IT Transformation in the Blink of an Eye

Customer Case Study

Unified data center helps enable hospital trust use virtualized foundation for clinical services

EXECUTIVE SUMMARY

Customer Name: Wrightington, Wigan and Leigh NHS Foundation Trust

Industry: Healthcare

Location: United Kingdom

Number of Employees: 4275 Trust staff with more benefiting from managed services

Challenge

- Design, build, and relocate to new data center within six months
- Create reliable, scalable, flexible, and cost-efficient infrastructure
- Lay foundation for self-funding IT model

Solution

- Cisco Unified Data Center, based around Cisco Unified Computing System (UCS) and Cisco Nexus switches
- Pre-validated FlexPod architecture combining NetApp, VMware, and Cisco solutions

Results

- Time to provisioning reduced by 96 percent
- Cabling costs lowered by 87 percent with further £500,000 saving from not having to replace 150 servers
- Power and cooling reduced by 79 percent

Challenge

Garry Harris understands better than most the importance of IT and its power as an enabler of change. As the head of IT services for Wrightington, Wigan, and Leigh NHS Foundation Trust, he and his small team are responsible for the IT on which the Trust's 4275 staff and the local population of 300,000 people depend.

The Trust is the leading provider of acute hospital services to the people of the Wigan Borough and surrounding area. It manages a busy Accident and Emergency department, a state of the art Outpatient Center and provides district general hospital services from three main sites, as well as specialist orthopaedic services to a much wider regional, national, and international catchment area. Main sites include:

- Royal Albert Edward Infirmary, the Trust's main district general hospital site located in central Wigan. This is the largest of the Trust's sites with over 738 beds and provides the main operating base for high quality emergency and associated secondary care.
- Wrightington Hospital, a leading orthopaedic center of excellence. Hip replacement surgery was pioneered at Wrightington Hospital in the early 1960s by Professor Sir John Charnley. The site continues to operate as one of the country's leading treatment centers for joint replacement.
- Leigh Infirmary, offering a range of outpatient, diagnostic, and limited inpatient services. It is mainly devoted to planned patient care and is protected from the pressures of emergency work.

"It's a very challenging time for everyone in healthcare," says Harris. "People are living longer and require more treatment, while budget pressures mean even greater emphasis on value-for-money services. At the same time, there is a general understanding that the solutions and changes healthcare demands will depend on a reliable, scalable, and flexible IT infrastructure."

Within the Trust's IT infrastructure was its data center, but rather than being the foundation on which to meet ambitions to improve patient care, it had become a source of concern and a barrier to innovation.

A major issue was that the facility was located in the town center offices of the local Primary Care Trust (PCT) in Wigan, which meant that the data center team's access to equipment was limited outside of office hours. Another issue was that, after a decade of meeting a 15 percent annual growth in servers, the center had hit its limit on power for devices and cooling.

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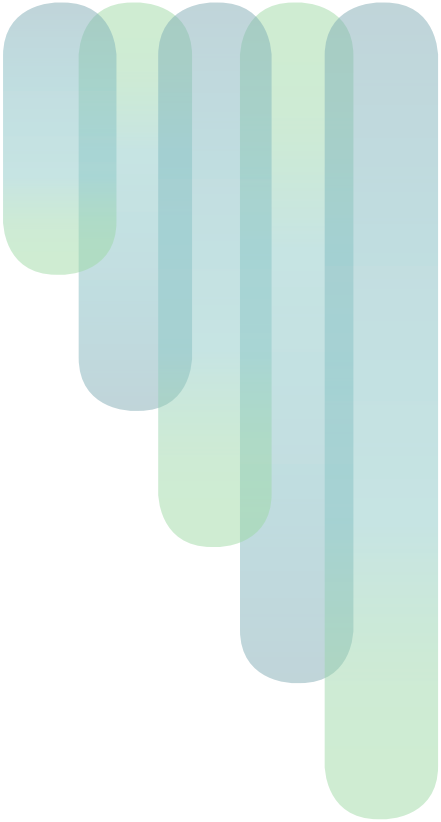

And, although the team had simplified things by standardizing on traditional blade servers from a single vendor, server sprawl and resource under-utilization were endemic. Essentially, each of the 200 servers was dedicated to a single application, and average CPU utilization per system was running at only six percent and RAM at 58 percent.

The lack of 24-hour access to the building added to the day-to-day management task, already made difficult by the use of a spanning-tree architecture, which meant that a problem in one part of the network could ripple throughout the infrastructure.

