

JANET, THE UK'S RESEARCH AND EDUCATION NETWORK, SCALES TO 100GBE

Summary

Company: Janet

Industry: Research and Education

Challenge:

- Scale capacity as demand doubles every 18 months
- Meet network needs of the UK's demanding research and education community
- Deliver highly available network services

Network Solution: High-performance, highly reliable, scalable and flexible router solution for the network backbone

Solution:

- T1600 Core Router
- T640 Core Router
- MX960 3D Universal Edge Router

Results:

- Has enabled smooth migration to 100GbE in London and surrounding areas
- Supports diverse applications, from "big data" to streaming video
- Delivers superior end-user network experience

The UK has a world-class reputation for the quality of its research and education, and the country's Janet network plays a vital role in maintaining and strengthening this role. Janet provides high-performance, highly reliable network services to research and education institutions across the United Kingdom, including universities, further education colleges, research councils, specialist colleges and schools. More than 18 million users are served by Janet.

Janet manages the operation and development of the network on behalf of JISC (Joint Information Systems Committee) for the UK Further and Higher Education Funding Councils with the primary aim of providing and developing a network infrastructure that meets the needs of the research and education communities. JISC also works in partnership with the Research Councils.

Challenges

Demand for bandwidth is on an inexorable ascent. "As a general rule, we double traffic every 18 months," says Dietrich Nanton, Core Architecture Team Manager for Janet.

For example, the Janet Lightpath managed service carries a portion of the 15 petabytes of data per year from the Large Hadron Collider in CERN to UK processing centers and supports international collaboration with researchers in other countries. "Researchers, particularly in astronomy and high-energy physics, import and export very large volumes of data," says Nanton. "Users are requesting 5 Gbps to 6 Gbps flows."

The business of running research and education is putting more demands on the network as well. More institutions are moving toward cloud services and IT outsourcing, which means more workers access vital applications and information that are not necessarily located in on-premise data centers.

The use of videoconferencing has soared as more researchers and academics have become accustomed to using the technology. Distance learning, too, has expanded as more universities and colleges offer courses to students in remote locations. More universities have opened overseas campuses, which accelerates the need for international bandwidth.

As a provider of transit network services, Janet must engineer the network to support a wide variety of uses, at very high speeds, and with high reliability. Network downtime translates directly into the inability to further academic research and educate students. The embracing of cloud services also drives reliability requirements, as an outage in the connection to the cloud means that work halts.

To meet the insatiable demand for affordable bandwidth, Janet needed to upgrade its 40 Gbps backbone in London and the surrounding area to 100 Gbps. The backbone interconnects the major cities in the UK, and regional networks connect the universities and research councils.

"It was clear that SDH or SONET was not being continued to the 100 Gbps level and that Gigabit Ethernet was the only path," says Nanton.

Selection Criteria

As a mission critical service to the UK's research and education community, reliability and scalability are vital. Janet must meet customers' demands for increased capacity at a controlled cost. The network must deliver on users' expectations for a quality voice and video experience, while supporting massive data volumes and a large geographical reach. Flexibility is also important, so that network capacity can be added easily to accommodate new demands.

Solution

Janet has used Juniper Networks routers in its backbone since 2006, and in spring 2011, Janet upgraded its Juniper core routers in London and Reading to 100GbE. The upgrade freed up line cards for the Juniper routers, which were then leveraged to double the connection speed between Reading, Warrington, Leeds and London to 80 Gbps. Connections in other outlying areas were also upgraded to higher speeds. (See Figure 1.)

"This technical advance is an example of Janet's commitment to ensuring that research and education in the UK is supported by a world-class infrastructure," says Nanton. "Having a 100GbE infrastructure helps us deliver the technologies that offer real value to our customers."

The migration to 100GbE over the DWDM optical network was well-planned and executed smoothly. "We tested for a week to 10 days, and everything was working fine, so we migrated over," says Jon Francis, Senior Engineer on the Core Architecture Team at Janet. "It was a smooth transition."

The high-performance network offers a wealth of network services to its customers. In addition to network transit, international transit services and dark fiber, Janet offers web, mail, IP voice, video, certificate services, DNS and more.

Janet uses Juniper Networks® T Series Core Routers and Juniper Networks MX Series 3D Universal Edge Routers in its backbone and regional networks. The T Series, which supports 100GbE, is ideal to meet Janet's growing volumes of Internet traffic. Janet uses Juniper Networks T1600 Core Router—a highly scalable, high-performance router—for its backbone. Despite its high performance, the T1600 consumes 40 percent less power, requires 40 percent less cooling and takes up less than half the physical space of competitive platforms.

Janet has a complete overlay network of MX Series routers that is used for its high-speed Lightpath service. The MX Series router provides the 3D scale, maximum performance, availability and service agility that service providers need in today's Ethernet environment.

