Mobility and Dell Healthcare

Healthcare without boundaries

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Dell Healthcare—Healthcare without boundaries

Healthcare is a real-time business

Information is the lifeline of an interconnected healthcare system designed to deliver patient-centric care. It is critical to saving lives, preventing medical errors, and improving the efficiency of healthcare delivery. Yet vital medical, clinical, and patient information is currently fragmented and largely inaccessible, making it difficult and costly to share across the healthcare ecosystem.

Putting detailed patient information at the fingertips of healthcare professionals across the globe can be a daunting and difficult task. Information must first be unlocked from the shackles of paper and properly secured to ensure patient privacy. And because caring for patients is a "real-time" enterprise, information must be made readily available at any time, at the point of care. But digitizing patient information isn't enough; caregivers still find themselves tethered to computer devices that do not have the information they need.

This can result in:

- **time lost** looking for the right patient information at the wrong workstation
- **duplicate tests and procedures** when doctors share patients but not patient information
- **errors** due to lack of complete information
- **disconnected and inefficient** healthcare systems

In short, healthcare hasn't been mobile. Until now.

Healthcare is mobile

Mobility is crucial in a clinical setting. With the explosion of patient data, clinicians are becoming dependent on accessing real time IT systems to improve their patients' lives. However, traditional obstacles such as limited single-machine access and disjointed security measures can create bottlenecks to critical data access and cause doctors and other clinical staff to waste valuable time logging in and out of systems, searching for devices with access to the right information, and struggling with other consequences of a poor IT user experience.

Dell's vision for healthcare mobility is based on integrating technology to give medical professionals the information they need, wherever they need it: *anywhere* within the hospital or their practice; *everywhere* outside the traditional provider location, for *everyone* who wants to be more involved in their healthcare.

Anywhere within the practice

With Dell's EMR solution for hospital affiliated physicians and the transition to digital patient records, physicians at small and medium practices will have the ability to more quickly access and update patient information. By integrating internet enabled mobile devices to their EMR system, physicians can access or update patient information anytime from virtually any location. And, in the near future, physicians will use remote diagnostics and monitoring devices coupled with mobile internet technologies to track vital information such as blood pressure and glucose levels and intercede to keep minor issues from becoming medical emergencies. New mobile internet devices will build a bridge between physicians and their patients to prevent illness and manage wellness.

