



## Cisco Catalyst 6500 Series Ensures High Reliability for Saint Luke's Health System

### Executive Summary

#### Customer Name

Saint Luke's Health System

#### Industry

Healthcare

#### Business Challenge

- Ensure high network reliability and application availability
- Enable deployment of wireless, Storage Area Network, and video applications

#### Network Solution

- Cisco® switching solutions, including the Cisco Catalyst® 6500 Series Switch and Cisco MDS 9500 Series Multidirector switches
- Cisco routing solutions, including the Cisco 7300 Series and 3600 Series routers
- Cisco wireless solutions, including Cisco Aironet® 1200 wireless access points

#### Business Value

- Created redundant, resilient high-performance network for delivering imaging and other advanced healthcare applications
- Deployed wireless access to critical applications including prescription ordering and charting
- Enabled maximum monitoring effectiveness for cardiac intensive care patients

**Dedicated to the highest level of patient care, Saint Luke's built a highly available, high-performance foundation for its next-generation medical applications using Cisco Catalyst 6500 Series switches.**

### Business Challenge

Winner of the 2003 Malcolm Baldrige National Quality Award, Saint Luke's Hospital of Kansas City, Missouri, is committed to quality processes and performance excellence. Saint Luke's Hospital is part of the Saint Luke's Health System, which includes nine hospitals ranging in size from 60 to 560 beds, and the Saint Luke's Medical Group, which operates physician offices throughout the Kansas City metropolitan area and the surrounding region. Saint Luke's Health System provides a wide range of primary, acute, tertiary, and chronic care services through almost 7000 physician, clinician, nursing, caregiving, and support staff members.

In 2003, Saint Luke's undertook a major upgrade of its data network. It connected four main hospitals on an OC-12 (622 mbps) SONET ring and built a new data center, which ranks among the top data centers in the U.S. for healthcare. In 2004, Saint Luke's increased the SONET ring capacity to OC-48 (2.488 Gbps).

"Quality of care depends on physicians and caregivers having immediate access to critical data," says John Wade, chief information officer for Saint Luke's. "We have always been committed to anticipating and adopting new technologies that improve our ability to deliver the highest quality of patient care, and our data network infrastructure plays a vital role in delivering on our commitment to patients."

Saint Luke's chose a SONET infrastructure to ensure a high level of network redundancy and application availability. The organization's goal was to upgrade the entire network to accommodate a Picture Archiving Communication System (PACS) for radiology imaging, electronic medical records, and other new applications. With greater reliance on electronic capabilities, clinicians need access to data 24 hours a day, from anywhere in the system and Saint Luke's was committed to ensuring highly reliable access.

The healthcare system had used networking solutions from Cisco Systems® for many years. As it upgraded its network, it again turned to Cisco for solutions.

