Optimising fleets with uninterrupted connectivity

By Chris Mason, VP of Sales for EMEA at Rajant Corporation

Underground mines are some of the most challenging places to deploy technology in the world. Despite significant technological breakthroughs over the years, laying the foundations required for fibre networks still requires a great deal of care and management.

Traditional wireless networks must still be connected at various points to the same fixed fibre infrastructure that can easily be damaged but not easily relocated. This creates a problem in the ever-changing layout of an underground mine. In such environments, it is vital the network is able to reach every corner of the mine and adapt with miners' movements to provide constant, uninterrupted communications.

Enhanced connectivity on the surface

On the surface, equipment and infrastructure must be moved almost daily away from new blast zones, which means the network that provides vital connectivity must frequently shift as well. This creates a problem for traditional wireless networks that operate from fixed infrastructure.

One innovative solution has seen equipment, people and vehicle fleets equipped with wireless technology and sensors to stream real-time data back to a command centre. This includes everything from a machine's current location to its tyre pressure, enabling operators to gain full visibility into the health status and performance of every asset.

Rajant's Kinetic Mesh® network architecture allows open-pit operations to easily introduce, relocate, or remove network infrastructure. It does this by placing lightweight BreadCrumb® nodes on fixed or moving assets, such as trucks and shovels, uniquely enabling vehicle-to- vehicle (V2V) communications between mobile equipment. That means nodes can be relocated without causing any downtime, and interference or signal blockage caused by the changing open-pit environment will not compromise network performance.

Flexible underground networks

In the most challenging underground environments, open-pit know-how is leveraged to solve networking shortfalls where connectivity and throughput demands are high, but infrastructure places limitations on how far wireless signals can travel.

Typically, an underground mining network requires fibre to every device. But installing fibre in active drives, panels and declines is challenging to schedule and can create operational and maintenance nightmares. Also, development, drill and blast areas can rarely support any fibre infrastructure, while trucks have been known to accidentally catch and rip down sections of fibre, dramatically affecting coverage.

As on the surface, it is possible to create a complete underground wireless network for mission-critical data, video, and voice communications. By using communication nodes attached to fixed and moving objects within the mine, a flexible network is created that can go wherever needed without requiring the installation of cumbersome equipment and infrastructure.

Predominantly used in hard-rock or metalliferous mines, but just as easily installed in soft-rock mines, a combination of Rajant BreadCrumbs and Poynting wide-band, bi-directional, circular polarised antennas are being used on more than 200 underground sites around the world.

BreadCrumbs maintain multiple simultaneous connections between peers and can send and receive information on different frequencies, mitigating issues due to interference, congestion, and equipment outages. Poynting antennas provide bi-directional coverage with dual-frequency Wi-Fi connections to assist in propagating signals around tunnel bends and to and from moving machinery.

The system is especially useful in providing expanded coverage in mining production and new development areas where there might be daily blasting operations or where existing infrastructure is minimal. Network coverage can be easily extended or changed as the mine develops too. With nodes on all production vehicles, the network travels with the equipment into areas where existing networks find limitations or no coverage at all.

Each node can be a mesh node, an access point, a bridge or a switch depending on the role an operator wants it to play. Because each node operates on two frequencies simultaneously, they can be connected to the rest of the mesh and act as a standalone Wi-Fi access point at the same time. This has proven to be particularly useful for mine surveyors and geologists who do not have to wait to get back to the surface to get connectivity for their phone or tablet.

Networks and automation

By deploying autonomous equipment for drilling and haulage, mines can achieve production and safety gains without the presence of an operator.

The challenge is that autonomous applications are not only bandwidth-intensive, but most require continuous, uninterrupted communication otherwise the autonomous vehicle has to stop due to safety reasons until communications are re-established. With network nodes attached to vehicles that can connect wirelessly, via multiple hops, back to a primary fixed network, a mesh network is the perfect solution for sending vehicles to places people cannot access.

An example is Australian Droid + Robot (ADR). This Brisbane-based underground robot and drone survey specialist was selected to inspect an abandoned mine in Queensland by the Department of Natural Resources, Mines and Energy (DNRME). ADR chose Rajant Kinetic Mesh to enable it to remain in constant communication with each robot while underground.

The Collingwood tin mine site, located 30 km south of Cooktown, had inadequate ventilation and ground support. There was also visible water making it a difficult terrain to traverse, yet the inspection needed to determine the condition of the bulkhead, which would be out of range of ADR's line-of-sight remote control. The mine had, therefore, been deemed by DNRME to be too hazardous for human inspection, so it looked to trial the safe alternative ADR had to offer.

Every ADR robot had a BreadCrumb node on-board enabling it to independently perform visual inspections, thermal imaging, laser survey scanning, gas sensing, and other tasks to identify and/or operate in the hazardous mine conditions. The network also uniquely enables these autonomous systems to communicate V2V and create an autonomous mesh network to manage their movements throughout the mine.

Regardless of the issues, Rajant's Kinetic Mesh maintained uninterrupted high throughput and low latency to overcome any obstacles. ADR's robotic 'inspectors' were enabled to independently scan, sense, and explore on behalf of DNRME personnel.