Anywhere within the hospital

Dell's Mobile Clinical Computing solution delivers on the 'anywhere within the hospital' vision and provides ease-of-use to clinicians:
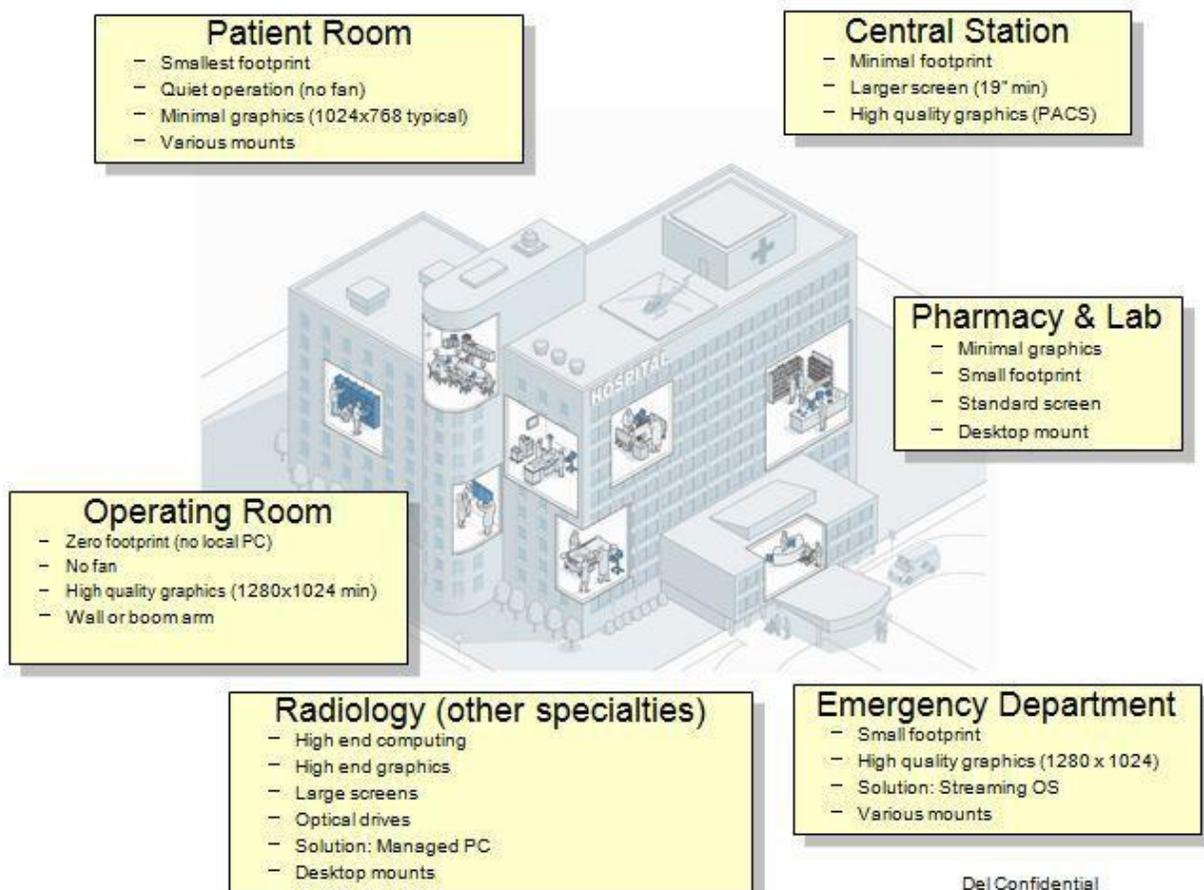
- **Patient data** at clinicians' fingertips—Users have easy access to patient data and applications on any device located anywhere in your hospital, including the Dell Streak mobile device.
- **Access** the same desktop from any device—Clinicians have the ability to roam from machine to machine while maintaining application states between moves. And with location awareness, data will always be printed next to the clinician, ensuring patient information is kept confidential.
- **Single sign-on** for uninterrupted workflow—Users can access all of the applications needed for their job after entering their password just one time.
- **Security** built around every user—At each end device, users can authenticate by simply waving a contactless smartcard that is integrated into the employee identification they already carry.

Along with giving clinicians the information access they've always wanted, Mobile Clinical Computing gives IT staff centralized control of end-user data, stored and managed in the data center:

- **Increased security**—Storing data in the data center, not on individual hard drives, significantly reduces the risk of lost or stolen data.
- **Maximized IT Efficiency**—Updates are completed in the data centre and rolled out automatically to the diskless client at reboot, reducing IT desktop support costs and time needed to deploy new images, patches and upgrades.
- **Streamlined Deployment**—Dell tests all hardware, software, and networking in each hospital's environment to help ensure optimal functionality and serves as a single point of contact through the entire process.

Dell's Mobile Clinical Computing solution is built upon the concept of ubiquitous computing devices at the point of care—Dell's Virtual Client infrastructure. This infrastructure is the core of the mobile clinical solution. Computing requirements in a hospital are very diverse (figure 1), Dell's Virtual Client architecture allows IT to optimize for unique environments without increasing complexity. Built on the philosophy that "one size does not fit all", Client virtualization enables IT to place the right computing device matched to each specific environment from a workload and form-factor perspective…all centrally managed.

