HOSPITAL NETWORKING GUIDE
A Practical Guide to Developing the Network in a Connected Hospital
A hospital’s network is the foundation for the critical applications that run on it. The return on the investments made on EMRs, PACs, clinical imaging systems and workstations on wheels can only be truly realized if those assets can connect people to the data they need – reliably, securely and with very high performance.

But the network is under constant pressure from new requirements driven by doctors wanting access on personal devices, patients wanting Internet connectivity, and clinical devices like pumps, patient monitors and image capture competing for scarce bandwidth.

Maintaining a network’s performance and security without burning out limited IT resources requires a new approach. Here we present a series of recommendations to build the “connected hospital” that will meet the needs of your users in the years to come.
Recommendation 1
Plan for the digitization of everything

The transformation to digital imaging is complete. The transformation to digital records is underway. The addition of networking capability to clinical devices (pumps, patient monitors, nurse call systems) and everyday objects (doors, thermometers, water sensors, signs) grows with each passing month. Your network needs to be ready for the hyper-connected near term. This means that having physical connectivity – wired AND wireless – throughout your facility is critical. This also means having sufficient bandwidth allocated throughout the network, but this needn’t mean over-provisioning. Your network needs to:

• Be user- and device-aware. A doctor accessing a PACS image on an iPad to provide a patient with an explanation should not need to compete for network access and bandwidth with a patient streaming a video for entertainment. Clinical users and clinical applications need to be prioritized over other, less critical, applications and users.

• Be application-aware. User and device awareness is necessary, but not sufficient, to get the most out of your network investment. The network needs to be able to prioritize and differentiate real-time applications over those more tolerant of latency and jitter. And with the increased use of Virtual Desktop Infrastructure (VDI), you need to be able to prioritize applications inside the VDI sessions as well.

With a network that is user-, device- and application-aware, you should have enough bandwidth to meet the needs of the all-digital world that is emerging without over-provisioning.
“The network is fundamental to our future plans. Everything is built on it, so it needs to be open. Getting rid of the emphasis on the device, as long as it connects to the network, makes us far more future-proofed.”

DR. DIRK LAMRECHTS, CIO AND CFO, EUROPE HOSPITALS

EUROPE HOSPITALS UPDATES NETWORK WITH ALCATEL-LUCENT ENTERPRISE INFRASTRUCTURE TO COMPUTERIZE SYSTEMS, INTEGRATING PATIENT CARE RECORDS ELECTRONICALLY, AUTOMATING PRESCRIPTIONS AND IMPROVING THE PATIENT EXPERIENCE

LOCATION: Belgium
716 beds, 1890 employees, 275 doctors

CHALLENGES
• To create IP network capable of supporting existing capacity and scaling to future growth expectations
• To enable introduction of new services and third-party applications, while remaining device-neutral
• To introduce presence notification for medical staff and computerized medical records and prescriptions

BENEFITS
• Delivered scalability and capacity to cope with future growth, including planned expansion to new locations
• Provided infrastructure for integrated medical systems, including patient records and prescriptions, from the doctor to the bedside
• Allowed introduction of new entertainment systems for patients, including iPads, improving patient experience and corporate reputation
Recommendation 2
Deploy pervasive WLAN

You should presume that the default mode of most devices on your network is wireless. The majority of devices in healthcare depend on being mobile: user devices like VoIP phones, WoWs (Workstation on Wheels), tablets and smartphones, clinical devices like infusion pumps, mobile image capture (radiology, MRI) and other devices like location tags, temperature sensors and door locks.

Wireless will dominate as a means of accessing patient information as EMRs become more and more tablet- and smartphone-friendly. The standardization of very fast wireless (today IEEE 802.11ac and more to come) means that large files can now be transferred quickly, driving increased usage of mobile image capture and mobile image viewing. There are even manufacturers of 802.11-based medical telemetry, the first step to eliminating proprietary protocols based on WMTS frequencies.