The T Series and MX Series routers run Juniper Networks Junos® operating system, a high-performance network operating system for routing, switching and security. Running Junos OS reduces the time necessary to deploy new services and decreases network operations costs. Running Junos OS in a network also improves the reliability, performance and security of existing applications. The network team at Janet appreciates the consistency of Junos OS. "We've had a good experience with Junos OS," says Francis.

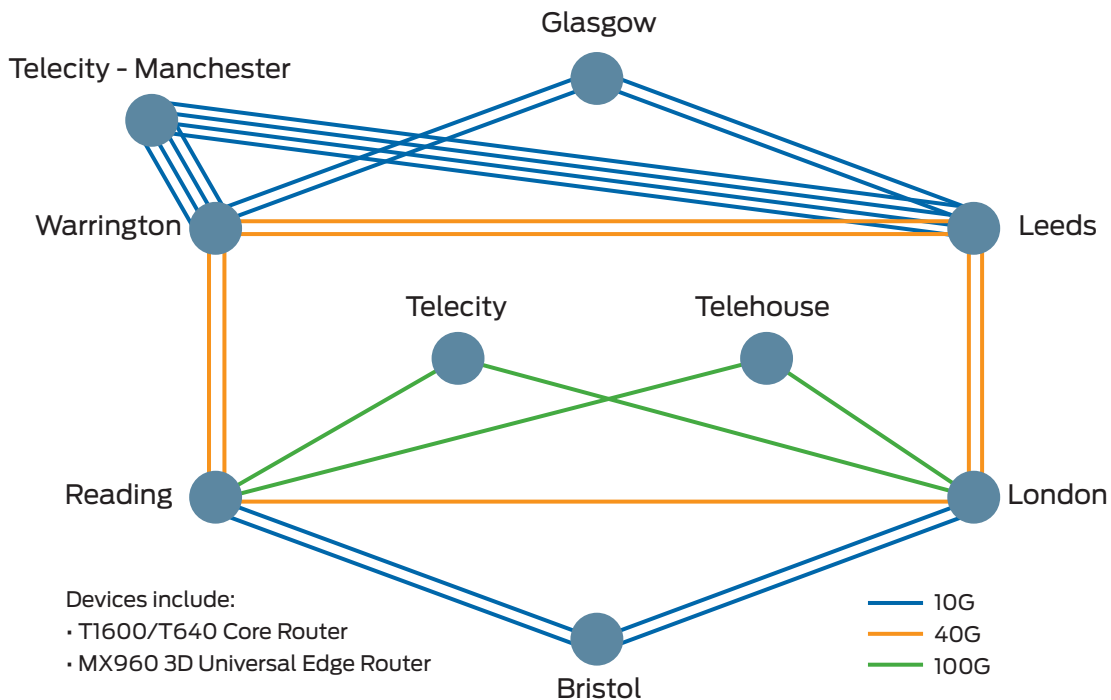


Figure 1: Janet upgraded its backbone network in the London region to 100GbE to support growing capacity needs.

Meeting service-level agreements with customers is vital. “Performance, availability and reliability are massively important for Janet, and the T Series routers have helped us achieve our service-level goals,” says Nanton.

High availability features in Junos OS help the team support a carrier-class environment. Janet takes advantage of the many high availability features on the T Series and MX Series routers, including non-stop routing. “If a network card fails, it generally means that we haven’t lost service,” says Nanton. “It gives the service provider more time to repair the issue.”

As a world-class research and education network, Juniper’s leadership in IPv6 was critical. Janet has run a dual-stack network using Juniper gear for more than 5 years. Janet also leverages the low-latency multicast capabilities of Junos OS in both IPv4 and IPv6 to support user demand for videoconferencing, video serving and news distribution.

“Performance, availability and reliability are massively important for Janet, and the T Series routers have helped us achieve our service-level goals.”

Dietrich Nanton,
Core Architecture Team Manager, Janet

The Results

Janet has delivered both strong business value and cost efficiencies—especially due to the aggregation of demand across the sectors that Janet serves.

Janet enables researchers in the UK to collaborate easily with peers around the world. Connecting the UK’s research and higher education institutions creates more effective ways for engaging with students—no matter where they are located. Individuals

and organizations can push back the traditional boundaries of teaching, learning and research and take full advantage of the digital world. Videoconferencing and video streaming allow lectures to be delivered to remote groups of students.

“The network is mission critical to our customers, underpinning all of their ICT activities,” says Nanton. “Just recently there has been a shift towards outsourcing and the use of the network to conduct business activities with commercial partners. This puts increasing demands on the network, and makes careful testing of new systems on the production network more crucial than ever.”

Next Steps and Lessons Learned

With bandwidth demands continuing to climb, Janet is continuing to deploy 100GbE in the network and is planning its strategy for the next-generation of the network. One key change is that the network requirements are to be set holistically and include the backbone, regional networks and international delivery relationships. This ensures that the network can continue to deliver a strong value to its customers.

For More Information

To find out more about Juniper Networks products and solutions, visit www.juniper.net.

To find out more about Janet, please visit: www.ja.net.

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