EXECUTIVE SUMMARY

Customer Name
King Fahd Medical City, Saudi Arabia

Industry
Healthcare

Challenge
- Facility designed as a state-of-the-art, specialized care centre
- Secure, reliable high-speed network required to support high volumes of multimedia content
- Scalable and flexible platform needed for future development

Solution
- Advanced, end-to-end Medical-Grade
- Network using Gigabit Ethernet fiber optic technology
- Wireless communications technology

Results
- Ability to manage hospital and patient records over the network keeps operating costs low, and staff productivity and patient care standards high
- Reduction in the time taken to access patient records by 75 percent and data entry by 60 percent
- Consultation times expected to decrease by 30 percent, enabling each doctor and nurse to treat up to nine more patients per day

New Medical Center Designs Network to Meet All its Needs

King Fahd Medical City (KFMC) installs network that helps improve patient care and reduce costs.

Challenge

Saudi Arabia is a large country with a fragmented healthcare system whose quality of care varies considerably between regions. The new King Fahd Medical City aims to change that, offering advanced patient care and acting as the leading tertiary care referral centre throughout the region for the treatment of rare and complex medical cases that other facilities are unable to treat.

The four-hospital, 1095-bed medical facility, which opened officially in October 2004, is the largest in the Middle East, built at a cost of over US$600 million. It is harnessing the latest communications technologies to provide rapid electronic access to patient records and medical images, for mobile and remote healthcare workers as well as those on site, and to support video streaming of surgical procedures to medical students wherever they are located.

Solution

KFMC's Chief Information Officer, Eng. Khalid M. Al-Salama, and his technical team had a strong idea of what had to be achieved in technology terms, but sought expert advice on the exact solutions that could be deployed to achieve the Medical City's vision. Cisco® engineers provided extensive consultancy over a period of several months, translating these high-level specifications into an infrastructure design employing advanced network technologies.

Cisco was able to draw on its Medical-Grade Network blueprint, which defines best practices and optimum technology combinations based on the company's work with other leading medical institutions around the world. This helped build a strong business case to support the proposed infrastructure, while meetings between some of the two organizations' most senior people helped ensure a strategic fit between them. The meetings were very productive, and demonstrated Cisco's commitment to the project.

As a publicly funded organization, the hospital had to go through a formal tender process. It awarded the contract to IBM and Cisco, because of the strength of their respective brands and the complete solution that each could offer. Al-Salama describes Cisco's vital role in the project: "We worked together from the beginning, designing the optimum network. Cisco provided us with very good support engineers and network designers, and gave us excellent value for money. The Cisco brand is more solid than other brands, and the company is easier to deal with here in the region than other suppliers. Training on Cisco equipment is available locally, so a lot of people are certified on the technologies here."

"The most critical aspect of the Cisco technology was the bandwidth and the availability it offered," Al-Salama says. "We have taken Cisco's biggest core switches, which give us the highest bandwidth, and we designed the network to be as reliable and available as possible, with redundancy at the access and core network layers. This infrastructure is really important in delivering the goals of the Medical City and will be central to our leadership role."

"What excites me is what we'll be able to do with the wireless coverage that we have for the campus, and the services we will be able to run on this network, such as radio frequency identification and asset tracking, and having wireless access to our patient records and hospital information system."

—Dr Abdullah S. Al-Amro, Chief Executive Officer, King Fahd Medical City

Indeed, the network will be the Medical City's digital nervous system, connecting not only the four hospitals, specialist outpatient clinics, and nursing school on the extensive campus, but also mobile and remote professionals who need access to patient files and other critical medical resources to aid them when not at a fixed computer terminal.

Having had the advantage of designing a new network, not replacing an old one, the Medical City aims to be a paperless and filmless environment. All patient records are managed electronically over the network, including medical images such as X-rays. Core applications include a PACS (Picture Archiving and Communication System) digital imaging solution from GE, which allows X-rays and other medical images to be archived and accessed electronically, heightening their protection as well as making them widely accessible to medical staff throughout the hospital complex and beyond.

Administration will also be managed across the network using a Hospital Information System (HIS). "Running our HIS over the network will save us a lot of time, while reducing costs and potential for error," says Al-Salama. The Medical City is anticipating about 50,000 to 60,000 application transactions a day to pass across the campus network, once the hospital is up to full capacity. At this time, the hospital expects to treat more than 50,000 inpatients and more than 600,000 outpatients annually.

It also intends to deliver e-learning by streaming video coverage of surgical procedures to medical students on the campus and beyond, to improve the quality of training, reduce costs, and increase the number of students who can participate simultaneously.

Results

The King Fahd Medical City is a world-class medical institution that is already well on its way to achieving the ambitious goals that it has set itself. The center is seeking not just to improve the healthcare of local and national citizens, but to place Saudi Arabia on the global healthcare map. Internally, within the campus, the Medical City has been able to deploy patient services at record speed.

In 2007, a trial of tablet PCs based on the Intel Mobile Clinical Assistant (MCA) platform delivered significant benefits. MCA features a lightweight, spill-resistant, and easy-to-use wireless interface that allows doctors and nurses access to patient care records. They can also document a patient's condition in real time, improving working practices and reducing administrative workload.

