



**HEALTHCARE
PROVIDERS**

**Putting Front Line
Performance First**

- Clinic
- Hospital
- Specialist
- Consultant
- Service Provider
- General Practitioner



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INTRODUCTION

The eHealth mission-critical data burden is increasing dramatically, faster even than growth in the overall data universe, driven by an increasing range of digital devices and services generating more and more information including electronic patient records, patient RFID tagging, plasma pumps, vital monitors, Picture Archiving and Communication Systems (PACS), equipment tracking, handheld tablets and electronic prescriptions.

Simultaneously, government cutbacks across European healthcare are combining with device and data growth to create a significant challenge to the hospital or clinic data centre and campus Local Area Network (LAN) in rapidly and securely distributing the digital volume.

The challenge must be resolved if the healthcare cost efficiencies being demanded by EU Member States are to be achieved.

The issue is not just locally within a member state, but now applies across the European Union with the EU Directive On Cross Border Healthcare 2011 opening patient healthcare access outside their home country which has a significant data centre dependency.

By enabling healthcare providers to proactively collaborate, reduce errors and cut the cost plus risk of efficiently responding to real time data demand from front line services, Brocade® makes a significant contribution to collaboration productivity, risk management and operating cost reduction in line with European government spending cuts.

Mission-Critical Healthcare Data Growth

The primary shift in EU healthcare strategy is towards a focus upon investment in improving front line service delivery performance at a substantially lower operating cost that does not impinge upon healthcare quality or safety, and therefore adversely impact litigation risk.

With, for example, the introduction of an electronic healthcare record, and digital radiographic imaging, the frontline healthcare services have an opportunity to meet the government cost reduction targets, but this digital volume increase must be supported by the eHealth data centre and network to be productive.

“Cooperation between EU member states in the field of healthcare has been strengthened in the field of e-health and through the development of a European network which will bring together, on a voluntary basis, the national authorities responsible for e-health.”

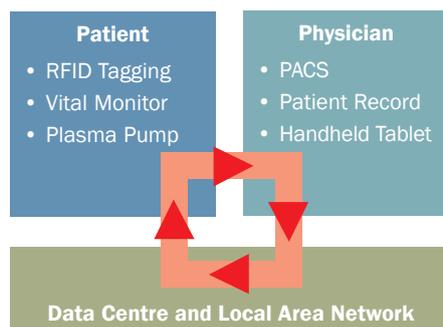
Source: EU Directive On Cross Border Healthcare 2011

Estimates indicate that the European eHealth technology market is already significant with Frost and Sullivan predicting that the information technology share of German healthcare expenditure has risen to 5% of a €240 billion budget in 2010 from 1% in 2005. Other projections say it could even rise to as much as 8% in 2020.

“The information technology share of German healthcare expenditure has risen to 5% of a €240billion budget in 2010 from 1% in 2005.”

Source: Frost & Sullivan

Figure 1. eHealth Digital Devices Drive Data Growth



The consequential healthcare data volume is predicted to grow to about 5 times the 2008 level by 2013 and the proportion of data that is governance, risk or compliance (GRC) sensitive is growing faster to take more than 30% of the overall 2013 data volume from about 20% in 2008.

The widening range of digital healthcare devices all need connection to the LAN enabling physicians and staff to gain remote

access and collaborate using conferencing, which makes a significant contribution to cost reduction. However, this places enormous pressure on the traditional healthcare data centre and network infrastructure.

Pressure On The Healthcare Data Centre And Network

This digital healthcare trend is stimulating demand for high speed data processing, recording, archive and reporting supported by audit trails. Simultaneously national healthcare regulators and practitioners are demanding real time data so it is no longer possible for the data centre to simply react which means the headroom for growth must be continuously available.

In the past there has been distance between the data centre and the healthcare frontline practitioner demand for improvements to operational performance but no longer.

To meet performance targets, the frontline medical staff are now dependent upon data centre and network support for their daily responsibilities including remote analysis of radiological images, updating electronic medical records, diagnosis using conference calls and mobile care in the community.

