

BASF Antwerp

Wireless connections offer alternative in industrial environment



“WE ARE EXTREMELY PLEASED WITH THE WIRELESS CONNECTIONS INSTALLED. WE WILL IMPLEMENT EVEN MORE WLANS IN THE FUTURE. FOR SOME LOCATIONS AT THE SITE, INSTALLING CABLES WOULD BE TOO EXPENSIVE OR EVEN IMPOSSIBLE.”

Marc Tubeckx, manager of the LAN network at BASF IT Services

The BASF site at the port of Antwerp is one of the biggest chemical sites in Belgium and the second biggest production platform in the entire BASF group. The 54 installations of the company cover an area of around 600 hectares by the river Scheldt in the port of Antwerp. Apart from fertilisers, it mainly produces synthetic materials, fibre products, heavy and high-grade chemicals. Around 3,500 staff work at this site. They are supported by over a thousand other people, who work for subcontractors.

BASF IT Services, a wholly-owned subsidiary of BASF, is responsible for all ICT at BASF Antwerp. The company was set up in April 2001, through an amalgamation of all BASF's IT activities in Europe, enabling the creation of a major IT services provider. BASF IT Services employs some 2,200 people and has around 100 IT specialists based at its Antwerp site. In 2002 BASF IT Services installed a new fibreglass network based on Cisco routers and switches serving 2000 PCs at this extensive site. Moreover, it successfully set up two wireless networks based on Cisco technology. BASF IT Services is delighted by the possibilities that wireless local area networks (WLANS) can offer industrial sites.

Crane-dockside connection

BASF IT Services implemented the first wireless project in the port docks where ships are moored for loading. Cargo is loaded via a remote-controlled crane. Initially the link between the control system on the dockside and the PLC steering in the crane consisted of a fibreglass cable integrated into the power cable. Information on control of crane functions was exchanged through this cable, as well as data on management and maintenance. This data was used to create a graphic representation in a control room, so that for instance failures could be quickly localised.

The frequent unwinding and rewinding of the power cable caused concern about possible breakages in the integrated fibreglass. So the technical services in charge suggested a wireless network. BASF would then also be gaining the experience needed to implement the control

EXECUTIVE SUMMARY

Background

BASF IT Services has installed innovative, wireless connections at BASF Antwerp, one of the largest chemical production complexes in Belgium and the second biggest production unit in the group. The company's 54 installations cover an area of about 600 hectares by the river Scheldt in the port of Antwerp. BASF Antwerp has a workforce of some 3,500 people and also employs over a thousand external workers. BASF IT Services is a young but experienced player in the ICT market and employs some 2,200 staff, with around 100 specialists in Antwerp.

Challenge

Because cables have to withstand a great deal in a tough industrial environment or are expensive to install, BASF went looking for alternative connections together with its ICT partner BASF IT Services, among others, for a remote-controlled dockside crane.

Solution

BASF IT Services set up a wireless connection to the dockside crane using Cisco Aironet equipment. Shortly afterwards BASF IT Services started a second wireless project that looked into the possibility of more wireless connections: a data connection that would bridge the eight kilometres between BASF and one of its logistic partners.

Results

BASF Antwerp now has a reliable and secure connection for controlling one of its dockside cranes. Moreover, a leased line to a logistic partner was successfully replaced with a wireless connection. Both installations work flawlessly.

link, through a wireless network, for an additional dockside crane if necessary. Eventually they and BASF IT Services opted for a redundant wireless connection.

“Replacing the cable as a precaution would have been too expensive a business and would have meant having to shut down the crane for a couple of days for the assembly work. The installation of the wireless infrastructure could, on the other hand, be done while the crane continued functioning. Moreover, the wireless connection is better



adapted to an industrial environment. With another cable we would eventually have run into the same problem of wear and tear; a wireless connection makes this impossible. And if the infrastructure still needs further work we can always fall back on the redundant connection, keeping the crane active in the meantime,” explains Marc Tubeckx, manager of the LAN network at BASF IT Services.

