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Main-Tauber district administrator's office switches to optical wireless

Effective administration at high bandwidth

The administrative districts in the Baden-Wurttemberg region of Germany were reorganised at the beginning of the year to consolidate smaller town districts and offices into larger administrations that would offer better efficiency and performance.

Part of the reorganisation involved creating regional offices for government functions such as forestry, road maintenance and youth welfare, which had previously been handled by small local teams. Creating these larger regional teams meant an increase in responsibility and workload of staff working in the newly-created district administration of Mein-Tauber, which has offices in the towns of Bad Mergentheim and Wertheim.

In addition to integrating departments and processes, the Mein Tauber district also needed to create a single, integrated voice and data infrastructure for the general administrative office.

Dietmar Hirsch, head of IT in the district, says the project was an enormous challenge: "We had to connect five offices, all within a radius of 1 kilometre to the central office. The connection had to be fast and secure, but a conventional glass fibre network was out of the question because it would be too expensive. Moreover, it would have meant also building an additional backup concept with further planning expenditure and other costs."

VoIP with optical wireless and 802.11g

Even before the reorganisation of the district, Dietmar Hirsch began exploring the possibility of wireless connectivity. All the satellite offices enjoyed a line-of-sight to the main office, leading Hirsch to believe that a mixture of Wireless LAN and directional radio would solve the connectivity issues. However, Hirsch was unable to find any other organisations that had taken this approach – the project was apparently unique in Germany because of its complexity.

To develop the solution from scratch, Mein Tauber worked with a regional systems integrator, Lurz Computer und Datensysteme, which had already installed much of the district administration's IT infrastructure. Together, they created a broadband 155Mbps backbone that connects to free-space optical (FSO) transmission systems to allow high-speed access to all central applications and communications from all central and satellite locations.

The Wireless LAN network is based on the 802.11g standard, and acts as a backup system where a fast optical connection isn't possible. All voice services are run over a Voice over IP network, which proved much more cost-effective than purchasing a new telecoms system for each special department. Conventional telecommunications would also have made simultaneous WLAN coverage almost impossible. Right from the start, the district administrator's office ruled out leasing additional communications lines as too expensive.

FSO-based transmission technology from LightPointe was selected rather than a combined FSO and WLAN because there were not enough channels in the 2.4Ghz frequency, which supports WLAN, to support all of the district office's departments. In addition, LightPointe's technology, which is license-free worldwide, supports flexible systems that operate across multiple distances – the district office uses a FlightLite 155 Mbps system for short distances of less than a few hundred metres, and a FlightSpectrum, also with a bandwidth of 155 Mbps, for the three offices more than a thousand metres away from the central office. The FlightSpectrum system has the added benefit of modern power transfer matching, enabling optimum adjustment of all parameters to the actual transmission distance.

Employees accessing the network over the WLAN connection use devices supplied by Artem, which are well proven for use with this type of network. "We have been working for some time with this manufacturer. Besides offering extremely reliable and sophisticated devices, Artem provides perfect support and so relieves the pressure on us in planning and day-to-day business," says Manfred Lurz, chief executive officer of LCD, the firm which installed the Main- Tauber network.

The communications infrastructure guarantees absolute priority to voice traffic, and the Voice over IP technology guarantees virtually 100 percent availability. This is achieved using Layer 3 switches from 3Com, which are designed to provide absolutely secure switching between optical and WLAN connections. Software was designed by 3Com especially for the project to run on the 3Com® SuperStack® 3 Switch 3226, following early tests, in order to make rapid spanning tree possible at port as well as switch level.

Installation during the Christmas rush

Mixed doubles: Optical wireless and WLAN in tandem.

Installation of the optical wireless systems proved simpler than expected. Hirsch explains: "We were impressed even before the LightPointe components were delivered. The device quality was fantastic at first glance, underlined by really outstanding packaging, from which many manufacturers could learn something."