Due to budget restrictions, the healthcare data centre may not have been always able to make the necessary investments to provide this mission-critical support capacity to the frontline.

However, advances in digital infrastructure like virtualisation, consolidation, 10 GbE capacity and Cloud service delivery to alleviate capital expenditure, are making for a sound business case.

Brocade Healthcare Data Centre And Network Solutions

Brocade has anticipated this growing healthcare data challenge using the Brocade One™ strategy as an adaptive foundation that enables a healthcare organisation to become “ready” for the data explosion rather than just “react” to each individual departmental need.

The capacity and response level is planned by Brocade experts in line with the customer forecast and consequently the significant costs and risks of attempting a reactive strategy are eliminated.

This Brocade Thought Leadership paper is designed to present an experienced healthcare perspective in applying adaptive data centre infrastructure technology to deal with the new frontline operational challenges being faced by policy owners including:

- External Auditor
- General Counsel
- Chief Risk Officer
- Compliance Officer
- Records Management
- Head of Internal Audit
- Chief Operating Officer
- Healthcare Practitioner
- Chief Information Officer
- Information Governance Officer
- Network Management Executive

MISSION-CRITICAL POLICY ISSUES

Local Healthcare Management

The European focus upon reforming frontline healthcare service delivery is empowering local practitioners to form multi-practice consortia in order to administer the budget efficiently and manage treatment, with the associated recording and government regulatory reporting.

This frontline policy has inspired United Kingdom local practitioner trials of data-intensive technology to support healthcare productivity, including Urgent Care Clinical Dashboards that enable practitioners to track urgent local patient care progress and meet a central government target for a 10% reduction in urgent care admissions by 2015. Initial pilot results have shown positive results with a 16% decline in patient admissions including accident and emergency from one local pilot inspiring an extended local clinical dashboard programme funded centrally.

“The data that we use has always been accessible to General Practitioners. However, it is now integrated in real time and is easily viewed in one place on the practitioner’s desktop. That’s the key. You can identify patients that may be struggling and, as a result, practitioners are able to be more proactive.”

Source: Urgent Clinical Dashboard Pilot United Kingdom www.GPonline.com

It is already recognised that a more collaborative local infrastructure including practitioners, hospitals and pharmacists will be an important contribution to personnel operational productivity and error reductions, but there is an obstacle with the performance of local data centres not being capable of meeting the data processing capacity and a lack of inter-operability between existing systems. Integration and consolidation leveraging Brocade’s high density network infrastructure or driving to a highly virtualised data centre environment using a high performance Brocade eHealth data centre technology would enable the practitioners,

hospital, pharmacist and even the regulator to collaborate in real time to meet the EU Data Protection Directive.