Being able to access and enter data anywhere in the hospital over the wireless network has reduced the time taken to access patient records by 75 percent and data entry by 60 percent. Consultation times are expected to decrease by 30 percent, enabling each doctor and nurse to treat up to nine more patients per day. Nurses are able to log routine procedures such as blood pressure and temperature readings at the point of care in just 10-15 seconds, eliminating the need for them to walk to and from the desktop PC and reducing the potential for errors. Similarly, the MCA reduces the time that it takes to prepare discharge summaries from 20 to 10 minutes.

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In terms of costs, the hospital estimates that the solution will decrease current costs per bed by up to 40 percent due to the elimination of paper records, better and more accurate communication, fewer transaction errors and associated wastage, and more precise stock ordering.

Dr Abdullah S. Al-Amro, Chief Executive Officer, says: "What excites me is what we'll be able to do with the wireless coverage that we have for the campus, and the services we will be able to run on this network, such as radio frequency identification and asset tracking, and having wireless access to our patient records and hospital information system."

Externally, the center is already thinking ahead to the services that it will be able to provide to medical institutions in the furthest corners of the country.

Thanks to Cisco's global Medical-Grade Network blueprint for the deployment of advanced communications technologies in the healthcare sector, the KFMC infrastructure has been designed specifically to allow for future generations of information and communications technology, including all aspects of multimedia convergence.

The Cisco concept of a Medical-Grade Network is designed to:

- Be more responsive and maximize the effectiveness of application and device performance to distribute information intelligently to improve quality of care
- Optimize responsiveness at the point of care to reduce the number of medical errors and improve clinical productivity
- Use intelligence within the network to make the most vital information available when, where, and for whom it is needed most
- Enhance integration of applications and services to improve diagnostic capabilities, reduce time to treatment for patients, shorten billing cycles, and create new revenue sources
- Provide smooth communication regardless of device or location
- Be interactive, able to connect various communication technologies to provide greater collaboration and knowledge sharing.

Technical Implementation

King Fahd Medical City has employed the latest available networking technology. This technology includes three levels of high-speed Ethernet connectivity: edge switches for end users across the campus, building-level switches, and connectivity back to the network core.

Twelve Cisco Catalyst® 6500 Series Switches provide 10 Gbps speeds across the network backbone. The Catalyst 6500 Series are intelligent multilayer modular switches, delivering secure, converged services from the data centre to the WAN edge. The hospital has chosen to use the 13-slot Cisco Catalyst 6513 chassis, designed specifically for high-performance, high port density Fast Ethernet and Gigabit Ethernet aggregation.

To help ensure zero downtime, Cisco has built in extensive redundancy, which covers each of the critical components within the core switch, including the supervisory controller, memory, and power supply. A second data center is also on the development roadmap.

Ninety-eight Cisco 3750 Series stackable switches with Power over Ethernet (PoE) have been deployed, to deliver high-speed connectivity to end users, while two Cisco Catalyst 4500 Series switches provide Ethernet LAN connectivity between campus facilities.

Support for converged network content has been provided via 11 Cisco 2800 and 3800 Series Integrated Service Routers, which offer secure, wire-speed delivery of concurrent data, voice, and video services. IP telephony (IPT) has been factored into the converged network infrastructure from the start, although it will be deployed in the second phase of the project.

The infrastructure supports QoS (Quality of Service), enabling one type of network traffic to be distinguished from and prioritized over another, to guarantee uncompromised performance for voice, video, and other delay-sensitive applications.

Over 200 wireless access points across the campus enable medical staff to collect and upload information from their personal digital assistants or laptops, when they are on the wards or between sites. The wireless network comprises 208 Cisco Aironet® 1200 Series IEEE 802.11 a/b/g wireless access points.

Security has been provided at multiple levels, from Cisco's PIX firewall guarding against external threats, to wireless security which demands that users are authorized with a specified network adaptor and ID at an access point level, before they can gain access to the server. Application-level security has also been implemented.

Not only does the Medical-Grade Network provide the secure foundation for all of the hospital's clinical needs and back-office administration and other processes, it is also, as the trial of the Intel Mobile Clinical Assistant (MCA) platform has proven, the means to take advantage of exciting new developments as they emerge.

"This infrastructure is really important in delivering the goals of the medical city and will be central to our leadership role."

—Eng. Khalid M. Al-Salama, Chief Information Officer, King Fahd Medical City

Product List

Routing and Switching
- Cisco Catalyst® 6500 Series Switches
- Cisco Catalyst 6513 chassis
- Cisco Catalyst® 3750 Series Switches
- Cisco 2800 and 3800 Series Integrated Service Routers

Network Management
- Ciscoworks

Security and VPN
- Firewall blade for 6500
- 600M IDSM-2 Mod Spare
- Network Admission Control

Wireless
- Cisco Wireless Services Module (WISM)
- Cisco 802.11ag LWAPP 1242 Series Access Points

For More Information

To find out more about the Cisco Medical-Grade Network click here.

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