Coverage is, of course, assumed inside the facility, but do not neglect areas where staff or visitors congregate outside the wards and examination areas – cafeterias, gardens, parking lots and even elevators are areas where coverage can make a huge difference in productivity. Pay close attention to coverage in “popular” areas to ensure sufficient density of access points are provided: nurses’ stations, auditoriums and staff lounges.

But coverage is not enough – to maintain top performance of ALL users of the wireless spectrum, capacity is critical. For this reason, IEEE 802.11ac is the recommended standard for all new deployments. Personal devices for the most part already support 802.11ac, and even older devices that support 802.11n will benefit from increased throughput and increased battery life.

CASA DI CURA BEATO PALAZZOLO ENABLES DOCTORS TO CONSULT PATIENT DATA FROM THEIR LAPTOP OR SMARTPHONE

LOCATION: Italy, Bergamo
148 beds, 30 branches

CHALLENGES
- Strengthen the existing network to manage medical systems, diagnostic images and video streaming applications
- Wire the whole structure in order to implement a 10Gb fiber backbone that can support a high level of traffic, avoiding bottlenecks
- To provide total Wi-Fi coverage

BENEFITS
- Simple and immediate examination of electronic patient records from laptop or smartphone
- Faster remote visualization of diagnostic images
- More mobility and collaboration within the organization
- Video streaming enables virtual doctor assistance in surgical procedures and help in training other staff
Recommendation 3
Evaluate the entire access network

Your wired LAN access network, like all elements of a modern healthcare network, needs to focus on maximizing up time and performance. Eliminate single points of failure by deploying redundant power supplies and architecting redundant links to the core. Your LAN access needs to ensure it isn’t a bottleneck for your wireless deployment – with 802.11ac in your network, gigabit speeds at the edge are essential. Having sufficient Power over Ethernet (PoE) capability is also critical; powering VoIP handsets and access points is, of course, a prime consideration, but more and more hospitals are migrating to IP-based video cameras to secure their facility and protect patients and staff alike. All of these devices will require PoE.

LIVERPOOL HOSPITAL IMPROVES PATIENT OUTCOMES WITH NEW END-TO-END NETWORK

LOCATION: Sydney, Australia
877 beds, 23 branches

CHALLENGES
• Support critical healthcare applications as well as communications and security infrastructure
• Standardize and refine real-time communications to allow clinicians to work efficiently, freeing them to spend as much time as possible caring for patients
• Implement a state-of-the-art network infrastructure for both voice and data communications, including ubiquitous, fixed and wireless access to clinical applications for staff throughout the campus

BENEFITS
• The network seamlessly connects users and systems across the hospital campus, across departments, and with independent organizations
• Reliable and secure access to electronic medical records wherever and whenever needed, at nurses’ stations or on the move with smart devices
• Staff are able to access to the information they need to make the best decisions for patients, improving communication and workflow, and reducing errors
• Single-vendor solution for network and communications leads to an overall successful implementation

“Alcatel-Lucent provided an end-to-end system that meets our needs today, and can grow along with us as our requirements evolve. Having a very reliable high-speed network has really contributed to our ability to provide better patient care.”

NICK VAN DOMBURG, CHIEF INFORMATION OFFICER, LIVERPOOL HOSPITAL
Recommendation 4
Right-size the core

An efficient, high-performance access network is only as good as the core network it connects to. The core is the most critical part of your hospital infrastructure; again, redundancy, resiliency and performance are paramount.

