

## Data exchange by WLAN and TTE in underground mining to a Supervisory Control And Data Acquisition system basing on OPC Unified Architecture

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### ABSTRACT:

*Data exchange and operation monitoring of underground mining activities is subjected to mobility of operation. The Horizon 2020 project – Real-Time-Mining deals with the continuously advancing production sites of mining with particular focus on ore mining. Automation and digitalization of mining operations increasingly necessitates the installation of infrastructure for data transmission and integration; the issue TU Bergakademie Freiberg and IBeWa Consulting Engineers deal within this project. Even at inactive parts of a mine, where accessibility is no longer possible to humans, sensors and data transmission technology is able to deliver safety relevant information for mine operation.*

*Wireless LAN is the predominant technology applied for mobile data exchange in underground mining. Automation requires uninterrupted exchange of data, making comprehensive coverage of a WLAN signal crucial. For spatially narrow sections, the application of leaky feeder cable proves to be feasible for minimizing installation effort, while providing a stable signal. For the underground mining industry, however, the requirements for surface and underground application of WLAN are diverging unfavorably. Demonstrated by an experimental test loop installed at the research and education mine Reiche Zeche, the paper points out the contradictory motivation of network suppliers to increase bandwidth performance and enhance noise cancellation with that of underground mine IT responsible to realize holistic network provision with limited infrastructure to be replaced continuously along production.*

*At the same time, embedding digital entities from the field level to superordinate communication structures becomes easier and more powerful. For the incentive of TU Bergakademie Freiberg to create a feasible Supervisory Control And Data Acquisition solution for small scale mining activities, reduction of system engineering proved to be most essential. A siloing effect of enclosed vendor environments is observed from manufacturers and system integrators side, making interaction and integration of multi-vendor technology challenging. The emerging industrial communication architecture “OPC Unified Architecture”*

*splits for the first-time functionality from the data transport level. Thus, it allows realizing communication of field level entities on a multi-level basis simultaneously, i.e. Machine to Machine, Machine to Application and Machine to Cloud. Demonstrated by a newly developed SCADA application for mine control, the advantage of a common language for both, horizontal and vertical communication, is high lightened, reducing effort for system engineering significantly.*

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