Solution

The Trust's decision to purchase a new Hospital Information System (HIS) that would not only support the Trust, but could extend to the wider healthcare community, helped to give Harris the mandate he needed to address the data center's limitations. Separately, the PCT decided to vacate its offices, effectively giving him and his team just six months to design, build, and relocate a new data center.

Fortunately, the location problem was quickly resolved with the news that a department at one of the hospitals was moving and the new data center could be housed there. In considering technology options, Harris and his team first looked at virtualizing onto classic blade servers. This approach would have reduced the number of servers required to run current applications to 30. However, on talking through the plans with Cisco, the team decided that an end-to-end approach based on the Cisco® Unified Data Center architecture offered a far more attractive alternative.

One of the most striking differences was that the Cisco solution only required 10 servers to cope with the same workload. "We wanted to create a very efficient and scalable virtualized infrastructure," says Harris. "The Cisco solution didn't have the restrictions in RAM that the traditional blades had, which meant we could run more virtual machines per server. We had a finite amount of physical space and wanted to crunch power down to give us maximum scalability as we develop services over the next 10 to 15 years. We finally settled on 20 servers which covers our needs for the next five years."

The entire solution is based on Cisco Smart Business Architecture validated designs with two Cisco Nexus® 7000 Series Switches at the center of a borderless, collapsed core. Virtual Device Contexts (VDCs) are used to virtualize the WAN and campus tiers, and the data center core, onto the same switches while providing complete administrative separation and fault domain isolation between the tiers. This solution not only simplifies management and reduces misconfiguration issues, it has also reduced capital investment because the two switches can do the job that in the past would have needed four or six devices. Day-to-day operations are made easier through the use of Virtual Port Channel (vPC), which improves overall resilience (by removing the need for spanning-tree and its associated problems) and also the bandwidth available per port.

The solution encompasses two sites, each with the same configuration, to provide business continuity and ease of management and support. Each comprises a Cisco Nexus 7000 Series Switch, linking to two Cisco Nexus 5000 Series Switches, and then to two chassis containing 10 Cisco Unified Computing System™ (UCS®) B200 M2 blade servers via Cisco Nexus 1000V virtual switches. The blades themselves benefit from the next generation of Intel processor technology: Intel® Xeon® 5600 series processors. The data center network core runs at 10Gbps, with 10Gbps optic fiber links from the Nexus 7000 to the Trust's facilities and users.

The SAN uses pre-validated FlexPod components, with iSCSI connections linking NetApp FAS3210A storage arrays, providing 30TB of storage, to the Cisco Nexus 5000 switches. A Cisco Nexus 2000 Series Switch is also attached to each Nexus 5000, providing 1Gbps and 100Mbps connections for legacy servers and applications. The Nexus 5000 also integrates Cisco UCS C460 M2 rack-mount servers into the overall infrastructure. These servers host the new HIS application and benefit from Intel® Xeon® E7-4800 processors designed for mission-critical applications.

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Avoiding any downtime in a mission-critical environment is a major benefit. Once the old blade servers were abstracted within VMware, UCS service profiles enabled the entire infrastructure to be ported over to the new solution "in the blink of an eye" thanks to the 10Gbps connections.

Results

With the creation of a Cisco Unified Data Center, WWL has significantly increased the agility, efficiency, and simplicity of its foundation for future services. A single fabric supports network access for all devices, unifying computing with the LAN and SAN. Differentiated services support the production, storage, and back-up networks.

The concept of unification extends to the device level with, for example, the Cisco Nexus 7000 switches performing multiple roles that previously would have demanded dedicated boxes. Compute resources are now easily accessible to all applications, creating a virtualized pool of shared resources able to scale quickly to meet demand and offering a controlled, cost-effective, and managed path to increased capacity when needed.

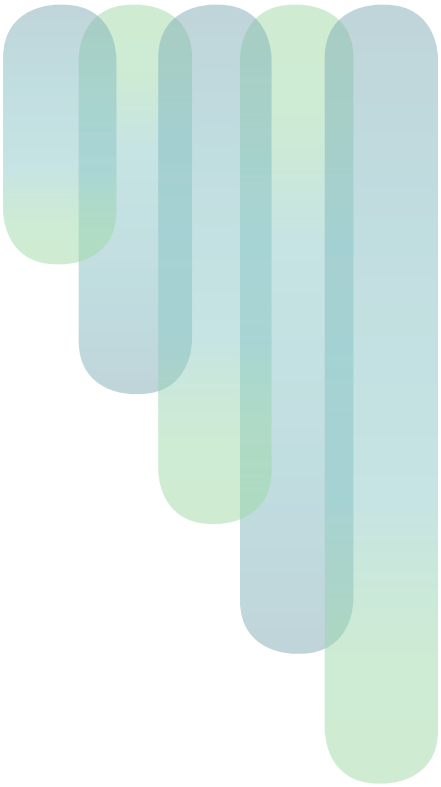
Using Cisco UCS to simplify and automate operations has enabled the Trust to:

