

# BPLM SPITFIRE™

**A REVOLUTIONARY STEP IN BROADBAND  
POWER-LINE MODEM TECHNOLOGY.**

**ENTIRELY NEW - designed and developed from the ground up  
Tested in production mine site environments**

*"The Nautitech 'Spitfire' power-line modem has proven itself to be ruggedized and reliable for our Australian applications together with the necessary level of technical support"*

– John, Eickhoff Australia. 

## **GET THE MOST OUT OF YOUR MOBILE EQUIPMENT:**

- Analyse data to identify losses in machine productivity.
- Control mobile equipment and view real-time data.
- Automate for central control of mobile machinery.

Ideal for machines operating in underground coal mines such as continuous miners, shearers and shuttle cars.

Full 100% availability achieved based on analysis of logged system data.



V2.0

## 1. MAIN FUNCTIONS

### ANALYSE

Allows capture and analysis of all operating parameters:

- Troubleshooting – reduce downtime.
- Preventative maintenance – reduce downtime.
- Optimisation of production – increase Tonnes Per Day (TPD).



### CONTROL

Relays operator commands to mobile equipment and provides operator with real-time operational data.



### AUTOMATE

Allows central control of mobile machinery.



## 2. FEATURES

Turn-key packages now available, includes the following components, ready for installation.

- Typical installation package for shearer: modem unit, remote LED display, isolation barrier and matching power-line BUS cable.
- Typical installation package for continuous miner: modem unit, remote LED display, inductive coupler and matching power-line BUS cable.

### 2.1 MODEM UNIT

- New power-line communications chip set (raw data rate up to 200Mbps).
- Data rate in actual applications using TCP/IP - 15Mbps typical up to 60Mbps depending on cable length.
- Shares the same mounting footprint as previous version for a smooth upgrade path.

#### CUSTOMISABLE FEATURES:

- Upgradable firmware.
- Quality-of-service settings.

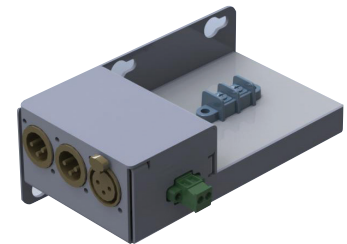
### 2.2 CAPACITIVE COUPLER

- A compact coupler that injects signals onto phase conductors up to 5 kVAC.
- Can be used on cables carrying any load current.



### 2.3 ISOLATION BARRIER

- Couples power-line signal to dual pilot cores of trailing cable.
- Protects equipment inside enclosure from high voltages caused by cable faults.
- Optional relay switching of power-line signal.



### 2.4 POWER-LINE BUS CABLE MALE TO FEMALE

Standardised cabling system and couplers.

- Eliminates potential for wiring mistakes.
- Validated to perform uniquely with this product.
- Screened twisted-pair cables to minimise interference.



### 2.5 REPEATER UNIT (OPTIONAL)

Increases the range of the Spitfire system.

Install in an intermediate location (e.g. DCB) to repeat messages between two end points such as between a continuous miner and section transformer.

Shares the same footprint as the Spitfire modem unit.



### 2.6 REMOTE LED DISPLAY

More advanced diagnostics.

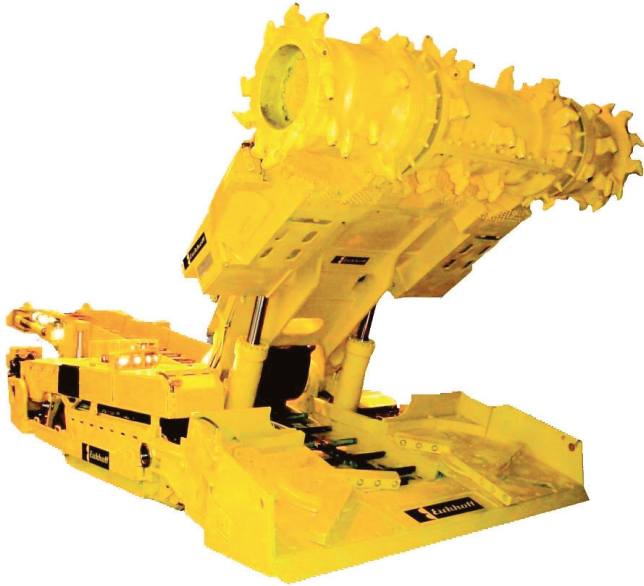
- LED display for quick visual indication of power, Ethernet status, power-line status and data rate.
- More detailed diagnostic data available via the Ethernet network e.g. signal strength, signal-to-noise ratio and packet statistics.



