French University Adopts 40 Gigabit Ethernet

Lothaire Team at University of Lorraine deploys Cisco 40 GE solution for higher bandwidth and big data demands.

EXECUTIVE SUMMARY

Customer Name: Lothaire Team at University of Lorraine

Industry: Education

Location: Nancy, France

Number of Employees: 6750 staff and 54,000 students

BUSINESS CHALLENGE

- Support growing network demands from universities and research centers
- Streamline network management
- Minimize total cost of ownership

NETWORK SOLUTION

- Upgrade to Cisco Catalyst 6904 40 Gigabit Ethernet Interface Modules for Catalyst 6500 Series Switches with Supervisor Engine 2T

BUSINESS RESULTS

- Provide faster transmission of big data and better collaboration to universities and research centers throughout eastern France
- Improve network scalability and simplify network access management to support over 100 sites from central location
- Control costs by leveraging existing Cisco Catalyst Switch infrastructure

INTEGRATOR PARTNER:

- AXIANS Network Services, a Cisco Gold Partner

Business Challenge

Universities are in the knowledge business. Paired with research centers, universities produce some of the world's most important breakthroughs in science, medicine, and technology. The discoveries that change the landscape of conventional wisdom and the way we view the world can be achieved only through extensive collaboration, sharing, and partnerships. Broadband data networks are playing an increasingly important role in supporting this collaboration among university and research personnel for publishing, sharing, and archiving their findings.

Based at the University of Lorraine, Lothaire Team serves universities, research centers, and high schools with Lothaire, a regional network for the Lorraine region of France. As a critical hub for this area of research activity, Lothaire is continually challenged to provide reliable, secure service to users. "The need for high-speed interconnection among these communities has become crucial in order to expand quality services to the entire Lorraine region," says Pierre Mercier, chief technology officer for Lothaire. "Demand continues to grow, and 40 GE technology from Cisco helps us scale our services to support higher performance for increased video and complex data use."

Lothaire is based on an infrastructure that its employees are familiar with and comfortable managing. From an operational standpoint, the organization wanted an easily-managed solution that could improve performance and increase connectivity speeds without requiring additional end-user training. "We have big campuses that have larger capacity needs, so we needed to upgrade the way their networks connect with ours," says Mercier. "At the same time, we wanted to maintain automatic configuration and management using on-demand web portals and interfaces for remote access to the network so we could cost-effectively maintain performance expectations and support our customers."

Network Solution

Lothaire Team had previously custom-built several networking solutions based on Cisco technologies to cater to the various needs of its clients and users. Using Cisco Catalyst® 2960-S, 3750-X, 4500, and 6500 Series Switches, Lothaire connects 101 sites across Lorraine, including university campuses and research facilities in the cities of Nancy, Metz, and Epinal.

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The network for Nancy, named StanNet, is built around four core Cisco® Catalyst 6500 Series switches and more than 600 access switches. Similarly, AmpereNet, a metropolitan area network for Metz, connects 13 sites across the city through Cisco Catalyst 3750 and 6500 Series Switches. StanNet and AmpereNet networks are connected through a 20 Gigabit Enhanced Wave Division Multiplexer (EWDM) passive optical system link to support high-bandwidth requirements. The previous network solution featured 2 GE connectivity between the core and access layers. Even with an upgrade to 10 GE, demand continued to rise quickly. Lothaire Team found that with links to access switches moving to 10 GE, more campuses were interested in interfaces greater than 10 GE to link the aggregation and core layers together.

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> **— Pierre Mercier, CTO**

Working with Cisco Gold Partner AXIANS, a subsidiary of VINCI Energies, Lothaire Team decided to deploy the new Cisco Catalyst 6904 40 GE Interface Modules for Catalyst 6500 Series Switches with Supervisor Engine 2T for a smooth transition to the next generation of high-performance computing.

"It's great to have seen in 15 years the evolution of the backbone from ATM 155 Mbps LAN Emulation to 40 Gigabit Ethernet, and all with Cisco IOS Software as the cornerstone," says Patrick Govindaraju, Axians consultant in charge of the university sector.

The solution is IEEE 802.3ba compliant, in keeping with an IEEE task force mandate "to provide a significant increase in bandwidth while maintaining maximum compatibility with the installed base of 802.3 interfaces, previous investment in research and development, and principles of network operation and management."

Leveraging the Cisco Catalyst 6500 Series Switches allows Lothaire to retain most of the hardware and firewalls already in place, avoiding costly reconfigurations and additional purchases. "The Catalyst 6500 is highly compatible with our existing infrastructure and helps us leverage that investment. From an operational point of view, our team is already familiar with Cisco technologies, so our team can work with this solution without additional training," says Mercier.

Adds Sébastien Morosi, Lothaire network engineer, "The Catalyst 6500 is extremely capable and flexible to support the backbone for the Nancy metro area and allows us to bring high-demand features to the region such as Virtual Private LAN Services (VPLS), including Layer 2 and Layer 3 VPN access. Universities have server rooms that require ever-greater connectivity at different levels on the network. Upgrading to 40 Gigabit Ethernet modules enables us to meet our growing demand, simplify and centralize backup, and provide more consistent, reliable access to users from virtually any location."

