While rebuilding its Albklinik hospital in Münsingen, operating company Kreiskliniken Reutlingen decided to invest in advanced technologies in order to improve patient care and services. It chose an integrated, high-performance infrastructure based on the Cisco Systems Medical-Grade Network concept, featuring IP telephony and wireless solutions. Efficiency gains, cost savings and enhanced patient care have all followed, contributing to a more effective and competitive organisation.

**Business Challenges**

The Albklinik in Münsingen belongs to a group of hospitals serving the second largest conurbation in the German federal state of Baden-Württemberg. The three hospitals operate as a collective unit and, with over 1,000 beds in total and a combined staff of 2,000, they provide a broad range of medical services.

Recently rebuilt, the new Albklinik hospital came into operation early in 2005. The reconstruction gave the operating company, Kreiskliniken Reutlingen, a unique opportunity to implement state-of-the-art communications in the new building. The primary objective was to use innovative technologies to improve patient care and services which would, in turn, enhance the hospital's competitive advantage in the fiercely contested German healthcare market.

At the same time, Kreiskliniken Reutlingen expected to achieve cost savings and staff efficiency improvements, thereby further enhancing patient care. The process of reviewing all aspects of networking and systems integration would also serve as a model for the other hospitals in the group.

**Solution**

In order to achieve these goals, Kreiskliniken Reutlingen decided to implement a converged IP network using switching, IP Communications and wireless technologies from Cisco Systems. The infrastructure was designed around the Cisco concept of a Medical-Grade Network, which seeks to provide the high levels of interaction, integration and accessibility that are essential in a modern healthcare environment.

“The progressive integration of hospital systems and voice communications using a converged network provides us with precisely those gains in efficiency that we need to continue to be successful in the face of competition”

Oliver Bredel
Managing Director
Kreiskliniken Reutlingen GmbH
In addition to all the hospital’s data applications, the secure, high-performance network also carries all its telephone services. Cisco CallManager software provides the call processing functionality, and hospital staff use both wired and wireless Cisco IP phones to access a range of telephony and data services.

A Cisco wireless local area network (WLAN) is integrated into the wireline infrastructure. This allows medical staff, who are frequently on the move, to remain in contact with patients or colleagues not only via wireless IP phones, but also via other mobile devices such as PDAs or laptops.

Healthcare specialist, xevIT networks GmbH, and building automation system provider, Novar, collaborated with Cisco to deliver its Nurse Call solution which is part of the Cisco Clinical Connection Suite of clinical applications. This allowed the partners to integrate the hospital’s existing nurse call and alarm systems into the IP infrastructure. As a result, staff no longer need to carry multiple devices, including pagers, because they can use their Cisco wireless IP phones to return calls, forward alerts to colleagues, and even view patients’ records and other data to help them make better-informed decisions.

Business Results

Since the new network was introduced early in 2005, it has enabled the Albklinik to progressively integrate its clinical and administrative systems. Recent innovations include Computed Tomography (‘CT’ or ‘CAT’ scanning) via teleradiology (the electronic transmission of radiographic patient images and consultative text). Rainer Hirt, Head of Planning at Kreiskliniken Reutlingen, explains: “In addition to the existing Hospital Information System, we have now networked patients’ electronic records, radiology systems and Computed Tomography at all three hospitals. This enables us to deliver the same level of high-quality diagnostics service at all sites.”

Münsingen is the first hospital within the group to use IP telephony and WLAN technologies which have generated benefits ranging from efficiency gains to cost reductions. Enhanced communications, enabled by the new network, are at the heart of these improvements.

“IP telephony and wireless LAN help to reduce costs and save considerable amounts of time. We can use these gains to improve patient care,” says Oliver Bredel, Managing Director of Kreiskliniken Reutlingen.

For example, the integration of the hospital’s Clinicom 21 light paging system into the telephony infrastructure enables patients to communicate their needs more directly and discretely to their carers. At the same time, it saves nurses unnecessary journeys and enables them to care for patients more efficiently while moving around the ward or unit.

“Overall, the service costs for operating the network are considerably lower than those for the previous system. It was a wise move to go for standards-based network technology, which can be integrated easily. We will also benefit from this when we connect up the other sites as planned.”

Rainer Hirt
Head of Planning
Kreiskliniken Reutlingen GmbH
IP telephony has also greatly simplified the invoicing of patients’ telephone calls. This is because the Cisco CallManager solution is directly linked to the invoicing software, thereby eliminating the need for manual entry of billing data by the hospital’s administration staff.

