



## Case Study

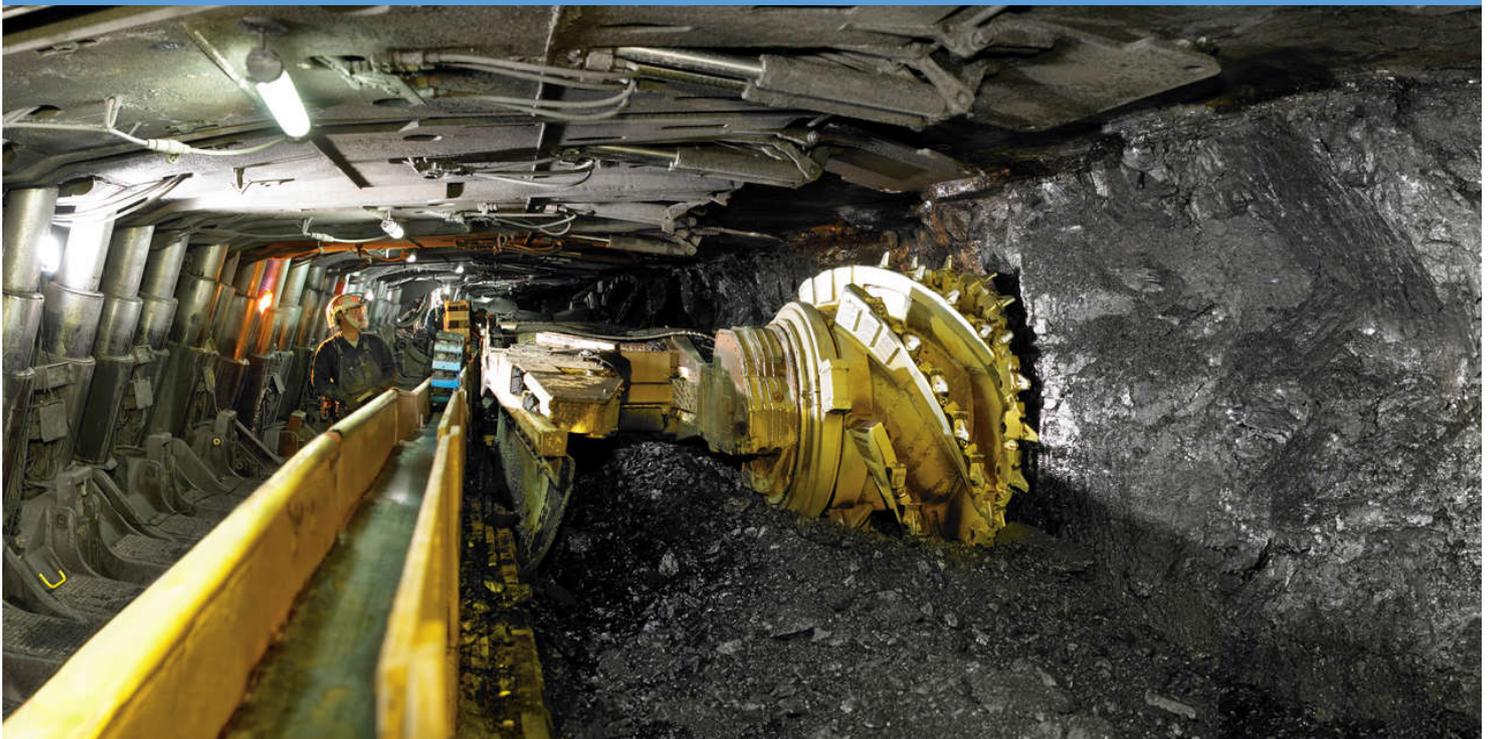
### Problem:

Bringing reliable high bandwidth communications to roadway development machines

### Product:

Nautitech Spitfire BPLM Wi-Fi Bubble

[www.nautitech.com.au](http://www.nautitech.com.au)



## Meeting the needs of tomorrow's Clients Today

Nautitech's Mission is, to create competitive advantage for our customers. To fulfil this objective we need to respond effectively to the rising demands for increased safety and productivity in hazardous areas and sectors. Nautitech has delivered many innovative industry first solutions in collaboration with our clients.

