1. Identify the MAC address of the FLEXmaster8 module you want to upgrade. The MAC address is displayed on the Version screen (Setup > Version).
2. Contact Carrier Access Customer Support. Based on your MAC address, they will tell you if your module can be converted.
   - If your module can be converted, continue with the procedure.
   - If your module requires a hardware upgrade, Customer support will advise you on how to proceed.

If you have any questions contact Customer Support

   Customer Support Direct: (800) 786-9929
   E-mail: tech-support@carrieraccess.com

**NOTE:** If you need to upgrade the module to 6.01 before converting it to ATM, you do not need to perform the database conversion, since the TDM to ATM conversion will erase the configuration.

**CAUTION!** This procedure is service-affecting. When a module is converted from TDM to ATM, the configuration is erased.
**Before Conversion**

Before conversion, this 2-slot chassis has two FLEXmaster8 modules.

**Conversion Procedure**

The following example demonstrates how to convert a FLEXmaster8 TDM module to a FLEXmaster8 ATM. The same steps apply to the other modules (FLEXmaster16 and FLEXmaster8A).

To convert a TDM module to an ATM module:

1. Ensure the module is operating with release 6.01 software. If not, see *Upgrading a FLEXmaster* on page 16-42 for instructions.

2. Identify the MAC address of the module to be upgraded (From the TUI, Setup > Vers).

3. With this MAC address information, contact Customer Support to obtain an upgrade key.
4. Go to the Diag > Upgrade screen.
5. Use the N/P keys to select the card to upgrade and press enter.

6. Fill in the upgrade key. The key entry area is made up of four fields divided by dashes. Type into each field and press enter to move to the next field. When you have filled in all four fields, press enter. The cursor will return to the first field.
7. Press ESC

8. Press Y, then press enter to upgrade. The module will reboot. While the module is upgrading it may look like the following screen:
9. Navigate to the Alarms screen to see that the module is now a FLEXmaster8 ATM.
CHAPTER 17

Troubleshooting

In this Chapter

- Overview
- Interpreting Alarm Indications
- Removing and Replacing Modules
- Diagnosing a Fault
- Loopback Test Paths
Overview

This chapter describes the troubleshooting process for isolation and resolution of a fault in a network associated with MASTERseries application modules. The troubleshooting process consists of visual inspection, interpreting alarms, executing test procedures, and using a logical process of elimination to isolate a fault, resolve the fault, and restore proper operation to the network. The hypothetical network illustrated in this document is a simple example of one application, and the troubleshooting techniques are general. Use the techniques and examples described here to develop a strategy for your specific network application.

Interpreting Alarm Indications

- Red Alarm
- Yellow Alarm
- Trunk Conditioning
- AIS Blue Alarm Propagation

The alarm indications of MASTERseries help to identify symptoms of problems in the network. The unit displays several alarm conditions to indicate operational status of the T1/E1 links and the associated channels. For the purposes of the alarm descriptions, each T1/E1 link consists of a transmit path and a receive path being sent independently in opposite directions from the central office to the end point. Each of the basic default alarm states are described in the following paragraphs and illustrated in the following figure.

Red Alarm

If one path of a T1/E1 link is broken (as indicated by the X in the figure above), the received signal is lost at the receive end point, causing a red alarm at the receive end point.

The blue alarm (AIS) is indicated only when channels are bypassed to another T1/E1 link. If any channels in the data stream are bypassed to another link, the AIS will not be indicated.
Yellow Alarm

When the received signal is lost at the receive end point, the receive end point will signal through its transmit side that a Loss of Signal (LOS) condition has been detected, causing a yellow alarm to be indicated at the central office, or other end point.

Trunk Conditioning

In addition to the yellow alarm at the central office, any T1/E1 port which receives a yellow alarm also indicates a trunk condition in the DS0 channels for any lines or trunks that are connected to the affected T1/E1 line. The PBX connected to an affected trunk at the central office will receive a trunk condition indication. Upon receipt of the trunk condition, the PBX will then go out of service, or re-route its traffic to another available T1/E1 link, if so equipped.

AIS Blue Alarm Propagation

The MASTERseries application modules support the blue alarm signaling convention which is user configurable and is used to indicate that the associated T1/E1 link is disabled due to a problem beyond the blue alarm end point, as shown in the following figure. However, if any DS0 channels are dropped from a point in the T1/E1 link which is disabled, the blue alarm is not indicated beyond that node. During a T1/E1 link outage, operational points in the T1/E1 link around the fault are in blue alarm, except for the links on opposite sides of the fault; the transmit and receive sides of the fault are respectively in yellow alarm and red alarm. This alarm color coding helps to isolate faults in T1/E1 links.

Removing and Replacing Modules

WARNING! THE MASTERSERIES APPLICATION MODULE IS SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD) AND SHOULD NEVER BE REMOVED FROM THE CHASSIS WITHOUT PROPER USE OF A GROUNDING WRIST STRAP ON A GROUNDED ANTISTATIC MAT. IMPROPER HANDLING CAN CAUSE DAMAGE AND VOID YOUR WARRANTY.

All application modules are removable and replaceable without disruption to system performance (hot swappable). After hot swapping a module, there can be up to a one minute delay before the master module reports the slave module as active or removed. After a module has been configured, if it is moved to a different location (that is, a different slot, or a different shelf), the configuration will be defaulted to a new configuration. If the module is moved back before doing a commit (see Saving
**Troubleshooting**

*Diagnosing a Fault*

*Configurations on page 5-29*, the original configuration will be restored. If the module remains in the new location, a new configuration can be entered or a saved configuration can be downloaded.

**NOTE:** If a module is removed from the chassis, a red alarm will occur indicating a **card is missing**. If the module is being removed and will not be replaced, then disable links before removing the module and no alarm condition will be generated.

---

**Diagnosing a Fault**

Fault diagnosis consists of isolating a fault by process of elimination. The technique of signal loopback is used to isolate faults to specific areas of the network.

**Preliminary Checks**

Prior to the start of fault analysis, the following preliminary checks should be performed:

- Visually inspect the integrity of connections, such as data device cables, telephone cables (T1/E1 lines), and power and ground connections.
- Observe the status of front panel indicators.

**Fault Analysis**

Faults in the network are isolated by performing a sequence of tests and checks. Using the loopback charts (*Troubleshooting Flow Charts* on page 17-5) the fault can be identified as existing in one of the following areas:

- Local data device
- Local data device cable
- Local MASTERseries module
- Telephone lines (T1/E1 link)
- Remote module
- Remote data device cable
- Remote data device
Loopback Test Paths

The MASTERseries offers a variety of loopback paths to isolate faults in the network (see Chapter 15, TUI Diagnostics). Use these techniques and examples to develop a strategy for your specific network application.

Fault Isolation

Loopback testing is used to verify elements of a network by sending test patterns through the network to specific nodes where the data can be looped back and checked for errors. When using loopback testing to isolate faults, the system can be partitioned into fewer elements until the fault is isolated. A fault can be isolated by first initiating loopback tests and sending test patterns through the nearest nodes in the network, then working outward toward the end nodes. The fault can be isolated as lying at the point in the network between where the nearer node loopback test passes, and the farther node loopback test fails.

The link and port loopback tests are described in detail in Chapter 15, TUI Diagnostics. These loopbacks can be initiated using the system console or using in-band command codes.

Troubleshooting Flow Charts

This section shows three troubleshooting flow charts to help isolate faults in a hypothetical system application. These flow charts are divided into three categories:

- Local Site Single Channel Problem—A problem is associated with a single channel timeslot.
- All Links and Ports Problem—A problem is common to links or ports associated with the unit.
- Local Site Link or Port Problem—A problem is detected at a local site which appears to be isolated to one port or link.
Local Site Single Channel Problem

At local site, one channel has a problem

Initiate timeslot loopback test for affected channel

Test results O.K.

Yes

Done—no fault found in unit. Check external data devices and cables.

No

Replace engine module at local site

Initiate timeslot loopback test for affected channel

Test results O.K.

Yes

Done

No

Contact sales/service representative
All Links and Ports Problem

1. All links and ports have a problem
   - Initiate preoperational check
2. Replace power supply
   - Test results O.K.
   - Yes: Replace interface adapter module
   - No: Test results O.K.
3. Replace interface adapter module
   - Test results O.K.
   - Yes: Initiate preoperational check
   - No: Replace engine module
4. Replace engine module
   - Initiate preoperational check
   - Test results O.K.
   - Yes: Done
   - No: Contact sales/service representative
5. Contact sales/service representative
   - Done
Local Site Link or Port Problem

- At local site, one link or port has a problem.
  - Port problem or link?
    - Port
      - Initiate port local loopback test
        - Test results O.K.
          - Yes
            - Initiate equipment loopback test
              - Test results O.K.
                - Yes
                  - Replace engine module
                  - Contact sales/service representative
                  - Done
                - No
                  - Contact sales/service representative
                  - Initiate network loopback test
                    - Test results O.K.
                      - Yes
                        - Replace engine module
                        - Contact sales/service representative
                        - Done
                      - No
                        - Contact sales/service representative
                        - Initiate network loopback test
                          - Test results O.K.
                            - Yes
                              - Replace engine module
                              - Contact sales/service representative
                              - Done
                            - No
                              - Contact sales/service representative
                              - Initiate line loopback test at remote site
                                - Test results O.K.
                                  - Yes
                                    - Replace engine module
                                    - Contact sales/service representative
                                    - Done
                                  - No
                                    - Contact sales/service representative
                                    - CONTINUED ON NEXT PAGE
  - Link
    - Replace engine module
      - Initiate equipment loopback test
        - Test results O.K.
          - Yes
            - Replace engine module
            - Contact sales/service representative
            - Done
          - No
            - Test results O.K.
              - Yes
                - Replace engine module
                - Contact sales/service representative
                - Done
              - No
                - Contact sales/service representative
                - Initiate network loopback test
                  - Test results O.K.
                    - Yes
                      - Replace engine module
                      - Contact sales/service representative
                      - Done
                    - No
                      - Contact sales/service representative
                      - Initiate network loopback test
                        - Test results O.K.
                          - Yes
                            - Replace engine module
                            - Contact sales/service representative
                            - Done
                          - No
                            - Contact sales/service representative
                            - Initiate line loopback test at remote site
                              - Test results O.K.
                                - Yes
                                  - Replace engine module
                                  - Contact sales/service representative
                                  - Done
                                - No
                                  - Contact sales/service representative
                                  - CONTINUED ON NEXT PAGE

- Contact sales/service representative
- Done
Local Link or Port Problem: Troubleshooting Flow Chart (Sheet 2 of 2)

Yes

Replace interface adapter module at remote site

Yes

Initiate line loopback test at remote site

Yes

Done

Test results O.K.

No

Replace engine module at remote site

Yes

Done

Initiate line loopback test at remote site

Test results O.K.

No

Replace engine module at remote site

Initiate line loopback test at remote site

Test results O.K.

No

Link or cable fault. Replace link or cables between local and remote sites

Yes

Done

Initiate port remote loopback test

Test results O.K.

No

Replace engine module at remote site

Contact sales/service representative

Test results O.K.

Yes

Done

Done—no fault found

Yes

Test results O.K.

No

Replace interface adapter module at remote site

Initiate port remote loopback test

Replace engine module at remote site

Test results O.K.

No
In this Chapter

- Minimum Requirements
- Installing the Java Runtime Environment (JRE) for Windows
  - Installing the JRE with Internet Access
  - Installing the JRE from the Software CD
  - Troubleshooting the JRE for Windows
- Accessing the Web-based GUI
- Overview of the GUI Interface
  - Menu bar
  - Tree View
  - Rack View
  - Status Bar
  - Detail View
Introduction

This chapter provides minimum system requirements for using the web-based graphical user interface (GUI) to the MASTERseries. The chapter also provides instructions for installing the current version of Java Runtime Environment used by the GUI and an overview of the options available through the GUI. The following chapters provide instructions for using the GUI to perform configuration, monitoring, and diagnostic operations.

Minimum Requirements

The following table lists the minimum system requirements for operating the MASTERseries GUI.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity</td>
<td>IP connectivity to the master module</td>
</tr>
<tr>
<td>Web Browser</td>
<td>Any Java capable web browser</td>
</tr>
<tr>
<td>Java</td>
<td>Your PC must be running the Java Runtime Environment (JRE) version 1.5.0</td>
</tr>
<tr>
<td></td>
<td>Update 07 or higher.</td>
</tr>
<tr>
<td>Screen resolution</td>
<td>1024 x 768 or higher.</td>
</tr>
</tbody>
</table>

Installing the Java Runtime Environment (JRE) for Windows

Before you can log in to the MASTERseries GUI, you must have the Java Runtime Environment (JRE) version 1.5.0 Update 07 or higher installed on your PC. If you do not have the JRE installed or if you have an earlier version of the JRE installed, you must install the most current version before you can use the GUI.

You have two options for installing the current version of the JRE:

- **Internet access** – If you have internet access, you will be prompted to download the ActiveX plug-in the first time you attempt to log into the GUI. See *Installing the JRE with Internet Access* on page 18-3 for instructions.

- **Software CD** – If you do not have internet access, install the JRE using the installation file included on the FLEXmaster software CD that accompanies your equipment. See *Installing the JRE from the Software CD* on page 18-5 for instructions.
Installing the JRE with Internet Access

If you have internet access, use the following steps to install the JRE the first time you attempt to log into the GUI.

1. Launch your browser and enter the IP address of the MASTERseries in the address bar.
   The default address is http://192.168.2.101.
2. Your browser will prompt you to install the missing plug-in or ActiveX control.

**NOTE:** The exact prompt and subsequent dialog displayed depend on what browser you are using.

3. When you click the prompt to install the plug-in, a dialog similar to the one shown displays.
4. Click **Install** (or **Yes**). The License Agreement dialog displays. Select **Typical Setup** and click **Accept** to start the installation wizard.

5. The following dialog displays showing the installation progress.
6. When the installation is complete, the Installation Complete dialog displays. Click **Finish** to close the wizard.

![Installation Completed dialog](image)

**Installing the JRE from the Software CD**

If you do not have internet access, use the following steps to install the JRE from the software CD before you log into the GUI the first time.

**NOTE:** If you do not have the JRE installed or if you have an earlier version of the JRE installed, you will get a blank screen when you attempt to run the GUI.

1. Insert the software CD that accompanied your equipment into the CD-ROM drive of your PC.
2. Locate the JRE installation file (**jre-1_5_0_09-windows-i586-p.exe**) in the java folder of the software CD.
3. Double-click the file name to start the installation wizard.
4. The License Agreement dialog similar to the one shown displays. Select **Typical Setup** and click **Accept** to start the installation wizard.

5. A dialog similar to the one shown displays to indicate the installation progress.
6. When the installation is complete, the Installation Complete dialog displays. Click **Finish** to close the wizard.

**Troubleshooting the JRE for Windows**

To use the MASTERseries GUI you must have JRE 1.5.0 Update 07 or higher installed on your PC, as described in *Installing the Java Runtime Environment (JRE) for Windows* on page 18-2.

If you see Java errors when attempting to launch the GUI on a Windows system, make sure that you do not have more than one version of the JRE installed. If you have multiple JREs installed on your system, your computer may be attempting to use the wrong JRE to launch the GUI.

To ensure that you computer is only using the most current version of the JRE:

1. Start the Java Control Panel by doing one of the following:
   - If present, click on the Java icon in the system tray and select Open Control Panel.
   - Run the following program file:
     
     ```
     C:\Program Files\Java\j2re1.n.n.nn\bin\javacpl.exe
     ```
     where
     
     ```
     n.n.nn
     ```
     is the version of JRE.
The Java Control Panel displays. Select the **Java** tab,

1. Click **View** in the Java Applet Runtime Settings panel to display the Java Runtime Settings window. Click **OK** to close the window.

2. If multiple versions of the JRE are listed in the Java Runtime Settings window, use the Control Panel Add or Remove Programs applet to uninstall any versions of the JRE that are earlier than 1.5.0 Update 7.

**NOTE:** You do not have to remove multiple updates of JRE version 1.5.0. The different updates are compatible.
4. Select the JRE version you want to uninstall and click **Remove**. Follow any on-screen instructions to complete the uninstall.
Accessing the Web-based GUI

After installing the JRE, use the following steps to access the web-based GUI.

1. Launch your browser and enter the IP address of your MASTERseries in the address bar. The default address is http://192.168.2.101. The Java environment start-up screen displays in your browser, followed by the Carrier Access login screen.

   ![Carrier Access login screen]

2. Enter the default user name and password and click Login.
   - Username: admin
   - Password: nms
3. The home page for the MASTERseries GUI appears. The exact appearance of the home page depends on the number and type of modules installed.

**NOTE:** RADIUS authentication is not supported in the GUI, though it is supported in the CLI. If RADIUS is enabled in the CLI, you may not be able to log in to the GUI. The message “Login Failed! null” will appear. In order to log in successfully, use local authentication.
Overview of the GUI Interface

The following illustration shows the parts of the GUI window.

The following sections provide detailed descriptions of each part.

- Menu bar
- Tree View
- Rack View
- Detail View
- Status Bar
Menu bar

The menu bar, located at the top edge of the display area, provides access to system-wide operations. The following sections describe each of the menu options.

Admin Menu

The Admin menu provides access to the following administrative operations:

- **Users** – Provides options for adding and deleting users, and resetting passwords. This menu option is only available to users with Administrator or Superuser privileges. See *Manage Users* on page 19-29 for detailed information about this menu option.
- **Password** – Allows the currently logged in user to change their password. See *Change Your Password* on page 19-31 for detailed information about this menu option.
- **Telnet** – Launch a telnet session to the master module. You can use the Telnet session to interact with the system using the TUI or the CLI. See *Chapter 5, TUI Configuration* for information about using the TUI and *Chapter 11, CLI Commands* for information about the CLI.

Configuration Menu

Use the Configuration menu to create and modify configuration profiles. See *Understanding Configurations* on page 19-2 for detailed information about this menu option.

Connect Menu

Use the Connect menu to configure internal timeslot cross-connect settings for link interfaces. See *Configure the Internal Timeslot Connections* on page 19-20 for detailed information about this menu option.
Overview of the GUI Interface

**Log Menu**

The options under the Log menu provide access to the System and Link Logs. The system log contains a history of system events. The link log displays the alarm history for the selected link. These logs can be used to help identify problems during troubleshooting and maintenance operations. For detailed information about these logs, see *Link Alarm Logs* on page 21-10 and *System Log* on page 21-12.

**Setup Menu**

The Setup menu provides access to the following system-wide configuration options:

- **Date & Time** – Sets the system time and date. See *Set the Date and Time* on page 19-7.
- **Console** – Sets the communication parameters for the NMS port on the master module. See *Set the Console Parameters* on page 19-32.
- **Idle Signaling Patterns** – Defines the ABCD idle signaling patterns. See *Configure the Idle Signaling Patterns* on page 19-26.
- **System Timing** – Sets which links to use as the timing source for the system. See *Configure the System Timing* on page 19-14.

**Alarms Menu**

The Alarms menu provides access to the following configuration options:

- **Contact Closures** – Configures the operation of the external alarm contact closures at the rear of the chassis.
- **Signaling** – Defines the ABCD/abcd signaling patterns that are transmitted in place of normal signaling when a link is in alarm.
- **Datacodes** – Defines the data patterns that will be transmitted in place of normal data on bypass connections when a link is in alarm.
Tree View

The Tree View provides access to additional configuration and monitoring operations for the system, individual cards (modules), ports, and timeslots. The width of the Tree View can be maximized, minimized, or resized using the bar separating it from the Rack and Detail views. See Chapter 19, GUI Configuration for information about configuring the options available from the Tree View.

