

Train Unit

The train unit controls communication and access between the internal train network and the masts. The unit will roam seamlessly between the masts providing uninterrupted service.

Based on GPS position and GSM mast information the train unit uses fuzzy logic and AI to select the best transmission path of each data channel. This enables the unit to do proactive roaming after an adaptation (learning) period.

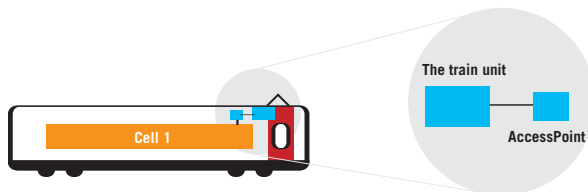
The train unit also handles the bundling of the available data channels. This means that the train has approximately 30 Mbps effective bandwidth per active channel. For example, if the train is between two masts and can connect to both of them the user will experience 60 Mbps of Internet connectivity.

Protocol Handling:

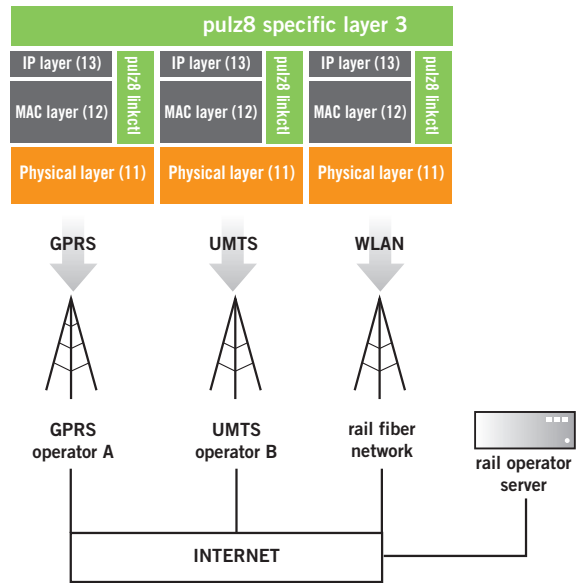
The train unit is able to handle pass through of several known IP based protocols such as IP Sec, SIP, H323 and PPTP. Gaming protocols can also be used, if the real IP addresses are routed to the train. It is possible to have the train identify itself as a normal network node, the same way a standard server would identify itself on the network.

Routing:

Routing in the train unit is possible with all standard internet protocols.



System Overview



VLAN:

While employing VLAN tagging/trunking the train operator will be able to separate the IP connection to the train into various closed networks.

- This enables monitoring of train statistics and service counters which will optimize service and maintenance.
- Provides real-time updates on seat reservations
- Information monitors and entertainment

ToS (Type of Service):

ToS prioritizing will assist applications like VoIP to get packets through the network fast enough so the user will not detect a delay. The roaming protocol handles buffering and bursting packets when roaming takes more than 20 milliseconds. Therefore, conversation will not be compromised while roaming between connections.

- Able to handle train speeds exceeding 250 km/hour without losing information/packets
- Bandwidth up to 30Mbps/s and above
- Frequencies from 1 Ghz to 10 Ghz including unlicensed frequencies which can be used by the carrier net between the train units and the mast unit.

Network protocol support:

Physical interfaces:

- 1 x Ethernet 10/100 FDX auto negotiate with 802.3af PoE support
- 1 x Ethernet 10/100 FDX auto negotiate
- 1 x RS-232 Serial port (multipurpose)
- 1 x miniPCI expansion slot

Protocol support

- IPSec
- 802.1Q VLAN
- 802.1d Bridging
- 802.1p ToS
- NAT/DNAT/SNAT
- Proxy & Socks5 proxy
- AES Rajndahl encrypted tunnelling (pulz8 specific)

Routing

- Static
- OSPF
- BGP4
- RIPv1/v2

Passthrough

- IPSec
- PPTP
- H323
- SIP

Mast Unit:

The mast unit provides the connection between the train and the mast. Via the mast units, data from the train is sent to the central server which terminates

each connection like a normal Internet connection and also routes the train's statistical information to the operator's internal server.