Our list of "industry innovations" demonstrates a vibrant culture that is not only enthusiastic but highly capable of exercising forward thinking in the development of products and solutions that meet tomorrow's challenges.

Nautitech welcomes accountability, and so offers full product life cycle support including Research and Development, product engineering, manufacturing, testing, installation, field technician service and support. Customer satisfaction is in our DNA where our experience and high emphasis on the full product life cycle is our way of guaranteeing our client's satisfaction.

The newest addition to the Nautitech suite of products and innovative solutions is the Nautitech Spitfire BPLM Wi-Fi bubble solution. The simplicity and robustness of this solution is surprising yet this has **not been achieved in an underground coal mine anywhere in the world, prior to Nautitech's solution.**

The Nautitech Spitfire BPLM Wi-Fi bubble is designed to enhance communications to the areas of the mines that currently do not have access to high bandwidth reliable communications such as on continuous miners during roadway development



## Introduction

Communication in an underground coal mine is not only an integral part of every mines operation, it is central to their future success. Given the current economic climate, operational excellence needs to be driven by the continual improvements in safety, productivity and efficiency which in turn are all highly dependent on how well the communications infrastructure works in the mine.

In recent times, real time communications from anywhere underground to the surface has become increasingly important. Mine operators recognise that improvements in this area will directly benefit the:

- Logistics of people (tracking)
- Early health and safety hazards

- Emergency communications
- Fleet optimisation
- Real time automated machine data collection and reporting to surface
- Automation
- Efficiency and productivity improvements

Therefore, the requirements for reliable communications is now beginning to extend into areas that typically did not have or had very limited communications. Such an area is the location of the continuous miners (CM) where fixed communications infrastructure is often not established or is some distance away from the CM.



## The pitfalls of no data communications

Improving safety and optimising mining processes are fundamental core functions that every mine strives to achieve continuously. However, if there are limitations on communications then how much improvement can be achieved without reliable data communications to the CM is questionable. Unfortunately, due to the lack of a reliable, robust solution, this has been an area that mine sites have struggled to improve and implement any robust solutions, until now.

Some pitfalls of no data communications to the CM include:

Lack of people communications to surface:

- People having to walk back in to an area with established communications infrastructure.
- No real time voice call/messaging around the CM
- Emergency communications

Lack of real time machine information

- Mining process not optimised
- Cannot detect early warning of maintenance problems
- Decreasing total uptime of production machinery.
- Logistics of maintenance/fixing of machines

No remote monitoring from surface

- Operational intelligence from the surface not optimised
- No Real time information of personnel location and activity
- Reduced monitoring/coordination of personnel and plant



## Current solutions

Over the years, communication methods in mines have taken various forms but are generally distinguished into two types that are commonly used, Wired and Wireless:

- Wired - Twisted pair, coax, CAT5, Fibre Optics, Trailing cables etc
- Wireless - Radio (Point-to-point mesh), Wi-Fi, Leaky Feeders etc

Typical product technologies using the wired/wireless communications systems

- 2 way radios
- VoIP phones
- DACs
- Integrated RFID in cap lamp designs (1 and 2 way messaging systems) Nodes, Access Points
- Serial Powerline Modems
- Broadband Powerline Modems
- RF tracking tags
- And many others

These technologies supporting communications in underground coal mines have had a chequered success rate, working well in some mines and being 'scratchy' in others. Often the limitations to these product technologies are the coverage areas achieved and the data bandwidth available at the CM. Current practices include putting individual access points along the roadway to boost the Wi-Fi signal to the CM areas which is very costly. It is also retrospective so a reliable data link is not achievable 100% of the time, for example, when the CM turns a corner.

