

DAVA BAUMANN discusses how connectivity can be re-imagined using portable cell towers and kinetic mesh network architecture.

With the number of connected devices, sensors and ‘smart’ technologies on the rise, industry leaders are in a unique position to modernise their working environments and gain a number of never-before accessible skills, including real-time visibility into the status of people, equipment, and operations of their organisations.

However, with this new toolbox of skills and technologies, organisations find themselves faced with another dilemma: the need for a robust, reliable and mobile network that can keep up with these demands 24/7.

It is the operators of large worksites that are often forced to watch productivity slow to a halt as cellular and other ‘make-to-break’ traditional networks struggle to keep up with such new and dynamic operations. Connectivity to cell towers – which can be few and far between in remote areas – could be further hindered by any number of things, ranging from distance to rugged terrain or extreme weather conditions. Reliable connectivity issues can leave operators feeling trapped and their fleet stranded, limiting productivity and putting organisations in difficult positions.

What operators need in this day and age is a completely mobile network – a ‘cell tower on wheels’, to synonymously move or have the ability to become one with the fleet.

Instant connectivity with total mobility and scalability

Operators in remote and/or sprawling industrial environments don’t always have enough existing

cell towers (or any towers at all) located within their range, and it can take an enormous effort to have one installed in a new location.

But what if, instead of being statically tied to one site, the cell tower had the ability to get up and drive directly to the place you needed it, moving with ease to rapidly expand coverage to that area across the entire fleet and area of operation?

These cell towers on wheels could also spread as far and wide as a site requires, flexibly augmenting or creating infrastructure *ad hoc* to provide ubiquitous coverage across growing operations – no matter how far out they span.

And as more connected people, devices and machines are added to the expanding site, new cell towers would simply roll in to provide the increased network support required, as well as work with the nodes installed on the numerous moving assets the organisations have.

With the roving connectivity of a cell tower on wheels, the many moving assets that make up an industrial site – from equipment to vehicles to people – could take robust connectivity with them as they travelled. The tower would simply follow along, dodging line-of-sight issues caused by rugged terrain and seamlessly connecting hot zones to allow operators to maintain unwavering connectivity to, communications with, and control over all the ‘things’ that power more efficient and productive operations.

Giving the network the ability of ‘wheels’ means that even outer-edge communications would be completely reliable and provide a previously impossible connection directly to a control centre.

Kinetic mesh: the key to IIoT and digital transformation

Industrial operators can kickstart their organisation’s journey to digitisation by deploying a kinetic mesh network topology. This type of network allows for multiple nodes to connect, broaden and strengthen the network where necessary. With the nodes essentially acting as compact, rugged, transportable, mini cell towers, virtually anything in the organisation’s infrastructure can be turned into networking equipment.

In comparison to a regular cellular network, which has limited cross communication, a kinetic mesh network can communicate peer-to-peer seamlessly via numerous instantaneous connections. These form an adaptable, dynamic network that has the ability to provide reliable wide-range communications practically anywhere.

Without the need to trade-off one feature for another, kinetic mesh networks provide unwavering bandwidth at high-speed, complete mobility, true mission critical reliability and scalability – a true future-ready network.

Building a reliable network starts with reliable hardware, and with the introduction of IIoT applications, they need more from their networks and they need it now. From rising bandwidth demands to an increase of cyber security concerns, the need for unwavering communications are at an all-time high. For example, devices connected via Wi-Fi experience a three to five second disconnect as they move between access points.¹ This slight break in transmission can make or break mission critical situations, with essential data being lost

or interrupted. The potential benefits that kinetic mesh networks bring when it comes to digitising industrial organisations are limitless, and due to the nature of the mesh network topology, there are numerous ways it can be used to transform a company's daily operations.

For example, kinetic mesh's 'predictive maintenance' feature gives companies the ability to visualise a problem and respond before it happens, minimising maintenance costs by up to 30 per cent and eliminating complete breakdowns of equipment by nearly 70 per cent, significantly reducing capex and opex. Furthermore, automation of machinery or other previously manual processes and monitoring equipment and methods can boost productivity by as much as 30 per cent.²

Organisations are catching on

Oil and gas field environments are already tempestuous and unpredictable enough, even before throwing network and connectivity issues into the mix. Rapid developments in technology are disrupting organisations' current operating models and pushing for change, forcing companies to update their thinking when it comes to technology. Changing the way organisations think when it comes to realising new tech and shifting the focus from simply implementing a gadget or wearable here and there to a total overhaul of network infrastructure should be viewed as a necessity, not a burden.

Today's oilfield operators must manage remote wells across hundreds of square miles of rugged terrain, manually retrieving information from each individual wellhead and

reporting back to the command centre weekly. This process is long, tedious and potentially unsafe for employees, and furthermore, the data collected on each weekly trip is virtually redundant once it reaches the command centre.

Digital technology adoption is offering a way forward, helping industry leaders move from caution to optimism in the coming years. According to Deloitte,³ 77 per cent of oil and gas organisations surveyed in 2017 are either exploring or designing their organisations with the future in mind. The fastest growth areas of digital investment in the sector are predicted to be in AI, robotics, drones, and wearables. And it is with this growth that organisations can expect increases in production by at least 20 per cent, with features such as remote wellhead monitoring installed.⁴

With 89 per cent of oil and gas professionals believing mobility will revolutionise their operating environments,³ kinetic mesh networks give operators the unwavering and secure connectivity needed to access and act on ever-increasing volumes of data, thus ensuring that productivity is maximised throughout inevitable market swings. Automation of processes and machinery, precision drilling, wellhead communications, automated drilling and pumping, drones for surveillance and inspection, together with production control and reporting are the key areas of interest for a successful transition into the digital age.