### 3. TESTING RESULTS

#### 3.1 PERFORMANCE TESTING:

*Use the Spitfire to connect these machines to your mine network. You can transfer any network data to/from the machine, including machine data, control data and live video streams and more.*



#### FIELD TEST UNDERGROUND COAL MINE NSW AUSTRALIA.

Continuous miner installation, power-line communications between miner and DCB.

|                           |         |
|---------------------------|---------|
| Length of power-line link | 400 m   |
| Raw data rate of link*    | 43 Mbps |

#### FIELD TEST UNDERGROUND COAL MINE QLD AUSTRALIA.

Longwall installation, power-line communications between CME & shearer.

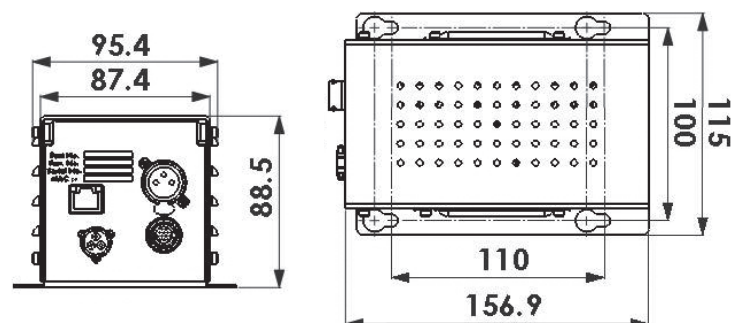
|   |                         |
|---|-------------------------|
| Length of power-line link                                   | 385 m                   |
| Raw data rate of link*                                      | 100 Mbps                |
| Ping times<br>(from PC at transformer to switch in shearer) | 4 ms typ.<br>30 ms max. |

\* Raw data rate refers to capacity of channel. Actual payload data rates are lower and depend on characteristics of traffic.

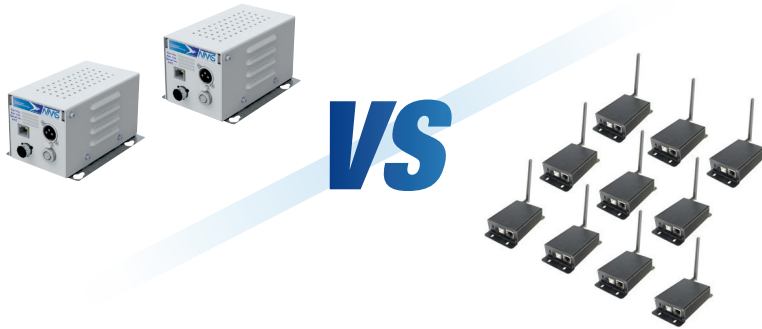
#### 3.2 AVAILABILITY / UP-TIME TESTING.

Full 100% availability achieved based on analysis of logged system data. During most recent field trial (underground coal mine) nil production shutdowns were attributable to the BPLM comms.

### 4. DIMENSIONS



## 5. COMPARISONS WITH WI-FI TECHNOLOGY



### 5.1 'PLUG AND PLAY' INSTALLATION:

Makes use of existing infrastructure – the trailing power cable. Installation is simple, relatively fast and inexpensive in terms of man hours to install it and associated downtime. Connectors cannot be interchanged. Parts are available separately for spares. Wi-Fi usually requires new infrastructure and a more complicated installation process.

### 5.2 KNOWN HISTORY:

Power-line technology has 20+years of operational history in underground coal mines around the world. Wi-Fi is a relatively new technology for underground mines.

### 5.3 CONTINUOUS OPERATION:

Hard wired connection eradicates the possibility of black spots which are a common challenge with Wi-Fi technology.

