

Reliable wireless connection of remote water supply stations to the control center



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Overview

- The municipality of Ober-Mörlen, which borders the Hochtaunuskreis district, supplies connected consumers primarily from its own groundwater supply.
- The substations are largely controlled via a remote control network whose cables have become deteriorated over time.
- Hence the Radioline wireless system now being used to reliably connect remote structures to the control system.
- The wireless path has provided stable operation since the very first day, prompting the system integrator to also use Radioline in other projects.

Customer profile

Situated around 35 kilometers north of Frankfurt/Main, the 5800 or so inhabitants of Ober-Mörlen are largely supplied from the municipality's own groundwater supply.

The supply network covers approximately 60 kilometers and is designed to deliver 250,000 cubic meters per year.



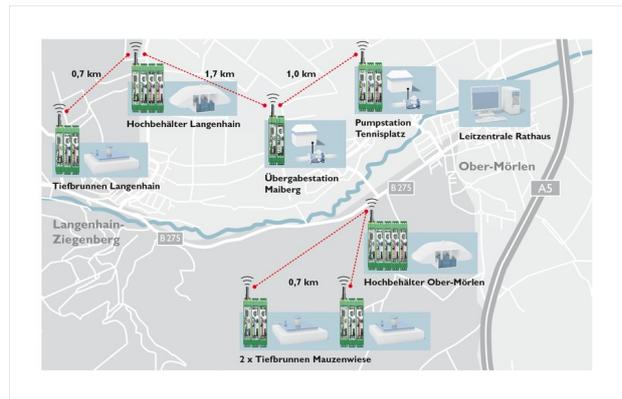
The municipality of Ober-Mörlen borders the Hochtaunuskreis district

Application

The wells, elevated tanks, and pumping stations were previously connected via permanent lines to the central control room situated in the town hall and monitored from there. Over the years, the deteriorated permanent lines have been gradually replaced by GSM/GPRS modems.

However, if the mobile network were to go down, none of the stations would still be within reach. In such an event, the entire water supply would collapse, as the elevated tank controllers would no longer be able to control the pumps of the deep wells autonomously. For this reason, the municipality decided to set up a parallel wireless network which is operated independently of a provider.

The nature of the decision was due to the fact that there were limited options for connecting the substations. The available budget meant that it was not possible to repair or install new underground cables, as the typical costs for this were up to 100 euros per meter. The individual remote structures therefore needed to be networked with the respective elevated tank via radio link.



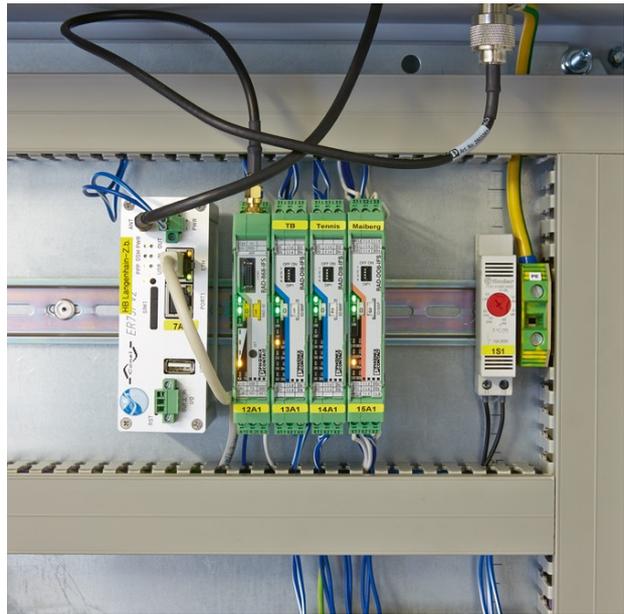
The wireless network comprises two elevated tanks and three deep well systems

Solution

First of all, the Wireless Team from Phoenix Contact examined the wireless coverage on a computer in the office. This provided an initial impression about the practicability of a wireless path. Next, the reliable functionality of the wireless paths deemed to be critical was verified by an on-site test. The municipality uses 2.4 GHz modules to connect two deep wells to the nearby elevated tank. By line of sight, the distance between the stations is 700 meters. There is also another wireless network that has been implemented with 868 MHz devices, as there are several obstacles between the remote stations which are better overcome by the lower frequency range. As a result, the third deep well located roughly 700 meters away and situated behind a hill can be directly connected to the other elevated tank.

A pumping station over 2.7 kilometers away could not be directly networked with the elevated tank, as the difference in height between the two stations is approximately 100 meters. Furthermore, the attenuation caused by the hill and trees is too high even for the 868 MHz modules. A transmission station situated up on the hill is therefore used as a repeater. From here, an optimum wireless connection can be established to both the elevated tank and the pumping station.

The wireless components transmit the predominantly digital signals from the substations to the elevated tank controllers, which then process the signals. Among other things, error and alarm messages are reported and flow rates and levels are recorded and analyzed. Based on this information, the pumps are activated as and when necessary to pump water so as to fill the elevated tanks. The computers in the control room access the elevated tank controllers via GSM/GPRS modems and indicate the respective operating state. In addition, they document inflow and outflow, and perform statistical evaluations of the water-pumping operations. In the event of a fault in the substations, the system notifies the on-call team.



2.4 GHz and 868 MHz devices are used to set up the wireless network

Summary

“Based on our positive experience with the Radioline system and the great service we received, we will be using wireless systems from Phoenix Contact more frequently in future,” concludes Thomas Pfeiffer, Managing Director of Pfeiffer Electronic GmbH, responsible for the automation project.

As Karlheinz König, who used to supervise the Ober-Mörlen waterworks, adds: “The wireless paths ensure stable operation and have not failed even once since the very first day.” Radioline thus provides an easy, flexible, and robust solution. Along with distributing the signals from up to 250 stations by simply turning the thumbwheel, this is achieved through software-free startup, extension, and replacement of modules in the wireless network.



The Radioline wireless system impressed Steffen Rehde and Karlheinz König, as well as Thomas Pfeiffer (from left to right)