HOSPITAL ENVIRONMENTS AND REQUIREMENTS

Patient Room
- Smallest footprint
- Quiet operation (no fan)
- Minimal graphics (1024x768 typical)
- Various mounts

Central Station
- Minimal footprint
- Larger screen (19" min)
- High quality graphics (PACS)

Pharmacy & Lab
- Minimal graphics
- Small footprint
- Standard screen
- Desktop mount

Operating Room
- Zero footprint (no local PC)
- No fan
- High quality graphics (1280x1024 min)
- Wall or boom arm

Radiology (other specialties)
- High end computing
- High end graphics
- Large screens
- Optical drives
- Solution: Managed PC
- Desktop mounts

Emergency Department
- Small footprint
- High quality graphics (1280 x 1024)
- Solution: Streaming OS
- Various mounts

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Client Virtual Computing is focused on providing IT with the ability to centralize control of all end user data and personalized images (their "digital identity"), while still enabling the flexibility of a broad range of compute models. Figure 2 represents the basic architecture of the solution.
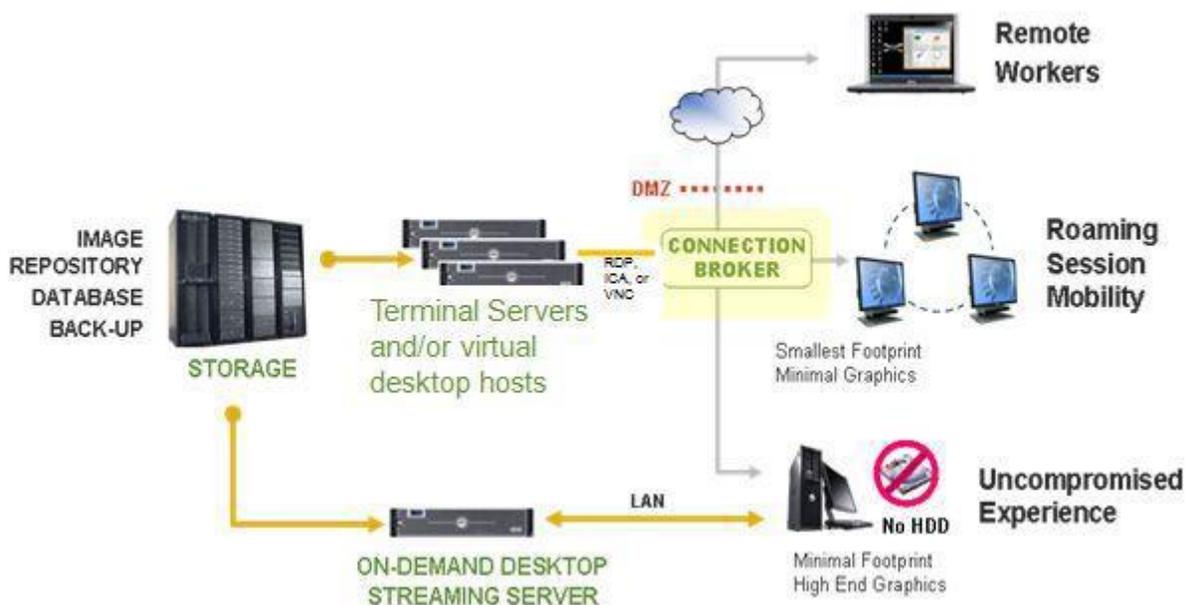
Dell's On-Demand Desktop Streaming Solution is at the core of the client-server architecture. This solution moves all storage from the desktop to the datacenter which provides IT with:

- Centralized control of data and images.
- Tighter security, easier manageability and better reliability – without compromising the end user experience.
- Ability to manage and stream both client and server images.
- A complete certified solution, supported from one source: Dell

At the center is the Connection Broker, which is fully integrated with Active Directory® (Microsoft) and is responsible for several tasks:

1. Secure authentication

2. Assigning applications to users or groups

3. Creating and monitoring user sessions

4. Enabling session roaming

Finally, the architecture is rounded out by a blend of thin client devices, and diskless clients that are On-Demand Desktop Streaming enabled.

