Private wireless networks for digitalized mining operations

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The need to constantly reinvent operations to optimize safety, sustainability, productivity and efficiency has made the case for digitalization and automation in the mining industry more compelling than ever. Investments in Industry 4.0 solutions have sharply increased over the past years, putting mining at the cutting edge of industrial innovation and transformation.

Digital transformation and automation can deliver significant rewards for mining companies. Advances in the Industrial Internet of Things, Artificial Intelligence, Machine learning and Augmented and Virtual Reality make it possible to improve decision making, drive autonomous trucks, track assets and monitor operations to ensure safe conditions in harsh and remote environments.

As a result, future mining operations are set to enjoy a steep decrease in injuries and fatalities while employing just-in-time productivity to deliver tonnage on demand and revolutionize efficiency — above and underground.

Having ultra-reliable and high-performing wireless connectivity across open pit and underground mining areas, stockpiles and processing facilities is essential to the digital applications they enable. Nokia Private Wireless solutions help mining companies to accelerate their Industry 4.0 journey and let them sustainably and responsibly transform their businesses.

Private Wireless networks are how Mining digitalization happens

Robust, pervasive and predictable wireless voice and data connectivity is the key to making Mining automation work. It enhances critical communications and enables a new breed of smart digital applications that can optimize operations.

Right now, many digitalization efforts are held back by aging communications networks that don't provide the necessary coverage, reliability, mobility, precision or service prioritization. Wi-Fi, TETRA and P25-based radio networks simply weren't created to cater for the demands of ultra-broadband and mission-critical use cases, video communications and the massive data footprint of industrial IoT sensors and devices.

Mature 4.9 LTE technology already enables 85% of industrial use cases as well as offering an easy upgrade to 5G, alongside access to a wide range of compatible devices. For business-critical and mission-critical industrial use cases with immense demands for reliable low latency and high capacity, 5G standalone (SA) is your best choice.

	Wi-Fi 5/6	TETRA P25	LoRaWAN BLE	Bluetooth BLE	4.9G/LTE 5G SA
High data-rate, low latency	✓	✗	✗	✗	✓
Mission-critical	✗	✓	✗	✗	✓
Cyber-secure	✗	✓	✗	✗	✓
Predictable performance	✗	✗	✗	✗	✓
Coverage	✗	✗	✓	✗	✓
Fast mobility	✗	✓	✗	✗	✓
LP-WAN (IoT)	✗	✗	✓	✓	✓
MC Voice	✗	✓	✗	✗	✓
Single tech, for all use cases	✗	✗	✗	✗	✓

Technology enablers for digital automation

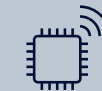Fast, reliable, and secure mobile data connectivity

Mission-critical voice and video communications

Real-time video streaming

Low-latency communications for extreme autonomy and automation

Sensor networks, IIoT

Data analytics and AI

Cloud and edge computing

Asset monitoring and predictive maintenance

Geo-location, geo-tracking and geo-fencing

Robots and drones

Augmented and Virtual Reality

Digital twin

Safer, more productive and efficient operations

Nokia private wireless solutions provide a robust, flexible and predictable network infrastructure which can support a variety of use cases for mine exploration and exploitation – above and underground.

New site exploration and prospecting: Set up a portable LTE configuration in minutes to provide high-bandwidth mobile connectivity for sensors, field workers and drones in even the most remote locations.

Drilling and haulage: Supplement automation by enabling personnel to monitor automated processes and operate machinery at a distance using virtual telepresence — enabling 24/7 operations.

Inspection of sites and facilities: Use robots and drones to remotely inspect mine sites, stockpiles and processing facilities.

Situational awareness and worker safety: Improve safety, sustainability and security with smart personal protective equipment (PPE), environmental sensors, video monitoring and geo-fencing services.

Geo-location, tracking and fencing: Smart PPE wearables can be used with geo-fencing applications to alert workers to no-go zones. This also provides a much-needed lifeline in confined spaces and other situations where the risk of accidents is high.

Mission-critical voice and video communications: Keep workers safe and connected with advanced push-to-talk (PTT) and push-to-video (PTV) services with features such as a panic button.

Predictive maintenance using IoT and analytics: Leverage pervasive wireless coverage to collect data from IoT sensors, feeding asset management and advanced data analytics applications.

Digital twins and AR/VR: Maintain an up-to-date digital model of the physical environment using data from sensors, cameras, drones and location-aware mobile devices. AR/VR systems and applications can then use this model to provide staff with real-time information, scenario simulations and instructions.
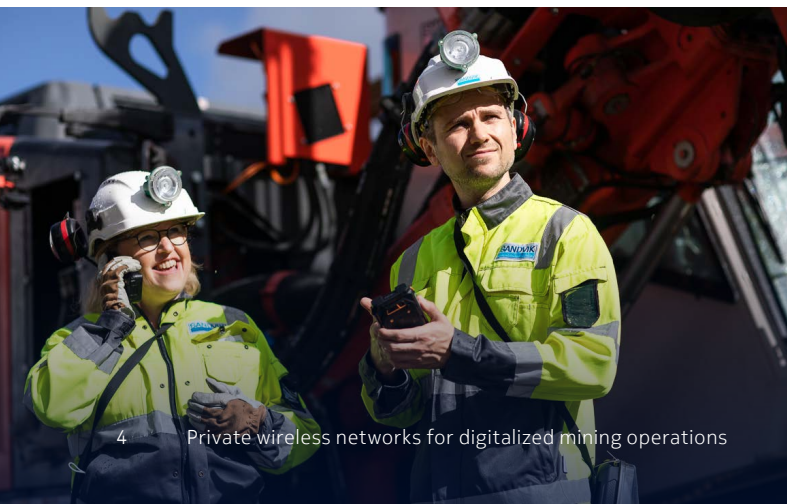
Nokia Digital Automation Cloud

Nokia Digital Automation Cloud (DAC) is a high-performance, end-to-end private wireless networking and edge computing platform designed to meet the mission-critical needs of the most asset-intensive industries with an easy to deploy campus-style network.