The Cisco solution also allows increased efficiency with access list management. With continual changes in the user population, managing access lists can be complex. A poor process can quickly drag down network performance. With its Cisco network, Lothaire Team engineers can leverage remote management functionalities and automatically-generated access lists in the networking equipment for an intelligent, robust solution to quickly grant or deny access to different resources by different users.

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PRODUCT LIST

Routing and Switching

- Cisco Catalyst 6500 Series Switches with Supervisor Engines 720 and 2T
- Cisco 6900 Series 40 Gigabit Ethernet Interface Modules for Catalyst 6500 Series Switches
- Cisco Catalyst 4500, 3750-X, and 2960-S Series Switches
- Coarse Wave Division Multiplexer (CWDM) and Enhanced Wave Division Multiplexer (EWDM)

Security and VPN

- Cisco ASA 5585-X Adaptive Security Appliance 5585
- Cisco Catalyst 6500 Series Firewall Services Module and ASA Services Module

Video

- Cisco TelePresence® Multipoint Control Units

Voice and IP Communications

- Cisco Unified Communications Manager (CallManager)

Wireless

- Cisco Wireless Services Module 2 (WiSM2)

"Some of our networks process thousands of lines at a time to allow users to process requests and perform their tasks," says Morosi. "This can often exceed 100,000 simultaneous transactions. Increased traffic places greater demands on the network and our ability to manage access lists effectively. We needed to scale our capacity to help ensure that service levels and secure backup perform optimally. Thanks to the Cisco Catalyst 6500 Supervisor Engine 2T, we can not only scale the bandwidth but also enhance the way we manage our access control lists (ACLs). The new features like ACL dry run and atomic commit are key to CIRIL achieving higher levels of efficiency."

With dry run support now available with Supervisor Engine 2T and newer releases of Cisco IOS® Software, applications can make intelligent decisions to improve the ACL management process. In older IOS releases, when a new feature was applied on an interface configured along with other features, and if the new feature did not fit in the total ternary content addressable memory (TCAM), then existing features were also affected and removed from the TCAM.

Now, however, applications can send regular requests to test whether or not requests can be programmed successfully. The Catalyst 6500 switch receives the dry run request, calculates the TCAM resources required for the request, and compares those resources against the available free resources. If the request fits in successfully, then the switch returns a success; otherwise the switch returns a failure. This dry run support aids Lothaire Team engineers in more efficiently managing ACLs through the process of feature changes.

The atomic commit feature further helps Lothaire Team improve the configuration process. Once a network administrator is ready for a configuration in a target area to become part of the running configuration, the target configuration must be explicitly committed by the client application. The administrator can use an atomic commit operation so that the entire configuration in the target area is committed only if application of the whole configuration in the target area to the running configuration succeeds. This capability minimizes disruption to the Lothaire network environment as a whole.

Understanding and addressing network performance and behavior are key priorities for Lothaire Team. With Cisco Flexible NetFlow capabilities for understanding traffic flow, Lothaire engineers have been able to develop a service portal to provide performance and security visibility to its customers. This feature has created greater flexibility for customers to adjust network policy depending on their needs. Lothaire Team has developed two free, open source tools to leverage Flexible NetFlow on its networks, NetMET (Network's METrology) and NetMAT (Network's MATrix). These metrology tools quantify and qualify the flows between the Lothaire network and the French NREN (RENater), and also serve as security tools that offer daily reports on key indicators such as Top N Talkers and traffic usage per protocol by source, allowing simplified analysis of traffic data.

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Business Results

Research networks today are transporting petabytes of data across academic institutions for collaborative scientific research. University and research campuses have a continually growing need for bandwidth, network access control, and operational efficiency. “We needed to be able to enhance service and support while controlling and reducing our operational costs,” Mercier says. “The support for 40 GE that we get with Cisco Catalyst switching solutions helps us leverage our existing investments and maintain an intelligent infrastructure that is ready to support cloud-based environments and the increasingly complex data and video applications required by universities and research centers.”

Adds Morosi, “With Cisco solutions we have excellent visibility over our switches to help us securely manage the bulk of traffic shifting from classrooms during the day to dormitories at night, support growing IP phone activity, and better handle classes via video conference that we broadcast live to other campuses, sometimes in remote locations.”

“It’s the best possible scenario,” he says. “We’re able to meet the evolving demands of our university and research partners, while providing better and more efficient services at lower costs.”

For More Information

To find out more about the Cisco Catalyst 6900 Series 40 Gigabit Ethernet Interface Module for Cisco Catalyst 6500 Series Switches, go to: http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/data_sheet_c78-696623.html.

To find out more about Lothaire and its free, open source network metrology tools, go to http://reseau.ciril.fr, http://www.netmet-solutions.org, and http://www.netmat.org/.

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