ERICSSON

Solution brief

# Private 5G delivers robust connectivity for autonomous mining operations

## Achieving safer, sustainable and more efficient mining operations with private cellular networks

# The connectivity imperative for modern mining

As global electrification and the shift to clean energy accelerate, demand for critical minerals is soaring. Consumption of lithium, copper, and nickel is expected to nearly triple by 2030.[1] Mining companies face mounting pressure to increase output while maintaining safety, sustainability, and efficiency.

As operations embrace smart mining—driven by automation, autonomous equipment, and real-time data to cut downtime, enhance safety, and optimize energy use—connectivity becomes mission-critical. But to succeed, operations require secure, industrial-grade connectivity that performs reliably in even the harshest environments.

Ericsson Private 5G delivers high bandwidth, low latency, and reliability needed to power these advances across surface and underground operations.

1 IEA (2025), Global Critical Minerals Outlook 2025, IEA, Paris

# Industry pressures demand new solutions

Historically, the mining industry has taken a cautious approach to adopting new technologies. Limited financial incentives and complex regulatory requirements made large-scale innovation less common. Today, however, rising productivity demands, a heightened focus on safety, and increasingly complex operations are accelerating the need for advanced tools and systems.

**Boosting mining productivity with automation**
A key motivator behind technology adoption is the need to boost output from existing mine sites. To achieve this, many companies are deploying autonomous haulers, drills and excavators, while also connecting assets across operations to streamline processes. These investments are already yielding clear gains in efficiency and return on investment.

**Improving mining safety through technology**
Mining environments often places workers in potentially hazardous environments. Innovations in automation and remote control are helping to reduce worker exposure by enabling equipment to be operated from safer, off-site locations. Coupled with stronger safety regulations and a long-standing commitment to worker protection, these technologies are contributing to steady, ongoing improvements.

**Meeting new operational demands**
As mines become more intricate and production goals more ambitious, the need to modernize intensifies — without compromising reliability, safety, or cost control. Those evolving challenges are increasing demand for systems that offer real-time visibility, predictive maintenance, and remote operational capabilities.

**Reducing mining operating costs**
Profitability in mining hinges on continuous efficiency gains — especially in ore extraction and transportation. However, incremental improvements are delivering diminishing returns, and new environmental regulations are driving up operating costs. As a result, many companies are turning to automation as the most effective path to reduce costs while maintaining high performance.

**Sustainable mining operations**
The mining sector faces growing pressure to minimize its environmental and social footprint. Technology is playing an increasingly important role in this effort. Connected worker systems, environmental modeling tools, and autonomous operations are helping companies monitor site conditions, identify risks earlier, and operate more efficiently. Automation also supports sustainability goals by lowering fuel use and cutting emissions.

**Mining cybersecurity and data protection**
As mining operations become more digitized, protecting critical systems and sensitive data is paramount. Robust cybersecurity is no longer optional — it's essential to ensure safe, continuous, and resilient operations.

According to the new Annual Report 2024 from the Mining and Metals — Information Sharing and Analysis Centre (MM-ISAC), released in February, cyberattacks in the mining industry tripled between 2023 and 2024.

**AI and digital twins in mining**
To improve planning, monitoring, and decision-making, mining companies are increasingly deploying artificial intelligence and digital twin technologies. AI powers predictive maintenance and real-time analytics, while digital twins enable operators to simulate and optimize processes before deploying them in the field. Both rely on the ultra-low latency and high bandwidth of private 5G.

# Advancing toward Mining 4.0

To remain competitive, mining companies are embracing Mining 4.0 — deploying new methods to extract, transport, and process materials more efficiently. Partnerships with OEMs are accelerating the use of autonomous trucks, load-haul-dump vehicles, and drill rigs that boost productivity, improve safety, and reduce environmental impact.

These advances require connectivity that performs in remote, rugged environments. Ericsson Private 5G delivers the speed, security, and resilience to power autonomous fleets, connected workers, predictive maintenance, and real-time monitoring — above and below ground.

**Private 5G mining ecosystem partners**
With Ericsson, mining companies gain more than a private network — they access a robust partner ecosystem spanning system integrators, OEMs, device makers, and application developers. From system integrators and device manufacturers to application developers, this collaborative network ensures industrial solutions are fully integrated, tested and ready for development. Together, with this ecosystem, Ericsson delivers the connectivity, automation, and performance needed to accelerate digital transformation across the entire operation.

**Advantages of a private 5G network**
- High bandwidth and low latency for demanding applications
- Open ecosystem to prevent vendor lock-in
- Reliable performance in harsh environments
- 10x fewer nodes than Wi-Fi for wide-area coverage
- Supports a broad range of devices and deployment models
- End-to-end security with SIM-based authentication

**Private 5G for underground and open-pit mining**
Mining environments push wireless networks to their limits. Traditional solutions fall short, but private 5G delivers the reliability, coverage, and security needed to power automation and connected worker applications in both underground and open-pit operations.