Tree View Context Menus

The context menus provide access to additional options related to the selected item in the tree. To access the context menu of a node, right-click on the selected item.

Rack View

The Rack View is a graphical representation of modules installed in the system. The Rack View can be maximized, minimized or resized by dragging the bar separating it from the Detail View.
Rack View Context Menus

A context menu for each module shown in the Rack View is accessed by right clicking on the module. The options on the context menu depend on the module type selected.

Status Bar

The Status bar at bottom of the screen indicates the system’s overall alarm status, date, software version, clock source, as well as the current editing and running configurations. The status bar automatically updates every 20 seconds.
**Detail View**

The Detail View appears below the Rack View. The information displayed depends whether you selected an option from the main menu or in the Tree View. The Detail View can be maximized, minimized or resized by dragging the bar separating it from the Rack View.

See *Chapter 19, GUI Configuration* for detailed information about what displays when you select an option from the main menu. When you select an option from the Tree View, the information displayed depends on whether you select the system or one of the cards (modules).

- System Details
- Card Details

**System Details**

![System Details Window](image)

When you log into the MASTERseries GUI, the Detail View displays System Details window, as described below. You can also display the system details by selecting the System Node from the Tree View. You can also use this window to set the system name, system location, and system contact information. See *Chapter 19, GUI Configuration* for detailed information about setting the information in the remaining fields.

- **System Name** – Create or modify the custom name for the chassis. See *Chapter 19, Set the System Name and Location* for naming requirements.
- **System Type** – The type of system. This value field is determined by the system to which the GUI is connected. This value is read-only.
- **System Location** – Specify the location of the system installed. See *Chapter 19, Set the System Name and Location* for naming requirements.
- **System Date** and **System Time** – The current system date and time. See *Set the Date and Time* on page 19-7 for configuration instructions. These values are read-only.
- **PS 1 Op Status** and **PS 2 Op Status** – Operational status of power supply 1 and power supply 2 (if installed).
- **System Master** – Indicates which card is currently the master. This value is read-only.
- **Running Config** – Indicates the current active running configuration. This value is read-only. See *Understanding Configurations* on page 19-2 for information about changing the configuration.
### Overview of the GUI Interface

- **Edit Config** – The configuration currently loaded into the edit buffer. See *Understanding Configurations* on page 19-2 for information about changing the configuration. This value is read-only.

- **Overall Alarm Status** – Indicates overall system alarm status. This value is read-only. See *Interpreting Alarm Indications* on page 17-2 for information about alarm indications.

- **System Contact** – Specify the primary contact for this chassis. See *Set the System Name and Location* on page 19-28 for naming requirements.

- **PS Fan Status** – Indicates the status of the fans in the chassis. If there is no fan module, this shows **None**. This value is read-only.

### Card Details

The Card Details window provides information about the selected card (module). To access this window, click on the desired card in the Tree View. These values displayed are read-only.

- **Slot Number** – The physical slot where the card is installed.

- **Card Type** – Type of card (FLEXmaster8, FLEXmaster ATM, FLEXmaster16 and so on). The number following the name indicates in which slot the card is installed.

- **Interface Type** – Type of card interface (T1 or DS3).

- **Port Type** – Indicates the port type (such as V.35) if one exists in this card.

- **Card Role** – Indicates whether this card is a master or slave.

- **Card Status** – Indicates the overall alarm status of this card. See *Interpreting Alarm Indications* on page 17-2 for information about alarm indications.
**Link: Details**

The Link Details window displays the current status of the selected DS1 link and allows you to set configuration options for link. To access this window, click on the desired link under the DS1 node in the Tree View *Configuring T1 Links* on page 19-10 for detailed information about the parameters in this window.

**DS3: Details**

The DS3 Details window displays the current status of the selected DS3 link and allows you to set configuration options for link. To access this window, click on the desired link under the DS3 node in the Tree View *Configuring DS3 Links* on page 19-12 for detailed information about the parameters in this window.
Getting Started with the GUI
Overview of the GUI Interface
CHAPTER 19

GUI Configuration

In this Chapter

- Introduction
- Understanding Configurations
- Recommended Configuration Sequence
- Set the Date and Time
- Open a Configuration Profile
- Set the Link Parameters
- Configure the System Timing
- Configure the V.35 Port Parameters
- Configure the Multi-Service Ports
- Define the ABCD Signaling Patterns
- Define the Data Patterns
- Configure the Internal Timeslot Connections
- Configure APS for Link Failures
- Configure Threshold Alarms
- Configure the Idle Signaling Patterns
- Set the System Name and Location
- Manage Users
- Change Your Password
- Set the Console Parameters
- Launch a Telnet Session
Introduction

This chapter provides detailed information about using the GUI to create and modify configuration profiles for the MASTERseries. Configuration profiles contain the settings for the operational parameters used by the MASTERseries. You can also use the GUI to view system and link logs.

You can also perform the configuration steps described in this chapter using the TUI, as described in Chapter 5, TUI Configuration, or the CLI, as described in Chapter 11, CLI Commands. For information about configuring ATM functionality, see Chapter 13, ATM Interworking Software.

Understanding Configurations

When you begin operations on a new MASTERseries, all of the operational parameters are set to their default values. You must use the steps described in the following sections to modify the parameter settings to meet your requirements and save the changed settings in a configuration profile.

Configuration profiles are complete sets of operational parameters that define how the system functions. Up to 16 configurations can be created and stored in non-volatile memory.

To view information about the current configuration profiles or create a new profile, select Options from the Configuration menu to open the Configuration Options window.

The Configuration Options window is divided into three panels.

- The Current panel displays the current configuration status. See Current Configuration Status on page 19-3 for a description of the fields in this panel.
- The Load, Current, and Activate panes in the configuration editor panel provide configuration editor options. See Configuration Editor Operations on page 19-3 for detailed information about the options in this panel.
The **Import** and **Export** panes in the import/export panel provide options for importing and exporting saved configuration profiles. See *Import or Export a Saved Configuration* on page 19-4 for detailed information about the options in this panel.

### Current Configuration Status

The configuration panel shows the current status of the configuration currently loaded in the configuration editor and the configuration currently being used to control the operation of the chassis. The fields in this panel are read-only.

The following table describes the fields in the configuration panel:

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Edit Config</strong></td>
<td>The configuration currently loaded in the configuration editor.</td>
</tr>
<tr>
<td><strong>Run Config</strong></td>
<td>The configuration currently running</td>
</tr>
<tr>
<td><strong>CFG # Modified</strong></td>
<td>Indicates whether the configuration currently loaded in the configuration editor has been modified.</td>
</tr>
<tr>
<td><strong>CFG # Committed</strong></td>
<td>Indicates whether the configuration currently loaded in the configuration editor has been committed (saved).</td>
</tr>
</tbody>
</table>

### Configuration Editor Operations

The **Load**, **Current**, and **Activate** panes provide access to the configuration editor functions. A dropdown list in each pane allows you to select one of 16 different configurations. Each action causes a corresponding change in the **Current** panel to reflect the configuration you selected.

**NOTE:** Editing a configuration has no impact on which configuration is currently running in the system.
The following table describes the configuration editor function accessed in each panel.

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>Loads a configuration into the configuration editor for editing as described in Open a Configuration Profile on page 19-9. Select the configuration number you want to edit from the Load From dropdown list and click Load. If you want to create a new profile, select New from the dropdown list. You can edit one configuration while another is running. You can also edit the currently running configuration. After a configuration profile loads in the edit buffer, you can make changes to the configuration settings as described in remainder of this chapter. If you are creating a new configuration profile, change the settings in the order described in Recommended Configuration Sequence on page 19-6.</td>
</tr>
<tr>
<td>Commit</td>
<td>Saves changes to the configuration currently loaded in the configuration editor as described in Save the Configuration on page 19-27. Select a configuration number from the Save To dropdown list and click Commit. If you edited an existing configuration, you can assign it the same number it had previously or a different number.</td>
</tr>
<tr>
<td>Activate</td>
<td>Changes configuration currently being used to control the system, as described in Activate the Configuration on page 19-27. Select the configuration number you want to use from the Activate Profile dropdown list and click Activate. The configuration settings in the selected configuration profile take effect. <strong>NOTE:</strong> If you edited and saved the currently running configuration, you must activate it before the changes take effect.</td>
</tr>
</tbody>
</table>

**Import or Export a Saved Configuration**

The options in the Import and Export panes of the import/export panel allow you to import and export saved configuration profiles. After you create a configuration profile for the current chassis, you can export the configuration to a file on the hard drive of the a computer for backup. If you are setting up multiple identical chassis, you can also import a configuration from a file on the hard drive of the a computer to each chassis.

**NOTE:** This section assumes you are familiar with the TFTP utility. For more information about TFTP see Basic TFTP Operation on page 16-34.
The following table describes the fields in the import/export panel.

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Import</td>
<td>Imports a configuration file from the hard drive of the computer located at the specified IP address into the edit buffer. See Importing a Chassis Configuration on page 19-5 for detailed instructions.</td>
</tr>
<tr>
<td>Export</td>
<td>Exports the currently running configuration to a file on the hard drive of the computer located at the specified IP address. See Exporting a Chassis Configuration on page 19-5 for detailed instructions.</td>
</tr>
</tbody>
</table>

**Exporting a Chassis Configuration**

When you export a chassis configuration, a file with the name `chassis.cfg` is saved to the TFTP server’s base directory on the computer running your TFTP program. This file contains all of the configuration profiles for the chassis from which it was exported. Another copy of `chassis.cfg` is written to the chassis system directory.

To export a chassis configuration file:
1. Connect a crossover Ethernet cable to the ENET1 port on the master module.
2. Plug the other end of the cable into the Ethernet port of your PC.
3. Open your TFTP program, and leave it running in the background.
4. In the Export pane, type the IP address of the computer to which you want to save the `chassis.cfg` file and click Export. A file with the name `chassis.cfg` is saved to the base directory specified for the TFTP server.
5. When the export is complete, a message box confirms the successful file export.

**Importing a Chassis Configuration**

After you create a set of configuration profiles for one chassis and export it as a `chassis.cfg` file, you can import the file to set up additional, identical chassis. Before a configuration file can be imported, it must meet the following requirements.

- The file you import must have the name `chassis.cfg`. The file must be located in the TFTP server’s base directory on the computer running your TFTP program.
- If a file with the name `chassis.cfg` already exists in the system directory, the import will fail. Before you an import a new `chassis.cfg` file, you must delete or rename the existing file in chassis’ system directory using the CLI. For more information about the file management commands available through the CLI, select the desired command from the system mode commands listed on system on page 11-319.

To import a chassis configuration file:
1. Connect a crossover Ethernet cable to the ENET1 port on the master module.
2. Plug the other end of the cable into the Ethernet port of your PC.
3. Start your TFTP program, and leave it running in the background.
4. In the **Import** pane, type the IP address of the computer from which you want to import the chassis.cfg file and click **Import**. A file with the name **chassis.cfg** is saved to module.

5. When the import is complete, a message box confirms the successful file import.

6. Reset the master card to activate the configuration (see *Resetting the Modules* on page 20-12).

7. If necessary, make changes to the configuration settings as described in remainder of this chapter.

---

**Recommended Configuration Sequence**

MASTERseries modules should be configured in the order presented in the following sections. Click on each of the steps below to see detailed information about each configuration step.

1. **Set the Date and Time**
2. **Open a Configuration Profile**
3. **Set the Link Parameters**
4. **Configure the System Timing**
5. **Configure the V.35 Port Parameters**
6. **Configure the Multi-Service Ports**
7. **Define the ABCD Signaling Patterns**
8. **Define the Data Patterns**
9. **Configure the Internal Timeslot Connections**
10. **Configure APS for Link Failures**
11. **Save the Configuration**
12. **Activate the Configuration**

In addition to performing preceding configuration operations, you may want to perform the following operations:

- **Set the System Name and Location**
- **Manage Users**
- **Change Your Password**
- **Set the Console Parameters**
- **View the Logs**

**NOTE:** You can also perform the configuration steps using the TUI as described in *Chapter 5, TUI Configuration*. 
Set the Date and Time

To set the date and time, select Date & Time from the Setup menu.

The Setup Date & Time window displays. This window is divided into two panels, Manual for manually setting the date and time and Network, for retrieving the time and date settings from a server.

Manually Setting the System Date & Time

1. Select Set Manually.
2. In the Manual panel, select the desired Year, Day, Month, Hour and Minute.
3. Click Save. The updated date and time displays in the status bar.

Using SNTP to Set the System Date & Time

To retrieve the time and date settings from a network server using SNTP:

1. Select Set via SNTP.
GUI Configuration
Set the Date and Time

2. Enter the required information in the Network panel.

   ![Network Panel]

   a. Enter the IP Address of the server from which the time and date information will be retrieved.
   b. Select the Synchronization Frequency. The synchronization frequency determines how often the time and date are updated.
   c. Select the Packet Transfer Protocol.

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>unicast</td>
<td>Data is synchronized one server.</td>
</tr>
<tr>
<td>multicast</td>
<td>Data is synchronized with a group of servers.</td>
</tr>
<tr>
<td>anycast</td>
<td>Data is synchronized with the closest member of a group.</td>
</tr>
</tbody>
</table>

4. If desired, select **Enable Timezone Offset** to set the timezone name and the number of hours and minutes this timezone is offset from the universal time clock (UTC).

5. Click **Save**. The updated date and time displays in the status bar.
Open a Configuration Profile

Before you can use the configuration settings you modify in the following sections, you must open a configuration profile in the configuration editor. You can create a new configuration or you can modify an existing configuration.

Use the following steps to access the configuration editor.

1. Select Options from the Configuration menu. The Configuration Options window displays.
2. If you want to edit a previously saved configuration, select the number of the desired configuration profile from the Load From pulldown list. If you want to create a new profile, select New from the pulldown list.
3. Click Load to load the selected configuration into the configuration editor.
4. Begin modifying the configuration parameters as described in the following sections.
Set the Link Parameters

Link parameters set the configuration options for the individual T1 and DS3 links. These parameters include setting the framing format, the Line Build Out value, and enabling and disabling various alarms.

Configuring T1 Links

The T1 Links are located under the DS1 node in the Tree View. To access the configuration settings for a specific link, this screen, click on the desired link.

The Link Details window for the selected link displays.
### GUI Configuration

Set the Link Parameters

The following table describes the fields in the Link Details window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link Status</td>
<td>Read Only. Indicates the current status of the selected link.</td>
</tr>
</tbody>
</table>
| Link Number         | Read only. Indicates the identifier for the DS1 link being configured. The identifier is in the form `{slot-number}{interface-type}{port-number}`, as follows:  
  slot-number – Range is 1 – 8  
  interface-type – L  
  port-number – Range is 01 – 16 |
| Link Name           | Type a name for the local side of this link. Valid names can be blank or up to 11 alphanumeric characters and are case sensitive.          |
| Destination Name    | Type name for the destination side of this link. Valid names can be blank or up to 11 alphanumeric characters and are case sensitive.      |
| Framing Format      | Select the link framing format.                                                                                                             |
| Line Build Out      | Select the output attenuation level of the T1 link. (This prevents overdriving and cross-talk on short lines.)  
  Available values: 0dB (Default), 7.5dB, 15dB, 22.5dB.                                      |
| Disable Alarm       | Enable or disable the alarm reporting features of the selected link. Before disabling a link, you should remove any configured traffic including management channels and clock sources associated with that link.  
  No – (Default) Enables alarm reporting for the specified link.  
  Yes – Use if the link is not being used and you want to prevent alarms from being reported on the link.    |
| Idle Code (Hexadecimal) | Enter the hexadecimal value for the idle code to be transmitted on each link.  
| Cross Alarm         | Enable or disable Cross Alarm Indication Signaling (CrossAIS) for each link.  
  No – (Default) Use if the link is not being used and you want to prevent alarms from being reported on the link.  
  Yes – Enables Alarm Indication Signaling for the specified link. |
| Loop Up Code (Hexadecimal) | Select the hexadecimal value for the loop up code to be transmitted on each link.  
  Loop up codes may be used to loop up mid-span repeaters. With test equipment, always remove any leading zeros from the most significant digit. For example, if the loop up code is 70 (binary coded digital equivalent 0111 0000), then enter 1110000 into your test equipment.  
  To avoid pattern duplication, the GUI allows only the following codes: 10 (Default), 20, 30, 40, 50, 60, 70. |
| Facility Data Link  | Configures the Facility Data Link (FDL) Protocol and enables performance monitoring statistics for the specified link. This data provides end-to-end error performance statistics that can be used to determine service quality.  
  Off – Default. No error collection.  
  T1_403 – (T1 ESF only) FDL operates in ANSI T1.403 mode, near end and far end.  
  PMON_D4 – (T1 D4 or T1 ERIC only) Provides superframe near end only performance monitoring. |

*MASTERseries - Release 6.01*
GUI Configuration
Set the Link Parameters

<table>
<thead>
<tr>
<th>Field</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line Code</strong></td>
<td>Select the line code to be used for the T1 link.</td>
</tr>
<tr>
<td><strong>B8ZS</strong> – (Default)</td>
<td>Generally used on newer T1 circuits.</td>
</tr>
<tr>
<td><strong>AMI</strong> –</td>
<td>Older link coding technique for T1 circuits.</td>
</tr>
<tr>
<td><strong>ATM Parameters (Available if the card is ATM enabled)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Scramble</strong></td>
<td>Enable (Default) or disable scrambling.</td>
</tr>
<tr>
<td><strong>Idle Cell Discard</strong></td>
<td>Determines whether the UNI to discard the ATM idle filler cells. Idle cells are inserted into the data stream to fill up to bandwidth when there is insufficient data being transmitted.</td>
</tr>
<tr>
<td><strong>Yes</strong> – (Default)</td>
<td>Set idle cell discard for the specified DS3 link.</td>
</tr>
<tr>
<td><strong>No</strong> –</td>
<td>Do not set idle cell discard for the specified DS3 link.</td>
</tr>
<tr>
<td><strong>Port Speed (Cells/Second)</strong></td>
<td>Read only. Displays the port speed in cells per second based on the values set above.</td>
</tr>
</tbody>
</table>

**Configuring DS3 Links**

The DS3 Links are located under the DS3 node in the Tree View. To access the configuration settings for a specific link, this screen, click on the desired link.

![Tree View](Tree View.png)

The DS3 Details window for the selected DS3 link displays.

