



BUILDING INDUSTRY

ZÜBLIN

Wireless network with “tunnel vision”

In Israel the joint venture Züblin - Jäger is building a tunnel to supply Jerusalem with water. A fail-proof wireless network 350 meters deep in the earth ensures communication without interruption.

The tunnel boring machine (TBM) “Isabel” is “eating” its way through a rocky mass, accompanied by loud roaring. The vibrations produced by Isabel penetrate right down to your bone marrow, demonstrating what enormous forces are at work. Slowly the head of the drill comes to a standstill. Technicians and engineers immediately begin scrambling about here and there. Discussions are taking place, measurements being taken, maintenance work performed on the drill rig, while radios are in continuous operation. A wireless network is quietly performing its service, ensuring that the radio system and additional services also function reliably deep under the earth.

Communication at the construction site using voice over WLAN

The tunnel supplying Jerusalem with water will be almost 13 kilometers long when it is completed in November 2020. Mekorot, Israel’s national water supplier, and the German-Austrian joint venture Züblin-Jäger began preparations for the tunnel-construction project in April 2016. The tunnel is to be built between Eshtaol and En Karem 350 meters below the communities of Kesalon and Ramat Raziel.

“We need a stable and reliable radio system for the tunnel-building phases in order to guarantee the communication for workers in the tunnel,” says Andreas Ratzke, IT coordinator for Tunneling Division 21 at Ed. Züblin AG. “As a result of regulatory requirements in Israel, our communications specialist providing assistance, Tunnelkom from Göppingen, in Baden-Württemberg, decided in favour of a voice over WLAN solution.” Components were chosen from the German network manufac-

turer LANCOM Systems for the wireless network.

The utmost in fail-proof

The requirements applying to the wireless network in the tunnel are stringent: While a fail-proof capability is assigned the highest priority, in selecting the technology a key criterion was ease of expanding it. After all, the network is supposed to be continuously expanded with progress in building the tunnel so as to network the entire construction

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Andreas Ratzke, IT coordinator for Tunneling Division 2I at Ed. Züblin AG

site. To this end, an access point is being installed every 500 meters in the tunnel. “We expect that a total of 40 access points will be needed,” says Ratzke. “We are using devices with two wireless modules. The first module links mobile clients to the wireless network, for example radio devices, smartphones, laptops or tablets. The second wireless module has a fail-proof function,” explains Ratzke. All the access points are linked with one another and with the Internet using sturdy fibre-optic cables. If there are any interruptions, for instance due to a cable breaking, the gap is closed by wireless LAN via auto WDS (Automatic Wireless Distribution System).

In order for the wireless system to function smoothly in the tunnel, different types of antennas are used: While omnidirectional antennas provide clients with wireless network access, directional radio antennas provide the backup via auto WDS. The management via WLAN controller also plays a key role: without this, the fall-back scenario via the auto WDS function would not be possible.

“All access points are laid down in advance in the controller along with



predefined scripts,” notes Ratzke. “This allows new access points to be set up smoothly, quickly and easily.”

A network for many applications

In addition to VoWLAN, cable-based voice over IP telephones are used in the tunnel. The wireless network is available as a back-up for IP telephony and TBM control if the cable connection breaks down. Technicians and engineers in the tunnel use the wireless LAN to go onto the Internet, allowing them to call up their e-mails from anywhere. On top of this, there are services such as the TBM early warning system, the alarm system, the IP cameras and the mixing plant control system.

The applications that use the wireless system are separated across different SSIDs and sub-networks, so-called Virtual Local Area Networks, that are logically separated.

Easy expansion

“Our biggest advantage lies in the high fail-proof level of the entire wireless network,” explains Ratzke. “The wireless LAN remains available virtually at all times in the tunnel thanks to the auto WDS and the use of the two radio modules.” In addition to wireless communication, this ensures that all other services can be reached at all times – independently of whether these run directly via the wireless LAN or the wireless connection as a fall-back solution. Easy expansion of the network thanks to zero-touch deployment as well as central management via the WLAN controller ensure rapid expansion of the network. “That is very important for us, as the wireless LAN has to grow together with the ongoing progress in the construction of the tunnel,” adds Ratzke.

Customer

Finding the best solution for every task: This credo has allowed Ed. Züblin AG to rise to place number one in German structural and civil engineering. Since it was founded in 1898 by the Swiss engineer Eduard Züblin, the company has been very impressive thanks to its innovative power, which is reflected in smart designs, new building materials and progressive production methods. In its capacity as member of the globally operating STRABAG SE, Ed. Züblin AG owes its success not least to the wealth of ideas and commitment of its 14,000 employees, a large team that also tackles complex construction projects, completing them at the best price and on time thanks to perfect workflows.

At a glance

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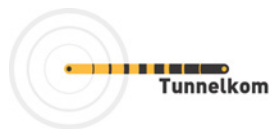
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Requirements

- › Blanket supply of the tunnel construction site with a simple, expandable wireless LAN
- › A stable, fail-proof wireless network to serve as the basis for a reliable voice over WLAN solution
- › Integration of additional applications in the wireless network, e.g. alarm systems, measurement devices, etc.

Components used

- › 40 x LANCOM L-322agn dual wireless
- › 1 x LANCOM WLC-4025+