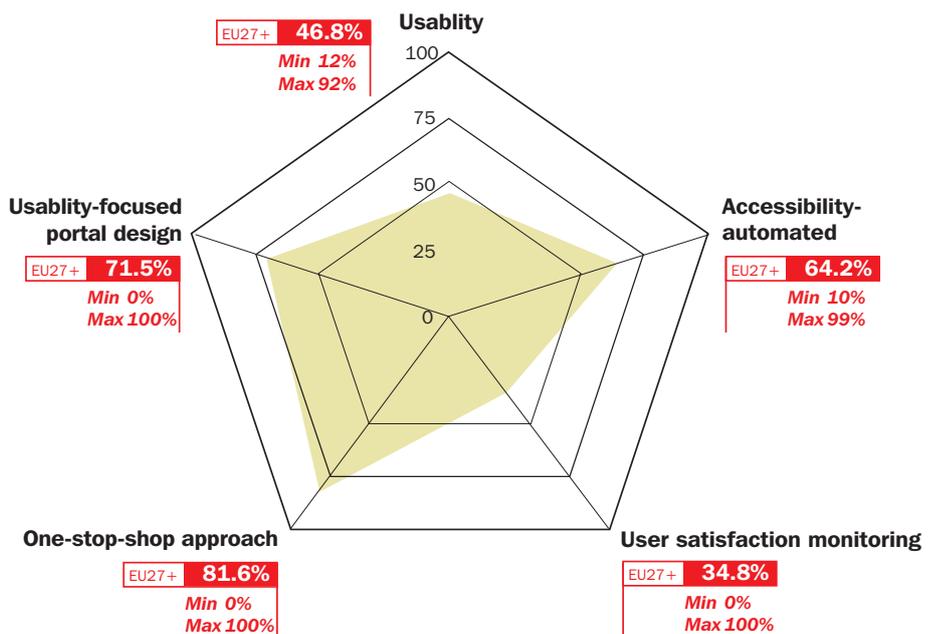
eHealth Online Responsiveness

Across the EU recent research has highlighted the growth of patient driven eHealth services including the making of appointments involving case handling and decision making online, with the most sophisticated systems allowing the practitioner to intercede in the process and arrange the appointment on behalf of a patient.

However, the capacity and scalability limitations of government data centres, particularly locally, is highlighted by the relatively low ratings for Usability and Satisfaction (see Figure 2) which are particularly critical for eHealth systems where a degree of urgency can be anticipated.

To improve performance the standardisation of eHealth as a shared service delivery model covering multiple local practitioner entities is being supported by EU state eHealth network and Cloud initiatives such as the United Kingdom G-Cloud. The Brocade value proposition to eHealth data centres or Service Providers is to deliver strategic support to managing growth which includes significantly

Figure 2. Online User Experience Across EU Government Portals



Source: European Commission Directorate General for information Society & Media Report: The evaluation process considered all national websites across the 14,000 sample, and 30% of regional and local sites

expanding network capacity and speed offerings, consolidation, avoiding traffic bottlenecks through high performance balancing of patient access and delivering dynamic failover protection.

The flexibility for network rightsizing is mission-critical in managing eHealth traffic growth, with simplification of bandwidth change, plus virtualisation to reduce complexity, emissions and costs, yet provide scalability.

In addition, the Brocade enhanced data store security using fabric-based high performance data encryption will support patient data privacy compliance as required by the EU Data Protection Directive.

Integrated Health Data Management

The German eHealth project is the largest in the EU and an example of the need for integrated secure data management in connecting 100,000 practitioners, 2,200 hospitals, 21,000 pharmacies and 200 public health insurance companies.

In the eHealth project German healthcare patients receive an electronic health smart card (elektronische Gesundheitskarte eHC) issued by a health insurance company to allow doctors, specialists and pharmacists secure access to patient data.

Similarly practitioners will use special smart cards (Heilberufsausweis HPC) to access patient information securely and provide electronic prescriptions for immediate transmission to pharmacists, reducing the time and complexity of paper work, allowing practitioners to spend this time with patients.



“A Spanish government study estimated that health practitioners spend 30%-50% of their time addressing paperwork and other tasks, rather than patients.”

There are multiple local projects including “prospeGKT” in Bottrop in North-Rhine Westphalia for electronic medical records covering 20,000 patients, and similarly Gesundheitsinitiative Rhein-Neckar (GRN) which equips patients with electronic health cards giving practitioners access to a web-based personal health record.

A key challenge yet to be finalised is the standard framework that would allow all systems to be fully interoperable as currently different vendors are involved in these local eHealth programs.

The central infrastructure for the project consists of connected Virtual Private Networks (VPN) and centralised infrastructure services. The local infrastructure comprises integrated solutions, including dedicated secure connectors integrating local or provider systems and card terminals to the national network.

Brocade experience in supply of eHealth Service Provider networks is extensive, and provides Virtual Private LAN Service (VPLS) over a broad geographic area that will be critical in enabling practitioners, hospitals and pharmacists to work seamlessly throughout a large clinic, hospital, healthcare group or even across countries.



PUTTING FRONT LINE PERFORMANCE FIRST

Security, Resiliency And Availability

In France, new trials of the Dossier Medical Personnel (personal healthcare record) are underway that will enable the population to access their own DMP via the Internet based procedures that will be tested and validated by ASIP Santé (French Health Ministry).