![DS3 Details](DS3 Details.png)
The following table describes the fields in the DS3 Details window.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS3 Status</td>
<td>Read only. Indicates the current status of the selected DS3 Link.</td>
</tr>
</tbody>
</table>
| DS3 Number     | Read only. Indicates the identifier for the DS3 link being configured. The identifier is in the form `{slot-number}`{interface-type}`{port-number}`, as follows:  
  slot-number – Range is 1 – 8  
  interface-type – D  
  port-number – Range is 01 – 03 |
| DS3 Name       | Type a name for the local side of this DS3 UNI Link. Valid names can be blank or up to 11 alphanumeric characters and are case sensitive.        |
| Destination Name | Type a name for the destination side of this DS3 UNI Link. Valid names can be blank or up to 11 alphanumeric characters and are case sensitive. |
| Framing Format | This field specifies the link framing format.                                                                                               |
|                | CBit – (Default) C-Bit parity framing. Stuffing is always present.                                                                           |
|                | M23 – Multiplex 2-to-3 (also known as M13). All three C-bits in a subframe are set to 1 if stuffing occurs or to 0 (zero) if stuffing does not occur. |
| Line Build Out | Select a value to sets the output attenuation level of the DS3 link. (This prevents overdriving and cross-talk on short lines.)                  |
|                | Available values: > 255 feet, < 255 feet                                                                                                     |
| Disable DS3    | Enables or disables the selected link. Before disabling a link, you should remove any configured traffic including management channels and clock sources associated with that link.  
  No – (Default) Enables alarm reporting for the specified link.  
  Yes – Use if the link is not being used and you want to prevent alarms from being reported on the link. |
| Transmit Clock | Selects the timing source for the link.                                                                                                |
|                | Internal – (Default) The link uses the chassis clock, as configured in the System Timing view (see Configure the System Timing on page 19-14 for detailed information).  
  This is the recommended mode of operation when a synchronous network is desired, for example when running CES.  
  Loop – The link uses clocking derived from the incoming link. |
| Data Mapping   | Select the how ATM data is mapped.                                                                                                         |
|                | Direct – (Default) ATM data is mapped to ATM cell boundaries based on the HEC field in the ATM cell header                                 |
|                | PLCP – Cells are mapped into the DS3 data stream using the ATM Physical Layer Convergence Protocol (PLCP) The PLCP mapping is a high overhead protocol and reduces the DS3 bandwidth from 106,000 CPS to about 96,000 CPS. It also allows users to transmit an independent clock reference through the DS3 link. |
### Configure the System Timing

Configure the system timing to specify which links to use as the timing source. You can configure one primary and one or more secondary external timing sources, or an internally generated timing source. The primary source is the link that is chosen first when scanning for a new clock source. The timing source can be from any link on the master module or any slave module.

Automatic switchover to the first available secondary clock source is initiated upon failure of the primary source. Clock source availability is determined by scanning from the first available link to the last available link in the chassis. If no secondary is available, the clock will fall back to the internal timing source of the module. Automatic restoral to the primary timing source will occur only if the timing source is internal or the current secondary fails.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Loopback**    | Select the loopback mode.  
None – (Default) No loopback, or normal operation.  
Line – causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module  
Local – The local loopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.  
Payload – The payload loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, with the exception that the framing and CRC-6 bits are reinserted to the transmit signal stream. The receive signal to the module is not affected by the loopback. |
| **FEAC LB Enabled** | Enables or disables the Far End Alarm and Control (FEAC) Loopback function. If this function is enabled and the DS3 receives a FEAC loopback code, the DS3 data will be looped back to the remote end.  
No – (Default) Disable the Far End Alarm and Control (FEAC) Loopback function for the specified link.  
Yes – Enable the Far End Alarm and Control (FEAC) Loopback function for the specified link. |
| **FEAC LB Required** | Forces the sending of a FEAC Loopback code to the remote end which should cause the data to be looped back (if the remote end has FEAC enabled).  
No – (Default) Do not send a FEAC Loopback code to the remote end for the specified link.  
Yes – Send a FEAC Loopback code to the remote end for the specified link. |
| **ATM Parameters** |                                                                                                                                                |
| Scramble         | Enable (Default) or disable scrambling.                                                                                                           |
| Idle Cell Discard | Determines whether the UNI to discard the ATM idle filler cells. Idle cells are inserted into the data stream to fill up to bandwidth when there is insufficient data being transmitted.  
Yes – (Default) Set idle cell discard for the specified DS3 link.  
No – Do not set idle cell discard for the specified DS3 link. |
| Port Speed (Cells/Second) | Read only. Displays the port speed in cells per second based on the values set above.                                                         |
Access the system timing configuration option from the Setup menu.

![Setup Menu](image)

The Setup System Timing window displays. The columns in this window can be resized by dragging the column separators.

![System Timing Window](image)

To set timing:

1. Select a Clock Mode.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>The timing source is the internal crystal of the module (±25ppm). This is the default.</td>
</tr>
<tr>
<td>External</td>
<td>The timing source is derived from the network using loop timing.</td>
</tr>
</tbody>
</table>

2. Select the links to be used as timing sources. A primary source must be selected if the clock mode is set to external to prevent synchronization problems. To simplify system administration, make the system timing source settings for each of the 16 configuration files identical.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>(Default) Indicates that this link is not a timing source.</td>
</tr>
<tr>
<td>Pr (primary)</td>
<td>Sets the selected link as the primary timing source for the chassis. You can select only one primary source.</td>
</tr>
<tr>
<td>Se (secondary)</td>
<td>Sets the selected link as an alternate timing source that can be used if the primary source fails. There is no limit to the number of secondary timing sources that can be used.</td>
</tr>
</tbody>
</table>

3. Click Save.
Configure the V.35 Port Parameters

To configure the V.35 port parameters, click on the desired port in the Tree View.

The parameters for the port display in the Detail View.

The following table describes the fields in the V.35 Configuration window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card Number</td>
<td>Read only. Indicates the card (module) for which the V35 port is being configured.</td>
</tr>
<tr>
<td>Port ID</td>
<td>Read only. Indicates the identifier for the V35 port being configured. The identifier is in the form slot-number interface-type port-number, as follows: slot-number – Range is 1 – 8 interface-type – P port-number – 01</td>
</tr>
<tr>
<td>Port Name</td>
<td>Type name for the destination side of this port. Valid names can be blank or up to 11 alphanumeric characters and are case sensitive.</td>
</tr>
<tr>
<td>Clock Source</td>
<td>Select the data port clock sources for each port. Internal – (Default) the system supplies a clock synchronized to the network. External – The clock is supplied by an external CPE device (sometimes called 306 mode in other devices).</td>
</tr>
<tr>
<td>Port Type</td>
<td>Read only. Port type has a fixed value of DACS.</td>
</tr>
<tr>
<td>Interface Type</td>
<td>Read only. Identifies the interface type as V.35.</td>
</tr>
</tbody>
</table>
GUI Configuration
Configure the Multi-Service Ports

Configure the Multi-Service Ports

Use the Multi-Service Port Configuration window to configure the management port and the connection rate of the management channel to a remote site. Sixteen multi-service ports are available for each card (module).

To configure a Multi-Service (MSRV) port, click the desired port in the Tree View. The parameters for the port display in the Detail View.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Rate</td>
<td>Sets the data rate for each DS0 to which a V.35 is cross-connected.</td>
</tr>
<tr>
<td>Nx64</td>
<td>64 kbps operation (Default)</td>
</tr>
<tr>
<td>Nx56</td>
<td>56 kbps operation with bit stuffing</td>
</tr>
<tr>
<td>Connection Rate</td>
<td>Read only. Displays the connection rate, which is equal to the base rate multiplied by the number of timeslots assigned in the Cross Connect window. (For more information about the Cross Connect window, see Cross Connect Window on page 19-20.)</td>
</tr>
<tr>
<td>Time Port</td>
<td>Read only. The status of the data port clock source for the selected port.</td>
</tr>
<tr>
<td>Destination Link Name</td>
<td>Read only. Displays the name of the link to which the time port is dropped. The user-specified link name is configured in the Name field on the link screen. For more information about the Link screen, see Set the Link Parameters on page 19-10.</td>
</tr>
<tr>
<td>Assigned Timeslots</td>
<td>Read only. Shows the number of timeslots assigned to the connection.</td>
</tr>
<tr>
<td>CTS (Clear To Send)</td>
<td>Configures the operation of the CTS signaling lead.</td>
</tr>
<tr>
<td>Auto</td>
<td>(Default) Follows RTS (Request to Send)</td>
</tr>
<tr>
<td>On</td>
<td>Signal is forced high.</td>
</tr>
<tr>
<td>DSR (Data Set Ready)</td>
<td>This field configures the operation of the DSR signaling lead.</td>
</tr>
<tr>
<td>Auto</td>
<td>(Default) Follows DTR (Data Terminal Ready)</td>
</tr>
<tr>
<td>On</td>
<td>Signal is forced high.</td>
</tr>
<tr>
<td>DCD (Data Carrier Detect)</td>
<td>This field configures the operation of the DCD signaling lead.</td>
</tr>
<tr>
<td>Auto</td>
<td>(Default) If the link that this port is connected to is in alarm, the DCD is turned off. If the alarm status is green, yellow, or minor the DCD is on.</td>
</tr>
<tr>
<td>On</td>
<td>Signal is forced high.</td>
</tr>
</tbody>
</table>
Define the ABCD Signaling Patterns

The ABCD signaling pattern is transmitted when the link first enters the alarm state. After the first 2.5-second interval, the abcd signaling pattern is transmitted until the alarm state clears.

To access the Signaling window, select Signaling from the Alarms menu.

The Alarms Signaling window displays. Use this window to define the ABCD/abcd signaling patterns. If no conditioning signal is specified, then the incoming signaling bit pattern will be frozen during alarm states.
You can enter up to nine Trunk Conditioning Signaling Patterns (in the form ABCD/abcd). The patterns defined here can be assigned to each time slot configured for robbed bit or CAS signaling of each link using the ABCD/abcd field on the connect screen. (CASD2 and robbed signaling are only supported link to link). See Defining ABCD/abcd Signaling Patterns on page 5-16 for more information.

**Define the Data Patterns**

Datacodes are 8-bit binary the trunk conditioning data patterns to be transmitted on the specified timeslot when the link is in an alarm state. The datacodes defined here can be assigned to each timeslot configured for bypass using the Datacode field on the Cross Connect window (for more information about the Cross Connect window, see Cross Connect Window on page 19-20).

To access the Alarms Datacodes window, select Datacodes from the Alarms menu.

The Alarms Datacodes window displays. Use this window to configure the Trunk Conditioning Datacodes (in 8-bit binary). If you do not define any datacodes, then the default 7E (hex) datacode will be sent.
Configure the Internal Timeslot Connections

This section describes how to create internal timeslot connections for link interfaces. A link can be:

- Connected to other links
- Connected to physical ports
- Connected to logical management ports
- Left idle

See Chapter 5, Configuring Internal Timeslot Connections for additional information about timeslot connections.

Cross Connect Window

To access the Cross Connect window, select Timeslot Cross Connect from the Connect menu.

The Cross Connect window displays. Use this window to add or remove timeslot cross connections. The Source, Destination, and Options panes can be resized by dragging the bars separating them. The columns in the Connection list can be resized by dragging the column separators.
To create a cross connect between links:
1. Select the desired link in the Source pane.
2. Select the link to which you want to make the timeslot cross connect in the Destination pane.
3. If desired, enter a name for the cross connect.
4. Click Add to create the connection.

To remove a cross connect between links:
1. Select the desired connection in the Connections list.
2. Click Remove to delete the connection.
GUI Configuration
Configure APS for Link Failures

Configure APS for Link Failures

Automatic Protection Switching (APS) configures how MASTERseries responds to link failures. For example, you can configure MASTERseries to switch to an alternate link when another link fails (red, blue/AIS or yellow alarm). If a link fails or degrades below the user-defined thresholds, APS can automatically re-route and/or vary link or channel parameters. When the failed link has been restored to service, the APS feature can be configured to automatically return to the original configuration or remain on the switched configuration.

APS configurations cannot be nested (that is, APS cannot protect against simultaneous multiple failures). However, when an APS condition clears, the module scans links for alarms starting with link 1L01. If an alarm condition is found on another link configured for APS, then an APS switch will be performed for that particular link.

APS will NOT switch configurations if a link is already in alarm when it is configured for APS, no switch will occur when the configuration is committed. An APS switch only occurs on the “transition” of a link from the green state to the red alarm status.

If APS is set for a link on the master module and the master module fails, then a master toggle will take priority over APS. The new master will take over and continue to run the current configuration.

The following figure shows a typical APS application.

Normal Operation—Network Link 1 carrying traffic to Port E and Link 4; Link 3 carrying traffic to Link 2

LINK 1 Fails—Port E switches to Link 2 and reduces traffic to Link 4; Reduces traffic to Link 3

LINK 2 Fails—Maintain Port E, Reduce traffic to Link 4; Reduce traffic to Link 3
To access the Auto Protection Switch window, select the desired card in the Tree View, right-click to display the context menu, and select Auto Protection Switch.

The Card Auto Protection Switch window displays. For each link, select the configuration you want to use for the APS. In the event of a link failure, the system performs an automatic protection switch to the specified configuration.

The following table describes the fields in the Auto Protection Switch window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>Read only. This indicates the link in the selected module.</td>
</tr>
</tbody>
</table>
| Config (Configuration) | This field lists the available configurations. From this list select the configuration to be used in the event of a link failure.  
**NO APS** – (Default) The system does not use APS.  
**CFG 1** through **CFG 16** – Use the dropdown list to select the configuration to use for APS. Do not select the currently running configuration. The system will not perform APS if you select the same configuration for APS as your running configuration. |
| Ret (Return) | Use the pulldown list to specify whether the system uses the original configuration for the link when the link returns to normal.  
**No** – (Default) Continue to use the APS configuration.  
**Yes** – Return to the original configuration. |
**APS Switch Indicator**

The status bar in the GUI always displays the currently running configuration (for example, RUN: CFG 1). When an APS switch occurs, the display changes to show [currently running CFG]/[previously running CFG].

In the example below, **RUN: CFG 2/1** indicates that an APS switch has occurred. The configuration now running is 2, and the configuration that was running before the APS was config 1.
Configure Threshold Alarms

The Threshold Alarms window configures which links will signal an alarm when a user-defined threshold is exceeded. A threshold is a specified level of unavailable/error seconds for links that have performance monitoring enabled. Performance monitoring is enabled using the Protocol field on the Link window. See Configuring T1 Links on page 19-10 for more information.

To access the Threshold Alarms window, select the desired card in the Tree View and right-click to display the context menu. Select Threshold Alarms.

The Threshold Alarms window for the selected card displays.

The following table describes the fields in the Threshold Alarms window:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Force Link to RED| Select whether the link will be forced to an alarm state when the threshold values for UAS and ES are met.  
No – (Default) The link will be forced into a minor alarm state when the threshold values configured for UAS and ES are met.  
Yes – The link will be forced into an alarm state when the threshold values configured for unavailable seconds (UAS) and errored seconds (ES) are met. This is very effective if APS is being used. |
| UAS State        | Select whether unavailable seconds (UAS) will generate an alarm.  
Disable – (Default) UAS levels will not generate an alarm.  
Enable – Triggers an alarm when the UAS threshold is exceeded in a 15-minute sliding window. A minor UAS alarm is generated if Force link to RED is set to no. A major alarm is generated if Force link to RED is set to yes. |
| UAS Threshold    | Enter the number of unavailable seconds allowed during a 15-minute sliding window before an alarm is declared for the specified link. Valid values are from 0 – 900 seconds. |
GUI Configuration
Configure the Idle Signaling Patterns

<table>
<thead>
<tr>
<th>Field</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES State</td>
<td>Select whether errored seconds (ES) will generate an alarm.</td>
</tr>
<tr>
<td></td>
<td><strong>Disable</strong> – (Default) ES levels will not generate an alarm.</td>
</tr>
<tr>
<td></td>
<td><strong>Enable</strong> – Triggers an alarm when the ES threshold is exceeded in a 15-minute sliding</td>
</tr>
<tr>
<td></td>
<td>window. A minor ES alarm is generated if <strong>Force link to RED</strong> is set to no. A major</td>
</tr>
<tr>
<td></td>
<td>alarm is generated if <strong>Force link to RED</strong> is set to yes.</td>
</tr>
<tr>
<td>ES Threshold</td>
<td>Enter the number of errored seconds allowed during a 1-minute sliding window before an</td>
</tr>
<tr>
<td></td>
<td>alarm is declared for the specified link. Valid values are from 0 – 900 seconds.</td>
</tr>
</tbody>
</table>

**Configure the Idle Signaling Patterns**

**NOTE:** This feature is not supported in release 6.01. Instead, the idle code is set when you configure the T1 links, as described in Configuring T1 Links on page 19-10.

The idle signaling pattern is a repetitive bit pattern used to indicate that the link is idle. To access the Idle Signaling Patterns menu, select Idle Signaling Patterns from the Setup menu.

The Idle Signaling Patterns window displays.

You can define up to eight idle signaling bit patterns.
Save the Configuration

After setting the configuration parameters as required, you must save (commit) the configuration as a configuration profile before it can be used. If you edited the running configuration, you can assign it a new configuration number or use the current number.

Use the following steps to save your configuration.

1. Select Options from the Configuration menu. The Configuration Options window displays.
2. Select the number you want to use for configuration profile from the Save To pulldown list and click Commit.

Activate the Configuration

A saved configuration must be activated before it is used to control the operation of the system. If you modified the running configuration, you must reactivate the configuration before the changes you made take effect.

Use the following steps to begin using a different profile from the one currently in use.

1. Select Options from the Configuration menu. The Configuration Options window displays.
2. Select the number of the configuration profile you want to use from the Activate Profile pulldown list and click Activate.
**Set the System Name and Location**

If desired, you can create a system name and location to identify the chassis and where it is located. You can also include the name or phone number to contact for assistance.

To specify a custom system name, location, and system contact:

1. Select the System Node from the Tree View. The System Details window displays in the Detail View.

2. Type a name in the System Name field. The name can be up to 64 alphanumeric characters and is case sensitive. This information is optional.

3. Type the location of the system. The name can be up to 64 alphanumeric characters and is case sensitive.

4. Type the name or phone number of the main system contact for this chassis. This information is optional.

5. Click **Save**. Clicking **Reset** clears all of the editable fields.

**NOTE:** This system name is not related to the MIB II sysName object.
Manage Users

The Users option under the Admin menu allows an Administrator or Superuser to perform user management operations, including adding and deleting users, setting user roles, and resetting passwords. The Users option is only available when a user with Administrator or Superuser user role is logged into the system.

To access the user management options, select Users from the Admin menu.

The following table describes the fields in the Users window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td>Shows the name of the currently selected user. To create a new user, enter a username of up to 32 characters. User names are case-sensitive.</td>
</tr>
</tbody>
</table>
| User Role  | Select the user type.  
Manager – Read and write privileges, including user access management.  
Operator – (Default) Read and write privileges, excluding user access management.  
Allmonitor – Read only privileges.                                              |
| Password   | Enter a password for the user. Passwords can use up to 32 characters and are case-sensitive.                                                |
| Confirm PW | Re-enter the user's password for verification purposes.                                                                                     |
| User List  | Lists of all existing users and their roles. To select a user for modification, click on the user’s name in the list. The selected name appears in the Username field. |

Adding a User

To add a user:
1. Type a name for the user in the Username field.
2. Select a role for the user from the User Role list.
3. Type a password for the user in the Password field.
4. Re-type a password for the user in the Confirm PW field.
5. Click Add. The new user’s name and role is added to User list in the lower part of the window.
Modifying an Existing User

To modify a user:
1. Select the user from the list in the lower half of the Users view. The user’s information fills in the User Information fields. You can edit the user role and the password, but not the name.
2. Edit the fields and click **Modify**. A dialog box appears, confirming the successful modification.

Deleting an Existing User

To delete a user:
1. Select the user from the list in the lower half of the Users window or type the user’s name in the Username field.
2. Click **Delete**. A dialog box appears, confirming the successful deletion.
**Change Your Password**

The Password option under the Admin menu allows the currently logged in user to change their own password. To access the user management options, select from the Admin menu.

The Admin Password window displays.