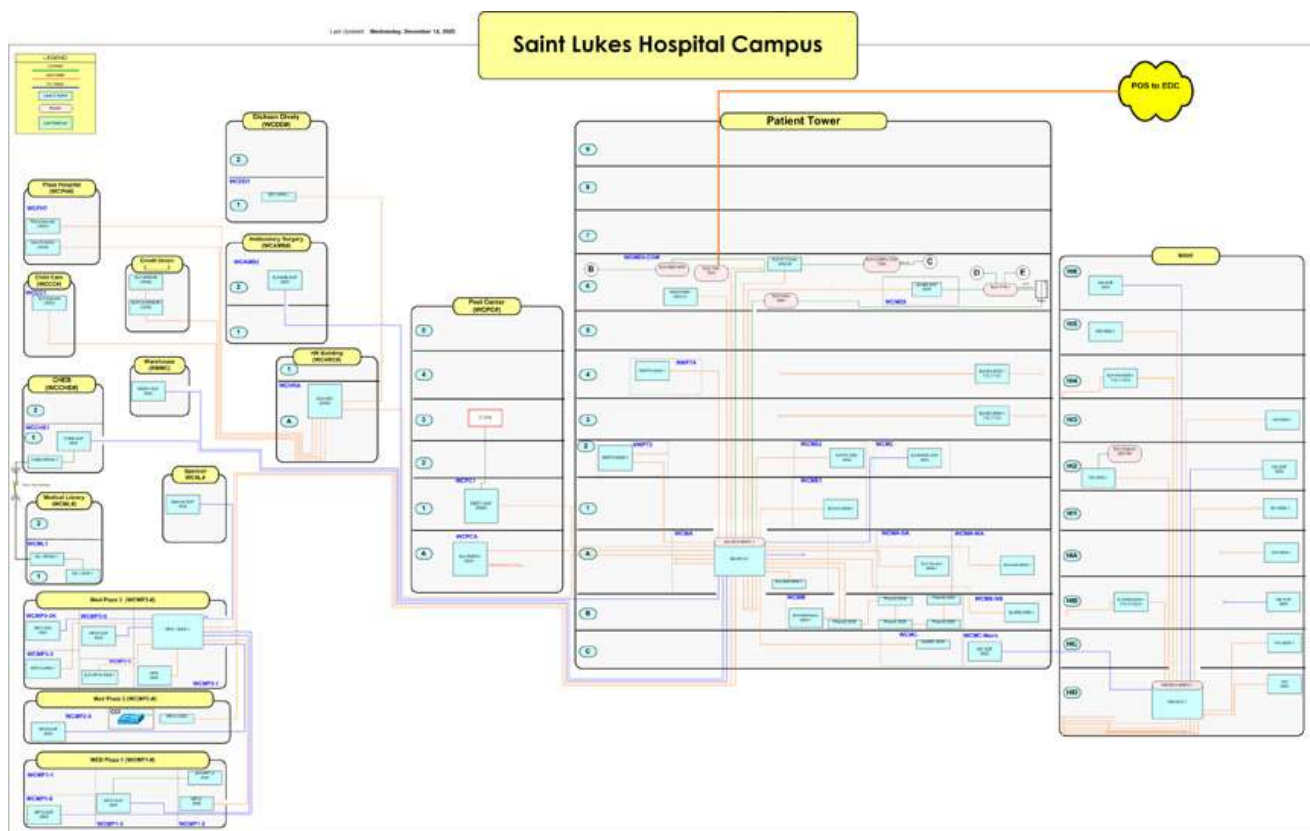
**“The main benefit of our upgraded network is reliability and throughput. Our goal is to enable physicians and caregivers to access PACS images anywhere in the health care system – at any time – within three seconds. One of the reasons we chose Cisco was because the Catalyst 6500 Series switches are proven and dependable.”**

– Troy Hottovy, Director of Technology and Security

## Network Solution

Saint Luke’s Cisco Medical Grade Network (MGN) is based heavily on Cisco Catalyst 6500 Series switches. Four main hospitals, including flagship Saint Luke’s Hospital of Kansas City, are connected to the SONET Ring and to the Saint Luke’s data center. The flagship hospital connects to the network over an OC-12 link, terminating on a Cisco 7300 Series Router. The Cisco 7300 Series is optimized for flexible, feature-rich IP services at the network edge. The three other main hospitals connect over OC-3 (155.52 Mbps) connections. Various buildings that house administrative functions, physician’s offices, the College of Nursing, and regional hospitals are connected to Saint Luke’s using DS-3 (45 mbps) or T1 (1.55 mbps) point-to-point links or Frame Relay connections.