The Ministry emphasised that the pilot programme posed particular challenges in terms of confidentiality, security and ergonomics that highlight the significance of personal data protection and continuous availability.

Robust security and resiliency policy using best practice are the foundation of eHealth compliance with the EU Data Protection Directive. Encryption is a vital aspect of information security as patient data is transferred across multiple entities then consolidated via polling servers into a data warehouse ready for review or be automatically transferred to real time Urgent Clinical Care Dashboards.

This mission-critical information needs encryption protection during its travels and whilst archived in accordance with the policy.

Comprehensive and secure medical treatment audit trails in digital form are mandated across Europe to avoid the increasing cost of litigation for government health departments and insurers which has become prohibitive and today requires a significant proportion of European healthcare budgets running into € Billions annually.



To minimise disruption and deliver a secure healthcare data environment, the Brocade DCX™ Backbone integrates with existing assets and extends their security and resiliency in storage networks by providing many of the critical elements for security risk management including data encryption and continuous data protection.

Brocade scalable high-performance data encryption solutions integrate with leading “key management systems” to ensure data protection within and between sites, while sustaining growth and performance.

This Brocade infrastructure is a critical part of the solution that ensures access between data centres by providing the connectivity to replicate data between storage systems.

Climate Change And Energy Management

There is a combination of regulatory and economic drivers to motivate reduced eHealth data centre energy consumption in line with the EU Climate Change Directive and Emission Trading Scheme, EU Eco Management Audit Scheme and European Code-Of-Conduct for Data Centres. A consolidated policy framework has emerged with adoption of the EN 16001 Energy Management System Standard.

“The aim is to inform and stimulate Data Centre operators to reduce energy consumption in a cost effective manner without hampering the critical function.”

EU Code Of Conduct For Data centre
Efficiency Director General.

To achieve these goals, data centres leverage newer, high density network solutions that allow consolidation to fewer, more energy efficient network elements.

Brocade experience has identified that as consolidation occurs, it is critical that overall performance is not sacrificed, because the next step of application virtualisation will lead to even higher network bandwidth demand as additional applications are consolidated onto fewer servers.

Simultaneously, storage is undergoing virtualisation transformation as data centres look to more scalable and flexible storage solutions that are shared across more applications which simplifies management and reduces space.

The combination of server virtualisation, storage virtualisation and network consolidation, allows a significant reduction in operating cost from savings in data centre power, space and cooling requirements plus reduced maintenance and support.

In addition to compliance and energy cost reduction, many local European eHealth facilities are simultaneously gaining productivity benefits from implementing VoIP unified communications, unified messaging, and video conferencing involving patient diagnosis and staff training.

A high performance and scalable Brocade network infrastructure allows for improved collaboration, diagnosis and training across multiple eHealth facilities.

In addition to powered LAN or Power Over Ethernet (PoE) required for VoIP, newer higher power-devices are emerging including tilt-and-pan cameras, video phones and wireless access points, which require higher power PoE+ connectivity. VDI is also emerging as a highly controlled secure, manageable solution within the sector.

As the Brocade's LAN infrastructure already supports the higher power standards, deployments are ready for emerging devices as needed. Higher bandwidth and higher coverage wireless access points are also critical in enabling improved patient information gathering by connecting more medical devices.

This Brocade supported technology allows real time monitoring and capture of data from vital monitors, plasma pumps, medical dispensary systems, and other digital equipment.

This constant capture and access of data allows for improved patient care, even as patients may move between departments, ensuring no lapse in treatment outcomes.

Air defence integrated with Brocade access points offer best in class wireless security which is critical as patient information is being transmitted over a wireless network.

