



EXECUTIVE SUMMARY

NHS Lothian

- Healthcare
- Edinburgh, Scotland
- 28,000 Employees

CHALLENGE

- Inadequate wide area network could not support government mandate to move to digital imaging
- Siloed, incompatible clinical and administrative systems hampered information sharing and efficient delivery of healthcare services
- Email was a considered a privilege, and only 300 out of 28,000 staff members had email and Internet access

SOLUTION

- New Pan Lothian Data Network removes boundaries to information access across the region
- Cisco ASR 1000 Series Aggregation Services Routers add capacity and future-proof NHS Lothian's ability to continue adding and expanding programs
- Cisco wireless and mobility solutions allow clinicians to spend more time with patients and less on administrative tasks

RESULTS

- IT group's modernization program has collapsed 12 years of technology innovation into less than three, and transformed nearly every aspect of the delivery of quality healthcare services
- Technology innovation is helping NHS Lothian make specialized resources available across multiple sites, saving travel time and potential delays in diagnosis and treatment
- New infrastructure will enable NHS Lothian to support multi-gigabyte files from advanced CT scanner without overhauling network core

Healthcare Provider Turns Imaging Mandate into New Healthcare Vision

NHS Lothian accelerates delivery of advanced community and hospital-based services with Cisco-based Pan-Lothian Data Network.

Challenge

NHS Lothian provides medical services for the second largest residential population in Scotland, including Scotland's capital of Edinburgh. The Lothian region extends over 700 square miles of rugged Scottish landscape.

Geographically and historically, NHS Lothian staff were used to working in relative isolation, reliant on manual systems, losing time on the road to meetings, and dispatching files from site to site by courier. Each hospital maintained separate administrative and clinical applications, so if a patient record was updated at one hospital, the new information was not available if the patient was referred to another hospital, potentially delaying reports or follow-up appointments.

Iain Robertson, head of IT operations and infrastructure for NHS Lothian, says that the healthcare system was still rooted in some traditions dating back to Victorian England. Even email was considered a privilege, and only 300 physicians out of 28,000 staff had email accounts or access to the Internet. "People were accustomed to the lack of shared systems, and put up with the inefficiencies."

An aging wide-area network (WAN) connected the major acute care hospitals with some of the NHS Lothian community hospitals.

Robertson recounts watching staff members try to use an online patient assessment application over a 64K circuit. He timed the process at seven minutes per page, or over two hours to complete a 20-page questionnaire for a single patient. "Multiply that by dozens of clinical and administrative applications used over the WAN, and you can imagine the level of inefficiency and frustration," says Robertson. Even the 100 Mbps connections between the core hospitals were inadequate, resulting in congestion and poor performance on an ongoing basis.

When the Scottish government issued a mandate requiring all health boards to move to Picture Archiving and Communications Systems (PACS), Robertson's goal was not merely compliance. "We had the opportunity to advance beyond an aging infrastructure and create a unifying, high-performance WAN that would deliver advanced healthcare services across the region." In parallel with deploying the new network, NHS Lothian began systematically replacing the siloed medical and administrative applications at each acute care hospital with an enterprise-wide electronic patient record application.

Solution

The existing NHS Lothian WAN had been developed on a site-by-site basis, creating a mixture of different vendors' equipment. Beyond the capacity problems, there was no common network management system available to Robertson's five-person network engineering staff; not all of the remote devices were even manageable. "The philosophy in the past was to buy inexpensive equipment for remote sites," says Robertson, "but in reality those supposed cost-savings were negated by much higher maintenance and operational costs in the present."

"We had the opportunity to advance beyond an aging infrastructure and create a unifying, high-performance WAN that would deliver advanced healthcare services across the region."

— Iain Scott Robertson, Head of IT Operations and Infrastructure, NHS Lothian

NHS Lothian had a strategic relationship with Cisco, and the IT group made the recommendation to standardize on Cisco® equipment for the new Pan Lothian Data Network. Shortly after the planning began, Cisco introduced its ASR 1000 Series Aggregation Services Routers, and proposed the new platform to NHS Lothian as the foundation for the Pan Lothian Data Network. The Cisco ASR is based on the Cisco QuantumFlow Processor, which is built around 40 custom QuantumFlow Processor Packet Processing Engines, each of which supports four threads of execution, or up to 160 independent processor threads running in parallel. The processing engine provides 10-Gbps throughput, even with Firewall, Network Address Translation, or other services enabled.

In the private sector, where Robertson had worked before joining the healthcare organization, the ASR routers would have been an easy investment decision. "But in healthcare, we had to look at the cost and determine if our needs could justify such a sophisticated aggregation device. Fortunately, we had the support of a visionary board, and the purchase was approved."

Considering how advanced the ASR platform was, Robertson's team was a little worried that they would have some significant ramp-up time in training and deployment, "but Cisco preserved the familiarity of the IOS® environment, and we knew we could build the core quickly," says Robertson.

Several months after the decision was made to build the Pan Lothian Data Network around the ASR routers, Robertson's team received word that the Royal Bank of Scotland was investing almost UK£4 million (US\$5.7 million) to help buy a state-of-the-art CT scanner for the University of Edinburgh's Queen's Medical Research Institute (QMRI) and NHS Lothian. QMRI will be the first institute in the United Kingdom and one of the first in Europe to take delivery of this type of scanner, which helps enable the latest research to improve the diagnosis and treatment of a range of heart and cancer illnesses.