Aerials up to 80cm in diameter were used for WLAN transmission.<0

Within two days all five satellite offices were installed and running. The most difficult part of the project was the preparation before installation, which involved laying the fibre optic and power cables, putting in place all the fixtures (sometimes at dizzying heights), and mounting aerials. Special fittings for mounting the optical radiating heads and the external aerials of the WLAN systems (with directional aerials with diameters of up to 80 cm used in some cases) were planned and manufactured ahead of time. In addition to various standard

brackets from LightPointe, special mast constructions and roof feedthroughs were also used.

The actual alignment of the LightPointe system was very simple, thanks to numerous supporting functions, and required absolutely no technical knowledge. "Especially in locations where optical alignment was not possible with the built-in sighting telescope, we learned to appreciate the advantages of the additional signal tone setup for headphones," said a delighted Ralph Albrecht, Project Director at LCD, said of the FlightSpectrum systems from LightPointe. "Finding the other location using the coloured LEDs in FlightLite was a real help in the sea of houses in the local towns."

Ralph Albrecht on the roof of central office

LightPointe's FSO technology uses special VCSEL diodes which combine the benefits of LEDs with the radiated power and speed of lasers. This means the systems fall in the safe 1M laser class. In addition, operating the systems does not require either a laser-protection officer or registration of the laser technology with the trade association.

Successful operation under all conditions

Following the successful completion of the installation by experienced LightPointe field technicians, initial start-up went without a hitch across the entire network. After the network had been in use for two months, all departments could communicate smoothly, says Dietmar Hirsch: "Right at the start we had a violent storm with wind speeds of more than 140 km/h – but all routes functioned without error. Even when it was snowing and raining heavily, the combination of optical wireless and wireless LAN proved ideal."

The benefits of inter-departmental communication are enormous, thanks to the clear structure and assignment of rights in the network. Flexible VLAN authorisation means that the IT department can now offer all employees access to the data they need. If, for example, the staff of the environmental office require geographical data for the state, they can now access the databases of the surveyor's department directly and save valuable time. VoIP integration has also proved to have been the right decision. Its introduction in the health

department was fast and smooth, resulting in plans to replace the cost-intensive telecommunication systems in the other departments too.

The network is also protected against a possible future blackout – pre-installation planning showed that the LightPointe solution offered a comprehensive three-year warranty package and the option of a straightforward system exchange the next working day. In addition, the company that is responsible for setting up and maintaining the network, LCD, is based only a few kilometres away in Bad Mergentheim, from where it can guarantee fast on-site service and can, if required, move the optical radiating heads from less critical routes to prioritised ones.

This means that if, for example, if the health department's system crashes, the road maintenance department's link, which is not so dependent on bandwidth, can be switched to WLAN and its more powerful radiating head can be swivelled to face the health department. And thanks to LightPointe's 24-hour express delivery service, regular operation can quickly be restored.

Manfred Lurz emphasises one further benefit of the system: "Especially in this time-critical project shortly before the Christmas holidays, it became blindingly obvious which companies took their support service seriously. In this respect, both LightPointe and 3Com excelled thanks to outstanding availability." Laughing, Lurz adds: "The support manager at LightPointe was even available by telephone on Christmas Eve."

No costs for the administrative reform

Because of the high availability of the entire wireless solution, Main-Tauber DAO has decided not to install a breakdown warning system. If the district office changes its mind in the future, it will be possible to integrate the wireless radio system into a network management system. The FlightSpectrum systems already include an optical management interface, making integration into an SNMP environment via LightPointe proxy agent possible, but the concept also provides for notification to a pager or a text message.

FlightLite with pitched roof construction

Hirsch of Main- Tauber is pleased that the overall solution works so smoothly and as a result has even saved the district administration money: "If you reckon the one-off investments against the cost of a conventional solution with rental and leasing charges for five new telephone systems, then the modem connections for the required time-management terminals and simple central administration, then the investment has already paid off."

This apparently unique project is an example of how an unconventional approach can seek out an entirely comparable replacement for a optical-fibre solution. "We can seriously recommend LightPointe's 'optical wireless' products to anyone," adds an enthusiastic Ralph Albrecht, Project Director at LCD, at a concluding project meeting.