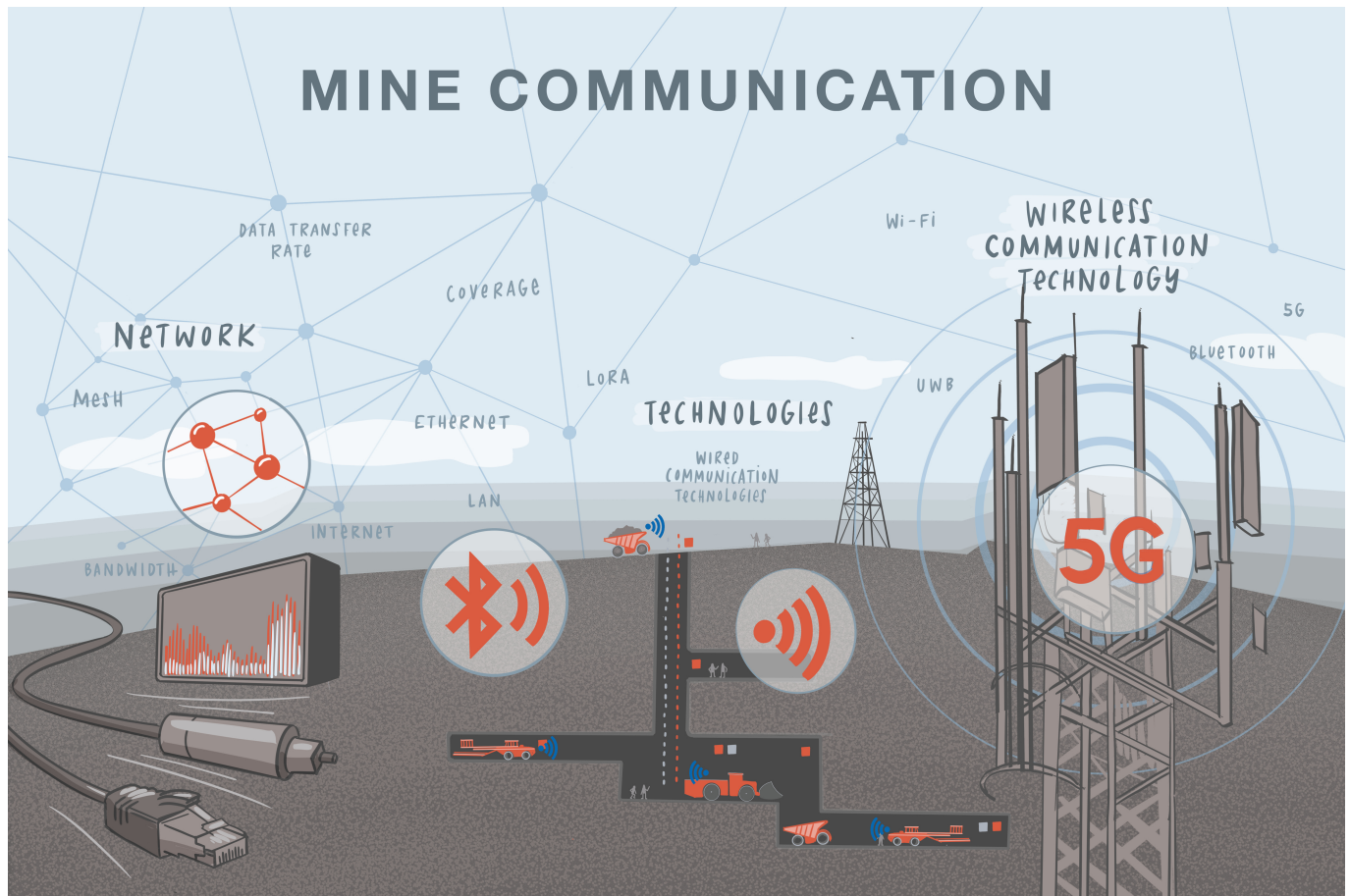# Mine Communication

As the mining industry moves towards greater automation, digitalization, and operational efficiency, advanced communication systems are essential. Our efforts focus on developing and implementing cutting-edge solutions for asset monitoring, data transmission, and autonomous driving within both underground and open-pit mining environments. We are working on reliable long-distance data transmission while enabling real-time video streaming, stable communication for collision avoidance, and the integration of autonomous vehicles into mining operations.

To ensure high-speed, reliable data transfer, we utilize Ethernet cables and optical fibers, providing robust communication infrastructure that supports the increasing data demands of modern mining systems. For wireless communication, we implement Bluetooth and Wi-Fi for short-range, high-data-rate needs, while LoRa technology is used for long-range, low-power communication, crucial for remote monitoring and control in vast mining sites.

Our work also includes pioneering the use of 5G networks, which offer ultra-high data rates and minimal latency. This technology enables real-time data transmission, remote control of heavy machinery, and seamless integration of autonomous driving systems in mines. With 5G, we can support advanced applications such as digital twin technologies, predictive maintenance, and enhanced safety protocols by enabling real-time data analytics and machine-to-machine communication.

By combining these innovative technologies, we are driving the digital transformation of the mining industry, enhancing safety, increasing productivity, and laying the foundation for fully automated and data-driven mining operations in the future.

Related projects:

- [AREA.AI](): Data transmission for collision avoidance via wireless communication technologies
- [ELMAR](): Data transmission from vehicles and use of 5G technology

Completed projects:

- [ARTUS](): Data transmission via Wi-Fi mesh networks
- [Cutting Drum 4.0](): Material detection using AE sensors
- [HEET2](): Data transmission of energy supply systems and monorail hanging railroads as well as the environmental parameters in underground areas via Wi-Fi and fiber optics and use of the MODBUS and CAN communication protocols
- [NEXGENSIMS](): Communication from mobile devices via UWB
- [Living lab Nivelstein](): Private 5G network for demonstrating and testing data transmission

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