"We could never have anticipated the acquisition of such a sophisticated piece of imaging equipment, and the associated bandwidth demand required to support the images generated by a 320-multidetector CT scanner," says Robertson. "If we had not given ourselves the proper foundation and future-proofed our investment, we might have faced a complete redesign of the core."

Instead, preparing for the CT scanner will merely require upgrading the circuits between the QMRI and NHS Lothian core and making some software changes to the ASR. “We knew that we had made the right investment decision for our infrastructure,” says Robertson.

Results

The original WAN had taken more than nine months to complete, and what Robertson describes as an army of engineers. The Pan Lothian Data Network should be deployed in three months, with most of the work handled by the five on-site network engineers. Compared to the old WAN, the Pan Lothian Data Network will not only be easy to deploy, but also less costly and easier to manage. The entire Pan Lothian Network is monitored centrally with CiscoWorks. “We have a team of five engineers easily supporting about 22,000 WAN and LAN devices at 297 sites across a 700-square-mile region,” says Robertson.

In the past, network engineers could spend an entire day trying to track down and fix a problem. For example, The Royal Infirmary alone has 32 node rooms. In the event that hospital personnel reported a problem, a senior engineer would have to travel to the hospital and spend most of the day checking wiring closets to find the problem. “With CiscoWorks, we can see the status of every device on the network from a central location,” says Robertson. “We can even be proactive about spotting problems, and rectify problems before any of our customers knows there is an issue.”

PRODUCT LIST
Routing and Switching <ul style="list-style-type: none"> • Catalyst 3560/3750 switches equipped with Layer 3 software • Cisco Catalyst 6509 Series Switches • Cisco ASR 1000 Series Aggregation Services Routers • Cisco 2800 Series Integrated Services Routers • Cisco 7201 Router
Network Management <ul style="list-style-type: none"> • CiscoWorks
Wireless <ul style="list-style-type: none"> • Cisco Aironet® Wireless Access Points

NHS Lothian's IT group undertook a modernization program that has collapsed 12 years of technology innovation into less than three, and transformed nearly every aspect of the delivery of quality healthcare services, and even the availability of new services that were not possible before.

One of the great challenges that NHS Lothian has is the difficulty balancing staffing from site to site. The Royal Hospital for Sick Children (RHSC), part of NHS Lothian's University Hospitals Division, for example, does not have a large radiology department.

With the new network in place, literally the entire picture is changing, not just for RHSC but also for the smallest and largest hospitals in the NHS Lothian healthcare chain. “Now radiologists can review x-rays

over the network. We are not dependent on shipping x-rays around or radiologists around,” says Robertson.

The new network has also freed clinicians from the constraints of the past by ushering in a new era of mobility. “Healthcare delivery is such an inherently mobile environment,” says Robertson, “but our old environment made it necessary for clinicians to find a wired PC in order to access the patient's records.” The first hospital to be equipped with Cisco wireless access points is St. John's hospital. A pilot group of clinicians were given Mobile Clinical Assistant devices to record patient data directly into Lothian's electronic patient record.

Clinicians embraced mobility with such enthusiasm that NHS Lothian has already announced that wireless electronic access will be expanded across St. John's, the Royal Infirmary of Edinburgh, the Royal Hospital for Sick Children, and the Western General Hospital.

Next Steps

The network is reaching out into the community with a pilot program that allows clinicians to remotely monitor home-based patients suffering with Chronic Obstructive Pulmonary Disease (COPD). This network-based monitoring has helped patients avoid tiring hospital trips and, in three cases, avoid prolonged, costly hospital stays. “We want our patients to travel through the healthcare system, from home-based care to community centers to acute care hospitals, and feel completely connected. Now we have the network foundation in place that can make that vision a reality” says Robertson.

Robertson has his sights set on a converged network for NHS Lothian, giving voice services the same freedom as data. He is also evaluating Cisco Telepresence™, to improve upon conventional video conferencing capabilities available to staff today. “Convergence, mobility, and conferencing are helping us break down long-standing barriers to more productive and responsive care.”

Technical Implementation

The new ASR core is a 1000 Mbps ring, connecting the Royal Infirmary of Edinburgh, Western General Hospital, St. John's Hospital, and the Lauriston Building. The switching infrastructure at the core was also upgraded to Cisco Catalyst® 6509 Series switches.

Seven large remote sites are equipped with Cisco 7201 routers, connecting to the core at 100 Mbps. WAN connections to all remote sites are now significantly faster than they were in the past. Fifty-eight sites are now connected using either 10/100 Mbps Ethernet with Catalyst 3560 or Catalyst 3750 switches equipped with Layer 3 software, or with multiple E1 leased lines using Cisco 2800 Series Integrated Services Routers or Cisco 7201 routers.

For More Information

To find out more about Cisco ASR 1000, visit <http://www.cisco.com/go/asr>



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

CCDE, CCSI, CCENT, Cisco Eos, Cisco HealthPresence, the Cisco logo, Cisco Lumin, Cisco Nexus, Cisco Nurse Connect, Cisco Stackpower, Cisco StadiumVision, Cisco TelePresence, Cisco WebEx, DCE, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn and Cisco Store are service marks; and Access Registrar, Aironet, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, EtherFast, EtherSwitch, Event Center, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, iQuick Study, IronPort, the IronPort logo, LightStream, Linksys, MediaTone, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, Network Registrar, PCNow, PIX, PowerPanels, ProConnect, ScriptShare, SenderBase, SMARTnet, Spectrum Expert, StackWise, The Fastest Way to Increase Your Internet Quotient, TransPath, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0903R)