When planning your new network consider:

• Deploying 10G/40G switches that eliminate bottlenecks and support virtual network design
• Right-sizing with small, high-capacity switches that can form a reliable and resilient virtual chassis and provide more than 7 Tb/s of switching capacity
• Streamlining your wired infrastructure by reducing the number of layers in your network design by eliminating the distribution layer, which reduces your capital expenditures (CAPEX) and operating expenditures (OPEX)
• Rethinking Virtual LANs (VLANs) with software-defined, flow-based policies that optimize wired and wireless traffic paths without changing your existing network
• Choosing newly designed, less power-hungry switches with lower power requirements
• Vendors that support pay-as-you-grow strategies that reduce budget pressures, but don’t compromise product features or scalability

ADOCATE HEALTH CARE CURES TRAUMA OF NETWORK PERFORMANCE
Advocate Health Care is the largest fully integrated, not-for-profit healthcare system in metro Chicago – and ranked among the top 10 in the entire U.S. After evaluation of their existing IT infrastructure and the growing demands that voice, video, data and imaging continue to place on their network systems, Advocate has chosen Alcatel-Lucent Enterprise because of the solution’s architecture, mobility vision, and cloud service integration.

Alcatel-Lucent Enterprise is able to provide Advocate Health Care and others with a solution that consolidates their network facilities and centralizes management, simplifying operations and lowering costs. Alcatel-Lucent Enterprise solutions virtualize IT operations, reducing costs by lowering power consumption, increasing network availability and up time, while making the network more flexible. With these improvements, Advocate Health Care is able to speed application deployment.
Recommendation 5
Simplify network management

Hospital IT staff are stretched to the limit. A new approach is needed to streamline network management operations and reduce errors that can have catastrophic impact. A modern hospital must be run on something other than traditional CLI-based element management; a simpler and more cost-effective unified network solution can manage both wired and wireless networks. With an integrated management solution, your IT staff can better manage the application and device experience of users on networks that extend across geographically dispersed locations – from hospitals to clinics to home users.

Choose a solution that enables you to provision, monitor and manage:
- Policies across the access layer on both wired and wireless networks
- Application fluency across the network
- Data center/server room elements and resources
- BYOD services (which device, what privilege, when, where, etc.)

A simplified, integrated network management approach that spans wired and wireless networks will enable you to better manage IT time and resources.

CHILDREN’S HOSPITAL OF PITTSBURGH OF UPMC WORLD-CLASS PEDIATRIC HOSPITAL TURNS TO ALCATEL-LUCENT ENTERPRISE FOR ITS MISSION-CRITICAL NETWORK INFRASTRUCTURE

CHALLENGES
- Improve patient care and outcomes, and create a ‘greener’ campus by ensuring a paperless environment
- Refine clinician workflows to allow clinicians to work efficiently
- Implement state-of-the-art network infrastructure
- Ensure comprehensive wireless coverage in all care venues
- Create a “quiet,” stress-free campus with reduced noise levels
- Reduce business risk and infrastructure costs

BENEFITS
- Support for HIMSS Stage 7
- Paging calls eliminated from public address announcements
- Reliable, secure, wireless access wherever it’s needed
- Reduced records management footprint and storage costs
- Simplified network management
- Improved flexibility of equipment use and staff communications

“To [allow computerized physician order entry], you need to build a network which can be available all the time. Physicians and nurses need access to data at all times, and you can’t wait for a switch to reboot or upgrade.”
FRANCOIS BODHUIN, TECHNOLOGY DIRECTOR, INSPIRA HEALTH NETWORK
Recommendation 6
Embrace BYOD

For many hospitals, BYOD has been established for some time as affiliated doctors demand access to both in-house and outside practice applications and assets. Managing BYOD in a secure way that protects patient information has traditionally been a manual, labor-intensive process, increasing the workload for an already-stretched IT team. With an advanced BYOD solution you can:

- Enforce differentiated network access based on contextual information, such as user roles (doctor, nurse, administrator), device types (WoWs, tablets, smartphones), and location (hospital, clinic, home use), which enables secure management and enforcement of differentiated policies
- Simplify and automate device on-boarding by allowing users to self-enroll, granting network access privileges based on user roles, device types and location
- Opt for 802.1X authentication with Advanced Encryption Standard (AES) security features, which allow users to enter a user name and password or self-enroll by automatically generating and installing device certificates through a web portal with no IT assistance
Recommendation 7
Provide patient and guest Internet securely, with minimal impact