![Admin Password Window](image)

The following table describes the fields in the Admin Password window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td>Read only. The name of the currently logged in user.</td>
</tr>
<tr>
<td>Old Password</td>
<td>Type your current password. Passwords are case sensitive.</td>
</tr>
<tr>
<td>New Password</td>
<td>Type your new password. Passwords can use up to 32 characters and are case-sensitive.</td>
</tr>
<tr>
<td>Confirm Password</td>
<td>Re-enter your password for verification purposes.</td>
</tr>
</tbody>
</table>

To change your password:

1. Select the **Password** option from the **Admin** menu. The Admin Password window appears.
2. Type your current password in the **Old Password** field.
3. Type your new password in the **New Password** field, then type it again in the **Confirm Password** field.
4. Click **Modify** to complete the change. Clicking **Reset** clears all of the fields.
Set the Console Parameters

The Console option under the Setup menu is used to configure the serial communication settings for the NMS port on the master module for the chassis. This port is used with the network management cable for local access from a PC or VT terminal to the MASTERseries module.

To access the user management options, select **Console** from the **Setup** menu. The Setup Console window displays.

![Setup: Console](image)

The following table describes the fields in the Setup Console window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Only one choice is currently available: <strong>Console</strong>.</td>
</tr>
<tr>
<td>Rate</td>
<td>Select the data rate management port.</td>
</tr>
<tr>
<td></td>
<td><strong>4800</strong> bps</td>
</tr>
<tr>
<td></td>
<td><strong>9600</strong> bps (default)</td>
</tr>
<tr>
<td></td>
<td><strong>19200</strong> bps</td>
</tr>
<tr>
<td></td>
<td><strong>IMPORTANT</strong>: If the Rate option is improperly set, the MASTERseries will not be accessible through the NMS port. The boot-up screen and the Carrier Access copyright screen are defaulted to 9600 baud. If the console speed is set to a baud rate other than 9600 and the unit is power cycled, the opening screens will not display, but the menus will.</td>
</tr>
<tr>
<td>Data</td>
<td>Read only. Indicates the number of data bits in a character. This is value is always 8.</td>
</tr>
<tr>
<td>Stop</td>
<td>Read only. Indicates the number of stop bits in a character. This is value is always 1.</td>
</tr>
<tr>
<td>Parity</td>
<td>Read only. Indicates the type of parity checking. This is value is always None.</td>
</tr>
</tbody>
</table>
GUI Configuration
Launch a Telnet Session

Launch a Telnet Session

A Telnet session can be used to access the TUI or the CLI. These interfaces provide alternative methods for performing configuration operations. For more information about the TUI, see Chapter 5, TUI Configuration. For more information about the CLI, see Chapter 11, CLI Commands.

Before you can use the Telnet session, you must connect an NMS cable between the master card and a VT100 terminal or the serial port of PC running VT100 terminal emulation software.

To access the Telnet option, select Telnet from the Admin menu. A Telnet session launches and connects to the IP address of the card connected to the NMS cable. The Login screen for the card displays. The Telnet session uses the default VT100 terminal or VT100 terminal emulation software. For a Windows PC, the default terminal emulation software is typically HyperTerminal.
GUI Diagnostics

In this Chapter

- Overview
- Performing Link Diagnostics
- Performing Port Diagnostics
- Resetting the Modules
GUI Diagnostics
Overview

Overview

This chapter covers the diagnostic capabilities available through the GUI. Be sure that you have completed the basic setup described in *Recommended Configuration Sequence* on page 19-6.

Performing Link Diagnostics

To perform diagnostics on a link, right-click on the link in the Tree View to display the context menu and then select Diagnostics.

**NOTE:** Diagnostics for the DS3c-3 Module, including Loopbacks, are found under the Flex > Uni menu in the TUI. For more information, see *Setting UNI Link Parameters* on page 13-4

The Diagnostics window displays. The window is divided into four panes. The following sections describe the options available in each pane.
**Guid Diagnostics**

**Performing Link Diagnostics**

## Link

The following table describes the information in the Link pane of the Diagnostics window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame</td>
<td>Read only. Indicates the frame format of the selected link. The frame format is set from the link details view (see <em>Set the Link Parameters</em> on page 19-10).</td>
</tr>
<tr>
<td>Line Code</td>
<td>Read only. Indicates the code type on the selected link. The line code is set from the link details view (see <em>Configuring T1 Links</em> on page 19-10).</td>
</tr>
<tr>
<td>Disabled</td>
<td>Read only. Indicates the setting of the Disable Alarm Reporting or Disable DS3 option for the selected link. The line code is set from the link details view (see <em>Set the Link Parameters</em> on page 19-10).</td>
</tr>
<tr>
<td>Protocol</td>
<td>Read only. Indicates the setting of the Facility Data Line Protocol option for the selected link. The line code is set from the link details view (see <em>Set the Link Parameters</em> on page 19-10).</td>
</tr>
</tbody>
</table>

## Loopback Test

The following table describes the Loopback Test pane of the Diagnostics window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback Type</td>
<td>Select the loopback type. See <em>Link Loopback Diagrams</em> on page 20-4 for a description of each loopback type. <strong>None</strong> – (Default) No loopback  <strong>Local</strong> – Local loopback  <strong>LocAis</strong> – Local AIS (T1) loopback  <strong>Payld</strong> – Payload loopback  <strong>RemLL</strong> – Remote line loopback  <strong>RemPL</strong> – Remote payload loopback (EFS only)</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>Enter the number of minutes you want to run this loopback test (1–999). Entering 0 causes the loopback to run indefinitely.</td>
</tr>
<tr>
<td>Start</td>
<td>Starts the loopback test.</td>
</tr>
<tr>
<td>Stop</td>
<td>Stops the currently running loopback test. This option is grayed out if no test is running.</td>
</tr>
</tbody>
</table>

**NOTE:** Diagnostics for the DS3c-3 Module, including Loopbacks, are found under the Flex > Uni menu. For more information, see *Setting UNI Link Parameters* on page 13-4
## Link Loopback Diagrams

The following table illustrates the behavior of the loopback options available when performing link loopback diagnostics. These loopback tests conform to ANSI T1.403, TR 54106, and PUB 62411. Whenever a loopback is active on a network interface, the front panel LED for that link flashes yellow (approximately once per second) to provide a visual indication that a loopback test condition is present.

<table>
<thead>
<tr>
<th>Loopback Diagram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>None</strong> – No loopback (normal operation). This setting is also used to abort an active loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>Local</strong> – Local Loopback. The local loopback is performed using transceiver circuitry. This test verifies proper operation of the unit up to the transceiver on the link interface.</td>
<td></td>
</tr>
<tr>
<td><strong>LocAIS (T1)</strong> – Local AIS Loopback. This loopback is the same as a local loopback except that AIS is sent to the far end while the loopback is activated.</td>
<td></td>
</tr>
<tr>
<td><strong>Line</strong> – Line Loopback. The line loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, allowing the line connected to the interface to be tested independently of the module. The receive signal to the module is not affected by the loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>Payld</strong> – Payload Loopback. The payload loopback causes the receive signal at the DS1 interface to be internally routed to the transmitter of the module, with the exception that the framing and CRC-6 bits are reinserted to the transmit signal stream. The receive signal to the module is not affected by the loopback. Multiframe alignment of signaling is not guaranteed during the payload loopback.</td>
<td></td>
</tr>
<tr>
<td><strong>RemLL</strong> – Remote Line Loopback. The remote line loopback is a loopback sent to the far end of the link. It is the same as a Line Loopback described above.</td>
<td></td>
</tr>
</tbody>
</table>
Performing Link Diagnostics

**NOTE:** An inactive BERT screen is presented if no BERT is connected and no test is running. After you select the required link, the link parameters are displayed. If a BERT is active, the BERT section of the Linkdiag screen displays the current BERT results on that link. Default BERT parameters are displayed if the test is not active. The **State** field indicates the ACTIVE or INACTIVE state of the BERT. BERT operations are independent of the loopback operations and can be performed in conjunction with the loopback operations.

The following table describes the options in the BERT Test pane of the Diagnostics window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direction</strong></td>
<td>Read only. Indicates the direction of the BERT. Only one direction is available:</td>
</tr>
<tr>
<td></td>
<td><strong>To Network</strong>  – Egress BERT only, out the link toward the T1 circuit (Network) not ingress toward the Time Slot Interchanger (TSI). The BERT will only work if all of the timeslots on the link under test are being used and the type field is populated with a value other than idle. If all timeslots are dropped to a port or assigned as MSrv the state will be ACTIVE and the SYNC will be IN and the BERT will run. If the link under test is a full bypass to another link, the link not being tested must not be in alarm for the state to become ACTIVE and IN SYNC.</td>
</tr>
<tr>
<td><strong>Pattern</strong></td>
<td>Select from one of the following patterns:</td>
</tr>
<tr>
<td></td>
<td><strong>Marks</strong>  – (Default) Repetitive pattern of 1’s</td>
</tr>
<tr>
<td></td>
<td><strong>Spaces</strong>  – Repetitive pattern of 0’s</td>
</tr>
<tr>
<td></td>
<td><strong>511</strong>   – Pseudorandom pattern of length 511 bits</td>
</tr>
<tr>
<td></td>
<td><strong>2047</strong>  – Pseudorandom pattern of length 2047 bits</td>
</tr>
<tr>
<td></td>
<td><strong>2^15-1</strong> – Pseudorandom pattern of length 215-1 bits</td>
</tr>
<tr>
<td></td>
<td><strong>QRSS</strong>  – Quasi random signal - 2^20-1</td>
</tr>
<tr>
<td><strong>BERT Timeout</strong></td>
<td>This field sets the duration of BERT. Enter 0 and BERT will run indefinitely. The maximum duration is 24 hours.</td>
</tr>
</tbody>
</table>
Performing Link Diagnostics

Current Test Status

The Current Test Status panel provides status information for the loopback and BERT tests for the selected link.

Loopback Status

The Loopback Status panel shows the settings for the currently running loopback test. The following table describes the fields in this panel. For more information about the available loopback types see Link Loopback Diagrams on page 20-4 These fields are read-only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback Type</td>
<td>Indicates the current loopback type.</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>The currently set timeout set for the loopback test.</td>
</tr>
</tbody>
</table>
**BERT Status**

The BERT Status panel shows the status for the currently running BERT test. The following table describes the fields in this panel. These fields are read-only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| **State**   | BERT results are gathered every five seconds during a BERT test. The window is updated with the last results.  
**ACTIVE** – BERT test is in progress.  
**INACTIVE** – BERT is not connected. |
| **Sync**    | State of synchronization of the interface. Pseudorandom patterns synchronized after 34 +n bits are received without error. Repetitive patterns synchronized when a received pattern of the same length matches the transmitted pattern.  
**IN** – The interface is in sync.  
**OUT** – The interface is out of sync. |
| **Sync Lost** | Number of times the interface has lost sync after gaining initial sync. (Initial sync, in this manual indicates the first time the interface under test gains sync. All BERT counts, Sync lost, Bit count, Bit errors, and Error rate are reset when BERT is started. Incrementing the count begins only after the interface gains initial sync.) |
| **Bit Errors** | Number of error bits received after gaining initial sync. |
| **Lapsed Time** | Number of minutes elapsed since test was started. |
**Performing Port Diagnostics**

MASTERseries supports diagnostic loopback and BERT functions on any ports in the MASTERseries unit. To perform diagnostics on a port, right-click on the port in the Tree View to display the context menu and then select **Diagnostics**.

The Diagnostics window displays. The window is divided into four panes. The following sections describe the options available in each pane.
GUI Diagnostics
Performing Port Diagnostics

Port

The following table describes the fields on the Port pane of the Diagnostics window:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Read only. It refers to the associated port type.</td>
</tr>
<tr>
<td>Interface</td>
<td>Read only. It refers to the configured interface setting.</td>
</tr>
<tr>
<td>Rate</td>
<td>Read only. Indicates the amount of configured bandwidth assigned to the selected port. This reflects the Connection Rate calculated in the port configuration as described in Configure the V.35 Port Parameters on page 19-16.</td>
</tr>
</tbody>
</table>

Loopback Test

The following table describes the Loopback Test area of the diagnostics window:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback Type</td>
<td>Select the loopback type. See Port Loopback Diagrams on page 20-10 for a description of each loopback type. <strong>None</strong> – (Default) No loopback <strong>Local</strong> – Local loopback <strong>Remote</strong> – Remote loopback</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>Enter the number of minutes you want to run this loopback test (1–999). Entering 0 causes the loopback to run indefinitely.</td>
</tr>
<tr>
<td>Start</td>
<td>Starts the loopback test.</td>
</tr>
<tr>
<td>Stop</td>
<td>Stops the currently running loopback test. This option is grayed out if no test is running.</td>
</tr>
</tbody>
</table>

**NOTE:** Diagnostics for the DS3c-3 Module, including Loopbacks, are found under the Flex > Uni menu. For more information, see Setting UNI Link Parameters on page 13-4.
GUI Diagnostics
Performing Port Diagnostics

Port Loopback Diagrams
The diagrams in the following table illustrate the behavior of the options available when performing port loopback diagnostics. These loopbacks conform to ANSI T1.403, TR 54106, and PUB 62411. Whenever a loopback is active on a network interface, the front panel LED for that link flashes yellow (approximately once per second) to provide a visual indication that a loopback test condition is present. See Port Loopback Diagrams on page 20-10 for a description of each loopback types.

<table>
<thead>
<tr>
<th>Loopback Diagram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None – No loopback (normal operation). This setting is also used to abort an active loopback.</td>
<td></td>
</tr>
<tr>
<td>Local – Loopback towards DTE at port interface.</td>
<td></td>
</tr>
<tr>
<td>Remote – Loopback toward the DCE at the port interface.</td>
<td></td>
</tr>
</tbody>
</table>

BERT Test

NOTE: If a BERT is active, the BERT section of the portdiag screen displays the current BERT results on that port. Default BERT parameters are displayed if the test is not active. The state field indicates whether the BERT is running on this port.

The following table describes the BERT Test pane in the Diagnostics window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>Read only. Indicates the direction of the BERT. Only one direction is available: To PORT – The BERT is connected to a port in place of the TSI. The BERT data is not cross-connected through the TSI. The full bandwidth allocated to the port is used for the BERT. Changing the baud rate automatically provides more or less BERT bandwidth per frame. This requires an external loopback at the port.</td>
</tr>
</tbody>
</table>
Performing Port Diagnostics

Current Test Status

The Current Test Status panel provides status information for the loopback and BERT tests for the selected port.
GUI Diagnostics
Resetting the Modules

**Loopback Status**
The Loopback Status panel shows the settings for the currently running loopback test. The following table describes the fields in this panel. For more information about the available loopback types see *Port Loopback Diagrams* on page 20-10. These fields are read-only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback Type</td>
<td>Indicates the current loopback type.</td>
</tr>
<tr>
<td>Loopback Timeout</td>
<td>The currently set timeout set for the loopback test.</td>
</tr>
</tbody>
</table>

**BERT Status**
The BERT Status panel shows the status for the currently running BERT test. The following table describes the fields in this panel. These fields are read-only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>BERT results are gathered every five seconds during a BERT test. The window is updated with the last results. ACTIVE – BERT test is in progress. INACTIVE – BERT is not connected.</td>
</tr>
<tr>
<td>Sync</td>
<td>State of synchronization of the interface. Pseudorandom patterns synchronized after 34 +n bits are received without error. Repetitive patterns synchronized when a received pattern of the same length matches the transmitted pattern. IN – The interface is in sync. OUT – The interface is out of sync.</td>
</tr>
<tr>
<td>Sync Lost</td>
<td>Number of times the interface has lost sync after gaining initial sync. (Initial sync, in this manual indicates the first time the interface under test gains sync. All BERT counts, Sync lost, Bit count, Bit errors, and Error rate are reset when BERT is started. Incrementing the count begins only after the interface gains initial sync.)</td>
</tr>
<tr>
<td>Bit Errors</td>
<td>Number of error bits received after gaining initial sync.</td>
</tr>
<tr>
<td>Lapsed Time</td>
<td>Number of minutes elapsed since the test was started.</td>
</tr>
</tbody>
</table>

**Resetting the Modules**

After you loading a new version of software or change the IP address of the system, you must rest the modules to activate the changes.

- Make sure to save your changes before resetting a module.
- Resetting a module does not affect the time and date settings.

To reset a module:

1. Select the module in the Tree View.
2. Right-click and select Reset this Card.

![Image of GUI showing Tree View and Reset This Card highlighted]

3. If the card you selected for reset is the Master, a confirmation dialog appears before the reset is performed.

![Image of confirmation dialog indicating Master reset confirmation]

This card is the Master. All connectivity to the chassis will be lost if you reset this card. Are you sure you want to do this?

[Yes] [No]
GUI Diagnostics
Resetting the Modules
GUI Maintenance

In this Chapter

- Overview
- Viewing Logs
- Viewing Link and Port Status
- Monitoring Link Performance
- Viewing Logs
  - Link Alarm Logs
  - System Log
- Upgrading a FLEXmaster
- Converting a FLEXmaster TDM Module to ATM
Overview

This chapter covers the monitoring functions available from the GUI. Before using any of these maintenance functions, complete the basic configuration of your cards as described in Chapter 19, GUI Configuration.

Configuring Alarm Contact Closures

Use the Contact Closures window to configure the operation of the external alarm contact closures at the rear of the chassis. To access the Contact Closures settings select Contact Closures from the Alarms menu.

The Alarms Contact Closures window displays. Use the Alarm Cut-Off Mode in this window to reset, enable, or disable the external alarm contacts. After selecting the desired mode, click Save to the save setting. Any change will not take effect until you commit (save) and activate the configuration as described in Chapter 19, GUI Configuration.

The following table describes the available Alarm Cut-Off Modes.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled (Default)</td>
<td>External alarm feature is active and alarm conditions will activate the external alarm relays.</td>
</tr>
<tr>
<td>Disabled</td>
<td>External alarm feature is inactive and alarm conditions will not activate the external alarm relays.</td>
</tr>
<tr>
<td>Reset</td>
<td>Deactivates the external alarm relays for the current alarm condition. If a new alarm condition is subsequently detected, the external alarm relay will be activated again.</td>
</tr>
</tbody>
</table>
**Viewing Link and Port Status**

The Card Statistics window provides the status of the individual links and ports for each card (module).

To view the statistics, right-click on the desired card in the tree view to display the context menu and select Card Statistics. The Card Statistics window displays. The window is divided into three panes. The following sections describe the information available in each pane.