Looking at Figure 2, the workflow enablement can be described as follows. An end user always authenticates to the Connection Broker regardless of device or location. The connection broker is aware of the user's profile, the device being connected, and where that device is located. Based on those three inputs, the Broker delivers and presents a desktop appropriately suited for the user. For example, at a thin client connecting inside the hospital, the Broker will deliver a set of applications via terminal services. Alternatively, that same client device can deliver a true virtual desktop if that user's profile is so configured in the Broker. In either case, when that user roams to an On-Demand Desktop Streaming client (e.g. Dell Optiplex™ 755), the Broker is capable of presenting a new set of applications that are intended to be launched and run locally on the client. For example, launching and running a PACS application for digital image viewing is best run locally due to intensive graphics.

The clinical mobility solution is built by including several features at the client end device which are then integrated with services delivered by the Connection Broker. These services can be summarized as:

1) User Authentication Security

2) Session Transfer

3) Location Awareness

1) User Authentication Customized for Healthcare

Providing for highly secure user authentication addresses some of the patient privacy guidelines required by HIPAA. This capability should be been seen as part of an overall security management strategy as dictated by this set of regulations. Dell believes that increased security need not impact workflow, namely the speed at which users gain access to their data. Hence, our solution is designed to meet both security and workflow needs and to be highly scalable. At the device end, users can authenticate quickly and easily using contactless smartcards that are incorporated into their standard employee identification badges. Contactless smartcards are read by a USB-attached reader smartcard reader. The benefit for users is they carry these employee badges anyway, and now can use them for computer access and at physical building access points as well. The action of "waving" a smartcard over the reader takes about one second to complete the authentication, which can translate into a large time savings compared to typing in credentials. At the Connection Broker, the user authentication information is compared against Microsoft's Active Directory server, and if the information meets the established policies, the user is granted access.

2) Session Transfer

The single most important feature from a user's point of view is the ability to roam from machine to machine during the workday while maintaining application state between moves. This can greatly enhance efficiency and satisfaction with IT systems. The Connection Broker provides the services that make this possible by monitoring the connection state between the terminal server, which hosts the user's session, and the client device. If the user logs off the system, the session ends and session transfer is not available. However, if the user disconnects their session, the session remains in a suspended state on the terminal server and is available to be transferred, or more succinctly, reopened the next time the user logs in. The hospital can set policy on how long sessions remain suspended on the terminal server, and if the user does not re-log in within that time, the session will be automatically terminated and all applications closed.

Users have two methods to disconnect their session. They can explicitly select this option from a software menu as they complete a computing task. Or, this operation can be automated by integrating a presence detector on the client device. With this simple USB connected device, a user simply walks away from the device, which causes key strokes to be automatically entered into the system. These keystrokes mimic the manual menu selection which cause a session disconnect. This presence detector aids in HIPAA compliance by preventing protected health information from being displayed after a user walks away from a computer screen. While not foolproof, presence detectors do aid in workflow as users can simply walk away.

3) Location Awareness

The Connection Broker provides services that aid in efficiency and workflow by assisting the user with automatic printer redirection and module specific application launching. Since the Connection Broker is aware of user location, it provides services to direct any print request to the local printer. This is particularly important once a user roams to different locations during the same session. They are guaranteed to always print to the local printer no matter how many times they have moved locations. The Connection Broker also provides a service that can open applications to specific modules depending on user location, preference, and role. It is capable of opening the EMR inside the patient room, for example, to the orders module of the corresponding patient each time a physician logs in. If a nurse logs in from the same device, the EMR is opened to the medication administration module instead. If the user roams from patient room to patient room, the system will adjust the application so that it displays the corresponding patient record each time. When a physician logs in from the nursing station, the EMR is opened to the patient list of his patients on that specific care area. These are just examples, and are customizable by individual, by group, and by application. The location awareness feature saves time and has a positive effect on efficiency. Another benefit is increased accuracy and safety, as the care provider no longer needs to click deeper into the application and select the patient explicitly as it now happens automatically.

