



CASE STUDY

Automated Monitoring of a Deep Underground Mine in Australia



PROJECT TYPE: Monitoring rock movement

COUNTRY: Australia

INDUSTRY: Underground mining

MAIN PRODUCTS:

- 1 Ackcio Gateway (BEAM-GW)
- 2 Ackcio Digital Nodes (BEAM-DG)
- 3 Ackcio Repeater Nodes (BEAM-RN)

CHALLENGE



Northparkes is a gold and copper mine in Central West New South Wales, Australia, that's been in operation since 1993. It consists of an underground block cave mine, a sub-level cave and an ore processing plant which produces copper concentrate for export.

The mine has existing instrumentation acquired through Mine Design Technologies (MDT) Australia, which provides customized geotechnical monitoring solutions to the mining and civil sectors, to monitor underground rock movement using MDT digital multi-point borehole extensometer (MPBX) sensors. Workers have manually collected data from these sensors once a week.

Legacy, cable-based monitoring solutions are impractical, costly and time-consuming, and only provide infrequent, time-stamped data. Mines are extremely complex and often high-risk sites that may need real-time readings to ensure safety, improve decision-making, and ultimately increase productivity.

The Northparkes mine has tunnels with many corners, which leads to major obstructions that will reduce the reliability and usability of certain wireless solutions such as the LoRa based star network solutions.

SOLUTION

MDT Australia selected the Ackcio Beam system for its trial installation that was carried out in the Northparkes mining site, which is 527 meters below ground.



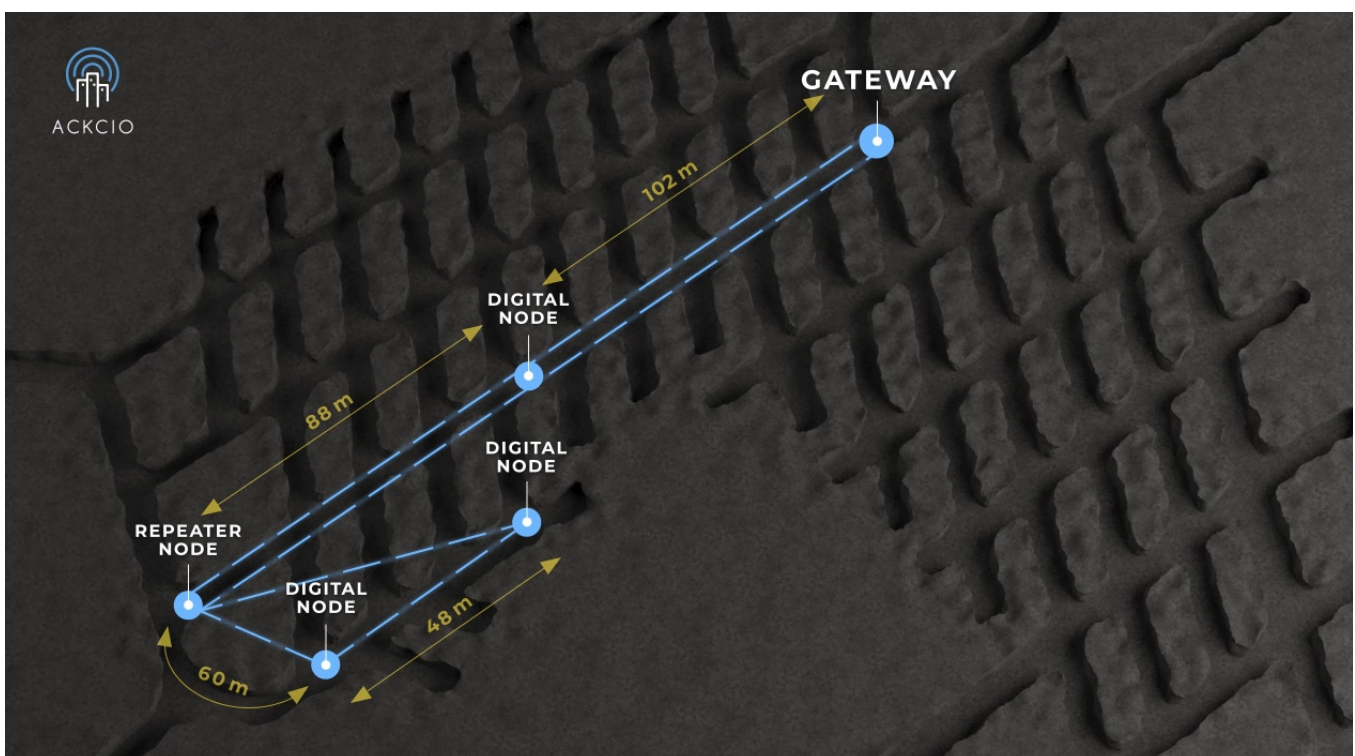
Ackcio's patented, long-range wireless mesh communication system can overcome the common challenges of isolated, hard-to-reach locations, such as underground mines, including signal interference and blockages, as well as the connectivity challenges of deep underground monitoring.