### Link Stats

The following table describes the fields in the Link Stats pane.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>Identifies the link on the selected card.</td>
</tr>
</tbody>
</table>
GUI Maintenance
Viewing Link and Port Status

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loopback</td>
<td>Shows the current loopback setting for each link in the card. See Link Loopback Diagams on page 20-4 for a description of each loopback type.</td>
</tr>
<tr>
<td></td>
<td><strong>None</strong> – (Default) No loopback</td>
</tr>
<tr>
<td></td>
<td><strong>Local</strong> – Local loopback</td>
</tr>
<tr>
<td></td>
<td><strong>LocAis</strong> – Local AIS (T1) loopback</td>
</tr>
<tr>
<td></td>
<td><strong>Payld</strong> – Payload loopback</td>
</tr>
<tr>
<td></td>
<td><strong>RemLL</strong> – Remote line loopback</td>
</tr>
<tr>
<td></td>
<td><strong>RemPL</strong> – Remote payload loopback (EFS only)</td>
</tr>
<tr>
<td>BERT</td>
<td>Indicates the status of the currently running BERT for each link in the card. See BERT Test on page 20-5 for a description of the available BERT.</td>
</tr>
<tr>
<td>Alarm State</td>
<td>Displays the current alarm state of each link. See Interpreting Alarm Indications on page 17-2 for more detailed information about alarm states.</td>
</tr>
<tr>
<td></td>
<td><strong>GREEN</strong> – No alarms.</td>
</tr>
<tr>
<td></td>
<td><strong>RED</strong> – One path of a T1/E1 link is broken. The received signal is lost at the receive end point.</td>
</tr>
<tr>
<td></td>
<td><strong>YELLOW</strong> – The received signal is lost at the receive end point.</td>
</tr>
<tr>
<td></td>
<td><strong>BLUE</strong> – The associated T1/E1 link is disabled due to a problem beyond the blue alarm end point.</td>
</tr>
<tr>
<td></td>
<td><strong>Minor</strong> – The link experienced a minor alarm condition. Minor alarms are not supported in release 6.01.</td>
</tr>
<tr>
<td>Alarm Received</td>
<td>Displays the alarm condition being received on each link. See Received Link Alarms on page 21-4 for a list of the possible alarm conditions.</td>
</tr>
<tr>
<td>Alarm Transmitted</td>
<td>Displays the alarm condition being transmitted on each link. See a list of the possible alarm conditions at Transmitted Alarm States on page 21-5.</td>
</tr>
</tbody>
</table>

**Received Link Alarms**

The following table describes the possible alarm conditions that can be received for a link.

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS</td>
<td>Alarm indication signal</td>
</tr>
<tr>
<td>B8ZS</td>
<td>B8ZS signature detected (T1)</td>
</tr>
<tr>
<td>CRC</td>
<td>CRC error detected</td>
</tr>
<tr>
<td>CZR</td>
<td>Eight consecutive zeros received (T1)</td>
</tr>
<tr>
<td>DB3</td>
<td>HDB3 signature detected (E1) *</td>
</tr>
<tr>
<td>ES</td>
<td>Errored second</td>
</tr>
<tr>
<td>INIT</td>
<td>Initialization</td>
</tr>
<tr>
<td>LAD</td>
<td>Inband loop-up activate detected (T1 D4/ERIC)</td>
</tr>
<tr>
<td>LCV</td>
<td>Line code violation</td>
</tr>
<tr>
<td>LDD</td>
<td>Inband loop-down activate detected (T1 D4/ERIC)</td>
</tr>
<tr>
<td>LOS</td>
<td>Loss of signal</td>
</tr>
<tr>
<td>MAIS</td>
<td>Multiframe alarm indication signal (E1 CAS)*</td>
</tr>
<tr>
<td>MRAI</td>
<td>Multiframe remote alarm indication signal (E1 CAS)*</td>
</tr>
<tr>
<td>NORM</td>
<td>Good signal</td>
</tr>
</tbody>
</table>
**GUI Maintenance**

**Viewing Link and Port Status**

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSL</td>
<td>Uncontrolled bit slip (E1)*</td>
</tr>
<tr>
<td>OOF</td>
<td>Out of frame</td>
</tr>
<tr>
<td>OOMF</td>
<td>Out of multiframe (E1 CAS) *</td>
</tr>
<tr>
<td>PDV</td>
<td>Pulse density violation</td>
</tr>
<tr>
<td>RAI</td>
<td>Remote alarm indication signal (E1 G.704)*</td>
</tr>
<tr>
<td>REBE</td>
<td>Remote end block error (E1)*</td>
</tr>
<tr>
<td>SESF</td>
<td>Severely errored superframe</td>
</tr>
<tr>
<td>SLP</td>
<td>Bit slip detected (E1)*</td>
</tr>
<tr>
<td>UAS</td>
<td>Unavailable second</td>
</tr>
<tr>
<td>YEL</td>
<td>Yellow alarm (T1)</td>
</tr>
</tbody>
</table>

* E1 is not supported in MASTERseries 6.01

**Transmitted Alarm States**

Displays the alarm condition being transmitted on each link. A list of the possible transmit alarm conditions and states follows:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS</td>
<td>Alarm indication signal</td>
</tr>
<tr>
<td>AisA</td>
<td>Transmitted a timeslot 0 AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>AisB</td>
<td>Transmitted a timeslot 0 AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>MAISA</td>
<td>Transmitted a timeslot 0 multiframe AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>MAISB</td>
<td>Transmitted a timeslot 0 multiframe AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>MRAIA</td>
<td>Transmitted a timeslot 0 multiframe remote AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>MRAIB</td>
<td>Transmitted a timeslot 0 multiframe remote AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>NORM</td>
<td>Normal operation</td>
</tr>
<tr>
<td>RAIA</td>
<td>Transmitted a timeslot 0 remote AIS signal on stream A of compressed link</td>
</tr>
<tr>
<td>RAIB</td>
<td>Transmitted a timeslot 0 remote AIS signal on stream B of compressed link</td>
</tr>
<tr>
<td>Yel</td>
<td>Yellow alarm</td>
</tr>
</tbody>
</table>
**GUI Maintenance**

**Monitoring Link Performance**

The MASTERseries application modules support both near and far-end performance monitoring (PMON) capabilities on T1 ESF links compliant using the ANSI T1.403 protocol. Near end performance monitoring capabilities are also implemented on T1 SF (D4) and E1 links.

The performance monitoring software collects performance parameters in one-second increments. The performance data is organized and stored for the following intervals:

- Current second
- Previous second
- Current 15 minutes
- Previous 15 minutes
- Current 24 hours
- Current 48 hours
- Current 72 hours

The current second and previous second displays provide a dynamic view of errors as they occur. These errors then move into the current 15-minute period (900 seconds).

The current 15-min display dynamically updates as performance data is being collected in the current interval. When the interval is complete the data moves to the Previous 15-min display and the most recent 15-minute interval and the current interval restart.

The current 24-hr, current 48-hr, and current 72-hr summary displays have a maximum count of 65,535 errors and are based on a sliding window of 15-minute intervals. So the current 24-hr report is an accumulation of the previous ninety-six 15-minute intervals, current 48-hr is an accumulation of the previous 192 intervals, and current 72-hr is an accumulation of the previous 288 intervals. The long report shows the same information as the short report and also includes the performance data for each complete 15-minute interval in the current 24 hour window. Each time an interval is completed previous intervals scroll down one in the list.

**NOTE:** Performance monitoring statistics for ATM modules are displayed under the Flex menu. For more information, see *Performance Monitoring* on page 13-36.

**NOTE:** AT&T TR 54016 Protocol is not supported in release 6.01.
Enabling Performance Statistics

Before you can view performance monitoring statistics for a link, you must enable performance monitoring as follows:

1. Select the desired link in the Tree View to display the Link Details window.
2. Select the desired value for Facility Data Link Protocol in the link details view.
   - OFF – (Default) No performance statistics collection.
   - T1_403 – Performance statistics collection operates in PRM mode, updating local and remote statistics every second.
   - PMON_D4 – Performance statistics collection operates in SF mode, local statistics only.
3. Click Save.

Viewing Performance Statistics

1. Select the desired link in the Tree View.
2. Right-click on the link and select Performance Statistics.
3. The Link Performance Statistics window for the selected link display in the Details View. The window is divided into two panels. All of the fields in this window are read-only.

The following table describes the fields in the upper, status panel of the Link Performance Statistics window.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link ID</td>
<td>Identifies the link for which the statistics are shown.</td>
</tr>
<tr>
<td>Protocol</td>
<td>The protocol for performance monitoring running on the link. This value is set as part of link configuration. See Configuring T1 Links on page 19-10 for more information.</td>
</tr>
<tr>
<td>Frame</td>
<td>The type of framing selected for the link. This value is set as part of link configuration. See Configuring T1 Links on page 19-10 for more information.</td>
</tr>
<tr>
<td>Link Name</td>
<td>This is the user-defined link name. This value is set as part of link configuration. See Configuring T1 Links on page 19-10 for more information.</td>
</tr>
<tr>
<td>Completed</td>
<td>This field indicates how many intervals have completed.</td>
</tr>
<tr>
<td>Refresh</td>
<td>Refreshes the information in the report panel.</td>
</tr>
<tr>
<td>Clear Stats</td>
<td>Clears the information in the report panel.</td>
</tr>
</tbody>
</table>

The following table describes the columns in the lower, report panel of the Performance Statistics window.

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval</td>
<td>The interval for which the performance statistics are shown. See Monitoring Link Performance on page 21-6 for a description of the intervals.</td>
</tr>
<tr>
<td>EE</td>
<td>The number of Error Events (EE) that have occurred up to a maximum of 65,535. If a link uses ESF framing, the following error conditions cause a single EE to be counted: a transition to an LOS, or OOF, or AIS condition, a CRC-6 error, or a controlled slip (also referred to as a frame slip). If a link uses SF framing then an EE is a BPV or a transition to an LOS, or OOF or CSS condition. If a link is E1-CRC4 then an EE is a CRC-4 error or a transition to an LOS, or OOF condition. <strong>NOTE:</strong> A single LOS, AIS, or OOF condition counts as a single EE, independent of how long it lasts.</td>
</tr>
<tr>
<td>ES</td>
<td>An Errored Second (ES) is a second that is not a UAS, with one or more EEs.</td>
</tr>
</tbody>
</table>
**GUI Maintenance**  
*Monitoring Link Performance*

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UAS</strong></td>
<td>The Unavailable Seconds (UAS) field is a count of one-second intervals during which service is unavailable. A UAS is declared when ten consecutive SESs occur. The ten SESs are subtracted from the SES count and added to the UAS count. Subsequent seconds are added to the UAS count until the UAS state is cleared. The UAS state is cleared when ten consecutive non-SESs occur. When the UAS state clears, the ten consecutive non-SESs are subtracted from the UAS count.</td>
</tr>
<tr>
<td><strong>SES</strong></td>
<td>A Severely Errored Second (SES) for an ESF link is a second that is not a UAS with 320 or more EEs, or one or more LOS, AIS, or OOF conditions. An SES for an SF link is a second that is not a UAS with 1540 or more EEs, or one or more LOS, AIS, or OOF conditions. An SES for an E1 link is a second that is not a UAS with 320 or more EEs, or one or more LOS, AIS, or OOF conditions.</td>
</tr>
<tr>
<td><strong>BES</strong></td>
<td>A Bursty Errored Second (BES) for an ESF link is a second that is not a UAS, and contains more than one but less than 320 CRC-6 errors and NO LOS, AIS or OOF conditions. A BES for an SF link is a second that is not a UAS, and contains more than one but less than 1540 BPVs and NO LOS, AIS or OOF conditions. A BES for an E1 link is a second that is not a UAS, and contains more than one but less than 320 CRC-4 errors and NO LOS, AIS or OOF conditions.</td>
</tr>
<tr>
<td><strong>CSS</strong></td>
<td>A Controlled Slip Second (CSS) is any second that is not a UAS that contains one or more controlled slips. A CSS (also referred to as a frame slip) occurs when there is a difference of exactly one frame between the transmitted and received data streams, resulting in the replication or deletion of a DS1 frame by the receiving terminal.</td>
</tr>
</tbody>
</table>
Viewing Logs

Logs for both the system and individual links are available. These logs can be exported to a file for use in troubleshooting.

Link Alarm Logs

Link Alarm logs are available for DS1 and DS3 links. The link alarm log window displays the alarm history log for the selected link. The alarm history log is a circular buffer containing a maximum of 400 entries.

To display the link alarm log, you can either of the following:

- Select the desired link in the Tree View, right-click to display the context menu, and select View Link Log.

The Alarm Log for the selected link displays in the View Link Log window.
Select **Link Log** from the **Logs** menu.

The View Link Log window displays. Select the link for which you want to view the alarm log and click **Retrieve Log**.

**Clearing the Log**

To clear the log entries, click **Clear Log** in either View Link Log window. Clearing the log entries permanently deletes them.

**Exporting the Log**

Use the following steps to save a copy of the link alarm history log on your local PC.

1. Click Export in either View Link Log window. The Save dialog box displays.

2. Select the file location and edit the file name, as needed.

3. Click Save.
**Log Messages**

On occasion, you may see a log entry like the one below. **INIT** indicates that alarm state machine was re-initialized. This happens when you hot-swap a module.

![Log Entry Example](image)

**System Log**

The View System Log window shows a history of system events, including configuration changes and error conditions. The system event history log is a circular buffer containing a maximum of 400 entries.

To display the system log, select log from the main menu bar and select System Log.

![System Log Window](image)

The system log displays in the Details View window.
Exporting the System Log

Use the following steps to save a copy of the system log on your local PC.

1. Click Export Log. The Save dialog box appears.

2. Select the file location and edit the file name, as needed.
3. Click Save to complete the export.

Clearing the Log

To clear the log entries, click Clear Log in the View System Log window. Clearing the log entries permanently deletes them.

Refreshing the Log

To refresh the log entries, click Refresh Log in the View System Log window. Clearing the log entries permanently deletes them.

Error Messages

The following table provides a comprehensive list of error messages you may find in the system log.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>********** No Framer Chip Detected **********</td>
<td>This message is generated to indicate a module failure. If this message occurs, contact Carrier Access Customer Support.</td>
</tr>
</tbody>
</table>
| Aps Failed (card#) Has Wrong Signature  | This message is generated when a card has been configured in one system then placed into a new system with the previous system’s configuration stored, and an APS is performed on the new system.  
Solution: Verify that the new card(s) are configured appropriately and perform an activate on the commit screen. |
| Aps Failed (card#) Timed Out            | This message is generated when a card has been instructed to perform APS but does not respond to the master card.  
Solution: Contact Carrier Access Customer Support. |
### Error Message

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aps Occurred: (link ID) change config from (config#) to (config#)</td>
<td>This message is generated when a card has been instructed to perform APS due to a failure on link #.</td>
</tr>
<tr>
<td>Aps Restore: (link ID) change config back to (config#)</td>
<td>This message is generated when a card has been instructed to perform APS due to a failure on link #.</td>
</tr>
<tr>
<td>Can't allocate more than one time slot to Mgmt Port (port ID)</td>
<td>This message is generated when you attempt to connect more than 64 kbps to the same management port.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong> Remove all but one of the time slots.</td>
</tr>
<tr>
<td>Clock Switch Occurred</td>
<td>This message is generated to identify a clock switch event that has altered the system clock.</td>
</tr>
<tr>
<td>Commit Configuration Failed</td>
<td>Refer to related messages in the syslog, then re-commit.</td>
</tr>
<tr>
<td>Commit Failed (card#) Has Wrong Signature</td>
<td>This message is generated when a card has been configured in one system and placed into another system with the previous systems configuration stored. The message is generated during the card(s) power up initialization. <strong>Solution:</strong> Display the configuration to be activated on the configuration screen to verify the configuration and perform an activate on the commit screen again.</td>
</tr>
<tr>
<td>Commit Failed (card#) Timed Out</td>
<td>This message is generated when a card has been instructed to save and/or activate a configuration but does not respond to the master card. <strong>Solution:</strong> Contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td>Committed Configuration #</td>
<td>This message is used to identify which configurations have been activated and at what time they occurred.</td>
</tr>
<tr>
<td>Configuration did not match system setup</td>
<td>This message is generated when module has been configured for a specific slot and is subsequently moved to a different slot in the same chassis.</td>
</tr>
<tr>
<td>Crossconnect Link (link ID) Slot (slot#) failed</td>
<td>This message is generated when the source and destination crossconnects do not match. <strong>Solution:</strong> Check the crossconnection tables carefully on the connect screen.</td>
</tr>
<tr>
<td>Database File Card Locations (#)</td>
<td>This message is generated when a database conversion is performed and specific card locations have not been converted to the new database. <strong>Solution:</strong> Upload the card(s) configuration to a PC and perform the database conversion program and then reload those configurations.</td>
</tr>
<tr>
<td>Download Failed</td>
<td>This message is generated when a configuration file older than version 2.0 is downloaded to a master module which is running version 2.0 software, and an activate is performed from the commit screen. <strong>Solution:</strong> Upload the card(s) configuration to a PC, execute the database conversion program and then reload those configurations.</td>
</tr>
<tr>
<td>File receive ended, card (#)</td>
<td>This message is generated when a file has been received properly by the unit.</td>
</tr>
<tr>
<td>File Send ended</td>
<td>This message is generated when a file has been sent from the unit and is completed.</td>
</tr>
<tr>
<td>File Send started</td>
<td>This message is generated when a file send (upload) from the unit has been initiated.</td>
</tr>
<tr>
<td>Invalid Passwd Entered</td>
<td>This message is generated when an invalid password is entered.</td>
</tr>
</tbody>
</table>
### Error Message

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link</strong> (link ID) and link (link ID) are Dropped to port (port ID)</td>
<td>This message is generated when more than one link on a single card is being dropped to a single port. Solution: Remove or reconfigure the drops from one of the links in error.</td>
</tr>
<tr>
<td><strong>Link</strong> (link ID) Slot (slot#) is connected to a missing card (card#)</td>
<td>This message appears if a card you previously connected to was pulled from the chassis. Solution: Return the card to the chassis, or idle the crossconnects to the missing card.</td>
</tr>
<tr>
<td><strong>Links in cards</strong> (card#) and (card#) are dropped to port (port ID)</td>
<td>This message is generated when more than one link on multiple cards are being dropped to a single port. Solution: Remove the drops from all but one of the links in error.</td>
</tr>
<tr>
<td><strong>Mixed DROP and IMUX on Port</strong> (port ID)</td>
<td>This message is generated when more than one IMUX link has Dacs drops from a single port. Solution: Only configure one IMUX link to handle those Dacs drops.</td>
</tr>
<tr>
<td><strong>Port</strong> (port ID) <strong>Assigned to Mgmt Port</strong> (port ID) and (port ID)</td>
<td>This message appears when a management port is connected to a management port and timeslot. Solution: Choose a connection to either a management port or a timeslot.</td>
</tr>
<tr>
<td><strong>Port</strong> (port ID) is configured for IMUX with only one link</td>
<td>This message is generated when only one link is defined as an IMUX. Solution: A minimum of one DS0 on two different links must be configured for IMUX mode.</td>
</tr>
<tr>
<td><strong>Power Supply Up/Down</strong></td>
<td>This message is generated to identify power supply failures or vacancies.</td>
</tr>
<tr>
<td><strong>Rack Master Switched from (card#) to (card#)</strong></td>
<td>This message is generated when a master redundancy toggle has occurred.</td>
</tr>
<tr>
<td><strong>Receive MS3 Image Sanity Failure!</strong></td>
<td>This message is generated when a receipt of version 2.x software is made to a version 3.0 card. Only 3.x software will be saved to flash memory.</td>
</tr>
<tr>
<td><strong>Resource Allocation conflict for Bpss Link</strong> (link ID) Slot (slot#)</td>
<td>This message is generated when you exceed the allocated resources (128 connections) across the syncbus. Solution: Eliminate connections until a commit can be activated. Suggestion: move inter-card (the syncbus connections between two cards) drops to local drops.</td>
</tr>
<tr>
<td><strong>Resource Allocation Conflict for Drop</strong> (drop#)</td>
<td>This message appears on the drop table when the drops are incorrectly mapped. Solution: Check the drops and remap them.</td>
</tr>
<tr>
<td><strong>Resource Allocation Conflict for Drop</strong> (link ID) Slot (slot#)</td>
<td>Syncbus drops are assigned by link/timeslot. This message is generated when a connection is attempted to a link/timeslot across the syncbus that has already been assigned.</td>
</tr>
<tr>
<td><strong>Resource Allocation conflict for Mgmt</strong> (mgmt ID) slot (slot#)</td>
<td>This message is generated when a conflict occurs in the management tables. Solution: Remap the management connections.</td>
</tr>
<tr>
<td><strong>Resource Allocation Shortage in card</strong> (card#)</td>
<td>This message is generated when the cross connect table is full. Solution: Reduce the amount of connections on the card(s) in question. If problem continues, contact Carrier Access Customer Support.</td>
</tr>
<tr>
<td><strong>Since link</strong> (link ID) is used for IMUX channel 1 (for E1) or 2 (for T1) must be configured as type IMUX</td>
<td>This message is generated when you idle out timeslot 1 (for E1) or timeslot 2 (for T1) on IMUX defined links. Solution: Make this timeslot an IMUX channel on IMUX defined links</td>
</tr>
</tbody>
</table>
### Error Message