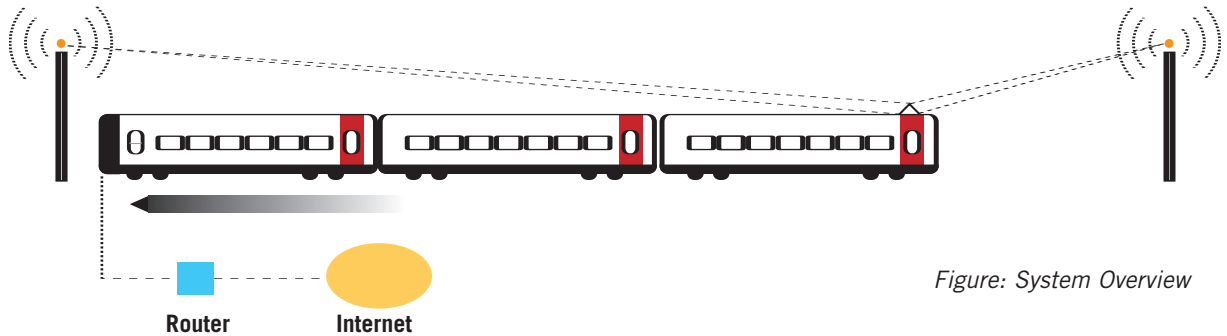
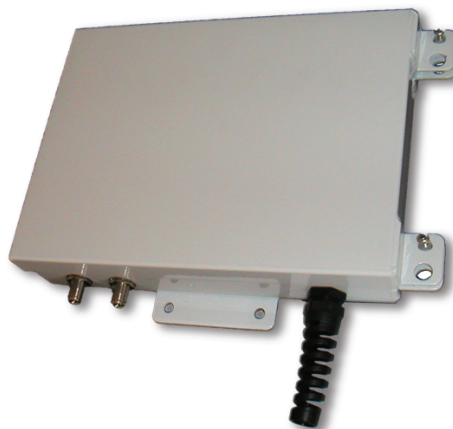
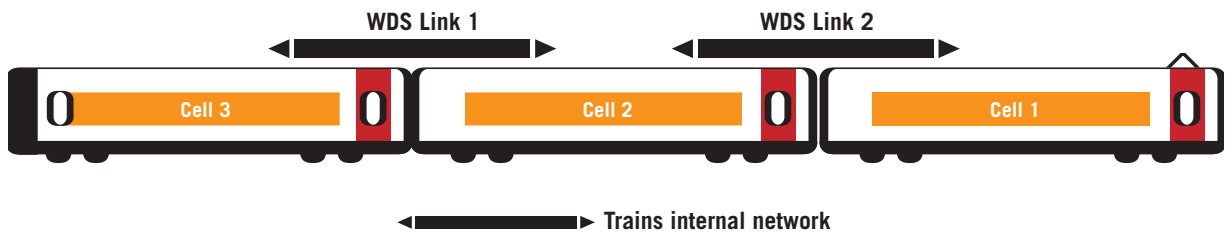


Figure: System Overview

The Train's Internal Network:

Inside the train standard 802.11 a,b, or g access points are connected with the WDS protocol.

The pulz8Express system will work with existing installation in the train regardless if it is a wired or wireless infrastructure.



pulz8 Train Unit

pulz8 Train Unit 3462

21.6 x 29.2 x 7cm

2.7 kg

Power input options:

AC 100-250V 50-60 Hz or DC 6-60V

Both options can be supplied with built-in battery backup

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pulz8: pulz8 delivers wireless network solutions and hotspots to operators, manufacturers and infrastructure owners in the passenger transport industry. Company headquarters are in Copenhagen, Denmark with sales representation in the USA and UK. www.pulz8.com