Everywhere outside the hospital

Dell's healthcare mobility vision extends beyond the four walls of a hospital. Not only is healthcare a real-time business, it's also an everywhere business.

Often clinicians are not physically at the point of care when their input and expertise are needed. With the Dell Streak, doctors and other experts can access patient information from virtually any location. Additionally, the Dell Streak handheld device can do for healthcare what other devices haven't:

— *Full Integration*—ability to fully integrate with hospital systems
— *Enterprise ready*—other devices are consumer oriented and do not meet security and privacy standards
— *True portability*—while other devices are either too large to be truly mobile or too small to be easily used, Dell's device is 'right sized' for mobility and ease of use, fitting into the pocket of a lab coat

Further, recent advancements such as wearable monitoring technologies and telehealth devices have extended care into the patient's home. Dell healthcare mobility solutions make this care touch-point more meaningful and efficient, stretching the boundaries of care.

The Dell Streak, when used in conjunction with remote diagnostic and monitoring medical devices, streamlines and enhances a physicians' ability to monitor the status of home-bound chronically-ill patients. Further, patient information can be made available to all other stakeholders in the care process and integrated into an electronic medical or personal health record.

For example, Dell is partnering with Biosign Technologies, Inc. to enhance patient-centric measurement, diagnosis, and communication of blood glucose. An inflatable wrist cuff will use the Streak to transmit glucose readings to a Dell hosting center where the data will be automatically calibrated, encrypted, added to the patient's electronic medical record, and transmitted to the physician.

As a result, primary care providers can perform more comprehensive evaluations than the 'snapshot' assessment typically obtained during office visits. They may be able to detect early onset of disease, prescribe appropriate interventions, and monitor results.

Everyone informed and involved

Healthcare issues are consistently among the most frequently searched topics on the internet and today there are hundreds of Android-based applications designed to help healthcare consumers understand, monitor and improve their health and wellness. Next generation devices such as the Streak can build a bridge between informed and engaged healthcare consumers and the medical community that serves them.

Dell's healthcare mobility vision reaches beyond doctors and hospitals to the patient—informing and empowering them. People connected to better information are more informed and possess the knowledge necessary to take control of their own health.

The right infrastructure

To realize the true benefits of mobility in healthcare, mobile devices must be integrated into the hospital's information sharing platform. They must not become another siloed technology adding cost and complexity for hospitals already struggling with inter and intra-operability.

Dell provides hospitals and physicians an information sharing infrastructure that hosts and protects EMR applications and patient information in the cloud, data center or health information exchange (HIE) and makes it available to medical professionals at the point of care, at the practice, in the hospital, or remotely for diagnosis and decision making.

Summary

Dell believes information is the foundation on which healthcare will move forward, transitioning from treating illness to managing wellness. When healthcare is information-driven, information is *interconnected*, making it available when and where it is needed to save lives. Yet, most patient data is trapped in paper and very little is interconnected to the greater healthcare ecosystem. Digitizing, and thus unlocking, patient records is the first step toward giving caregivers anytime, anywhere access to life-saving information. But sharing that information within the hospital's four walls, much less everywhere a clinician goes, is a daunting task.

Dell's Mobile Clinical Computing solutions offer a way for hospitals to easily share patient information throughout the hospital with ease of use while also maintaining control. With Dell's help, health information exchanges will break down barriers to sharing information across the globe, leading to the creation of communities of care, and ultimately, innovations in medicine. And the Dell Streak for healthcare will allow people to tap into these communities of care and become a proactive participant in their own health, reducing the cost of healthcare and creating a healthier planet.