BUSINESS CASE

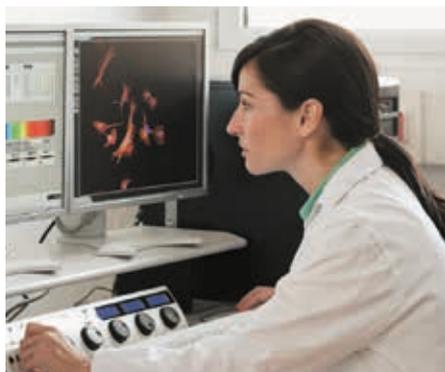
In the past government data centre performance has not been aligned to eHealth objectives, which has led to a more tactical approach to providing the data centre capacity, speed and feed rates. However, this is no longer sustainable due to the pressure on healthcare costs, pan-Europe formalised eHealth policy, exponential growth in data and the need to support the patient by prioritising frontline services.

The Brocade strategy for eHealth data centres, LANs and geographic connectivity, has a consolidated and integrated approach that will deliver the capacity for sustained risk management responsiveness and lower operating cost, which may be extended to the wider chain of contractors, outsourcing, hosting and Cloud Service Providers.

eHealth Data Centre Issue	Fragmented Ethernet Static-Process Architecture	Brocade One Strategy: An Integrated, Consolidated And Virtualised eHealth Services Solution
Risk Management		
Data Security	Complex to manage and unreliable	Continuous data protection and encryption to defend against malware and denial of service attacks
Usability and Response	Rigid physical connections for server platforms and storage	Flexible virtual server and storage relationships with shared resource pools
Adaptive To New Demands	Inflexible	Virtual machine aware networks allowing mobility to optimise resources and respond to change
Healthcare Data Governance	Not feasible economically	Tiered storage for information lifecycle management and healthcare data governance policy alignment
Resiliency and 24x7 Availability	High risk	Fewer elements reduces continuity risk; virtualisation and redundancy for higher resiliency
Operating Cost		
Space Reduction	High due to the number of low density network	Fully optimised data centre space via newer high density, devices required lower profile devices reduces footprint
Maintenance Costs	Increase due to a high number of devices and aging infrastructure	Consolidation allows fewer network elements, fewer contracts and simplified management
Lower Energy Cost	Unavailable or restricted	Fully enabled server and storage virtualisation in conjunction with fewer newer low-power network devices reduces power consumed by 50% or more
Clinical Intelligence	Unavailable efficiently restricting care and raising safety risk	High performance capability including large image file access and distribution
Expansion Capacity	Very restricted	Virtualised server and storage raises efficiency and capacity yet reduces footprint with large file separation
Asset Management existing	Restricted or unavailable	Comprehensive inter-operation between new and data centre and LAN assets; key asset management to maximise utilisation
Consolidation On Unified Network	Inefficient or unavailable	Comprehensive collaboration using optimised wired/wireless network infrastructure for unified communications, voice and video

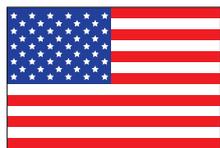
Source: IDL Analyst

PUTTING FRONT LINE PERFORMANCE FIRST



BUSINESS CASE STUDIES

The most significant advances in eHealth delivery worldwide have been in the USA supported recently by the US government HITECH \$\$ multi-billion funding of eHealth projects. Brocade innovation in data centre support for higher eHealth productivity at lower risk has had significant success in the USA and in Europe as part of the German eHealth programme which is the largest in Europe.



Local Physician Group

Melbourne Internal Medicine Associates (MIMA) is the largest and most comprehensive independent physician group in Brevard County, Florida USA, and has deployed an end-to-end Brocade network to connect two data centres and 17 distributed facilities that support 100s of physicians and staff.

“All of our staff, physicians, and treatment centres need immediate access to patient data no matter where they are located or what time of the day it is. This makes performance and reliability paramount for us.”

“We have lives ultimately depending on our network and cannot afford slow connections or intermittent access. To this day, we’ve never had a second of downtime with our Brocade network.”

Source: MIMA Chief Information Officer

As a result, MIMA has successfully reduced its time to process and run medical applications by more than 90%. Physicians are now empowered with 24x7x365 real time access to patient medical records, reducing unnecessary travel and courier time to retrieve confidential information.

“With our previous network infrastructure, we had certain applications that took several hours to process critical tasks. Through technology based on the Brocade BigIron® RX switches, we were able to link multiple 10 Gigabit Ethernet (GbE) ports together into 20 and 40 gigabit links.”