- Reduce the time to provision new servers by 96 percent (from four weeks to 30 minutes)
- Cut the time to replicate services by 99 percent (Previously to create a test environment to apply an upgrade the Trust would have to build another server and install the operating system, database engine, application and all associated patches. On average this would take 16 continuous hours. With VMware running across its UCS hosts it can replicate an environment within five minutes and make it available for testing)
- Reduce the time to decommission servers by 97 percent (from four hours to five minutes)
- Lower cabling costs by 87 percent (based on a UCS chassis using multiple 10Gbps network connections compared to single 1Gbps connections for each server)
- Avoid the need to replace 150 servers over the next five years, saving an estimated £500,000

Virtualization on UCS has also delivered major space savings, with some 35 racks of physical servers reduced to two half-racks. Importantly, too, overall power usage for devices and cooling has been reduced by 79 percent. Unification has also improved consistency and therefore manageability. Fault isolation and the use of domains for services, combined with the ability of virtual machines (VMs) to automatically switch over when there is a problem, help ensure clinical services are maintained. Cisco In-Service Software Upgrade helps enable patches and other improvements to be made without affecting services.

Many of the changes are almost invisible to users. For example, a loop in the network can no longer disrupt the telephony system. Before, the bandwidth required to run the Trust's Picture Archiving and Communication System (PACS) application meant that it had to be located at the main acute hospital. Today, 10Gbps across the WAN means that the application and its 16TB of dedicated storage have been relocated to the new data center, helping ensure that it now benefits from improved resilience, performance, and management from the co-located IT team. The links also enable data not just to be mirrored between the two sites, but also backed up every four hours to a third site over the campus WAN.

Other changes are more noticeable to users. For example, in addition to allowing some 40 percent capacity for future growth, the WWL team runs its own test and development resource. This capability, combined with the rapid provisioning made possible by service profiles, means that requests for new services, such as creating a Windows server for a new clinical system can be completed within 30 minutes rather than the previous four working weeks.



For Harris, the new data center means that he can now work to create a new business model for IT services at the Trust. “We now have the potential to scale the infrastructure to start offering services to other organizations, not just to those within the NHS but also local government,” he says. “It will give us the ability to share resources seamlessly rather than being constrained by the barriers of the physical network. The potential for securing new capital investment in the future will be so limited that we need to look for new sources of generating income, and sharing services across geographical areas makes a great deal of sense.”

“The new data center has had a massive impact on the way that people view and use IT within this organization,” adds Harris. “We switched over without any adverse impact to staff and patients and subsequent performance and availability have been second-to-none. It has transformed the perception of IT provision, and people are now asking me what the next developments are going to be.”

Next Steps

Creating a platform for the future was a major reason for choosing the Cisco solution, and factored into those plans was the introduction of Virtual Desktop Integration (VDI). The Cisco approach to stateless computing and the way in which RAM is utilized across VMs were important considerations. So too was the Unified Fabric on the Cisco Nexus switches, which will enable the use of fiber channel-based storage, which is often desirable in a VDI environment.

The Trust is now running a VDI pilot aimed at evaluating how best to extend the life of its PC hardware moving forward and also to determine how it can be used to deliver centralized applications for the hospital’s mobile workforce of doctors and nurses.

For More Information

To find out more about Cisco Unified Data Center, visit: www.cisco.com/go/unifieddatacenter

To find out more about Cisco Unified Computing, visit: www.cisco.com/go/ucs

To find out more about Cisco Nexus switches, visit: www.cisco.com/go/nexus

Product List

Unified Computing

- Cisco Unified Computing Solution B200 M2 Blade Servers
- Cisco Unified Computing Solution C460 M2 Rack-mounted Servers

Switching

- Cisco Nexus 7000 Series Switches
- Cisco Nexus 5000 Series Switches
- Cisco Nexus 2000 Series Switches
- Cisco Nexus 1000V Series Switches

Security

- Cisco ASA 5585-X firewalls

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