Another advantage of Cisco IP telephony is that patients can take their IP phone and phone number with them if they are transferred between wards, without the intervention of a telephone engineer.

Being able to get hold of staff more easily, particularly in an emergency, is an important benefit for the hospital management. Emergency calls can be forwarded to every member of staff’s wireless IP phone and text messages can be added. The technology is also able to handle group calls or search for a specific member of staff, helping to locate colleagues without unnecessary, and potentially life-threatening, delays.

Early results suggest that hospital processes have become leaner, resulting in noticeable improvements in the quality of both clinical and nursing care. “The merging of different hospital systems via the Cisco network has improved working procedures on all wards. We are avoiding duplication of effort and, by using our staff more efficiently, we are enhancing patient care,” says Rainer Hirt.

Such service improvements also have a sound business basis, as Oliver Bredel explains: “We are using innovative technologies specifically to enhance our competitive position in relation to other hospitals.”

At the same time, service costs have fallen and the switch to treatment invoicing according to Diagnostic Related Groups (the government’s DRG financing requirements) has also brought with it some added financial benefit. IP telephony enables the hospital managers to save on internal calls (which are effectively free of charge) and improve workflow in their institutions, thanks to the integration offered by the technology.

In the long term, the Albklinik in Münsingen will continue to benefit from using one infrastructure to meet all its communications requirements: for example, administration and maintenance costs will be significantly lower than for separate networks. As well as providing flexible and secure links for mobile employees, wireless technology also provides a cost-effective alternative to the infrastructure that would otherwise be required for digital enhanced cordless telecommunications (DECT) equipment.

“IP Telephony and Wireless LAN help to reduce costs and save considerable amounts of time. We can use these gains to improve patient care.”

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Managing Director
Kreiskliniken Reutlingen GmbH
Rainer Hirt comments: “At the same time, we have comfortably circumvented the risks posed by DECT interfaces. Overall, the service costs for operating the network are considerably lower than those for the previous system.

“It was a wise move to go for standards-based network technology, which can be integrated easily. We will also benefit from this when we connect up the other sites as planned,” he adds, referring to the Reutlinger Klinikum at Steinenberg (the academic teaching hospital of Tübingen University) and the Ermstal klinik at Bad Urach.

As it is highly scalable and flexible, the new infrastructure will also safeguard the investments made so far. Oliver Bredel concludes: “The progressive integration of hospital systems and voice communications using a converged network provides us with precisely those gains in efficiency that we need to continue to be successful in the face of competition.”

“In addition to the existing hospital information system, we have now networked patient’s electronic records, radiology systems and computed tomography at all three hospitals. This enables us to deliver the same level of high-quality diagnostics service at all sites.”

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Albklinik Münnsingen has deployed a converged IP infrastructure capable of carrying voice, data and video traffic. It is based upon the Cisco concept of a Medical-Grade Network designed to:

• Be more responsive - maximising the effectiveness of application and device performance to distribute information intelligently to improve quality of care
• Optimise responsiveness at the point of care to reduce the number of medical errors and improve clinical productivity
• Use intelligence within the network to make the most vital information available when, where and for whom it is needed most
• Enhance integration of applications and services to improve diagnostic capabilities, reduce time to treatment for patients, shorten billing cycles and create new revenue sources
• Provide seamless communication regardless of device or location
• Be interactive, able to connect various communication technologies to provide greater collaboration and knowledge sharing.

The high-performance network backbone consists of Cisco switching solutions, while Cisco CallManager software provides call processing functionality. A Cisco Voice Gateway connects the Albklinik’s private network to the public switched telephone network (PSTN). A range of Cisco IP Phones, including the Cisco Wireless IP Phone 7920, deliver voice and data services to clinical and administrative staff. Cisco IP Phones are highly configurable, thanks to their ability to act as XML (Extensible Markup Language) terminals. They are flexible enough to run a range of applications - for example, providing two-way communications and information facilities to patients and nursing staff.

Online diagnostics and remote management make it easier for the IT department to identify and fix any problems. In addition, both the wireline and wireless elements of the infrastructure are fully redundant in design, to ensure high levels of availability.

The xevIT Healthcare system combines with the Nurse Call application from Cisco Clinical Connection Suite to integrate existing nurse call and alarm systems into the IP network through xevIT Communication Servers (XCS). Cisco Clinical Connection Suite is an advanced set of clinical applications that directs, locates and prioritises information for clinical staff and their patients. Its four applications include: Nurse Call, Patient Monitoring, Location-Based Services and Collaborative Care.