

5G technology goes underground

30 August 2019



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Automation and digitalization are increasingly used in almost every major industry to improve efficiency. Thanks to rapid advances in artificial intelligence and robotics, and innovations like X-ray diffraction and electric vehicles, the mining sector is also catching up with the technological revolution.

According to a White Paper by the World Economic Forum and Accenture, digitalization could bring about over USD \$425 billion of value for the mining industry, customers, society and environment by 2025. It could also lead to a reduction of 610 million t of CO₂ emissions, as well as a significant improvement in safety, saving lives and preventing injuries.

With the vision to create a sustainable and smart mining system, a team of experts have developed a 5G radio network under the EU-funded SIMS project. A news release on the project website states that project partners Boliden and Ericsson, together with Telia, have installed the 5G network using New Radio (NR) in Sweden's Boliden Kankberg mine. Peter Burman, program manager

at Boliden, says: "We work actively with robotization to improve productivity and safety in the mine which requires future proof communication solutions. 5G is an important component enabling advanced automation and by that, a safer and more sustainable mine."

Mine of the future

The same news release highlights the advantages of 5G technology over other communications solutions for connectivity in difficult environments like mining. "With characteristics like very low response times and the option for local data handling, 5G is the best suited technology to meet the safety and efficiency requirements of the mine."

Magnus Leonhardt, head of strategy and innovation at Telia, adds: "To guarantee safety in the mine, for example, the network must function even if communications to the outside world is disrupted. Reliable communications can now be secured with the network we have built."

5G NR is the global standard for a unified, more capable 5G wireless air interface that will deliver significantly faster and more responsive mobile broadband experiences, and extend mobile technology to connect a range of new industries. Air interface refers to the radio frequency portion of the circuit between the mobile device and the active base station.

The ongoing SIMS (Sustainable Intelligent Mining Systems) project was launched to develop, test and demonstrate new technologies for the mining industry. One example is the [use of drones](#) to explore tunnels with no risk to humans. Project partners believe such a technology could be beneficial for inspections after blasting and rockfalls, and for shaft inspections. They say autonomous drones equipped with multiple sensors and thermal camera could help increase productivity, requiring less time for inspection.

Other technologies covered by SIMS include

remote-controlled machinery, virtual reality simulators and automated electrical vehicles. For example, SIMS partners envisage a diesel-free underground mine using mobile machinery powered by battery technology, such as wheel loaders, trucks and diggers. They hope to increase production by 40-80 percent with the use of autonomous machines and believe that improvements in mine control centers would increase production by 10-20 percent. They also emphasize that the use of battery-powered vehicles underground would save energy and reduce CO₂ emissions "on the order of 250 tonnes/y per underground machine or 4000 tonnes/a in a typical 1 Mton/y underground metal mine," as noted on CORDIS.

More information: SIMS project website:
www.simsmining.eu/

Provided by CORDIS

APA citation: 5G technology goes underground (2019, August 30) retrieved 17 October 2021 from <https://techxplore.com/news/2019-08-5g-technology-underground.html>

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