



The future of high-speed transport

Blu Wireless' mmWave high-speed transport solution, LightningBlu, addresses railways' demands for super-fast, robust connectivity by delivering multi-gigabit track-to-train infrastructure. Backed by Quality-of-Service (QoS) tiering capabilities, rail operators can reliably use the infrastructure for signalling, CCTV, high-speed passenger Wi-Fi, and more.

Sustainable and cost-effective deployments

High-gain trackside backhaul eliminates the need for costly fibre connections to each lineside node. Ultra-low energy requirements mean each node can be powered by a local solar panel and battery, further reducing deployment costs and energy requirements compared to technologies such as GSM-R.

Self-aligning high-gain solution

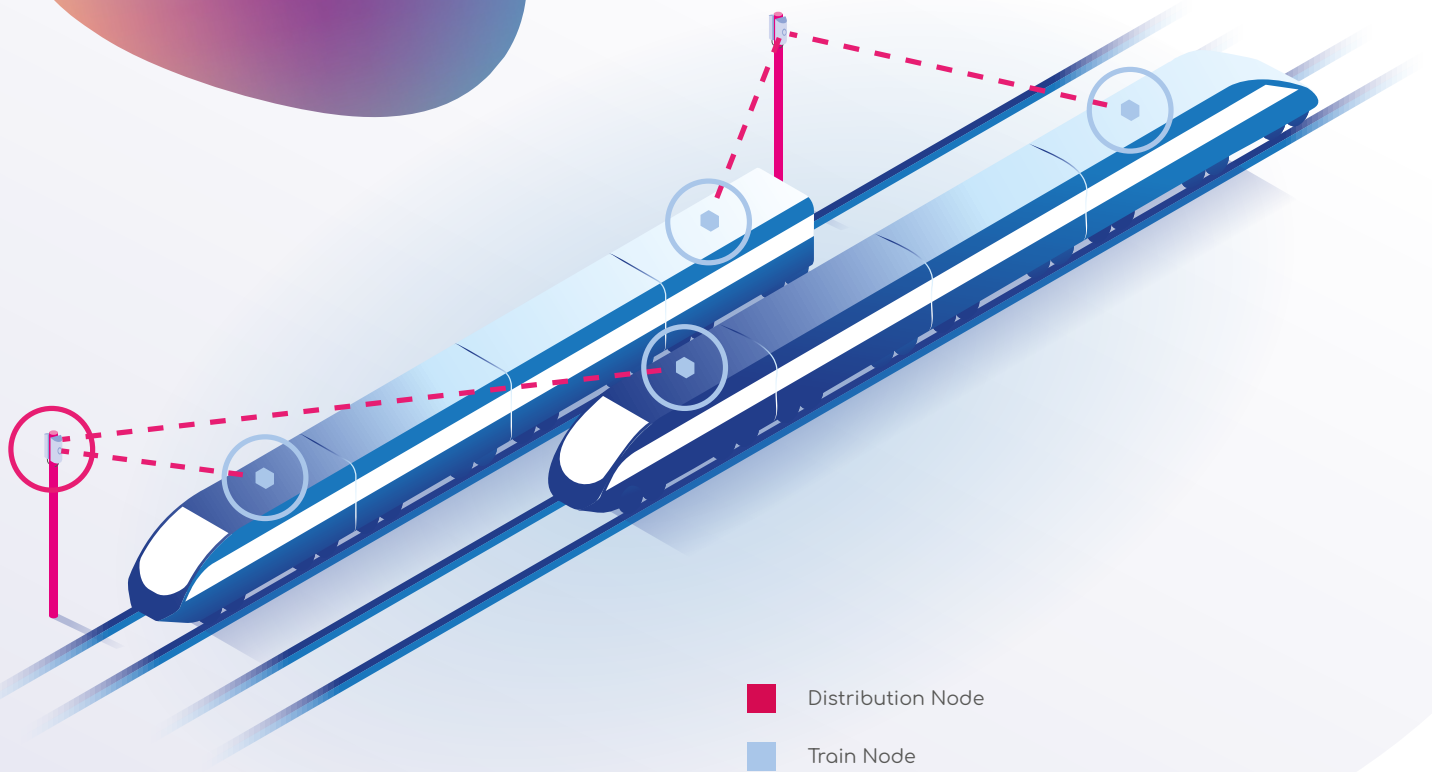
Trackside nodes use electronically steerable high-gain antennas to communicate with one another, via four robust multi-gigabit-capable mmWave modems. Advanced software optimises the beams.

Our mmWave technology provides the connectivity foundations that pave the way for advancements in rail transport, by supporting improved passenger experiences, increased safety, and decarbonisation.

Highlights

- **Speed:** Up to 3Gbps connectivity per node at up to 300km/h
- **Reliability:** Seamless handover and low latency
- **Range:** Up to 2km
- **Low-cost:** Delivers data at less than 1/5 the cost of current solutions

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How it works

Each train node contains two modems designed to connect to trackside units. These trackside units link to one another using mmWave point-to-point connections, via the same licence-exempt 57-71GHz frequency band that's used for track-to-train connectivity. This removes the need for a fibre connection to each node.

Track-to-train connectivity is delivered using a sophisticated "make before break" protocol, capable of exploiting multiple wireless links. This delivers seamless multi-gigabit internet connectivity whilst the train moves along the track at speed.

LightningBlu Technology

The train roof-mounted node comprises of two high-performance phased array 60GHz radios connected to a dual mmWave modem, supporting an enhanced version of the IEEE 802.11ad standard. Trackside units based on the same 60GHz radio and modem technology are located at regular points along the track. As the train moves along the line, the data connection is seamlessly handed over from tower to tower using sophisticated networking software.

Less trackside infrastructure means less time, maintenance, cost & complexity to roll out

- Each train node maintains two independently managed multi-gigabit links to the trackside
- Operates in the license-exempt 57-71GHz band, which provides 6 non overlapping 2GHz wide channels
- All links able to be allocated to any available mmWave channel
- Links can also be used to form carriage-to-carriage connectivity for simple train assembly
- Typical trackside tower spacing of 1-4km, depending on track environment
- Track-to-train connectivity at speeds of 300km/h

The benefits

- **Integrated solution:** LightningBlu is a holistic rail connectivity solution that includes hardware and software to enable Quality of Service tiering for track-to-train communications, and self-aligning high-gain trackside equipment.
- **Fast, low-cost deployments:** No costly power or fibre connections required for each trackside node, contributing to a 5x lower cost per Mbps per km than a 5G NR MNO private rail network.
- **Supporting rail decarbonization:** Trackside nodes require around 40W of energy, compared to around 800W for 5G Small Cells.
- **Improved passenger experience:** Make rail travel more attractive by offering reliable, high-speed on-train Wi-Fi, capable of supporting large numbers of passengers.
- **Robust operation for rail:** Designed to operate to rail-certified EN 50155 standards for temperature, vibration and safety.

Improved on-train passenger Wi-Fi makes rail travel even more attractive.