**Underground mining**
Dense rock and winding tunnels degrade traditional wireless signals. Wi-Fi, mesh, and leaky feeders have long been used, but they lack the reliability, latency, and security required for automation. However, private 5G, operating in low-frequency bands such as Band 5 (850 MHz), delivers better propagation and consistent performance, enabling safe, reliable control of remote and autonomous systems.

**Open-pit mining**
Open-pit operations require wide-area coverage for autonomous fleets and connected worker systems. Private 5G provides high throughput and low latency over large areas, enabling real-time coordination of trucks, graders, sensors, and AR/VR safety tools. Spectrum availability varies by country but can be supported via licensed, unlicensed, or lightly licensed bands.

# Powering the smart mine with Ericsson Private 5G

Mining is becoming smarter, safer, and more autonomous—all enabled by industrial-grade connectivity. A 5G-ready private cellular network delivers the speed, low latency, and performance needed to support dense networks of connected devices and business-critical equipment.

Ericsson's private 5G delivers the ultra-reliable, high-performance wireless foundation mines need to connect workers, machines, and critical operations across the most challenging environments. With unmatched speed, low latency, and resilience across global deployments, Ericsson's private 5G delivers proven technology that mining operations can deploy with confidence, supporting everything from autonomous haulage fleets and computer vision to underground communications and predictive maintenance. Software-based solutions also allow mining companies to test and scale 5G capabilities cost-effectively, with future-ready upgrade paths.

"The Ericsson private cellular network allows us to roll out more autonomous machines and helps us improve worker safety and increase production efficiencies above and below the surface."

Luis Canepari, CIO, Newmont

**Why Ericsson Private 5G stands out**
Built for the unique demands of mining, Ericsson Private 5G combines proven technology, flexible deployment, and ruggedized performance:

- **Underground performance:** Consistent connectivity in deep operations with superior low-frequency propagation.
- **Open-pit scalability:** Wide-area coverage for autonomous fleets and connected worker systems.
- **Engineering reliability for extremes:** Built to withstand extreme temperatures, dust, vibration, and electromagnetic interference.
- **Flexible deployment:** Start small, scale as ROI is proven, with cost-effective software-based upgrades.
- **Local partnership model:** Global expertise combined with local integration and support.

**Driving differentiation with advanced radio innovation**
Ericsson brings unmatched radio expertise to mining, enabling superior performance where it matters most:

- **Ericsson Uplink Booster:** A breakthrough in coverage and spectral efficiency, delivering up to a tenfold increase in edge signal strength. Ideal for video-intensive use cases such as computer vision, remote operation, and autonomy.
- **Massive MIMO 64T64R radios:** With 192 antenna elements and advanced beamforming, these radios maximize capacity and reliability. Already proven in demanding scenarios like remote-control dozing, they ensure stable connectivity for smart vehicles and autonomous equipment.

# Reference cases

**Newmont advances automation**
At Newmont's Cadia mine, Ericsson deployed Enterprise Private 5G to enable tele-remote dozing across a 2.5 km zone with a single radio, replacing unreliable Wi-Fi. The deployment improved safety, reliability, and productivity, prompting Newmont to expand private 5G across 14 global sites for drills, trucks, and graders.

[View case]

**Agnico Eagle deploys world's deepest underground private cellular network**
At Agnico Eagle's LaRonde mine, Ericsson partnered with Ambra to deliver the world's deepest underground LTE network, located 3.5 kilometers below the surface in Quebec. The private network provides voice and data services while enabling IoT applications that enhance safety and efficiency. Benefits include real-time communication, improved workplace safety, and sustainable operations.

[View case]

**High-performance mobile connectivity drives Boliden's Aitik mine automation**
Ericsson's mobile connectivity solution enabled Boliden to automate drill rigs at its Aitik mine, reducing annual costs by approximately one percent and avoiding the need for two additional rigs. The company is now expanding automation to include fully automated trucks that will optimize transport flow and lower fuel consumption and emissions.

[View case]

# Why choose Ericsson Private 5G for mining

Ericsson's private networks are purpose-built for industrial transformation, enabling safer, more efficient, and more sustainable mining. The benefits extend beyond productivity to include reduced environmental impact, stronger resilience, and new business opportunities for mining partners and telecom providers.

Through global expertise and a collaborative ecosystem, Ericsson empowers mining companies to adopt smart technologies with confidence — without facing deployment or integration challenges alone.

**How we can help**
Driving change in mining is complex, but the automation powered by private 5G provides a clear path forward. These technologies address many of the industry's persistent challenges and play a key role in shaping the future of mining.

Learn more about how private 5G connectivity can support your digital transformation and explore solutions tailored to the needs of your operation.

Visit our website: Improve mining operations with smart mining - Ericsson

## About Ericsson

Ericsson enables communications service providers and enterprises to capture the full value of connectivity. The company's portfolio spans the following business areas including Networks, Cloud Software and Services, Enterprise Wireless Solutions, Global Communications Platform, and Technologies and New Businesses. It is designed to help customers go digital, increase efficiency and find new revenue streams. Ericsson's innovative investments have delivered the benefits of mobility and mobile broadband to billions of people globally. Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York. www.ericsson.com/mining



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