> Importance of Smart Networks In Healthcare Delivery

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The Healthcare Market Landscape

> **Major Employer**
  - 1 in 11 working Americans are in US healthcare
  - The industry challenged by a shortage of appropriately skilled labor

> **Massive costs, massive scale**
  - ~300,000 total sites in the US (eg. Hospitals, Clinics, Medical-Dental buildings. Etc)
  - 1,000,000 hospital bed spaces, 770,000 physicians, 2,700,000 nurses

> **Medical errors drive costs onto the system**
  - 44k -98k deaths/yr attributable in some level to medical error
  - Malpractice claims $37.8B/yr

> **An aging population, increasing demand stressing healthcare system**
  - Total cost $2.5Tr by 2010

> **The industry is characterized by many stakeholders**
  - Including patients, family members, providers, payers and suppliers

Current trends not sustainable. Solutions enabling efficiency, reduced errors, and improved employee and patient satisfaction are key
Healthcare – The Situation and Response

Stressors
- Aging population
- More expensive treatments
- Nursing, Physician shortage
- Staff workload, morale
- Medical errors
- Increased litigation
- Information complexity
- Insurance cost, rising # of uninsured
- Increased regulation
- Increased public expectations

Improvement methods
- Improved and streamlined medical procedures and treatments
- IT within clinical processes
  - Primary IT/comms engagement point
  - “Wellness” or “illness avoidance”
  - Secondary IT/comms engagement point

Projected benefits of IT within Clinical Processes*
- Effectiveness/productivity up 23%
- Adverse Drug Events down 80+%...
- Radiology turn-round within 12 hours –improves from 12% to 85% with wastage dropping from 15% to 3%

A major way forward is massive digitization of healthcare → digital within clinical processes → streamlined processes, catch errors as they are made

* = Source Queens Hospital Group, NY, NY
Healthcare Networks

10 Clinical Grade Attributes:

- Available
- Secure
- Guaranteed QoS/SLA
- Pervasive coverage (WAN and LAN)
- Seamless Mobility (Session integrity)
- Transaction Integrity
- Non-Repudiation
- Evolve-ability
- Adoptability (Easy, Convenient)
- Workflow Engaged

Clinical Grade allows Clinicians to Depend upon and Trust the Infrastructure
– Clinical Grade does not impede their work, neither does it require their attention
– they must come to assume that it is always there and always delivers
Serving the Diverse Mobility Requirements of Healthcare Workers

Nurses
- Hands free, Point of Care, Reduction in errors & admin

Doctors
- Presence, WAN, simplicity, rich information, immediacy

Administrators
- Location of assets and clinicians, surveillance, sensors

A Mobility Solution that meets current Investment Triggers
How do nurses use clinical information?

Work Sampling
195 information transfer episodes, 18.5 hours, 10 nurses
Oral communication with colleagues (91 episodes)

Resources Nurses Want at Point-of-Care

> Nurses have diverse information needs
> Nurses communicate with a wide range of colleagues
> HC IT provides more effective mechanism to capture this information and enable communications

Source: Doran et al, UofT
Healthcare Communications

Communication Services to improve efficiency and enable reduced clinical errors

**MMoIP Foundation:** Efficient sharing of clinical results through deployment of mobile, secure multimedia collaboration

**Clinical Alarms & Alerts:** Improved care and staff efficiency through real-time delivery of clinical alerts to mobile staff handsets

**Asset Management:** Improve efficiency through real-time tracking and status management of assets. Extend to patients and staff tracking.

**Comm Engaged Clinical Apps:** Efficient clinician collaboration through communication services embedded directly in clinical applications

Integrated Solutions and services to address CIO staff/skills shortage dilemma
New Network Foundations for Healthcare

Continuity
Storage solutions, Business Continuity, Information Backup

Distributed Image
PACS/RIS distribution with networks that deliver the right performance

Connected Community
Doctors office & clinic, seamless application delivery

Network Solution that meets current challenges
Distributed Medical Imaging
Requires Optical Ethernet Networks

Problem
Need to distribute medical images, **Radiology** is 15% of total

Requirements
4 second **response**, urban area, Prioritized services, **performance and security**

Solution
Campus and Urban **Nortel Optical Network**, partner serviced or customer owned

Results
Radiology **time savings**
Less repeat, **non-reimbursed studies**
Higher imaging studies volume
Network **cost savings**
WAN Community Healthcare Networks

**Mobility**
Communications services for clinicians, home care nurses and first responders

**Patient Monitoring**
Improved monitoring of chronic diseases in wide area

**Assisted Living**
Enabling longer term independent living for the elderly

A Vision that reaches across the needs of the sector
Network Services and Clinical Integration

Asset Management
- Location Services
- Asset Manager
- Maintenance Manager
- Alarms/Alerts Manager
- Clinical Monitor Mgr
- IV Pump Mgr
- Nurse Call Mgr

Communication Services
- VoIP Communications
- MMOIP Comms
- Media Application Services

Clinical Applications
- Clinical Applications - PACS/RIS, EHR (Nurse Charting), Labs, Pharma…