Patients and guests spend lots of time in your facility, and providing Internet access will help them pass the time more pleasantly and productively, increasing patient satisfaction and enhancing your reputation in the community. But providing patient and resident access should not have a measurable impact on your organization’s most important users – clinical providers and your IT staff. We recommend a guest and patient Internet service that:

- Spans both the wired and wireless network to provide options for users
- Is logically separated from the hospital network to protect patient information, but uses the same physical infrastructure
- Is tuned to ensure that care provider access or performance is not compromised
- Is automated so guest and patient access does not require IT involvement

UTMB CHOSE ALCATEL-LUCENT ENTERPRISE TO PROVIDE BETTER ACCESS AND A MORE EFFICIENT SYSTEM TO ACCESS PATIENTS’ DATA

CHALLENGES
- Physicians needed a system to access the patients’ record information more efficiently
- Patients required a better system for checking in and out of the hospital
- As UTMB is a teaching hospital, students required better access to the hospital network

BENEFITS
- Physicians, doctors and clinicians can provide data more quickly to make their jobs easier
- Patients have a better experience with the hospital due to having timely information for check-in and check-out
- WLAN has provided more access to students across the hospital for higher availability
Recommendation 8
Extend connectivity beyond the hospital

Your new network should be able to go beyond the hospital and interconnect clinics, administrative offices and home users.

When considering network extension options, choose:

- Environmentally hardened access switches and access points to provide connectivity around hospitals and at outdoor locations, such as parking lots and green spaces
- WLAN-based point-to-point and/or point-to-multipoint bridging connections, which offer a great way to extend your entire network to another building without having to lay cables
- Remote access points that enable doctors and other healthcare professionals to work from a home office with all the same access to services and applications they are accustomed to in the hospital

"Alcatel-Lucent delivers three compelling elements: the equipment performs exceptionally well, it’s really easy to manage, and it is much, much more cost-effective than any other manufacturer."

DAVE HUNT, MANAGER OF OPERATIONS AND SERVICE SUPPORT, CLARK MEMORIAL HOSPITAL

ALCATEL-LUCENT’S ENTERPRISE NETWORK INFRASTRUCTURE ENABLES CLARK MEMORIAL HOSPITAL’S WORLD-CLASS HEALTHCARE SERVICE

LOCATION: United States
1700 staff, 241 beds

CHALLENGES
- Grant care providers mobile access to clinical data in a fast, reliable and secure way that continually ensures the integrity of patient data and permits staff to deliver on service expectations
- Provide the same level of network services for both the main hospital and remote sub-acute facilities
- Comply with government mandates to deploy Electronic Health Records (EHRs) in a meaningful way

BENEFITS
- Modular architecture allows for incremental growth versus large-scale replacement
- Provides investment protection and stability
- Intuitive management interface improves team efficiency
- Industry-leading price-performance provides great return on investment
- Inherent security and reliability of the network infrastructure contributes to compliance with governmental healthcare legislative requirements
Build the Connected Hospital

The network is the foundation for delivering the data and applications that ultimately drive outstanding patient care and improve outcomes. Alcatel-Lucent Enterprise application fluent network solutions offer excellent value with solid investment protection and seamless high-quality experiences. They provide:

- A pervasive WLAN with unified wired and wireless policies
- Optimized LAN core and edge with a wide range of choices
- Simplified network management capabilities

Our Connected Hospital solutions enable device freedom, whether devices are hospital-provided, personal, wired or wireless. And our solutions ensure patient information is kept private.

With Alcatel-Lucent Enterprise Connected Hospital solutions you get network designs that can provide reliable, high-performing and resilient environments that allow care providers to focus on those who matter the most - their patients.

Find out how we can help you become a Connected Hospital.

ADDITIONAL INFORMATION
http://enterprise.alcatel-lucent.com/healthcare
tinyurl.com/clarkmemorial
tinyurl.com/upmc-chp-ref
tinyurl.com/ahc-podmesh

BLOGS FOR MORE PERSPECTIVE
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