**Figure 1**  
Saint Luke’s Campus Network

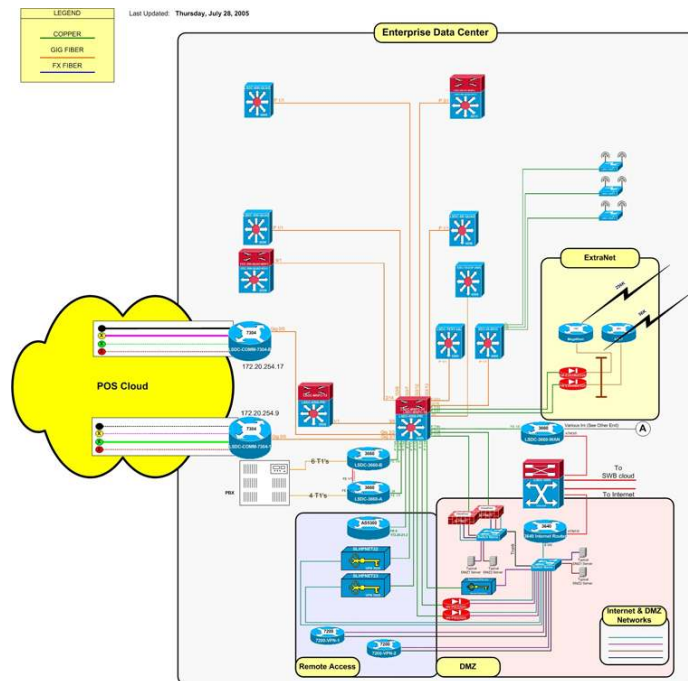


For the healthcare system's network core, distribution, and access layers, Saint Luke's chose Cisco Catalyst 6500 Series switches. A new hospital that will open in February 2006 is designed using the Cisco Catalyst 6509 switches for its core network. Each of the four main hospitals on the SONET ring and the data center will also soon have two redundant Catalyst 6509 switches forming the network core. Distribution switches are configured with Cisco Catalyst 6500 Series Supervisor Engine 720 modules for high-performance routing and switching and the ability to enable new applications and services in the future, such as voice and wireless. Dual Cisco Catalyst 6509 switches are connected with Gigabit Ethernet to each other, as well as to an access layer based on dual Cisco Catalyst 6506 switches.

Most of the distribution-layer switches are configured with Cisco Catalyst 6500 Series Firewall Services Modules (FWSMs). This high-speed, integrated firewall module provides the fastest firewall rates in the industry and enables any port on the switch to operate as a firewall port. Saint Luke's uses the Cisco FWSM to provide firewall services to certain small groups of users. These users may require access to Saint Luke's network through an affiliated facility. Other users, such as those with specialized FDA-approved devices that utilize special features, may not be compatible with other applications running on the main network. For example, a heart monitoring application may not work properly if the hospital's virus-checking software attempts to check it. In these cases, Saint Luke's separates users on virtual LANS (VLANs) outside of the Cisco FWSM. Saint Luke's has also implemented Dynamic Host Configuration Protocol (DHCP) snooping features to protect the network against rogue servers and to mitigate man-in-the-middle attacks.

Each Catalyst 6506 Switch used for the access layer is configured with redundant Cisco 6500 Series Catalyst Supervisor Engine 32 modules to help assure maximum uptime and security. These switches will initially be installed in critical care areas, such as emergency departments, intensive care units, and surgery areas before undergoing wider deployment throughout the Saint Luke's Health System. They will also implement Power over Ethernet (PoE) to provide power to Cisco Aironet® 1200 and 1300 series wireless access points, which are currently deployed in several hospital locations to provide wireless access.

**Figure 2**  
Saint Luke's Data Center Network



The new data center is organized in four quadrants – each with highly available configured Cisco Catalyst 6513 switches. Two quadrants are currently deployed, with the remaining two scheduled for deployment in 2006. Here, the switches function as access switches to the hospital's server farms. Cisco PIX® Security Appliances are used in the data center to provide firewall services between the hospital's network and users coming into the network over external connections.

The data center also hosts a central Internet connection which terminates on a Cisco 3640 Router. Cisco 3660 routers are used to provide trunking for PBX voice traffic over the SONET network.

Saint Luke's is currently expanding its storage area network (SAN), which stores images from the PACS, as well as archived data. The Fibre Channel-based SAN uses storage solutions from IBM, EMC, and HP. Cisco MDS 9500 Multilayer Director switches provide scalable, high-availability switching for the SAN with low total cost of ownership. Currently Saint Luke's is building a redundant site for backing up SAN data.

**“Quality of care depends on physicians and caregivers having immediate access to critical data. We have always been committed to anticipating and adopting new technologies that improve our ability to deliver the highest quality of patient care, and our data network infrastructure plays a vital role in delivering on our commitment to patients.”**

– John Wade, Chief Information Officer

## Business Value

With a powerful network that spans its facilities, Saint Luke's recently opened Saint Luke's East-Lee's Summit – its first all-digital facility. The new facility's imaging department is entirely filmless. A new all-digital hospital is scheduled to open in February of 2006. As vital patient care applications are increasingly electronic, high network availability becomes even more important as physicians and caregivers will require 24-hour-a-day network access.

