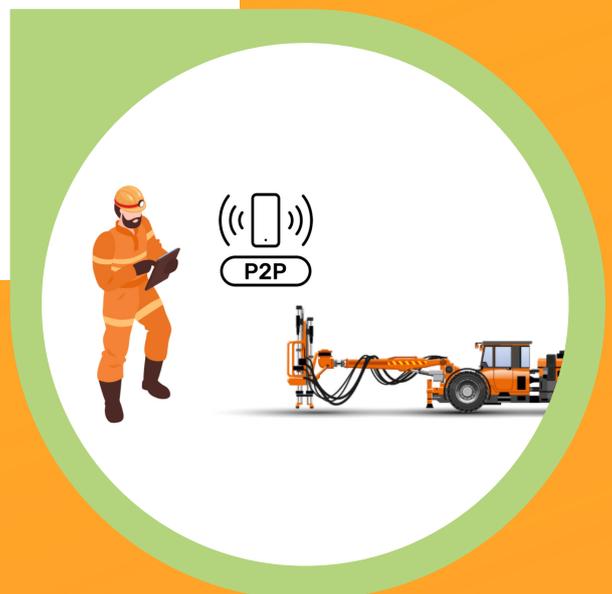




## PEER-TO-PEER NETWORKS IN UNDERGROUND MINES

FOR CONNECTING MINERS TO ENHANCE  
DATA ACCESS, INCREASE PRODUCTIVITY  
AND SAFETY



## First- and Second-Order Requirements

Mining is a physically demanding environment that taxes people and equipment. With increased digitization sweeping through the mining industry, hardware, software, and networking solutions are increasingly being used to reduce costs and increase productivity. While the benefits of digitization are increasingly well-known, it is critical to understand that a successful transition to digital is exceptionally sensitive to factors such as the business's role within the value chain, specific activities being performed, and even company culture.

For example, most people understand that mining activities involve a large amount of physical impact: moving tons of ore, drilling holes into solid rock, using dynamite. Such environments obviously require a high level of physical robustness for the hardware used, e.g., tablets, sensors, and so on. We can think of these a “first-order” requirements for the mining environment.



**" Every new WiFi  
access point  
costs us \$7000 -  
\$9000. And it  
does not get data  
to the face**

ROB MANSFIELD  
IT INFRASTRUCTURE  
PETERSON UG MINE





However, these first-order requirements are only table stakes for entering this industry. In order to reap the benefits of digitization, solutions need to account for higher-order concerns such as: (a) damage to equipment that will inevitably occur; (b) the ongoing physical constraints of data transfer in an environment where maps are literally being redrawn every day; and (c) the dollar value of each row of data.



## A. Equipment Damage

Despite the best efforts of all involved, equipment damage is almost an everyday occurrence at mine sites. Part of this has to do with the sheer difficulty of continually maneuvering massive pieces of equipment through dark tunnels with inches to spare for up to 12 hours at a time. In addition to damaged tablets, other utilities such as power, water, and internet connectivity underground can also suffer damage due to impacts on junction boxes, water mains, and wireless access points. The last of these is particularly important: reliably storing and quickly transferring production and operational data under harsh conditions is a critical component of today's digitization solutions.

Certain vendors of apps and databases do an exceptional job of making sure that data entered on an app is secure on its tablet, and will sync upon its next access to internet connectivity. This absolutely addresses the “reliably storing” aspect of data management. However, it does not fully address the “quickly transferring” aspect.



## B. Physical Data Transfer Constraints

One aspect of mining that often escapes those unfamiliar with the industry is that the whole business is dependent on continually changing the physical landscape. Passages get longer, tunnels get deeper, and piles get bigger. Therefore, utility requirements are very different from in many other physical industries such as manufacturing or construction, where the entire site has a perimeter: Once utilities are run within that perimeter, you're done. With mining, one is literally never done unless the mine is shut down. This means that utilities such as power and internet are constantly playing catch-up with the actual "advance" of the mine itself. And they actually never catch up, so that the equipment that is at the vanguard of the advance – equipment that captures critical production data – is by definition outside of infrastructure-driven internet access for long periods of time. Given that one of the selling points of mining digitization is near-real-time access to critical production data, this means that a total dependence on infrastructure-driven internet access will likely always be a roadblock to fulfilling the mining company's business objectives – and indeed, for digitization in mining itself.



## C. Dollar Value of Data

Getting accurate production data is critical to mining companies.

- A single scoop of a loader can be worth \$8,000 or more.
- A single gold mine can extract up to \$1 billion of gold ore in a calendar year.



# The Opportunity

The long-term trend in the mining industry is one of declining productivity, driven by declining ore grades as well as approaching the limits of manual operations and their associated inefficiencies. Against this background, the best leverage that the industry possesses is cost reduction.

- The best way for mining companies to reduce costs today is to be able to dynamically adapt to the deviations from plan that they encounter every day and every shift as they change the landscape.
- The faster they can adapt to these deviations, the greater the value for them. The better we can enable mining companies to speed up such adaptations, the greater the value for us.
- Speeding up such adaptations requires that digital mining solutions be able to “quickly transfer” data. However, given the game of catch-up played by infrastructure because of the very nature of mining, it is clear that this battle cannot be won through infrastructure-based networking alone.





This is where peer-to-peer will be exceptionally valuable. We can leverage the dynamism of the mining environment, where multiple pieces of tablet- equipped machinery are constantly moving past each other, to quickly transfer data to the control center, where decisions can be made efficiently and safely.

This generates tremendous value for mining companies and the stakeholders they serve.



# Typical use cases for Peer-To-Peer networks

It is imperative that the supervisors, dispatch and Remote Operations Centers to get as near-real-time information as they can to address any downs and delays and to address safety related issues and incidents. A few use cases are to:

1. Gather current task status information from operators in areas with no connectivity (e.g. those in lone worker settings)
2. Get data from equipment telematics so the ROC has access to time series data to monitor equipment production rates
3. Get equipment down delay codes from operator or equipment and pass that along to maintenance in near-real time
4. Streamline collection of workplace exams and equipment exams with so safety can be notified at any point during

And many more.



## Conclusion

In conclusion, peer-to-peer will play a foundational role in driving digitization across the mining industry. Products such as GroundHog Peer-to-Peer that integrate well with other mining software is in an excellent position to help you digitize your mine and drive transformational results.

Please contact us for a demo of the GroundHog Peer-to-Peer system and explore how you can use it in your operations.



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