“This provided us the necessary bandwidth and boosted our performance, which immediately cut key application time down to minutes and allowed us to support more locations and patients.”

“If applications are deployed that slow down our staff this can significantly reduce our efficiency and ability to handle critical patient care. Having a high performance (Brocade) network infrastructure prior to deploying new applications can ensure a solid foundation to build these new applications to improve efficiency and patient care.”

Source: MIMA Chief Information Officer

Organisations in the healthcare industry rely on various applications to run everything from general business processes to specific medical imaging and diagnostics.

The integral component responsible for advancing or hindering these applications is often the networking infrastructure. MIMA is no different in that a majority of its network traffic and performance needs are linked to critical applications that enable physicians and staff to perform a wide range of daily tasks.



University Clinic

The Johannes Gutenberg University in Mainz Germany realised the availability of new healthcare applications to improve care and operations meant the existing network would not support the ever-increasing traffic load.

Simultaneously restructuring in the German health sector would soon cripple the network. The clinic needed additional computer links, more bandwidth, and clinic-wide access to stored digital data to continue serving the clinic workforce and patients which meant a fully optimised, high-performance network to accommodate that data growth.

Today the clinic network consists of seven Brocade BigIron switches: six interconnected in a star shape using multimode fibre optics with the seventh used for testing and as a spare device.

All system links feature a redundant configuration using Open Shortest Path First (OSPF) which manages dynamic routing, load balancing across all available trunks, and seamless failover in the event of a fault.

The Brocade BigIron chassis each currently use only half the available interfaces, providing the clinic with sufficient capacity for future expansion.

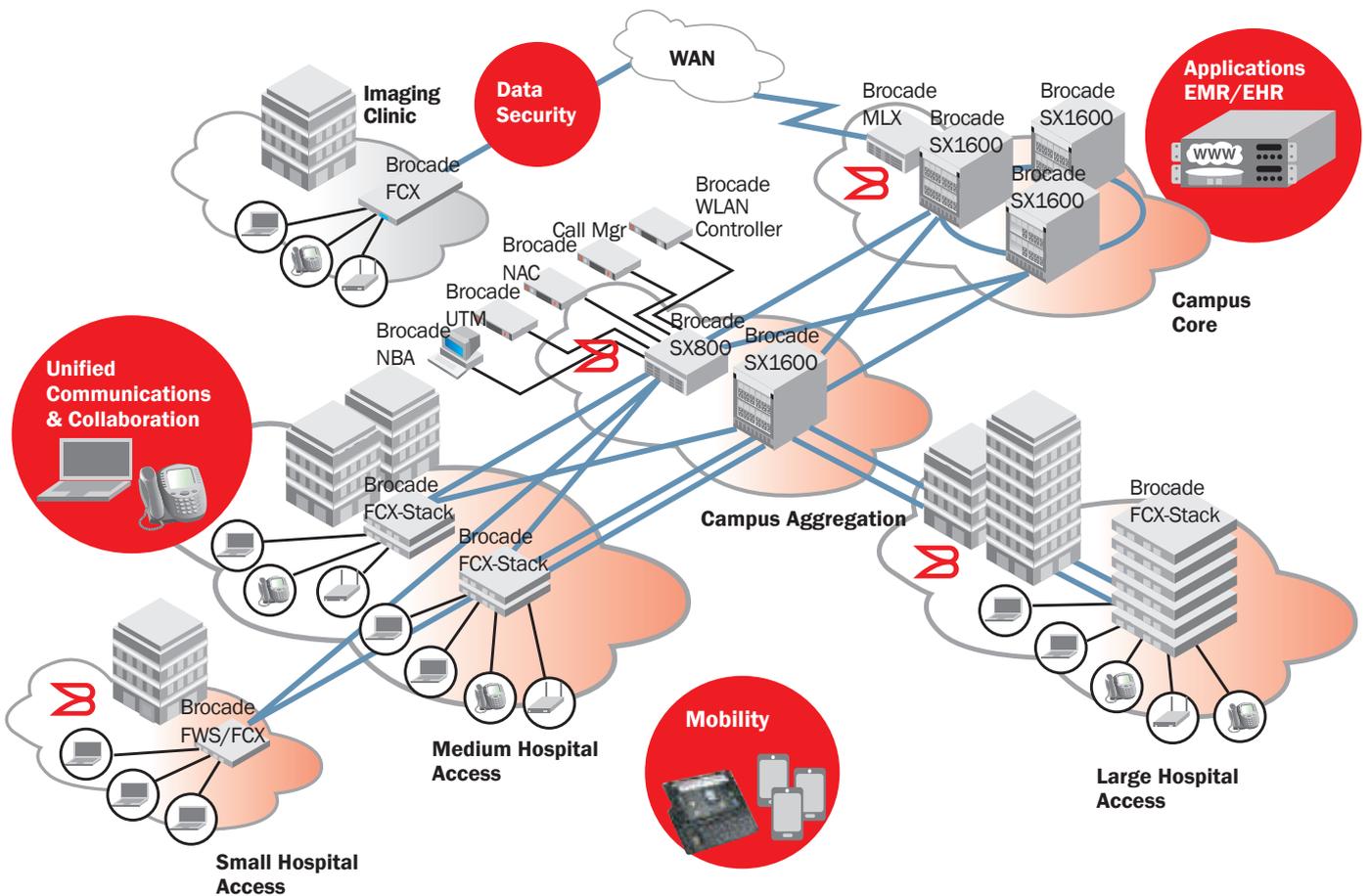
Today the 10 GbE network spans the entire university campus and users can connect from anywhere which has enabled installation of video monitoring, access verification, and fire detection systems over the network and Voice over IP (VoIP) is planned.

