

Information Circulation - The Key to Fast Return on IT Investment

New healthcare systems need high performance cabling to deliver full benefit to staff and patients

New technology offers an opportunity to meet the ever-growing demand for improved healthcare without undue financial pain for patients or tax payers. Advanced diagnostic and administrative systems have shown they can help achieve better patient outcomes while avoiding endlessly increased working hours for staff. But unless information from these systems reaches the right people when they need it, many of the benefits are lost.

New magnetic resonance imaging (MRI) and computed tomography (CT) scanners, for example, produce 3-D images that make diagnoses easier. To take advantage of this, healthcare bodies worldwide are upgrading older MRI and CT equipment to the latest standard. However, to maximize benefit to patients, the new equipment must form part of an infrastructure that delivers output quickly to the appropriate medical staff.

The same is valid for new administrative systems utilizing applications such as patient records, bed allocation and the dispensing of medicines. In many cases, these must provide hundreds of staff throughout a building or across a campus with fast, error-free information. If the network cannot do this, the investment in new software and equipment will simply create disconnected islands of information.

In teaching hospitals, multimedia links already play a key part in education programs. By letting students on remote sites see and hear lectures, they allow top consultants to share knowledge and experience with a wider audience. In the same way, video can give large groups a close look at surgical procedures without ever entering the operating theater.

More recently, telemedicine has taken these techniques a step further. Using video and audio links, consultants are able to make remote diagnoses, giving patients in other buildings, or even different countries, the benefit of their expertise. Beyond even this, some surgeons are using robotic links to work on complex procedures with teams located in other hospitals.

In the past, high quality video needed in these applications required expensive, dedicated cabling. Today, high performance structured cabling allows staff to plug in video cameras at any network outlet, in the same way as a PC or printer.

Bandwidth Demand

New systems for diagnosis, management and teaching are not the only demand drivers for high performance networking. The structure of healthcare is changing in ways that make it more dependent on effective communication.

As well as cooperating with each other, hospitals are starting to work closely with general practitioners and social service agencies. To make best use of resources

spread over many sites, these cooperative groups must have strong wide area communications. These in turn, feed more data traffic into LANs (Local Area Networks) within each site, increasing their need for high bandwidth cabling.

This trend will grow as groups build new systems to drive down costs. Many, for example, are already gaining economies of scale through buying on-line for the whole group. As suppliers of products ranging from drugs to cleaning materials allow purchasing over the Internet, documentation will switch from paperwork to network, adding to pressure on cabling infrastructure.

At the same time, collaboration in areas such as research is also accelerating the move to on-line communication. Using the LAN, researchers can share data and reports within a building or send them to colleagues on other sites via wide area connections. Added to this, the LAN is the gateway connecting medical staff with the vast information resources on the Internet.

Moving to Gigabit Networks

Yesterday's networks will not support the new wave of bandwidth-hungry systems. Without a modern network that delivers information quickly and reliably, even multimillion dollar IT investments will disappoint users. A new system that keeps users waiting for information will soon be branded as a white elephant.

Gigabit network electronics, transmitting data at 1000 Mb/s can provide the throughput needed to make systems fast and responsive. But they can only do this when linked by up-to-date, high performance cabling. Cabling that worked well at 100 Mb/s may simply not have the bandwidth to operate reliably at 1000 Mb/s.

Even if cable performance measured in the laboratory looks good, results in the real world may be very different. Factors such as mismatched connectors, electro-magnetic noise, resonance in short links and imperfect installation can all raise error rates. Each error means data has to be resent, and that means waiting longer for information.

The impact of this is clear when transmitting a CT brain scan comprising 515 images totalling 150 megabytes of data and a spinal scan amounting to 127 megabytes. A network giving true data throughput of 1000 Mb/s, will let staff anywhere in a hospital view the scans in just 2.2 seconds. At 100 Mb/s, the wait would be around 22 seconds, a delay that could cause more than just frustration when fast diagnosis is vital to a patient's outcome.

Ready for Advanced Systems

Recent work at SYSTIMAX Labs, one of the world's leading cabling development facilities, has helped to resolve problems with underperforming networks. New mathematical and hands-on testing techniques have been used to develop unshielded copper cabling with performance well beyond Category 6 standards. This new SYSTIMAX® GigaSPEED® XL Solution ensures that

installations achieve full specified throughput, keeping systems responsive and reliable even under adverse conditions.

Comparative tests between the new solution and multi-vendor Category 5e and Category 6 cabling showed the benefits of better design. Of special relevance were tests on Serial Digital Video (SDV) Transmission of uncompressed video at 270 Mb/s, a method well suited to distance learning and telemedicine.

The tests used 100-meter copper cabling channels with four connectors. To simulate real-world electro-magnetic interference, a pulse generator injected noise into the adjacent pair. The results made it quite clear that Category 5e cabling could not handle the requirement. A mixed vendor cabling system that met minimum Category 6 specifications did produce a picture, but many bit errors resulted in “snow” obscuring the images.

However, with its extra crosstalk margin, the SYSTIMAX GigaSPEED XL channel, gave sharp images. Even when engineers added two more channel connections, taking the total to six, the video was clear and continuous.

Stronger Backbones

Using high performance cabling to connect administrative and diagnostic systems can solve many network problems. However, faster connections to equipment increase the risk that the network’s backbone will become a bottleneck.

Many items of computing and medical equipment now come with Gigabit Ethernet ports as standard. This has led to rapid growth in the use of 1 Gb/s network connections that, in turn, mean more data traffic converges on the backbone cabling. If this cabling, connecting systems with users throughout a building or across a site, does not have enough performance, information flow will stall and users will be left waiting.

The traditional remedy for this is to install singlemode optical fiber that can deliver data at high speed over long distances. However, the cost of this is too great for some healthcare establishments. To solve the problem, researchers have now developed new 10 Gb/s laser optimized, multimode fiber technology called the SYSTIMAX LazrSPEED® Solution

Using lower cost electronics, this can deliver 10 Gb/s for up to 550 meters. As a result many more organizations can afford to upgrade their network backbones to 10 Gb/s and unblock the information flow to medical and administrative staff.

In some hospital applications, 10 Gb/s fiber is also connected directly to medical equipment to give the fastest possible end-to-end information delivery. In operating theaters, for instance, where surgeons need immediate access to information including digital X-Ray images, MRI scans and patient records, the extra speed can be vital. It can also provide the throughput needed for remotely performed surgery and high quality video links to lecture theaters.

In applications such as this, where network performance is vital to patient care, lower quality cabling is simply not an option. However, the need for quality cabling infrastructure applies throughout the healthcare sector. It is the foundation on which it can build the technology that its future success depends on. Many of today's high hopes for better care rest on systems that can only keep their promises if they are part of a fast, reliable network.