Offered as a service, Nokia DAC combines reliable high-bandwidth, low latency 4G/5G connectivity with local edge computing capabilities and a catalog of 'click and deploy' applications. Add in our portfolio of ruggedized Nokia Industrial user equipment and whatever your industry or use case, we've got you covered.

Nokia DAC comes with edge computing hardware, radio access points, add-on applications and user equipment. It also comes with spectrum options – unlicensed (MulteFire and Nokia DAC unlicensed), shared (CBRS) or licensed spectrum – giving you secure, pervasive indoor and outdoor connectivity.

Whether you prefer a planned migration starting with 4.9G/LTE, or go direct to 5G SA, we're happy to share and help you build on the experience of our many enterprise customers worldwide who are powering their digital transformation with Nokia DAC private wireless solutions.
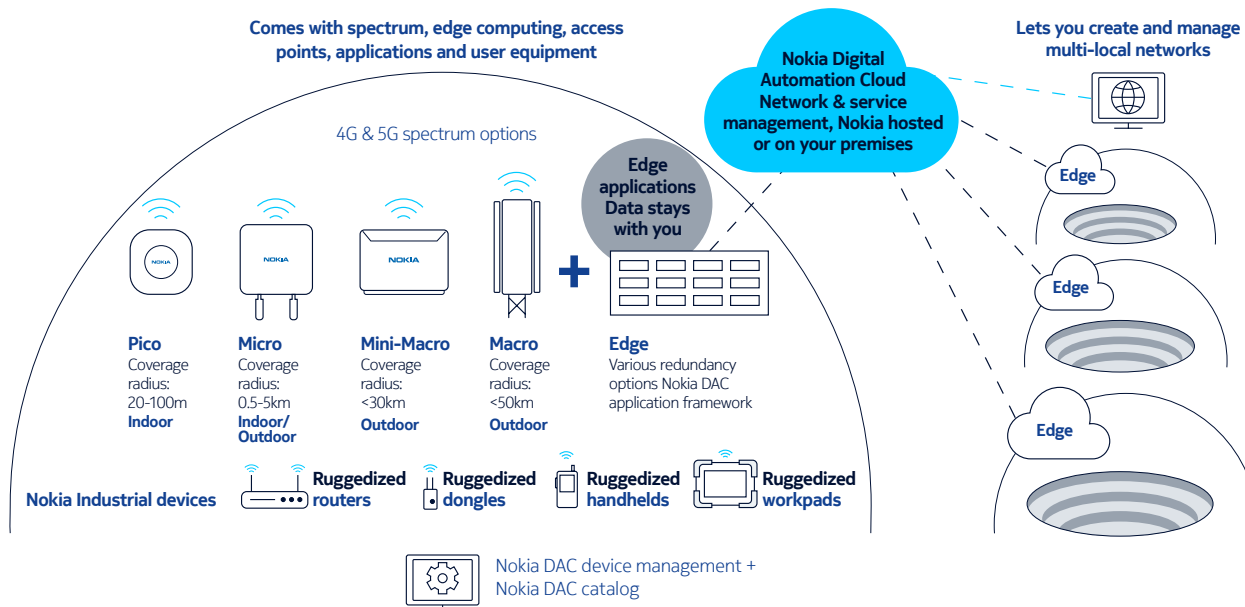
Nokia DAC gives you:

- An easy to deploy industrial-grade private wireless network
- High reliability with proven 4G/LTE, 5G SA and MulteFire technology
- Simple plug-and-play connectivity for all your assets
- Full control over the creation and management of multi-local networks
- Low latency and strong security
- Wide and deep coverage
- Dependable QoS management
- Easy scalability, up and down
- A rich portfolio of ruggedized industrial devices
- A growing catalog of Nokia and partner applications
- An ecosystem of industry-leading companies, solution providers and other key players

Comes with spectrum, edge computing, access points, applications and user equipment

Lets you create and manage multi-local networks

Nokia Digital Automation Cloud Network & service management, Nokia hosted or on your premises

4G & 5G spectrum options

Edge applications Data stays with you

Pico
Coverage radius: 20-100m
Indoor

Micro
Coverage radius: 0.5-5km
Indoor/ Outdoor

Mini-Macro
Coverage radius: <30km
Outdoor

Macro
Coverage radius: <50km
Outdoor

Edge
Various redundancy options Nokia DAC application framework

Edge

Edge

Edge

Nokia Industrial devices

Ruggedized routers

Ruggedized dongles

Ruggedized handhelds

Ruggedized workpads

Nokia DAC device management +
Nokia DAC catalog

NOKIA

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We create technology that helps the world act together.

As a trusted partner for critical networks, we are committed to innovation and technology leadership across mobile, fixed and cloud networks. At Nokia.com We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Adhering to the highest standards of integrity and security, we help build the capabilities needed for a more productive, sustainable and inclusive world.