BROCADE eHEALTH DATA CENTRE AND NETWORK TECHNOLOGY

The strategic goal of the Brocade Campus Healthcare Reference Architecture is a data-centric and application aware infrastructure and network that helps ensure the entire matrix of data centre servers, network fabric, and storage leverages advanced Brocade technologies to optimise communications and safeguard application content including critical patient data.



Figure 3. Brocade Campus Healthcare Reference Architecture



PUTTING FRONT LINE PERFORMANCE FIRST

The Brocade One strategy for healthcare may be defined as “eHealth Ready” with capacity and bandwidth to manage the exponential growth of digital healthcare devices and demand for care insight leading to significant improvement in outcomes at lower cost.



- **PACS**
- **Patient portal**
- **Digital imaging**
- **Management accounting**
- **Electronic patient record**

The Challenge

- Use technology to attract and retain talent
- Implement strong security to control access to patient data
- Improve staff productivity with leading-edge medical applications
- Deploy new wireless monitoring devices and services such as HD video conferencing
- Determine how much network you need for next-generation electronic patient record, imaging, PACS, voice and collaboration applications

The Brocade Solution

- Highest density 10 GbE network core
- High-availability network infrastructure
- Unified management to simplify operations
- Wire-speed, reliable and secure network infrastructure
- Proactive network monitoring to ensure high levels of service
- Modular, extensible form factors to expand capacity as needed in a future-proof architecture

The Benefits

- Lower ownership cost
- Non-stop critical patient services
- The ability to meet stringent Service Level Agreements
- Network infrastructure that supports current and future applications



- **Disaster recovery**
- **Business continuity**
- **Regulatory compliance**
- **EU Data Privacy Directive**
- **Unified wired/wireless security**
- **Data protection and encryption**

The Challenge

- Data corruption from malware
- Natural and manmade disasters
- DoS and DDoS attacks against applications
- Unauthorised access to data and applications
- Wireless security challenges, rogue access points and new mobile devices

The Brocade Solution

- Encryption of patient records
- High performance with comprehensive security
- Comprehensive Layer 2 and Layer 3 high availability
- Data centre extension and continuous data protection
- Data and application protection from malware, DoS and DDoS attacks
- Best-in-class end-to-end security with McAfee, IBM ISS, and Symantec