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slave card (card#) disappeared</strong></td>
<td>This message is generated when a slave card is removed from a chassis or has stopped communicating with the master module, indicating that the slave module is no longer available. If the module appears to be operational but can not been seen on the master module, contact Carrier Access Customer Support.</td>
</tr>
</tbody>
</table>
| **Slave card (card#) moved into slot (#)** | This message is generated when more than one link is dropped to a single port.  
**Solution:** Remove the drops from one of the links in error.                                                                                                                                                          |
| **Slave card (card#) registered**   | This message is generated when a slave card is initially installed in a chassis. It indicates that the slave module is now active and ready for configuration.                                                                                                      |
| **Slave module (card#) is absent**  | This message is generated when a slave module has failed. It can also be caused by a slave module that has been removed from the system and you have not removed the syncbus connections to that module. In both cases this message is generated on a system reset or power cycle.  
**Solution:** Investigate reason for module failure or remove the syncbus connections from the connect screen if the module is to be removed permanently.       |
| **Telnet Session Allowed From x.x.x.x** | This message is generated to track what IP addresses have been allowed Telnet access to the local system and what time it occurred.                                                                                                               |
| **Telnet Session Closed**           | This message is generated when you issue a control C (Ctrl C) or performs an exit Telnet function.                                                                                                                                                        |
| **Telnet Session Denied From x.x.x.x** | This message is generated when the disable Telnet option is active on the Telnet screen. This message tracks what IP addresses have attempted access to the local system and what time it occurred.                    |
| **Telnet Session Terminated by Local User** | This message is generated when a Telnet session is terminated.                                                                                                                                                                                          |
| **Telnet Session Timed out**        | This message is generated when a Telnet session times out on its own after 10 minutes of keyboard inactivity.                                                                                                                                          |
| **Too Many Timeslots Assigned to Fxs Port (port ID)** | This message is generated when more than one timeslot is allotted to the FXS voice port.  
**Solution:** Remove all but one of the time slots.                                                                                                                                            |
| **Too Many Timeslots Assigned to Port (port ID)** | This message is generated when more than the allotted bandwidth is being dropped to a single port.  
**Solution:** Remove drops until the bandwidth is equal to the port speed.                                                                                                                   |
| **Too Many Time Slots Assigned to Port (port ID)** | This message is generated when too many destinations are assigned to a single port.  
**Solution:** Calculate the appropriate bandwidth for the port and assign only what is allowable.                                                                                         |
| **Transfer Failed on Card (card#) after (# of bytes) error (error code)** | If this message appears, you must repeat the file transfer.                                                                                                                                                                                            |
| **Transfer Rx Failed card (card#) timed out** | This message is generated when the receiver of the transfer has timed out.                                                                                                                                                                               |
| **Transfer to card (card#) completed successfully** | This message is generated with a successful transfer to the specific card number.                                                                                                                                                                     |
### Upgrading a FLEXmaster

For information about upgrading FLEXmaster modules, see *Appendix C, Upgrades*.

### Converting a FLEXmaster TDM Module to ATM

For information about converting TDM modules to ATM, see *Converting a FLEXmaster TDM Module to ATM* on page 16-43.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description and Solution (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Tx Failed card (card#)</td>
<td>This message is generated when the transmitter of the file selected has timed out.</td>
</tr>
<tr>
<td>timed out</td>
<td></td>
</tr>
<tr>
<td>Transfer type file (filename.ext)</td>
<td>This message is generated when a file transfer from the master to a slave card is activated. It indicates the specific file being sent.</td>
</tr>
<tr>
<td>to card (card#) started</td>
<td></td>
</tr>
<tr>
<td>Warm reset of card (card#)</td>
<td>This message is generated when a card in the system has been instructed to warm reset.</td>
</tr>
<tr>
<td>Performed</td>
<td></td>
</tr>
</tbody>
</table>
GUI Maintenance
Converting a FLEXmaster TDM Module to ATM
Data Port Interfaces

In this Appendix

- Data Port Interfaces
- V.35 DCE (DB-25)
- V.35 DCE (DB-26)
- Network Management Cable
**Data Port Interfaces**

The MASTERseries application modules are available with either a V.35 data port interface. The pinouts and available cable adapters are specified in this appendix.

**V.35 DCE (DB-25)**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Female, DB-25—Adaptable to standard V.35 connector with cable adapter (DB25 male to 34 pin Winchester female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical</td>
<td>Meets V.35 specification</td>
</tr>
<tr>
<td>Type</td>
<td>DCE (Data Circuit-terminating Equipment)</td>
</tr>
</tbody>
</table>

The Carrier Access Corporation V.35 data cables are built according to the pin assignments listed below:

**V.35 Data Ports**

<table>
<thead>
<tr>
<th>V.35 Pin Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CCITT</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>102</td>
</tr>
<tr>
<td>105</td>
</tr>
<tr>
<td>106</td>
</tr>
<tr>
<td>107</td>
</tr>
<tr>
<td>108.2</td>
</tr>
<tr>
<td>109</td>
</tr>
<tr>
<td>103a</td>
</tr>
<tr>
<td>103b</td>
</tr>
<tr>
<td>104a</td>
</tr>
<tr>
<td>104b</td>
</tr>
<tr>
<td>113a</td>
</tr>
<tr>
<td>113b</td>
</tr>
<tr>
<td>142</td>
</tr>
<tr>
<td>114a</td>
</tr>
<tr>
<td>114b</td>
</tr>
<tr>
<td>115a</td>
</tr>
<tr>
<td>115b</td>
</tr>
</tbody>
</table>
V.35 DCE (DB-26)

The V.35 DCE data port connection is made at the sub-miniature DB-26 connector on FLEXmaster16 and FLEXmaster8A modules using the 10-foot, 25-foot, or 50 foot Carrier Access DTE V.35 cable equipped with a sub-miniature DB-26 connector and a 34-pin Winchester connector.

This cable is used to connect the FLEXmaster V.35 DCE data ports to synchronous V.35 DTE data sources up to 1.536 Mbps, all rates (1-24) Nx56 or Nx64 channel-rate progression.

The Carrier Access Corporation V.35 data cables are built according to the pin assignments listed below:

<table>
<thead>
<tr>
<th>Sub-miniature DB-26</th>
<th>Signal</th>
<th>Winchester 34-pin (female)</th>
<th>Paired Signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+ Shield)</td>
<td>← Protective Ground →</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>← Signal Ground →</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>← Transmit Data A —</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>← Transmit Data B —</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>— Receive Data A →</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>— Receive Data B →</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>← RTS —</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>← DTR —</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>— CTS →</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>— DSR →</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>N/C Not Connected</td>
<td>K</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>— CD (RLSD) →</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>← External Clock A —</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>← External Clock B —</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>— Transmit Clock A →</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>— Transmit Clock B →</td>
<td>AA</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>— Receive Clock A →</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>— Receive Clock B →</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>N/C Not Connected</td>
<td>J</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>N/C Not Connected</td>
<td>BB</td>
<td></td>
</tr>
<tr>
<td>9, 13, 18</td>
<td>Open Pins/No Contact</td>
<td>L, N, NN</td>
<td></td>
</tr>
<tr>
<td>19, 21, 26</td>
<td>Open Pins/No Contact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Signal Definitions

<table>
<thead>
<tr>
<th>Signal Definitions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Ground</td>
<td>Directly connects the DTE circuit ground to the DCE circuit ground to provide a conductive path between the DTE and DCE signal commons.</td>
</tr>
</tbody>
</table>

### Control Signal Definitions

The MASTERseries application module is a DCE with control signal outputs of: CTS, DSR, and DCD. The input control signals are: RTS and DTR. The receiver for each control signal shall interpret the situation where the control is not implemented or connected as an OFF condition.

<table>
<thead>
<tr>
<th>Control Signal Definitions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Terminal Ready (DTR, 108.2)</td>
<td>The DTR control is monitored by the DCE and is reflected on DSR. If data is being dropped to the DCE port and the cable is not connected, then the data output to the network interface will be ones.</td>
</tr>
<tr>
<td>Data Set Ready (DSR, 107)</td>
<td>Set on by the DCE to signal that the DCE is ready to receive data. PATHmaster/TRANSmaster/DATAmaster/LINKmaster/CLOCKmaster modules—DSR follows DTR. BANDmaster module—DSR follows DCD.</td>
</tr>
<tr>
<td>Request To Send (RTS, 105)</td>
<td>This control is used by the DTE to condition the DCE for data transmission. The RTS control is monitored by the DCE and reflected on CTS. Set ON by the DTE to indicate to the DCE that it is ready to transmit. Set OFF by the DTE to indicate to the DCE that it has no data to transmit.</td>
</tr>
<tr>
<td>Clear To Send (CTS, 106)</td>
<td>This control indicates that the DCE is ready to receive data. On the PATHmaster/TRANSmaster/DATAmaster/LINKmaster/CLOCKmaster modules CTS follows RTS. On BANDmaster modules CTS follows DCD.</td>
</tr>
<tr>
<td>Received Line Signal Detector (DCD, 109)</td>
<td>This control indicates whether the DCE is ready to receive data. Set on when channels are assigned to the data port and the T1 link the port is connected to is green. On MASTERseries modules: DCD is set off when channels are not assigned to the data port or the link the port is connected to is not green. On BANDmaster modules. There are two special cases: If Fallback is off: then DCD is set off when any of the T1 links the port is connected to are not green. If Fallback is on: Then DCD will remain on and the data port will rate adapt as long as at least one or more of the T1 links the port is connected to is green. DCD is set off when all of the T1 links the port is connected to are in an alarm condition.</td>
</tr>
</tbody>
</table>

### Timing Signal Definitions

<table>
<thead>
<tr>
<th>Timing Signal Definitions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit Signal Element Timing (DB/114)</td>
<td>Signals on this circuit provide the DTE with transmit clocking. Off to on—The DTE uses the off to on transition of this timing element to clock data on the transmit data circuit.</td>
</tr>
</tbody>
</table>
**Signal Definitions (Continued)**

<table>
<thead>
<tr>
<th><strong>Receiver Signal Element Timing (DD/115)</strong></th>
<th>Signals on this circuit provide the DTE with receive clocking. This will be a smooth clock without gaps. On to off—The on to off transition shall indicate the center of each binary element on receive data.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Clock A (DA/113)</strong></td>
<td>Signals on this circuit provide the DCE with transmit clocking. On to off—The on to off transition shall indicate the center of each binary element on transmitted data. OPTIONS— 1. External clock selected—The on to off transition of the external clock input (DA) is used to clock transmit data into the DCE. 2. Internal clock selected—The DCE input clock is not used to clock transmit data into the DCE, instead the on to off transition of the Transmit Signal Element Timing (DB) is used.</td>
</tr>
</tbody>
</table>

**Data Signal Definitions**

<table>
<thead>
<tr>
<th><strong>Received Data (BB/104)</strong></th>
<th>Data signals generated by the DCE and clocked out on the OFF to ON transition of Receiver Signal Element Timing to the DTE.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitted Data (BA/103)</strong></td>
<td>Data signals generated by the DTE and transmitted to the local DCE.</td>
</tr>
<tr>
<td><strong>Ring Indicator (RI, 125)</strong></td>
<td>This control is always set off by the Carrier Access DCE.</td>
</tr>
</tbody>
</table>

**Diagnostics**

The following data port pins are not currently supported. Port diagnostics including local and remote port loopbacks are supported through the network management interface.

<table>
<thead>
<tr>
<th><strong>Local Loopback (LL/141)</strong></th>
<th>Local port loopbacks are only supported through the Carrier Access network management interface. <em>When a local loopback is performed to the TELEport, the telephone will ring.</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Remote Loopback (LL/140)</strong></td>
<td>Remote port loopbacks are only supported through the Carrier Access network management interface.</td>
</tr>
<tr>
<td><strong>Test Mode (TM/142)</strong></td>
<td>This control is always set off by the Carrier Access DCE.</td>
</tr>
</tbody>
</table>
The following table specifies the pinout for the Carrier Access network management interface. This is a typical configuration for a standard null modem cable and will operate in PPP or console mode.

<table>
<thead>
<tr>
<th>PC Com Port Signal Name</th>
<th>DB-9 Female Pin No.</th>
<th>RJ-45 Male Pin No.</th>
<th>NMS Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCD/DTR/DSR</td>
<td>1 to 4 to 6</td>
<td>NC</td>
<td>Controls</td>
</tr>
<tr>
<td>RXD</td>
<td>2</td>
<td>2</td>
<td>Tx Data</td>
</tr>
<tr>
<td>TXD</td>
<td>3</td>
<td>3</td>
<td>Rx Data</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>RTS</td>
<td>7 to 8</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>CTS</td>
<td>8 to 7</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>RI</td>
<td>NC</td>
<td>NC</td>
<td></td>
</tr>
</tbody>
</table>
SNMP Trap List

In this Appendix

- SNMP Trap Support
The following table lists the SNMP traps.

<table>
<thead>
<tr>
<th>Trap Name</th>
<th>Generic Trap #</th>
<th>Specific Trap #</th>
<th>Description</th>
<th>Variable Binding 1</th>
<th>Variable Binding 2</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link Down</td>
<td>2</td>
<td>2</td>
<td>The DS1 link or the Management Interface has changed its state from green to red</td>
<td>Index (INTEGER)</td>
<td>Msg (STRING) “1L01” or “5L03” or “3M01”</td>
<td>Major: Red OOF, Red LOS, Red OOMF, Yellow, AIS, Red UAS Threshold</td>
</tr>
<tr>
<td>Link Up</td>
<td>3</td>
<td>3</td>
<td>The DS1 link or the Management Interface has come up</td>
<td>Index (INTEGER)</td>
<td>Msg (STRING) “1L01” or “5L03” or “3M01”</td>
<td>Informational</td>
</tr>
<tr>
<td>Authentication Failure</td>
<td>4</td>
<td>4</td>
<td>An erroneous community name has been received</td>
<td>None</td>
<td>None</td>
<td>Informational</td>
</tr>
<tr>
<td>Card In</td>
<td>6</td>
<td>2</td>
<td>A new card has reported to the master card</td>
<td>Msg (STRING)</td>
<td>None</td>
<td>Informational</td>
</tr>
<tr>
<td>Alarm</td>
<td>7</td>
<td>7</td>
<td>System is still in alarm</td>
<td>Msg (STRING)</td>
<td>None</td>
<td>Informational</td>
</tr>
<tr>
<td>IMA Failure Alarm</td>
<td></td>
<td></td>
<td>An IMA group has failed</td>
<td>Index (INTEGER)</td>
<td>Msg (string) “cleared” or “declared”</td>
<td>A third variable binding exists which provides more details about the alarm.</td>
</tr>
</tbody>
</table>
Upgrades

In this Appendix

- Upgrading a FLEXmaster
Upgrading a FLEXmaster

This appendix describes how to upgrade a FLEXmaster module running 4.x or 5.x software.

- Upgrading from 4.X to 6.0
- Upgrading from 5.X to 6.0

For information about upgrading from version 6.00 to 6.01 see *Downloading Application Files on page 16-31* (in Chapter 16, TUI Maintenance).

**Prerequisites**

To perform the upgrades, you need to be familiar with the CLI and with the TFTP utility.

- For more information about TFTP see *Basic TFTP Operation on page 16-34*.
- For more information about using the CLI see Chapter 11, CLI Commands.

**NOTE:** Upgrades are not supported over Telnet.

**NOTE:** If you have modules of different software versions in the same chassis (for example a 5.0 module and a 6.0 module), you may see some exception errors until all modules have the same version.
**Upgrading from 4.X to 6.0**

This section describes how to upgrade from release 4.x to release 6.0/6.01.

**Setup**

Before you start, obtain the following files and save them to your PC:

- **vxWorks.mgh**   The upgrade vxWorks.mgh application file.
- **ver6xx.pgl**     The release 6.0 installation software.

These are available on the MASTERseries 6.01 software CD in the 4.02 to 6.00 Upgrade folder.

**Document your Configuration**

Note your current clock and cross-connect settings.

- **Clock settings.** For more information about clock settings, see *Configuring System Timing on page 5-10*
- **Cross-connects.** For more information, see *Connect Screen on page 5-19.*

**Overview**

The following procedures describe the major steps required for the upgrade

1. Establish connectivity between the upgrade computer and the FLEXmaster module with both the network management cable (and terminal emulation software) AND Ethernet cable (via IP).
2. The upgrade utility program vxworks.mgh will delete old files and replace with new files.
3. Use the TFTP server software provided on the Carrier Access installation disk to replace the files.
4. Configure the cell site for typical legacy TDM mode of operation including Location Management (LMU), LAN extension and remote management.
5. Power cycle the unit.
**Upgrades**

**Upgrading a FLEXmaster**

All Modules must have the same configuration number

Look at the running configuration in slot 1. In this example the running configuration is 1.

![Image](image1.png)

This number should be the same for all modules.

Go to all the other modules and save their running configuration to be the same number as the module in slot 1. In this example, the module is running configuration 3. After the commit it will run configuration 1 as the module in slot 1 above.

![Image](image2.png)
### Set the IP address of the module

Set the IP address so that it is the same subnet as the TFTP server. For example, if your TFTP server is on 192.168.2.X network, to set IP of the module to 192.168.2.101, perform the following steps.

Navigate to the CLI Setup > mGmt > CLI.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/# interface 1e1</code></td>
<td>Change mode to interface 1E1.</td>
</tr>
<tr>
<td><code>/1E1# shutdown</code></td>
<td>Set 1E1 to out of service.</td>
</tr>
<tr>
<td><code>/1E1# ip config 192.168.2.101</code></td>
<td>Configure the IP address of the interface.</td>
</tr>
<tr>
<td><code>/1E1# no shutdown</code></td>
<td>Set 1E1 to in service.</td>
</tr>
</tbody>
</table>

#### Delete the 4.X vxWorks.mgh file

From the CLI (Setup > mGmt > CLI), erase vxWorks.mgh

The following steps describe how to delete this file.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/1E1# cd ..</code></td>
<td>Change to root mode</td>
</tr>
<tr>
<td><code>/ # cd system/</code></td>
<td>Change to system mode</td>
</tr>
<tr>
<td><code>/system# show files</code></td>
<td>Display the files currently in the system directory.</td>
</tr>
<tr>
<td>File Name</td>
<td>Size (bytes)</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>HLink.mgh</td>
<td>43715 bytes</td>
</tr>
<tr>
<td>fpga.mgh</td>
<td>38498 bytes</td>
</tr>
<tr>
<td>vxWorks.mgh</td>
<td>2643309 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>271352 bytes</td>
</tr>
<tr>
<td><code>/system# file-delete vxWorks.mgh</code></td>
<td>Delete the file vxWorks.mgh</td>
</tr>
<tr>
<td><code>/system# show files</code></td>
<td>Display the files again, to confirm that you have deleted the file.</td>
</tr>
<tr>
<td>File Name</td>
<td>Size (bytes)</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>HLink.mgh</td>
<td>43715 bytes</td>
</tr>
<tr>
<td>fpga.mgh</td>
<td>38498 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>271352 bytes</td>
</tr>
</tbody>
</table>

**NOTE:** Do not reboot the FLEXmaster before downloading the upgrade files (described below). If you reboot at this stage, the module will not run normally.
**Download the Upgrade vxWorks.mgh**

From the CLI, download the upgrade vxWorks.mgh. This file is on the MASTERseries software CD, in the 4.02 to 6.00 Upgrade folder.