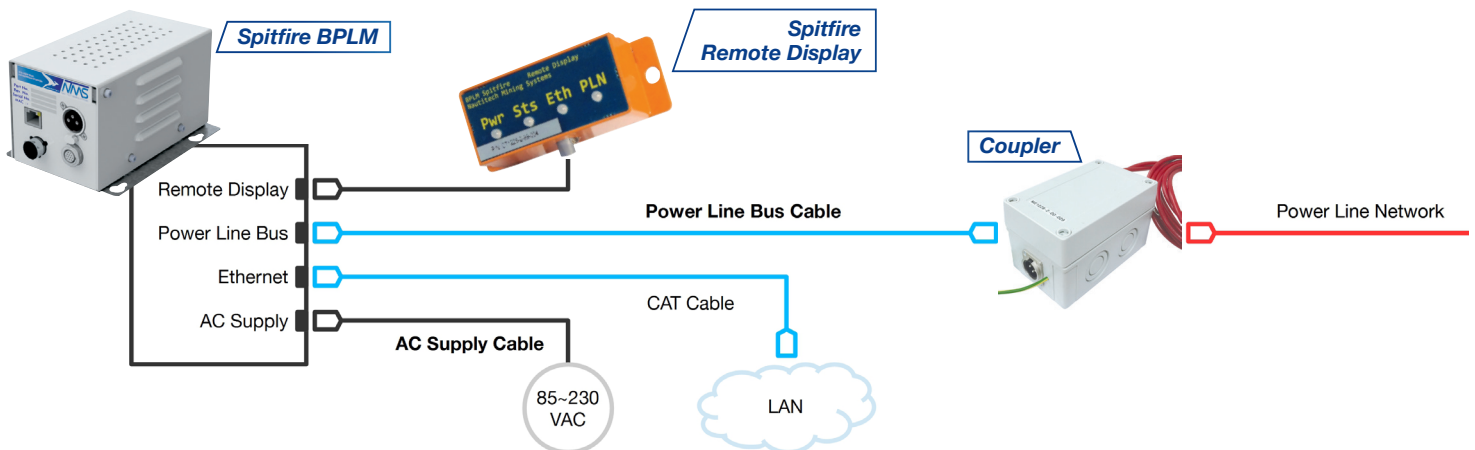
### 5.4 SUITABLE FOR A BROAD RANGE OF VEHICLES:

The only working solution for highly mobile vehicles such as shuttle cars and continuous miners which frequently operate out of line of sight which makes them impractical for Wi-Fi technology.

### 5.5 WELL PROTECTED:

No risk of physical damage to the equipment which is installed in existing protected enclosures. In contrast, Wi-Fi requires distributed infrastructure that is exposed to the punishing mining environment.

## 6. TYPICAL INSTALLATION



## 7. ORDERING INFORMATION

| PRODUCT TYPE                        | PRODUCT VARIANTS                             | NTMS PART NUMBER |
|-------------------------------------|--|------------------|
| Spitfire broadband power line modem | 110-230 VAC, Ethernet RJ45 connector         | CT1228-2-99-001  |
| Remote display                      | 2 metre cable with connector                 | CT1228-2-99-003  |
| Spitfire Capacitive Coupler         | 5kVAC 2Z:1Z (Standard)                       | ME1228-2-00-029  |
| Power-line isolation barrier        | (Standard)                                   | CT1228-2-99-005  |
| AC supply cable                     | 3-way female connector to free end, 2 metres | PL122810         |
| Power-line bus cable                | Male connector to female connector, 1 metre  | CT1228-2-21-006  |
|                                     | Male connector to female connector, 2 metres | CT1228-2-21-005  |
| Power-line bus cable                | Male connector to BNC plug, 1 metre          | CT1228-2-21-007  |
|                                     | Male connector to BNC plug, 2 metres         | CT1228-2-21-003  |
| Power-line bus cable                | Male connector to free end, 1 metre          | CT1228-2-21-008  |
|                                     | Male connector to free end, 2 metres         | CT1228-2-21-002  |
| Power-line bus cable                | Female connector to free end, 1 metre        | CT1228-2-21-009  |
|                                     | Female connector to free end, 2 metres       | CT1228-2-21-004  |
| Power-line bus connector            | Male, with installation instructions         | CT1228-2-21-010  |
|                                     | Female, with installation instructions       | CT1228-2-21-011  |

## 8. SPECIFICATIONS

|                                    |                         |
|------------------------------------|-------------------------|
| Supply voltage                     | 85 to 264 VAC           |
| Supply frequency                   | 50 Hz, 60 Hz            |
| Supply current (110/230 VAC), max. | 400/200 mA              |
| Ethernet interface                 | 10BASE-T/100BASE-TX     |
|                                    | Shielded RJ45           |
| Operating temperature              | 0 to 60 degC            |
| Vibration                          | IEC 60068-2-6           |
| Shock                              | IEC 60068-2-27          |
| EMC emissions                      | IEC 61000-6-4           |
| EMC immunity                       | IEC 61000-4-2/3/4/5/6/8 |

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NTMS is wholly Australian, our technology is designed and manufactured in house:

- The First widely adopted methane shutdown system.
- The First broad band power line modem to take real time data from the face.
- The First electronic diesel engine packages for hazardous areas.
- The first infrared camera for use in hazardous areas.