

University College London Deploys a Zero-latency Platform from Force10 to Study Cheaper, Faster Broadband Internet Connections

Customer
PROFILE

Customer
University College London



Industry
Educational Research

Application
Research Network

Highlights
UCL has deployed an E1200 chassis with a route processor, nine switch fabric cards, plus a full selection of 48-port Gigabit Ethernet line cards to bring the total port count to over 500.



Your broadband connection could be both cheaper and more secure in future as a result of research now underway at University College London (UCL) — and it will be because Force10 Networks' high-speed switches provided UCL's research network with a rock-solid, zero-latency platform on which to build its test labs, and with which to take its researches further than before.

Background

Internet Service Providers (ISPs) are always looking to lower their costs and pass on some of those savings to their customers. Much of the cost associated with running an ISP business is the sheer amount of hardware that's required. A significant proportion of that consists of single-use appliances, such as routers — core to the ISP business — and other functions, including network and application management but especially security, which in recent years has moved from being a nice-to-have to a must-have.

As a result, the number of security appliances has burgeoned. According to IT industry research and analysis firm IDC, telcos are big purchasers of such devices, which run applications such as intrusion prevention and firewalling. It means they have a lot of capital tied up in those boxes, each of which requires maintenance, power and cooling and space, none of which is cheap.

If they could move those applications off expensive, single-use boxes and onto cheap, PC-based servers, they could reduce hardware acquisition and operational expenses considerably. With virtualisation technology, they could run several such applications on a single server, cutting costs even further.

That's what the work of UCL researcher Adam Greenhalgh and his colleagues could enable. The UCL test labs' research is currently funded by the UK Government's leading funding

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Adam Greenhalgh

UCL Researcher
University College London

agency for research and training in engineering and the physical sciences, the Engineering and Physical Sciences Research Council (EPSRC) and European Framework programmes.

The research aims to discover how highly demanding applications such as security appliances — for example, firewalls — run on standard PCs, which is where the bottlenecks are, and what can and needs to be done to smooth over or eliminate them.

For example, key areas Greenhalgh is investigating include memory bottlenecks in multi-core computers, and the path that network packets follow inside the PC between the network interface and the processor, and back again.

Selection Criteria

The tests required to explore these issues demand huge amounts of consistent bandwidth, so UCL specified a test lab consisting of some 100 PCs connected in a variety of topologies. Once installed, the PCs needed a network to connect them, and a switch at the centre that could handle the massive load.

Greenhalgh explains: “We were after a switch with a large number of ports, over 400 — and they needed to be non-blocking. Those were our key requirements. We looked at two vendors — Force10 and one other — and selected Force10’s E1200.”

Specifically, UCL’s key research criteria were:

- Lots of ports on a single chassis (400 active ports)
- Ability to get high density, wire speed 10 Gigabit Ethernet in a single chassis
- Constant latency non-blocking across the backplane

“The switch sets up the topology for the network, so we might end up with a classical Internet to ISP scenario to link to one or more boxes and then examine the traffic types,” says Greenhalgh.

The types of application that Greenhalgh and his colleagues are testing include software routers and security appliances running in virtual machines — the kind of setup an ISP could deploy to reduce its hardware acquisition and maintenance expenditure. The volumes of bandwidth and low latency require-

ments are akin to those of a telco or enterprise requiring a high-speed switch fabric inside its data centre.

Only the Force10 Networks E1200 met these tough requirements, so UCL bought an E1200 chassis with a route processor, nine switch fabric cards, plus a full selection of 48-port Gigabit Ethernet line cards to bring the total port count to over 500. What swung it in favour of Force10’s E1200 was not just performance, according to Greenhalgh. It was also that “line speed was constant across the backplane. For us, constant performance and latency more important than speed.”

Deployment and experience

Setting up the equipment was easy, says Greenhalgh. So easy in fact, that the researchers did it all themselves, with only one small glitch, resulting from the labs having bought the wrong power supply. Once that was sorted out, the E1200 went to work with a will.

UCL also needed to call Force 10 Networks’ technical support to resolve an issue in an SNMP module. “We resolved those by email and by phone — we found it easy and straightforward,” says Greenhalgh.

Greenhalgh says that the switch has performed up to and beyond his expectations. “There’s no latency, and we would buy more if needed to, although this depends on grants.”

“It’s fully populated with cards and ports — we have 460 cables going into it — but it’s done exactly what we wanted, it doesn’t get in the way, we don’t worry about it or notice it — which means there’s no latency on the experiments. It’s the best thing we can say.”

“It’s there, it works,” he says.

Greenhalgh sees the E1200 at the heart of the test network as a solid platform for future developments. “We’re likely to develop it with more line cards but I don’t see much change until we need to upgrade the switch.”

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Real-world benefits

Greenhalgh put his researches in a nutshell — “We’re trying to exploit the excess of resources on the PC.” More specifically, he reckons there are a number of real-world benefits to be drawn from his researches. Among these are helping ISPs to:

- Prevent denial of service attacks on its customers cost-effectively and so keep broadband costs low.
- Inspect and process data from small packets at high rates, for example SIP packets used in voice-over-IP applications
- Use commodity hardware and switching, and move away from dedicated appliances towards software-only solutions

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About The Manufacturer

Force10 Networks

- Industry leading density and resiliency delivers simpler networks at lower costs
- High performance Ethernet routing, switching and security ensures predictable application performance
- End-to-end high performance Ethernet networks from core to edge

E1200 Switch/Router

- Best-in-Class Resiliency
- Massive Scalability
- 1,260 Gigabit Ethernet or 224 Ten Gigabit Ethernet Ports per Chassis
- Full L2 Switching and IPv4/IPv6 Routing

E1200 Performance and Density

- Gigabit Ethernet density with 672 line-rate ports
- 10 Gigabit Ethernet density with 56 line-rate ports
- Throughput: processes one billion packets per second
- Security scalability: supports one million Access Control Lists with no performance degradation



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