Two Cisco Aironet 350 workgroup bridges, which can cover the distance up to the dockside, were installed on the crane. These make contact with two Aironet 350 access points, 250 metres away at most. Two network appliances connect the access points with the control apparatus on the dockside. Two Cisco routers also connect the access points with the management console. Although a separate protocol is used for data traffic between the crane and steering, BASF IT Services made sure that the wireless connection was well protected.

Because the standard security protocol WEP can be hacked into, BASF IT Services also included Temporal Key Integrity Protocol (TKIP) and Message Integrity Check (MIC). TKIP, also known as WEP key hashing, is an improvement on WEP and stops hackers discovering the WEP key. MIC is a mechanism that checks whether the data packages sent have been tampered with en route. Moreover, BASF also uses MAC-based address filtering. This carries out a check on the unique MAC code supplied by the manufacturer, so that only data from known stations is accepted.

BASF now has two secure Ethernet connections with the PLC steering of the crane. Thanks to the redundant infrastructure, the connection remains intact if one part of the system fails. So far it has worked excellently, so everything points to the new crane being equipped with the same wireless infrastructure.

Spanning eight kilometres

BASF IT Services also delivered a second WLAN project, in which they set up a wireless connection with a capacity of 11 Mbps across a distance of no less than eight kilometres. This link takes care of the data transfer relating to delivery assignments between BASF and one of its logistic partners. Information such as quantity, mode of transport and packaging information on the flow of goods is exchanged through the air. For practical reasons the connection was built up through a repeater site.

“The last, small piece of the connection was the hardest to bridge because there are several container companies situated in that area. The containers are often stacked up several metres high and the dockside cranes also pose a problem. This meant there was no direct

visual contact with the aerial at the final destination. But we managed to establish a stable connection by working in two stages. The first seven kilometres we could cover in a direct line. Then we installed a repeater point that receives the signal and sends it across the last kilometre at an angle that avoids the obstacles,” says Marc Tubeckx.

Marc Tubeckx: “In the past, information was sent through a leased line. This long-distance connection provided us with a good test and an excellent opportunity for broadening our knowledge of wireless transmission. The BASF site includes a number of places where a wireless network would be a good solution.

That’s why we first wanted to gather enough know-how and be sure that such connections would work satisfactorily over longer distances in an industrial environment. Because this link passes through a varied landscape – including docks, bridges, factories, sheds, containers, dockside cranes – we could test thoroughly for interference and other important factors relating to aerial installation and polarisation.”

The infrastructure consists of a Cisco 2621 router at BASF that is connected to an Aironet 350 bridge. This in turn is connected to a parabolic aerial that is mounted on a chimney at a height of 65 metres. The aerial broadcasts the signal across the Zandvliet and Berendrecht locks to a lighting mast seven kilometres away, where another two Aironet 350 bridges are installed. One receives the signal from BASF and the other broadcasts it on to the final destination. There it is received by another Aironet 350 bridge, which finally forwards the data to the Cisco 2621 router at the BASF partner’s site. All the equipment was installed in three days.

The data that BASF sends through this wireless connection requires more security than the WLAN installation with the crane. So additional protection measures were provided through 3DES. The security is activated on the Cisco 2621 routers at both ends of the connection. 3DES or Triple DES is a version of DES (Data Encryption Standard) that encrypts data up to three times.

Getting the hang of the procedures

BASF IT services chose Cisco equipment based on objective criteria.

“I read all the documents and made a preliminary study of the equipment available, partly because the infrastructure in an environment such as this one has to meet certain technical specifications. Cisco came out well. Moreover, independent reports cite Cisco equipment as being reliable. Finally, it’s also important for us to be able to rely on the supplier for support. In the case of the long-distance connection for example, we required official approval from the Belgian Institute of Postal Services and Telecommunication (BIPT).



Because it involves new technology and there are only a few such projects set up, you really have to wade through the procedures. Cisco's help with this has been outstanding," says Marc Tubeckx.

BASF Services is especially satisfied with the stability of the wireless networks. "In the future we will probably implement more WLANs. For some locations at the site, installing cables would be too expensive or even impossible. Also, it would be useful to equip certain warehouses with WLAN apparatus so that portable terminals can be used to keep all kinds of supplies up-to-date. There is a great future in store for wireless communication," concludes Marc Tubeckx.



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