This file has the same name as the file used for 4.0x, but it is a different file. The files can be distinguished by size. The upgrade vxWorks file is 545 KB in size, the original vxWorks file is over 2500 KB.

**Make sure the tftp server is running.**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# file-download vxWorks.mgh</td>
<td>Download the upgrade vxWorks.mgh file. The command includes the IP address of the tftp server.</td>
</tr>
</tbody>
</table>

```
Downloading vxWorks.mgh from 192.168.2.253
.................................
Download Complete
/system#
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# show files</td>
<td>Display the files, to confirm that you have successfully downloaded the file.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>HLink.mgh</td>
<td>43715 bytes</td>
</tr>
<tr>
<td>fpga.mgh</td>
<td>38498 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>271352 bytes</td>
</tr>
<tr>
<td>vxWorks.mgh</td>
<td>557587 bytes</td>
</tr>
</tbody>
</table>

**Download ver6xx.pgl**

From the CLI, download the 6.0 Application file, ver6xx.pgl. This file is on the MASTERseries software CD, in the 4.02 to 6.0 Upgrade folder.

**Make sure the tftp server is running.**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# file-download ver6xx.pgl</td>
<td>Download the .pgl file. The command includes the IP address of the tftp server.</td>
</tr>
</tbody>
</table>

```
Downloading ver6xx.pgl from 192.168.2.253
.................................
Download Complete
/system#
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# show files</td>
<td>Display the files, to confirm that you have successfully downloaded the file.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTE: The new software will not activate until a hard reset is performed. So POWER OFF the chassis to reboot the module. The module will restart, automatically upgrade the bootrom and install the new software. The module will reboot at least once during this process. Upon completion, the module will be running version 6.01.

### File Names

<table>
<thead>
<tr>
<th>File Name</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ver6xx.pgl</td>
<td>3961721 bytes</td>
</tr>
<tr>
<td>directory</td>
<td>1760 bytes</td>
</tr>
<tr>
<td>HLink.mgh</td>
<td>43715 bytes</td>
</tr>
<tr>
<td>fpga.mgh</td>
<td>38498 bytes</td>
</tr>
<tr>
<td>flash</td>
<td>271352 bytes</td>
</tr>
<tr>
<td>vxWorks.mgh</td>
<td>557587 bytes</td>
</tr>
</tbody>
</table>

### Logging In

The default login and password are `admin` and `nms`, respectively. For an introduction to MASTERseries 6.01, see Chapter 4, Getting Started.

### Checking the Configuration

- Verify that the primary and secondary clocks are set correctly, and if not, re-configure to correct setting. For more information about clocks, see Configuring System Timing on page 5-10.
- Verify that all cross-connects existing before the upgrade are present.
Upgrading from 5.X to 6.0

This section describes how to upgrade from release 5.x to release 6.0/6.01.

Overview

The following procedures describe the major steps required for the upgrade:

1. Establish connectivity between the upgrade computer and the FLEXmaster module with both
   the network management cable (and terminal emulation software) AND Ethernet cable (via IP).
2. The upgrade utility program ver5xx.pgl will delete old files and replace with new files.
3. Use the TFTP server software provided on the Carrier Access installation disk to replace the
   files.
4. Configure the cell site for typical legacy TDM mode of operation including Location
   Management (LMU), LAN extension and remote management.
5. Power cycle the unit.

IP Connectivity

Set the IP address so that it is in the same subnet as the TFTP server. For example, if your TFTP
server is on 192.168.2.X network, to set IP of the module to 192.168.2.101, perform the following
steps. Navigate to the CLI: Setup > mGmt > CLI.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/# interface 1e1</td>
<td>Change mode to interface 1E1.</td>
</tr>
<tr>
<td>/1E1# shutdown</td>
<td>Set 1E1 to out of service.</td>
</tr>
<tr>
<td>/1E1# ip config 192.168.2.101</td>
<td>Configure the IP address of the interface.</td>
</tr>
<tr>
<td>/1E1# no shutdown</td>
<td>Set 1E1 to in service.</td>
</tr>
<tr>
<td>/1E1# cd ..</td>
<td>Change to root mode</td>
</tr>
<tr>
<td>/# cd system/</td>
<td>Change to system mode</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Display the files currently in the system directory.</td>
</tr>
</tbody>
</table>

File Name                      Size (bytes)
----------------           ------------
directory                          1760 bytes
ver5xx.pgl                        43715 bytes
flash                            271352 bytes
chassis.cfg                      330759 bytes

Delete the 5.X Application file

From the CLI (Setup > mGmt > CLI), erase ver5xx.pgl and the chassis.cfg file if present. The
following steps describe how to delete these files.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1E1# cd ..</td>
<td>Change to root mode</td>
</tr>
<tr>
<td>/# cd system/</td>
<td>Change to system mode</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Display the files currently in the system directory.</td>
</tr>
</tbody>
</table>
Upgrading a FLEXmaster

**Upgrades**

**Upgrading a FLEXmaster**

Download the Upgrade ver5xx.pgl

From the CLI, download the upgrade ver5xx.pgl. This file is on the MASTERseries software CD, in the 5.0 to 6.0 Upgrade folder.

**NOTE:** This file has the same name as the file used for 5.x, but it is a different file. The files can be distinguished by size. The upgrade ver5xx.pgl file is 5703 KB in size, the original ver5xx.pgl file is 3136 KB.

It is important to download the upgrade ver5xx.pgl, because this file performs the upgrade when the module reboots.

**Make sure the tftp server is running.**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# file-delete ver5xx.pgl</td>
<td>Delete the file ver5xx.pgl</td>
</tr>
<tr>
<td>/system# file-delete chassis.cfg</td>
<td>Delete the file chassis.cfg</td>
</tr>
<tr>
<td>/system# show files</td>
<td>Display the files again, to confirm the deletion.</td>
</tr>
</tbody>
</table>

**Download the Upgrade ver5xx.pgl**

From the CLI, download the upgrade ver5xx.pgl. This file is on the MASTERseries software CD, in the 5.0 to 6.0 Upgrade folder.

**NOTE:** This file has the same name as the file used for 5.x, but it is a different file. The files can be distinguished by size. The upgrade ver5xx.pgl file is 5703 KB in size, the original ver5xx.pgl file is 3136 KB.

It is important to download the upgrade ver5xx.pgl, because this file performs the upgrade when the module reboots.

**Make sure the tftp server is running.**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# file-download ver5xx.pgl ipaddr 192.168.2.253</td>
<td>Download the .pgl file. The command includes the IP address of the tftp server.</td>
</tr>
</tbody>
</table>

Transfer the Upgrade ver5xx.pgl

Next, you need to exit the CLI and return to the TUI. From the TUI, transfer the 5.0 Application upgrade file, ver5xx.pgl, to the other modules in the chassis, if any.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/system# exit</td>
<td>Exit the CLI and return to the TUI.</td>
</tr>
</tbody>
</table>

From the TUI, press ESC two times to return to the main menu. Select Setup > Xfer.

1. In the Xfer screen press enter and enter the password.

   The Source field automatically displays the slot number of the master module.

2. At the File field, use the N/P keys to select Program + LSI Firmware (.pgl). This is the System program software.
Upgrades
Upgrading a FLEXmaster

3. For Target: Use the arrow keys to select the modules to transfer the software to.
   For each module, use the N/P keys to select yes or no.
   
   **Yes** - Perform the file transfer to this module
   **No** - File transfer to this module is not currently selected

   Select yes for each card located in the system, and press enter to begin the transfer.

   ![Transfer File Between Card(s) In The Rack](image)

   The screen indicates that the transfer is in process.

   ![Card 2 loading 167936 bytes](image)

   When the transfer is complete, press the escape key to exit.

   ![***Transfer complete, successful***](image)
Warm-reset the Chassis

When the transfer is complete, return to the main menu. Select Diag > Warmreset, and reboot the chassis.

The new software will activate upon reset. The module will restart, automatically upgrade the bootrom and install the new software. The module will reboot at least once during this process. Upon completion, the module will be running version 6.01.

Logging In

The default login and password are admin and nms, respectively. For an introduction to MASTERSeries 6.01, see Chapter 4, Getting Started.
10Base-T

The most widely installed Ethernet local area networks (LANs) use ordinary telephone twisted-pair wire. When used on Ethernet, this carrier medium is known at 10BASE-T. 10BASE-T supports Ethernet’s 10 Mbps transmission speed.

100Base-T

Also called "Fast Ethernet," it is a 100 Mbps version of Ethernet. 100Base-T transmits at 100 Mbps rather than 10 Mbps. Like regular Ethernet, Fast Ethernet is a shared media LAN. All nodes share the 100 Mbps bandwidth. 100Base-TX uses two pairs of Category 5 cabling, one pair for transmission, one pair for receiving.

AAL

ATM Adaptation Layer

Type 1 - AAL functions in support of constant bit rate, time-dependent traffic such as voice or video (default in CES-CBR configuration).

Type 2 - AAL undefined by International Standards bodies. Its anticipated use is for variable bit rate video transmission.

Type 3/4 - AAL functions in support of variable bit rate, delay-tolerant data traffic requiring some sequencing and/or error detection support. This was originally two AAL types, i.e., connection-oriented data traffic requiring minimal sequencing or error detection support.

Type 5 - AAL functions in support of variable bit rate, delay-tolerant connection-oriented data traffic requiring minimal sequencing or error detection support

AC

Alternating Current.

Adapter Module

The adapter module is the I/O module and is the rear portion of the MASTERseries units.

Address

A coded representation of the origin or destination of data.

ADPCM

Adaptive Differential Pulse Code Modulation. A speech coding method which uses fewer bits than the traditional PCM (Pulse Code Modulation). ADPCM allows encoding of voice signals in half the space PCM allows.

AIS

Alarm Indication Signal (blue alarm). All ones - used as keep-alive signal. Propagates through a T1 link network to indicate a link outage.
<table>
<thead>
<tr>
<th>Glossary</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm Condition</strong></td>
<td>Instantaneous alarm event.</td>
</tr>
<tr>
<td><strong>Alarm State</strong></td>
<td>An alarm condition that has been integrated over time to an Alarm State.</td>
</tr>
<tr>
<td><strong>AMI</strong></td>
<td>Alternate Mark Inversion. Line coding pattern used in T1 spans.</td>
</tr>
<tr>
<td><strong>ANSI</strong></td>
<td>American National Standards Institute.</td>
</tr>
<tr>
<td><strong>APS</strong></td>
<td>Automatic Protection Switching.</td>
</tr>
<tr>
<td><strong>ARP</strong></td>
<td>Address Resolution Protocol. A method for finding a host’s Ethernet address from its Internet address. The sender broadcasts an ARP packet containing the Internet address of another host and waits for the second host to send back its Ethernet address. ARP is defined in RFC 826.</td>
</tr>
<tr>
<td><strong>ATM</strong></td>
<td>Asynchronous Transfer Mode. Very high speed transmission technology. ATM is a high bandwidth, low-delay, connection-oriented, packet-like switching and multiplexing technique. Usable capacity is segmented into 53-byte fixed-size cells, consisting of header and payload, allocated to services on demand. The term “asynchronous” applies, as each cell is presented to the network on a “start-stop” basis - in other words, asynchronously.</td>
</tr>
<tr>
<td><strong>B8ZS</strong></td>
<td>Binary Eight Zero Suppression is a technique in T1 that modifies the AMI encoding to ensure minimum pulse density without altering customer data. When eight &quot;zeros&quot; in a row are detected, a pattern with intentional bipolar violations is substituted. These violations enable the receiving end to detect the pattern and replace the &quot;zeros.&quot;</td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>The amount of data that can travel through a channel in a given period of time. Bandwidth is usually measured in cycles per second (hertz) or in bits per second (BPS). The larger the bandwidth, the more information the network can handle. ISDN is usually 64KB, 128KB or 256KB. ASDL and DSL are generally faster than ISDN and sometimes faster than cable. Cable connections are usually 500KB or 1MB. T1 is 1.5MB and T3 is 45MB.</td>
</tr>
<tr>
<td><strong>BERT</strong></td>
<td>Bit Error Rate Test</td>
</tr>
<tr>
<td><strong>BES</strong></td>
<td>Bursty Errored Seconds. Short duration disruptions of a digital bit stream.</td>
</tr>
<tr>
<td><strong>Bit Stuffing</strong></td>
<td>The process of inserting extra bits into a T1 link to restore the bit rate of link.</td>
</tr>
<tr>
<td><strong>BITS</strong></td>
<td>Building Integrated Timing System. An accurate timing source used to synchronize the DS0, DS1, and higher rate transmissions in a central office. Outside North America it is called a Synchronization Supply Unit (SSU).</td>
</tr>
<tr>
<td><strong>Broadcast</strong></td>
<td>Broadcast is a transmission to multiple, unspecified recipients. On an Ethernet network, a broadcast packet is a special type of multicast packet which nodes on the network are always willing to receive.</td>
</tr>
<tr>
<td><strong>Bypass</strong></td>
<td>Exchanging bytes among timeslots and T1/E1 links.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CAS</td>
<td>Channel Associated Signaling (E1 signaling protocol).</td>
</tr>
<tr>
<td>CBR</td>
<td>Constant Bit Rate. An ATM service category that supports a constant or guaranteed rate to transport services such as video or voice as well as circuit emulation requiring rigorous timing control and performance parameters.</td>
</tr>
<tr>
<td>CCS</td>
<td>Common Channel Signaling. Signaling in which one channel in each link is used for signaling to control, account for, and manage traffic on channels of the link.</td>
</tr>
<tr>
<td>Central Office (CO)</td>
<td>Where telephone companies terminate customer lines and locate switching equipment to interconnect those lines with other networks.</td>
</tr>
<tr>
<td>CES</td>
<td>Circuit Emulation Service. The ATM Forum circuit emulation service interoperability specification provides interoperability agreements for supporting constant bit rate (CBR) traffic over ATM networks that comply with the other ATM Forum interoperability agreements. Specifically, this specification supports emulation of existing TDM circuits over ATM networks.</td>
</tr>
<tr>
<td>Challenge Handshake</td>
<td>A strong authentication method used with PPP for user login. A type of authentication in which the authentication agent (typically a network server) sends the client program a key to be used to encrypt the username and password. This enables the username and password to be transmitted in an encrypted form to protect them against eavesdroppers. When using CHAP, the username/password is sent encrypted over the connection, preventing sniffing. See also PAP.</td>
</tr>
<tr>
<td>Authorization Protocol (CHAP)</td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td>A generic reference to a data path, such as a voice channel or a high speed data channel, which can include one or more time slots.</td>
</tr>
<tr>
<td>CLI</td>
<td>Command Line Interface.</td>
</tr>
<tr>
<td>Customer Premise Equipment (CPE)</td>
<td>On digital circuits provided by the telephone company, any terminating hardware owned by the user and not by the Telco (telephone company) is generically referred to as CPE.</td>
</tr>
<tr>
<td>CRC</td>
<td>Cyclic Redundancy Check. A check sum indicator based on the remainder of a polynomial calculation performed on the transmitted data that is used to verify, with some fixed probability of correctness, whether that data was transmitted.</td>
</tr>
<tr>
<td>CSS</td>
<td>Controlled Slip Second. A controlled slip is the replication or deletion of the payload bits of a DS1 frame. A Controlled slip can be performed when there is a difference between the timing of a synchronous receiving terminal and the received signal.</td>
</tr>
<tr>
<td>CSU</td>
<td>Channel Service Unit. A device used to protect the telephone network from equipment faults at a customer location.</td>
</tr>
<tr>
<td>DACS</td>
<td>Digital Access Cross Connect System. Equipment that separates a number of T1 signals into their component DS0s and rearranges and redirects them in an unrestricted fashion.</td>
</tr>
</tbody>
</table>
then reconstructs new T1s consisting of a mix of DS0s from the original T1s. Used for grooming or grouping DS0 channels originating from various sources, but destined for the same location.

**DC**
Direct Current.

**DCE**
Data Circuit Terminating Equipment. Usually a modem, though it can be a data set, DSU, or other device that is used to connect a computer to a data communications service.

**Default Gateway**
Default Gateway is a routing table entry which is used to direct packets addressed to hosts or networks not explicitly listed in the routing table.

**DHCP**
Dynamic Host Configuration Protocol

**Digital Access & Cross-connect System (DACS)**
A digital switch for routing and switching T1 lines (and individual DS0 channels within T1 lines), among multiple T1 ports. It performs all the functions of a normal switch, except connections are typically set up in advance of a call, not together with a call, as in most, low bandwidth voice-band voice and data communications systems. A DACS is basically a manual T1 switch.

**DLCI**
Data Link Control Identifier. DLCI is a channel number which is attached to data frames to tell the network how to route the data in Frame Relay Networks.

**DNS**
Domain Name System. DNS is a general-purpose distributed, replicated, data query service chiefly used on Internet for translating host names into Internet IP addresses. DNS is defined in STD 13, RFCs 1034 and 1035.

**DS0**
Digital Signal Zero, the standard bandwidth for digitized voice channels

**DS1**
Digital Signal Level 1. A digital signal transmitted at a nominal rate of 1.544 Mbps.

**DSU**
Digital Service Unit. A device used to condition a data signal for transmission over the relatively long wires from the customer location to the telephone office.

**DSX-1**
Digital Signal Cross Connect level 1. Such as a DS-1, but without the proper protection circuitry (CSU) for transmission to the WAN. Used as a port for connection to local equipment such as a PBX.

**DTE**
Data Terminal Equipment (user terminal equipment). Usually a computer terminal or a PC emulating one, or a computer.

**DTS**
Digital Transcoding Switch.

**Dynamic Host Configuration Protocol (DHCP)**
A network configuration that allows maintenance to be performed from a central site rather than by end users.
**Dynamic Station**  
A dynamic station is a host which is added automatically to an ARP or LAN table.

**E1**  
A digital transmission link with a total signaling speed of 2.048 Mbps. E1 is a standard for the digital transmission in Europe (The European equivalent to the North American T1).

**Earth ground**  
A wire conductor that terminates in the earth for electrical purposes. It is generally the negative side of the circuit and is most important in alternating current (AC) circuits. Chassis Ground is the general term used in direct current (DC) circuits.

**EE**  
Errored Event.

**ESD**  
ElectroStatic Discharge.

**Electromagnetic Interference (EMI)**  
Equipment used in high speed data systems, including ATM, that generate and transmit many signals in the radio frequency portion of the electromagnetic spectrum. Interference to other equipment or radio services may result if sufficient power from these signals escape the equipment enclosures or transmission media. National and international regulatory agencies (FCC, CISPR, etc.) set limits for these emissions. Class A is for industrial use and Class B is for residential use.