It's not just equipment that can be connected. Wi-Fi tags for personnel are emerging as a solution designed to be used in hazardous work areas. Underground, like in other industrial settings, personnel tracking is an essential requirement to improve situational awareness and communication – delivering real-time visibility, which is needed to maximise the safety, security and productivity of personnel.

With the Rajant-Poynting solution, underground mines can enhance network capacity and mobility to run advanced applications that power greater safety, efficiency, and autonomy – all without the use of expensive fibre. IM

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Increasing Capacity to Meet Your Needs

The most important benefit in mineral processing is to maximise production time and minimise maintenance. GIW understands that uptime is everything! That is why in this time of uncertainty we are more committed than ever to providing our partners with an uninterrupted supply of pumps and parts.

GIW is working tirelessly to get ahead of any future shortfalls in the market. Our factories are operating at normal capacity and we have increased the foundry output by 15%. We are continuing to produce parts in anticipation of customer demand. We also have a healthy inventory of non-white iron parts to cover your needs for the near future. Rest assured, we are in constant communication with our sub-suppliers to ensure an uninterrupted supply.

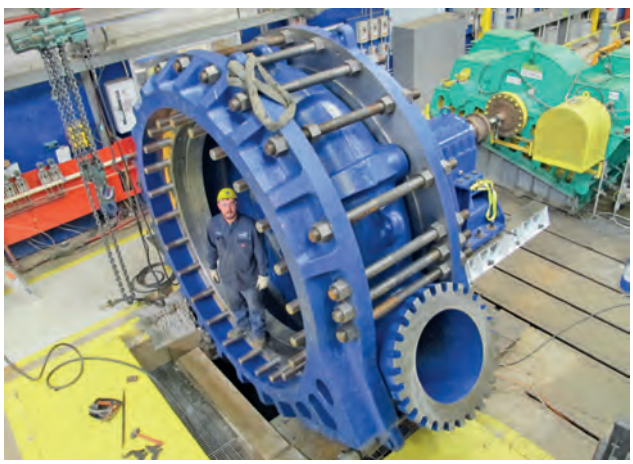
GIW is renowned worldwide for its reliable and wear resistant slurry pumps. In order to meet future market needs, GIW is forging ahead with the $42.2 million expansion at their Grovetown, Georgia manufacturing complex.

Construction of the additional 70,000 sq.ft (6,503 sq.m) facility is progressing on schedule. The additional manufacturing space will have cleaning, shot blasting, heat treatment, machining, assembly and painting areas.

This expansion ensures we can continue to deliver just what our customers need: rugged, cost-effective slurry pumps.

GIW Is On Your Side

We recognise that when times are hard, every penny counts and reliable tech support is critical. GIW products are designed to help you lower your total cost of ownership and reduce unplanned outages. But if a system breaks down unexpectedly, our customer service agents are available 24/7 to help you find the solution you need, when you need it.



GIW is dedicated to making your job easier, safer and more efficient with innovative product features. Our focus on system analytic technologies and new wear programs allow us to solve problems in the field before they occur

Solutions Designed With You in Mind

MDX RAMSL (Remotely Adjusted Mechanical Suction Liner) – Commissioned in 2018, this technological innovation allows you to mechanically control suction liner adjustment during operations. This upgrade allows maintenance personnel to adjust their pump suction liners in less time than ever before. What once took a crew an average of 32 weekly work hours now takes a single worker one minute with the simple push of a button. RAMSL has delivered on its promise to reduce downtime and facilitate safe and reliable maintenance while reducing overhead costs.

TBC-92 (pictured, top left) – The latest in a long line of high-pressure pumps, the TBC-92 provides operators with longer run times, fewer outages, increased production, and a lower cost of ownership. The pump's sturdy components contribute to a long wear life that reaches up to 6,000 hours of operation before requiring maintenance.

Predictive Wear Tools – When it comes to part wear, the goal is to achieve the maximum lifespan from wear components and minimise the risk of unexpected outages. Our technicians have developed a device to facilitate measurement and eliminate the guesswork from the process, making measurement easier, quicker and more accurate. This device reduces downtime by providing operators with reliable measurements of the material loss and remaining thickness to determine when the next pump repair or inspection should occur.¬

Ven-Bin Workflow Efficiency – Inefficient workflow contributes to production losses. Maintenance teams often spend valuable time tracking down small but critical parts such as gaskets, bolts and packing rings. To solve this problem, GIW has developed an intuitive hardware cart (Ven-Bin) to keep every tool and part in one place. The modular design standardises how millwrights do their work. The Ven-Bin is proof that even small modifications can help to minimise downtime and boost efficiency during maintenance without sacrificing safety.

Customer Service – Our team of specialist are on hand to assist you with after-hours breakdown rush, technical services, and spare parts sales. You can get your questions answered easily with just one phone call to +1-888-832-4449.

From the development of new product lines to optimising current working methods, GIW is by your side. When you choose GIW, you gain a partner that is dedicated to your success. You can count on us to support you through your simple and most complex challenges.

GIW Industries, Inc. (A KSB Company)
5000 Wrightsboro Road
Grovetown, GA 30813
United States of America
+1 706 863 1011
GIW-Marketing@ksb.com
www.giwminerals.com