The Benefits

- Reduced operational costs
- Compliance with regulation
- Secure, non-stop access to information and applications
- Authorised access to critical and confidential information
- More effective disaster recovery and business continuity with a redundant network infrastructure



- **IP telephony**
- **Wireless mobility**
- **Video conferencing**
- **Unified communications and collaboration**

The Challenge

- Improve patient care while controlling costs
- Comply with stringent healthcare security mandates
- Accelerate response times to medical situations
- Improve collaboration between multidisciplinary groups
- Reduce travel costs while maintaining face-to-face communications

The Brocade Solution

- Adaptive mobility and mobile security infrastructure
- Validated joint solutions with Avaya, ShoreTel and Microsoft
- Validated solutions for end-to-end security with McAfee, IBM ISS and Symantec
- Optimised wired/wireless network infrastructure for unified communications, voice and video

The Benefits

- Best-in-class solutions and optimised costs
- Improved protection of patient data and compliance with regulations
- Converged network for improved productivity and reduced operational costs
- Scalable edge network capacity for WLANs to support future growth while protecting investments
- Maximum network security with intrusion protection capabilities across both wireless and wired networks

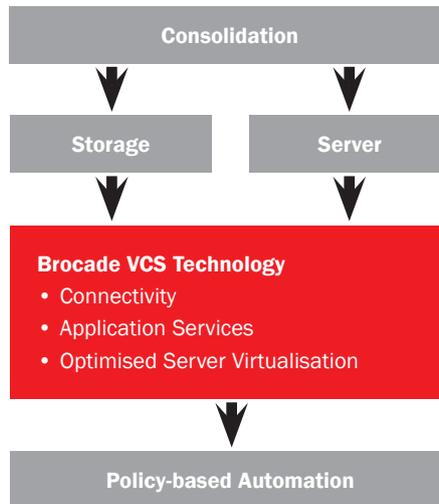
Next Generation Brocade eHealth Technology

For next generation eHealth data centres where virtualisation is being deployed, the Brocade Virtual Cluster Switching (VCS™) technology will allow a flexible virtualised network edge for server connectivity. This solution delivers rapid response to changing needs and the ability to quickly accommodate growth of new applications and data.

This is particularly important in the EU drive for “front-line-first” healthcare policy enabling local patient online access to medical records of appointment making and virtual mobile interaction between patient, practitioner and the hospital.

“Advanced application services on Brocade VCS technology will help ensure that eHealth applications and data receive the highest level of security and data protection.”

Figure 4. Brocade VCS Technology



Source: Brocade Optimised Data Centre Consolidation with Server Virtualisation and Brocade VCS Technology

To minimise disruption, the Brocade VCS technology is designed to operate with existing data centre storage and network assets, while providing enhanced services where needed.

To simplify administration, these advanced services can be automated via policy-based rules aligned with upper-layer application requirements. Virtual Machine aware networks allow for the addition and migration of virtualised applications anywhere in the Brocade VCS technology Ethernet fabric, while ensuring a more resilient network design.

Through the Brocade One strategy, the rest of the Brocade portfolio integrates with existing Brocade fabrics and extends their value by providing:

- Secure Computing
- Unmatched simplicity
- Non-stop networking
- Investment protection
- Application optimisation

For server platforms and storage, the rigid physical connections between applications and data are being replaced with more flexible virtual relationships and shared resource pools. Enhanced data mobility, protection and security are now key to preserving data integrity and fulfilling EU regulatory requirements.

By combining enhanced connectivity with advanced storage and application-aware services, the Brocade VCS technology is centrally positioned to coordinate new eHealth capabilities in both server and storage platforms and thus to maximise data centre productivity.

NEXT STEPS

Brocade Healthcare Expert Briefing

Brocade subject matter expertise is available as a free briefing directly, or in conjunction with an approved consulting and systems integration firm, to enable risk, compliance, audit and IT executives in healthcare to align eHealth policy objectives to a more dynamic, secure and available data centre.



PUTTING FRONT LINE PERFORMANCE FIRST

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