“A major benefit of our new network is reliability – having patient data available 24 by 7,” says Hottovy. “One of our goals is to enable physicians and caregivers to access PACS images anywhere in the health system – at any time – within three seconds. One of the reasons we chose Cisco was because the Catalyst 6500 Series switches are proven and dependable. We also see the 6500 Switch as a longer-term investment, whereby we understand Cisco will be developing and supporting this workhorse switch for at least the next 10 years.”

Dependability is especially critical for one application called the *eICU*®. Launched in January 2005, this application enables several “intensivists” – highly specialized intensive care physicians, to monitor approximately 60 patients from the data center 24 hours a day. With highly redundant operations in the data center, Saint Luke's decided to take advantage of that environment to locate the intensivists. These physicians monitor intensive care patients' vital signs over a real-time system that enables them to see and speak with the patient directly over the network. This application enables Saint Luke's to maximize the effectiveness of highly specialized resources, provide coverage to four locations, and simultaneously increase the quality of care by having an intensivist monitor these critical care patients in various St. Luke's hospitals across the Kansas City metropolitan area 24 hours a day seven days a week. If a patient's vital signs suddenly change, the intensivist can begin initiating the appropriate action even in the critical seconds before a physician or nurse can physically reach the patient's bedside.

With wireless data access, caregivers can save steps and time. “Caregivers won't have to leave paper charts outside of rooms anymore,” says Hottovy. “They will be able to use a wireless computer on wheels or tablet and move from one room to the next without having to log in and out of a centralized computer – saving time.” Saint Luke's has already deployed wireless PDAs, which enable physicians to write treatment scripts and prescriptions. When the doctor is sitting with a patient, he or she can write a prescription, which is faxed directly to the patient's pharmacy so that it can be filled and ready when the patient arrives to pick it up. Wireless access will also facilitate caregivers' use of the hospital's electronic medical record system when it goes online.

As another example of working according to best practices, Saint Luke's is currently creating a disaster recovery warm/hot site, which will rely on the Cisco MDS 9500 Series switches to centralize all data onto the back-up SAN.

"We are using CiscoWorks LMS to help manage configurations and device faults," says Hottovy. "We're also using Cisco Network Analysis Modules (NAM) for gaining application-level visibility into network traffic. The NAM allows us to more easily gather response time data, capture traffic, and monitor aspects of the network. We're continuously striving to implement management best practices that will allow us to be even more efficient and proactive."

## Next Steps

With high standards for quality, Saint Luke's plans to continue implementing new technologies and applications that help them to maintain those standards. The healthcare system is expanding the intensive care monitoring application to additional facilities within the system.

Today, wireless users are primarily located in emergency departments, but Saint Luke's plans to deploy a wireless environment for all users across its network over the next year. The new wireless environment will be launched in the new all-digital hospital early in 2006 and provide access to a new electronic patient charting application and allow caregivers to be mobile throughout the hospital. Saint Luke's plans to expand its wireless network to over 1000 access points over time, and will be using the Wireless LAN Service Module to allow roaming. Another application planned for deployment in 2007 is an order entry system that enables physicians to order lab tests.

"We want to be sure that our staff have the critical resources they need," says Wade. "Patients rely on us to be there for them, and as we expect to maintain – or improve – our high standard of care, we expect our network to be there for us. Cisco stands behind our network."

## For More Information

To learn more about Cisco routing solutions, visit: <http://www.cisco.com/go/routing>.

To learn more about Cisco switching solutions, visit: <http://www.cisco.com/go/switching>.

To learn more about Cisco wireless solutions, visit: <http://www.cisco.com/go/wireless>.

To learn more about Saint Luke's, visit: <http://www.saintlukeshealthsystem.org>.

**"The new network consolidation capabilities make it possible to provide applications and instances of applications on logically separated physical lines, which reduces line costs and capital expenditures for DBS and for customers. It also greatly simplifies maintenance and configuration."**

– Dr. Christian Leis, Head of Networks

This customer story is based on information provided by Saint Luke's Health System and describes how that particular organization benefits from the deployment of Cisco products. Many factors may have contributed to the results and benefits described; Cisco does not guarantee comparable results elsewhere.

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