Core Network & Services

Data Center/Core Applications

Clinical Alert Management

Users / Network Access
- Clinical Monitors
- Patients/staff
- Clinicians/staff

> Secure
> Scalable
> Reliable
> Converged
> LAN and WAN

Storage
BC/DR
Basic Implementation of Clinical Grade Networks

> Assumptions
  
  • Ethernet is the delivery of choice in wired environments  
  
  • WiFi is the primary internal mobility service today  
  ➢ Mobile WiMax is in the developmental/testing stage today for Healthcare  
  
  • More than one staff member needs access to patient information  
  
  • Not all staff need access to all patient data – Authorized only  
  
  • Care for the patient is intended to be holistic, versus silos of specialization  
  
  • Interdisciplinary collaboration is beneficial to patient outcomes  
  
  • End business goal is to create better patient outcomes as efficiently as possible  
  
  • All healthcare deals with various levels of Regulations

There are a lot of moving parts to a Healthcare network
How to approach your design criteria

> End user (staff) visibility to Network systems is their availability of services/applications

> Active/Active versus Active/Back-up design philosophy
  • Design for Active/Active whenever possible
  • Design for controlled responses during device outage (QoS)

> Application delivery in device failure state
  • Decide before failure occurs
  • Implement prioritization scheme according to systemic needs
  • Validate in controlled state prior to actual failure

> Concepts may be applied in LAN, MAN and WAN designs

> Capture and build in user feedback

Keep the core business in mind when designing the various elements
Availability

> Active/Active designs are more cost effective and resilient
  • RPR, SMLT, ECMP

> Application prioritization without service starvation
  • Prioritization is required any way you turn

> Applications should not have to be modified to take advantage of Network Resiliency

Healthcare professionals should never be directly aware of the network
Security

> Perimeter is more permeable today

> Practices and People must be included beyond devices

> Monitoring and Correlation services

> Layered Defense allows for best resiliency

> Reference Unified Security Framework
  • [www.nortel.com/security](http://www.nortel.com/security)

Security is a function of identifying risks and balancing this knowledge with mitigation strategies and tactics
Mobility

> Secure access to the airwaves

> Mobility versus Wireless LAN access

> Control the quality of experience for end users

> Mobility enables higher levels of collaboration

> Mobility must be seamless, ubiquitous

> Reference Mobility Portfolio
  • www.nortel.com/mobility

Mobility within a Clinical Grade Network provides enhanced opportunities for faster time to decision and more accurate decisions
Wired & WLAN Point of Care Solution

Point of Care solution links core network resources to user clinician terminals
New capabilities to detect various parameters are emerging
  • RF-ID – identity, Location detection – position, Sensor – environment

Many new applications are emerging which:
  • Use these singly or jointly
  • Use these to impact communications of voice/data
  • Use voice/data plus these to create different outcomes

The result – Environmentally Aware Networks with new capabilities
  • Combines communication with sensory awareness of object, people and environment

These new concepts can be handled in an “ad hoc” manner or can be incorporated into an Environmentally Aware Network
Wired & WLAN Point of Care Solution

Services enhanced by sensor knowledge

<table>
<thead>
<tr>
<th>Emergency Response capabilities</th>
<th>Relationships &amp; interactions</th>
<th>Regular workflow support and enabling functions</th>
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<tbody>
<tr>
<td>Code Blue</td>
<td>Clinician Coord Location and Context</td>
<td></td>
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<tr>
<td>Code Adam</td>
<td>Patient tracking and/or monitoring</td>
<td></td>
</tr>
<tr>
<td>Code Brown</td>
<td>Equip’t tracking, location &amp; condition</td>
<td></td>
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<tr>
<td>Code Violet</td>
<td>Equip’t/clinician, equip’t-patient assoc</td>
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<tr>
<td>Code Yellow</td>
<td>Clinician Point of Care Communications</td>
<td></td>
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<tr>
<td>Code Red</td>
<td>Clinical Collaboration</td>
<td></td>
</tr>
<tr>
<td>Code Orange</td>
<td>Drug safety, sec’y and environment</td>
<td></td>
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<tr>
<td>Drug theft / tamper</td>
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<tr>
<td>Equip’t theft/move’</td>
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POC services become better integrated into clinical workflow, making it more efficient and allowing new approaches
Mobile Interoperability in Healthcare

Valued Sources – Leveraged Information

Clinical Info Sources
Monitors, Sensors
Location Awareness
Medical Imaging

Nortel MCS/LCS: Profile, Presence, Collaboration
Multi-Media, Device Independence, Pro Services

Nortel IP Voice Solutions
Nortel IP Data Solutions
Nortel Wireless Solutions

Mobile Clinicians
Devices of Convenience and Choice
(Handsets, PDA, Thin Client, Badge, Desktop)

Valued Targets – Care & Cost Leverage Points

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Summary

> Healthcare IT transformation is underway
  
  • New network technologies are accelerating this transformation

> Solutions exist to deliver Clinical Grade communications

> Solutions must meet the needs of clinical processes

> Sensors will enable new levels of efficiency/performance
Over 15,000 healthcare organizations in the US & Canada rely on Nortel solutions everyday.