Like oil and gas organisations, mining companies can also reap the benefits of kinetic mesh in their impending digital transformations.

In an industry where short periods of operational downtime can cause millions of dollars in losses, mining operators must be

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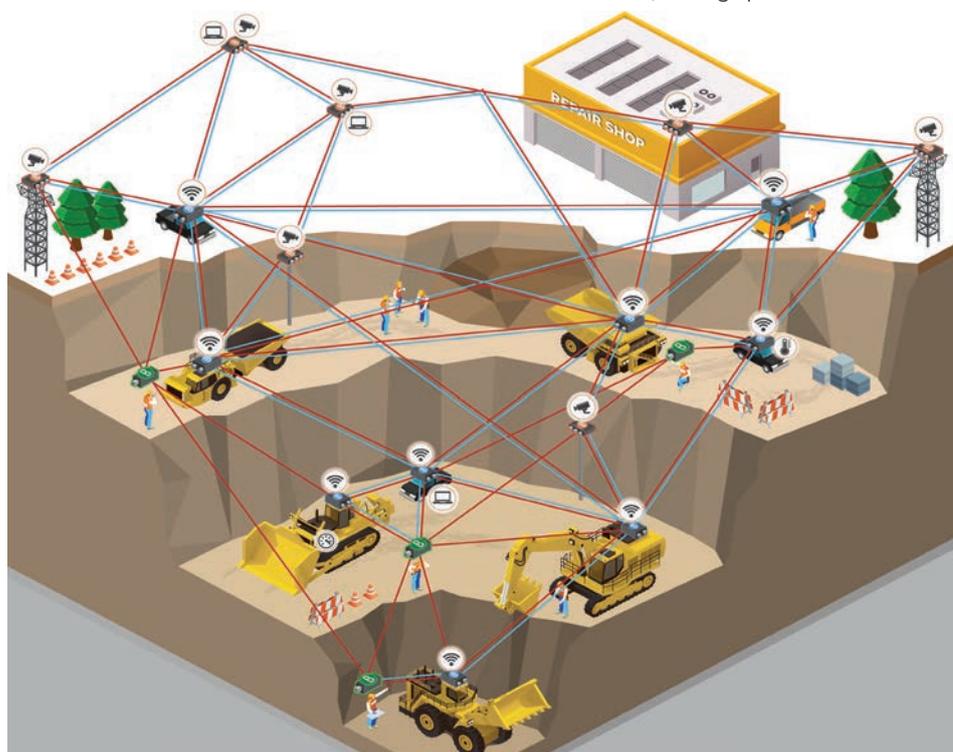


empowered to continuously monitor, manage and control their fleets of high-value equipment, vehicles and personnel wherever they roam. Kinetic mesh networks are proven to stand up to the extremes of mine environments, and effectively connect sprawling open pit and underground mining operations.

For example, an industry model for an open pit mine producing 80,000 tons of ore per day estimates the cost of the required machinery to be in excess of USD47.5m.⁵ These high-value assets must be carefully managed to ensure uptime is always optimised, which in turn will maximise production. By placing nodes directly on these vehicles, shovels and pumps, the organisation can seamlessly link them together – gaining real-time information from each asset's applications on status, efficiency, maintenance needs, and more, even as they move across the rugged landscape.

In 2017, fleet automation and optimisation were the key trends in the mining industry, with Deloitte estimating in its annual trend report that approximately 35 per cent of current mining positions in South Africa will be completely automated by 2037.⁶ By analysing real-time data with analytical engines, mines can often improve their processed mineral yields by three to 10 per cent within months. Using self-driving technology in mines can result in a 15 to 20 per cent increase in production, as well as reduced costs in fuel and maintenance.⁴

Autonomous equipment, aerial surveillance and inspection, automated positioning systems, M2M communications, and production reporting are only some of the potential applications that kinetic mesh networks could support in mines across the world. They have already been implemented in some of the largest mining operations around the world to reliably cover people and assets across all remote sites. And so far there is no sign of any slowdown – globally, 69 per cent of mining firms say they are looking at remote operation and monitoring centres, 29 per cent at robotics, and 27 per cent at unmanned drones.⁶ ■



A kinetic mesh network topology features multiple nodes that basically act as transportable mini cell towers. Virtually anything in the organisation's infrastructure can be turned into networking equipment. Giving the network the ability of 'wheels' means that even outer-edge communications would be completely reliable and provide a previously impossible connection directly to a control centre.

¹ <https://www.mbtmag.com/article/2016/07/your-network-infrastructure-ready-iiot>

² Industrial IoT Survey 2017, MindBrowser & The IoT Magazine

³ <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/human-capital/us-cons-og-hc-trends-industry-report.pdf>

⁴ <https://www.rajant.com/moving-assets/>

⁵ <https://www.rajant.com/applications/mining/>

⁶ <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-tracking-the-trends-2017.pdf>