**EMS**  
Element Management System.

**Engine**  
The engine is the front portion of a MASTERseries module.

**ES**  
Errored Second.

**ESF**  
Extended SuperFrame. Comprises 24 frames.

**Ethernet**  
Ethernet is a particular network topology and protocol, especially useful in LANs. It comes in various speeds and is often regarded as THE current technology for general network direct connection. The current connectivity is generally considered to be 10Base-T or 100Base-T, while the backbone, if one is used, is coaxial cable or Fiber optic. There is also a 1000Base-T for certain specialty copper joining situations.

**FEAC filter**  
Far End Alarm Control

**Flash**  
An operating parameter used with routers that can be set to block the transfer of packets from one LAN to another.

**Frame Relay**  
Frame Relay is a packet-switching protocol for connecting devices on a WAN. Frame Relay networks support data rates up to 1.544 Mbps.

**FT1**  
Fractional T1. Partially used T1 line (some vacant channel timeslots).
<table>
<thead>
<tr>
<th><strong>Full Duplex</strong></th>
<th>A communications method where each end simultaneously transmits and receives.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPRS</strong></td>
<td>General Packet Radio Service. A mobile data service, often called 2.5G, that employs unused TDMA channels to carry packet-switched data across a GSM network.</td>
</tr>
<tr>
<td><strong>GPS</strong></td>
<td>Global Positioning System. A navigational radio network of more than two dozen satellites orbiting the earth in a constellation that enables a GPS receiver located anywhere on earth to accurately calculate the latitude, longitude, and altitude of the receiver.</td>
</tr>
<tr>
<td><strong>Grooming</strong></td>
<td>Grooming refers to either consolidating or segregating traffic to make more efficient use of the facilities.</td>
</tr>
<tr>
<td><strong>HDB3</strong></td>
<td>High Density Bipolar 3. A bipolar coding method that does not allow more than 3 consecutive zeros.</td>
</tr>
<tr>
<td><strong>HDLC</strong></td>
<td>High level Data Link Control. The HDLC protocol secures information in a data frame that allows devices to control data flow and correct errors. For any HDLC communications session, one station is designated primary and the other secondary</td>
</tr>
<tr>
<td><strong>ICMP</strong></td>
<td>Internet Control Message Protocol. Handles errors and sends error messages for TCP/IP.</td>
</tr>
<tr>
<td><strong>IGMP</strong></td>
<td>Internet Group Management Protocol. A protocol used by IP hosts to report their multicast group memberships to an adjacent multicast router.</td>
</tr>
<tr>
<td><strong>IMA</strong></td>
<td>Inverse Multiplexing over ATM. A technique used to transmit high speed data through several lower speed T1 lines by splitting (multiplexing) the high speed data into smaller ATM packets that can be sent through separate T1s and then recombing (inverse multiplexing) the data packets at the receiving end</td>
</tr>
<tr>
<td><strong>IMUX</strong></td>
<td>Inverse Multiplexer.</td>
</tr>
<tr>
<td><strong>Integrated Access</strong></td>
<td>Access to more than one carrier service over a combined higher speed line. For example, a single T1 access line can be used to connect to an 800 service as well as a frame relay service offered by a carrier. The services are multiplexed together over the one line.</td>
</tr>
<tr>
<td><strong>Internet Protocol (IP)</strong></td>
<td>Internet Protocol, the method by which most Internet activity takes place. Members with access to TCP/IP through a SLIP or PPP connection can connect to many ISP services in this manner. As the name implies, it is a protocol for network activity. Most current networks support some sort of TCP or IP directly or indirectly.</td>
</tr>
<tr>
<td><strong>IP address</strong></td>
<td>A string of four numbers separated by periods (such as 111.22.3.144) used to represent a computer on the Internet. The format of the address is specified by the Internet Protocol in RFC 791. Each of the four number must be 255 or less; they may be 0.</td>
</tr>
<tr>
<td><strong>IP Mask</strong></td>
<td>The IP mask is a unique 4 byte (32 bit) value that allow the recipient of IP packets to distinguish between different host IDs.</td>
</tr>
</tbody>
</table>
| **IP Multicast** | The transmission of an IP datagram to a host group, a set of zero or more hosts identified by a single IP destination address. A multicast datagram delivered to members of its
destination host group with the same "best efforts" reliability as regular unicast IP datagrams, for example, the datagram is not guaranteed to arrive intact at members of the destination group or in the same order relative to other datagrams.

**IP Routing**

IP Routing is the process, performed by a router, of selecting the correct interface and next hop for a packet being forwarded. Routing is done to send a packet to a specific destination.

**IXC**

Inter-Exchange Carrier. The long distance phone company that provides connections between POPs and connects to the customer premises using local telephone companies at both ends. These are unregulated and there is a competitive choice for the customer. AT&T and MCI are examples.

**Jitter**

Undesirable short-term frequency deviation which is encountered in data transmission lines.

**LAN (Local Area Network)**

A group of computers at a single location (usually an office or home) that are connected by phone lines, network cables of various configurations or coaxial cable. Usually controlled and administered by a system or network administrator.

**LBO**

Line Build Out. Insertion of attenuation (loss) in a short transmission line to make the line behave as a longer line.

**Link**

A connection to the wide area network, usually a T1 or E1 interface, but can also be an ISDN (PRI) or other arrangement.

**LOF**

Loss Of Framing. A red alarm.

**loopback**

A diagnostic test in which a signal is transmitted across a medium while the sending device waits for its return.

**LOS**

Loss Of Signal. A red alarm.

**LSB**

Least Significant Bit. Lowest order bit in the binary representation of numerical value.

**MAC Address**

Media Access Control Address. The MAC Address is the hardware address of a device connected to a shared network medium.

**Mask**

A mask is a filtering aid that is used to define classes of addresses. By defining classes, any packet can be judged as to whether it should pass the filter or not.

**MIB**

Management Information Base A database of objects, with attributes and values, representing the manageable components of a network device. Used in SNMP. There are industry standardized MIBs and proprietary MIBs

**MTU**

Maximum Transmission Unit. The largest frame length which can be sent on a physical medium.

**Modem**

MOdulator-DEModulator, a device that takes digital computer signal, converts it to analog, and sends it across the phone line. Another modem on the reverse does the exact opposite action. Modems transfer data at different speeds or rates, called baud.
<table>
<thead>
<tr>
<th><strong>Glossary</strong></th>
<th><strong>MSB</strong></th>
<th>Most Significant Bit. The highest order bit in the binary representation of a numerical value.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSC</strong></td>
<td>Mobile Switching Center. A telephone switch that bridges or connects a mobile telephone network to another telephone network such as a PSTN.</td>
<td></td>
</tr>
<tr>
<td><strong>MTU</strong></td>
<td>Maximum Transmission Unit. The largest frame length which can be sent on a physical medium.</td>
<td></td>
</tr>
<tr>
<td><strong>Multicast</strong></td>
<td>Multicast is an Ethernet addressing scheme used to send packets to devices of a certain type or for broadcasting to nodes.</td>
<td></td>
</tr>
<tr>
<td><strong>Multiplexer</strong></td>
<td>A complex piece of telephone equipment which combines the data stream of several leased lines for transmission over a single higher bandwidth leased line. Multiplexors are used in the construction of WANs.</td>
<td></td>
</tr>
<tr>
<td><strong>NAT</strong></td>
<td>Network Address Translation. An Internet standard that enables a local-area network (LAN) to use one set of IP addresses for internal traffic and a second set of addresses for external traffic. A NAT box located where the LAN meets the Internet makes all necessary IP address translations.</td>
<td></td>
</tr>
<tr>
<td><strong>NE</strong></td>
<td>Network Element. A piece of telecommunications equipment that can be monitored or controlled.</td>
<td></td>
</tr>
<tr>
<td><strong>NEBS</strong></td>
<td>Network Equipment Building Standards</td>
<td></td>
</tr>
<tr>
<td><strong>Network Management System (NMS)</strong></td>
<td>A system which allows a provider or end user to manage portions or all of a telecommunications network; in xDSL, network management systems allow providers to control and monitor those services based on the ADSL streams, at both the physical and logical layers of the services.</td>
<td></td>
</tr>
<tr>
<td><strong>Network Socket</strong></td>
<td>A network socket is defined to be the unique identification to or from which information is transmitted in the network.</td>
<td></td>
</tr>
<tr>
<td><strong>NNI</strong></td>
<td>Network to Network Interface. A protocol for the interface connecting two ATM networks.</td>
<td></td>
</tr>
<tr>
<td><strong>Node</strong></td>
<td>Junction point in a network.</td>
<td></td>
</tr>
<tr>
<td><strong>NTP</strong></td>
<td>Network Time Protocol. A protocol designed to synchronize the clocks of computers connected to a digital network.</td>
<td></td>
</tr>
<tr>
<td><strong>OA&amp;M</strong></td>
<td>Operations, Administration and Maintenance. A group of network management functions that provide network fault indication, performance information, and data and diagnosis functions.</td>
<td></td>
</tr>
<tr>
<td><strong>Out of Frame (OOF)</strong></td>
<td>A DS3 OOF defect is detected when any three or more errors in sixteen or fewer consecutive F-bits occur within a DS3 M-frame. An OOF defect may also be called a Severely Errored Frame (SEF) defect. An OOF defect is cleared when reframe occurs. A DS3 Loss of Frame (LOF) failure is declared when the DS3 OOF defect is consistent for 2</td>
<td></td>
</tr>
</tbody>
</table>
packet

A unit of data sent across a network. When a large block of data is to be sent over a network, it is broken up into several packets, sent, and the reassembled at the other end. The exact layout of an individual packet is determined by the protocol and network architecture being used.

PAP

Password Authentication Protocol (PAP). An authentication protocol that allows Point-to-Point Protocol peers to authenticate one another.

PBX

Private Branch eXchange. A small telephone switching system (exchange) usually on a customer's premises that also connects to the public switched telephone network.

PCM

Pulse Code Modulation. The standard 64 kbps digital voice format.

PING

Packet InterNet Groper. A protocol and program for sending a signal to see whether another network host or other device is online and responding. PING is used to test reachability of destinations by sending them an ICMP echo request and waiting for a reply.

POP

Point of Presence. A site that has a collection of telecommunications equipment, usually refers to ISP or telephone company sites.

Port

A connection to local data equipment (typically within the building). For example, V.35 or RS-232.

PPP

Point-to-Point Protocol. Provides a standard means of encapsulating data packets sent over a single-channel WAN link. It is the standard WAN encapsulation protocol for the interoperability of bridges and routers.

Protocol

A protocol is a set of formal rules describing how to transmit data across a network. Low level protocols define the electrical and physical standards to be observed, bit- and byte-ordering, and the transmission, error detection and correction of the bit stream. High level protocols deal with the data formatting, including the syntax of messages, the terminal to computer dialogue, character sets, sequencing of messages and so on.

PST

Public Switched Telephone Network. Public Switched Telephone Network, which refers to the international telephone system based on copper wires carrying analog voice data. This is in contrast to newer telephone networks base on digital technologies, such as ISDN and FDDI. Telephone service carried by the PSTN is often called plain old telephone service (POTS). Most telephone companies are trying to filter data and streaming services into one network and leave the PSTN for mostly voice usage.

PVC

Permanent Virtual Circuit. a circuit or channel through an ATM network provisioned by a carrier between two endpoints.

QoS

Quality of Service. A QoS class can have specified performance parameters (specified QoS class) or no specified performance parameters (unspecified QoS class). QoS classes are inherently associated with a connection. A specified QoS class specifies a set of
performance parameters and the objective values for each performance parameter identified. Examples of performance parameters that could be in a QoS class are:

Cell Loss Ratio  
Cell Transfer Delay  
Cell Delay Variation

A specified QoS class provides a quality of service to an ATM virtual connection (VCC or VPC) in terms of a subset of ATM performance parameters defined in Section 3 of Appendix A of the ATM Forum UNI v3.1 specifications. Initially, each service provider should define objective values for a subset of the ATM performance parameters for at least one of the Service Classes (Service Class A, B, C, or D) from ITUT recommendation I.362 in a reference configuration that may depend on mileage and other factors.

QoS Classes are currently defined as:

Class 1 - Supports a QoS that will meet Service Class A performance requirements (circuit emulation, constant bit rate video). Should yield performance comparable to current digital private line performance.

Class 2 - Supports a QoS that will meet Service Class B performance requirements (variable bit rate audio and video). Intended for video and audio in teleconferencing and multi-media applications using packets.

Class 3 - Supports a QoS that will meet Service Class C performance requirements (connection-oriented data transfer). Intended for interoperation of connection-oriented protocols, such as Frame Relay.

**RAM**
Random Access Memory. Volatile storage that loses its contents when power is off.

**RFC**
Request For Comment. A numbered Internet informational documents and standards widely followed by commercial software and freeware in the Internet and UNIX communities.

**RIP**
Routing Information Protocol.

**RJ-45**
An 8-pin USOC plug and jack arrangement providing a unipolar electrical interface.

**RJ-48C**
An 8-pin USOC plug and jack arrangement providing a bipolar electrical interface.

**Robbed-bit signaling**
A signaling method which uses the least-significant bit in every sixth sample of each voice channel, devoted to convey on/off hook conditions, busy, ringing, and so on.

**Routing**
The process of selecting the most efficient circuit path for a message.

**RS-232C**
Collection of specifications defining unipolar electrical and mechanical interfaces between terminals, computers, and modems; generally limited to 19.2 kbps.
| **RS-422** | Collection of specifications defining bipolar electrical and mechanical interfaces between terminals, computers, and modems; generally limited to 2 Mbps. |
| **SCR** | Sustained Cell Rate. A calculation of the average allowable, long-term cell transfer rate on a specific connection. |
| **SES** | Severely Errored Second. |
| **SGSN** | Serving GPRS Support Node |
| **slot** | The position in the chassis for a Module, Adapter or Power Supply. |
| **SNMP** | Simple Network Management Protocol. SNMP is the most common method by which network management applications can query a management agent using a supported MIB (Management Information Base). SNMP operates at the OSI application layer. |
| **Socket** | See Network Socket. |
| **SS7** | Signaling System no. 7. Standard signaling protocol between major phone system switches. |
| **SVC** | Switched Virtual Circuit. A path over a packet-switched network that appears to be a dedicated circuit, but in fact the connection only stays up as long as needed, and then ends. |
| **switch** | In networks, a device that filters and forwards packets between LAN segments. Switches operate at the data link layer (layer 2) of the OSI Reference Model and therefore support any packet protocol. LANs that use switches to join segments are called switched LANs or, in the case of Ethernet networks, switched Ethernet LANs. |
| **synchronous** | See asynchronous as an opposing technology. Data transmission using synchronization bytes, instead of start/stop bits, to control the transmission. In xDSL, video streams are considered to be synchronous in nature. |
| **T1** | Trunk Level 1. A digital transmission link with a total signaling speed of 1.544 Mbps. A powerful, high speed transmission line connection to the Internet; it can also alternatively handle 24 voice channels. There are also Fractional T1 lines. A T1 line can send a gigabyte of information in less than 10 seconds. It has the capability of many simultaneous "conversations" or connections within. T1 supports voice, data and video at different frequencies on the same connection. T1 is a "full time connection" as opposed to dial-up. Also known as T-1 and sometimes DS1. T-1 is a standard for the digital transmission in North America, the European equivalent is an E1. |
| **TCP** | Transmission Control Protocol. TCP is the most common transport layer protocol used on Ethernet and the Internet. TCP is built on top of Internet Protocol (IP) and is nearly always seen in the combination TCP/IP (TCP over IP). It adds reliable communication, flow-control, multiplexing and connection-oriented communication. It provides full-duplex, process-to-process connections. TCP is defined in STD 7, RFC 793. |
| **TCP/IP Stack** | Transmission Control Protocol over Internet Protocol. TCP/IP stack is the standard Ethernet protocols incorporated into 4.2BSD UNIX. While TCP and IP specify two |
protocols at specific layers, TCP/IP is often used to see the entire DoD (Department of Defense) protocol suite based upon these, including Telnet, FTP, UDP and RDP.

**TDM**  
See Time division multiplexing

**Telnet**  
A terminal emulation program for TCP/IP networks such as the Internet. The Telnet program runs on your computer and connects your PC to a server on the network. It lets you connect to other computers on the Internet.

**TFTP**  
Trivial File Transfer Protocol. A simplified version of FTP that transfers files but does not provide password protection or user-directory capability.

**throughput**  
Throughput is the amount of data a communications channel can carry, usually in bytes per second.

**Time Division Multiplexing (TDM)**  
TDM systems offer a synchronous transmission of data over a fixed bandwidth channel. The most popular TDM transports are a T1 (1.5 Mbps) transport and a T3 (45 Mbps) transport. This transmission medium is ideal for traffic requiring a CBR transport, such as voice.

**timeslot**  
A single 64 kbps channel within a T1 or E1 signal; also called a DS-0 in North America. May also see a byte time on a circuit switched bus within a system.

**trunk**  
A communication path between two offices that carries voice or data.

**TSI**  
Time Slot Interchange.

**UAS**  
Unavailable Seconds - UAS are calculated by counting the number of seconds that the interface is unavailable.

**UBR**  
Unspecified Bit Rate – file transfers and voice mail, no service guarantees

**UDP**  
User Datagram Protocol. UDP is an Internet standard network layer, transport layer and session layer protocols which provide simple but unreliable datagram services. It adds a checksum and additional process-to-process addressing information. UDP is a connectionless protocol such as TCP, is layered on top of IP. UDP is defined in STD 6, RFC 768.

**UMTS**  
Universal Mobile Telecommunication System

**Unavailable Seconds (UAS)**  
UAS are calculated by counting the number of seconds that the interface is unavailable.

**UNI**  
User to Network Interface. A protocol for the interface connecting user equipment to an ATM network.

**V.35**  
A CCITT standard protocol for transmitting data.
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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VBR</td>
<td>Variable Bit Rate. An ATM Forum defined service category supporting variable bit rate data traffic with average and peak traffic parameters.</td>
</tr>
<tr>
<td>VBR-nrt</td>
<td>Variable Bit Rate-non real-time. Used for applications such as airline reservations and frame relay internetworking.</td>
</tr>
<tr>
<td>VBR-rt</td>
<td>Variable Bit Rate-real time. Used for applications such as real-time desktop video conferencing and voice</td>
</tr>
<tr>
<td>VC</td>
<td>Virtual Circuit. A data connection between two points on a network that may be carried over a variety of real circuit configurations during a single period of communication.</td>
</tr>
<tr>
<td>VCI</td>
<td>Virtual Circuit Identifier. label used to identify a VC on a data network. The label may change as the data passes from device to device across the network</td>
</tr>
<tr>
<td>VP</td>
<td>Virtual Path. A data connection between two points on a network that may be carried over a variety of real circuit configurations during a single period of communication.</td>
</tr>
<tr>
<td>VPI</td>
<td>Virtual Path Identifier. A label used to identify a VP on a data network. The label may change as the data passes from device to device across the network.</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network. A private long distance network that uses leased lines to connect computers or LANs. A wide area network is a linking of computers not physically attached through conventional network connectivity. Usually the WAN connection is a dedicated or high grade dial up phone link. It is often done with T1 or T3 connections but can also be through satellite or other technologies.</td>
</tr>
</tbody>
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