## The Nautitech solution

Recognising the importance of existing and proven technologies, Nautitech have partnered with NLT to develop a solution that provides a robust, high bandwidth data communication solution allowing direct communications from the surface control room to the CM. The result? Reliable communication between above ground control room of the mine to/from the CM with a Wi-Fi hotspot access.

Mine site: Ensham Resources (Queensland, Australia)

### Mine site Requirements:

- Data communication extension to the CM with high bandwidth and Wi-Fi capacity
- Does not drop out when CM turns a corner
- Trailing cable length up to 400m

To extend communications to the CM and CM area, two main solution requirements were recognised as being essential in order to achieve the desired reliability:

- Extending the surface network to the CM – Achieved through the Nautitech Spitfire broadband power line modem (BPLM)
- Creation of a hotspot around the CM – Achieved through a Wi-Fi Access Point

### Characteristics of Nautitech Spitfire modems:

- Reliable and high bandwidth
- Uses existing trailing cables
- Protected from mining environment

### Characteristics of Wi-Fi hotspot:

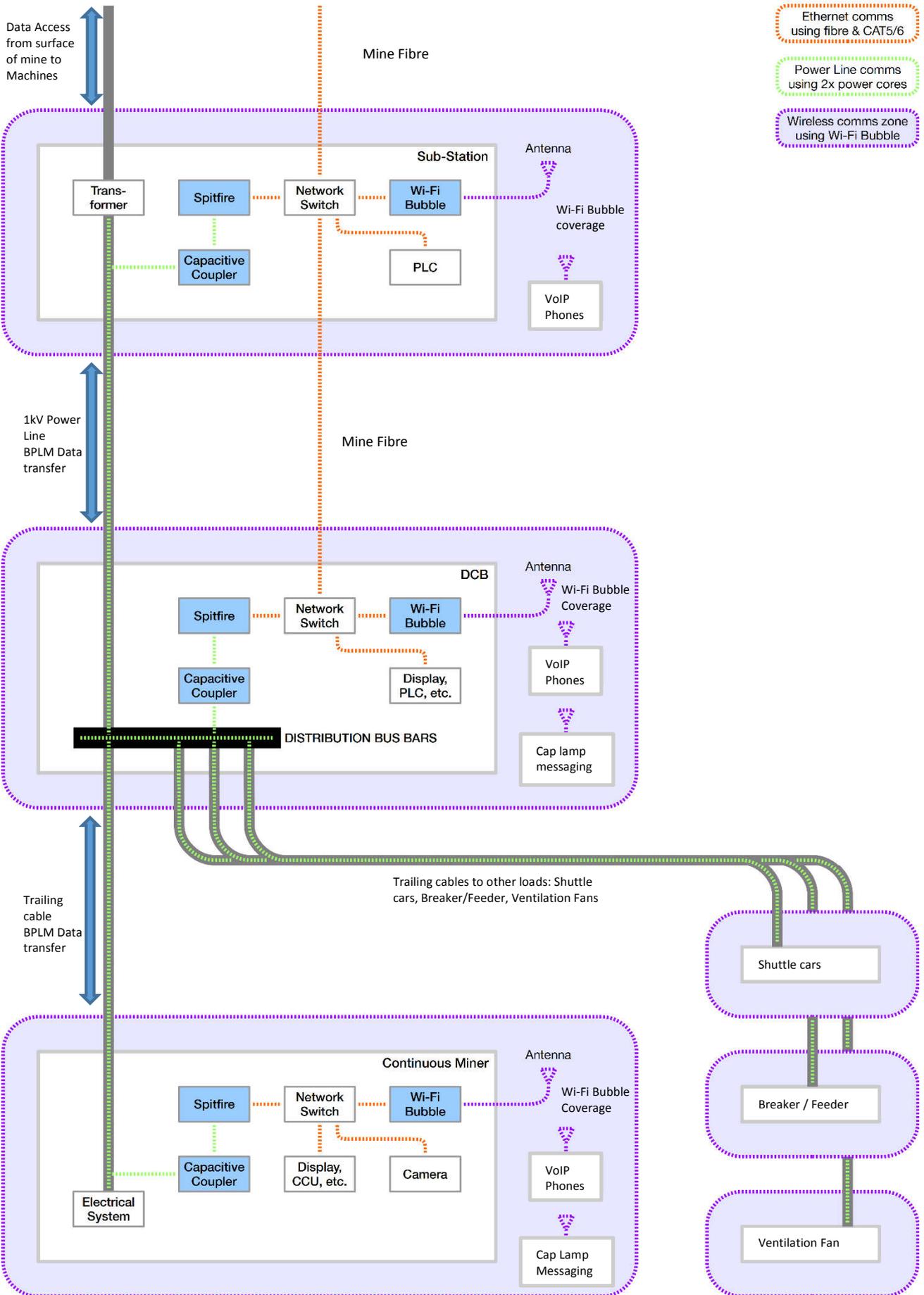
- Use of portable equipment without wires
- Coverage in areas where it's needed.