The Northparkes installation consisted of Ackcio Digital Nodes (BEAM-DG) to monitor the (MPBX) sensors. Sensor-agnostic, Ackcio nodes connect to all major sensor brands and types. With a long battery life and the ability to send and receive data over long distances, they're a good fit for harsh, remote underground settings.

The project also used Ackcio Repeater Nodes (BEAM-RN) to expand the network coverage by acting as data bridges between the Digital Nodes. Ideal for underground environments and large deployments, Ackcio Repeater Nodes connect around tunnel corners and reach remote distances where data collection was previously unattainable or unsafe. Repeater Nodes are essential to maintaining reliability in underground environments where nodes are installed far from the Gateway.

The above image shows the challenging layout of the Northparkes mine's underground mining operations. For the trial, MDT Australia and Northparkes chose an extraction drive where several MDT MPBX instruments were already installed. The MPBX instruments were connected to the Digital Nodes through MDT Smartlink adapters.

The Gateway was placed at the end of the chosen extraction drive. The first Digital Node with the MPBX instrument it was connected to was located 102m away from the GW. To provide connectivity to the DG Nodes located in the neighboring extraction drive, a Repeater Node was installed as shown in the above layout.



The layout image also shows the wireless links that the Nodes formed between themselves automatically using Ackcio Mesh, our patented long-range wireless mesh communication protocol. This allows for MPBX instruments to be monitored in multiple extraction drives with a single Gateway.

The other advantage of Ackcio Mesh is that each Node has multiple wireless links with multiple Nodes. This increases the reliability of data collection significantly because if one link gets disrupted, the Nodes automatically choose an alternative link to avoid any disruptions in the communications.

Both the Ackcio Digital Nodes and Repeater Nodes operate at low frequencies and consume less power to extend battery life. And their IP67-rated cast-aluminum enclosures are built to withstand the harshest conditions, from extreme temperatures to the pressure and shock from blasting at underground sites.

RESULTS



Remote data access



Eliminated manual worker readings



Over 99% reliability



Continuous, real-time readings from deep underground



Complete understanding of rock movement

The pilot deployment was a success. Ackcio Beam's long-range wireless mesh feature enabled the MPBX sensor data to be sent to the Gateway from the remote locations within the extraction drives with 100% reliability.

In fact, the results surpassed the expectations of the client who had initially been skeptical that a wireless solution could reliably monitor sensors installed in very remote areas of underground excavations.

Northparkes will consider rolling out the Ackcio Beam solution in the future when it expands its underground mine.

Benefits

- Easy to install and use
- Reliable communication
- Ultra-low power consumption
- No external power supply needed
- Durable construction



 ACKCIO

ABOUT ACKCIO Ackcio builds reliable wireless data acquisition systems for industrial monitoring applications. The company automates monitoring processes and provides remote, intelligent data to enable increased safety and efficient risk management in mission-critical industries, including construction, infrastructure, mining, and rail. Ackcio's flagship solution, Ackcio Beam, is an industrial data acquisition platform that uses a patented long-range wireless mesh network to monitor sensors accurately and reliably in both above-ground and underground environments. Ackcio is headquartered in Singapore and supports clients across the world. In 2021, the company was included in Forbes Asia's inaugural '100 to Watch', a list of small companies and startups on the rise across Asia Pacific.

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