This solution combines existing and proven communication technologies together that are very well proven, robust and readily available. Moreover, the two independent systems have been used extensively in many different mine applications in Australia and overseas markets; in underground coal and other non-hazardous mining applications.

## SIMPLE INSTALLATION AND IT JUST WORKS



## Spitfire Wi-Fi Bubble Setup Configuration



## Reaping the benefits of the Spitfire BPLM Wi-Fi bubble

The Spitfire BPLM Wi-Fi bubble solution at Ensham marked a remarkable leap in data communications to and from the CM and its surrounding areas to the surface. Ensham mine personnel who have been involved in the installation of the system have all been very surprised at how well it has worked and the extreme reliability. Such is the success of the Spitfire BPLM Wi-Fi bubble, Ensham is now looking into other applications such as on shuttle cars where valuable data such as Thermal camera video could also be streamed to the surface.

The new possibilities now available due to the Spitfire BPLM Wi-Fi bubble solution is exciting indeed. The same set-up can be used in other mining vehicles that use a trailing cable as a power source, and the technology is not limited to underground coal mines.

The system is also a means of getting any existing valuable data that currently resides on a local system on the CM and shuttle cars, such as proximity detection systems. Such valuable data provided to the mine control room in real time will no doubt provide additional opportunities for driving improvements in safety, efficiency and productivity.

Other suitable applications are:

- Breaker / Feeder, Shuttle cars, Conveyors
- Live video streaming
- Data logging of machine state / Fault analysis
  - o Production improvements
  - o Preventative maintenance
  - o Diagnostics
- Automation of machines – remote control from surface.

**“We used to have ongoing problems getting comms from our DCB to miner. Then we tried the Nautitech Spitfire BPLM and couldn’t be happier with its performance and reliability. We are now consistently getting 45Mbps over the 300m cable, and it just works, we love it. Very soon we will trial the new Super Spitfire which will enable power-line comms back to the substation (460m) – a huge benefit as our old fibre solution had created significant difficulties”**

**Brad Price (Electrical Engineering Superintendent, Ensham)**



## Mines of the future

The challenges facing the mining industry are significant and increasing. Productivity must be maximised and sustained while operating costs are driven down. Cost of mine operations will remain a major challenge in the mines of the future therefore effective and robust communications technology is essential to further enhance safety, efficiency, productivity, performance improvements.

Emergency response times will be reduced, minimising the consequences and additional safety risks in incident management.

More importantly, the mine of the future will inevitably further increase its reliance on reliable communications to anywhere in a mine especially areas that have no fixed infrastructure.

Through the Spitfire BPLM Wi-Fi bubble, Nautitech has once again demonstrated excellence in providing innovative solutions to our clients. Working closely in partnership with our clients, our team continues to excel and exceed the needs of our customers and delivering tomorrow’s solution to today’s challenging environment.