

Revolutionising train connectivity with active architecture

Faster installation • Higher performance • Lower lifecycle costs

The connectivity challenge

Modern rail demands fast, reliable, and scalable onboard connectivity – for passengers and operations. But traditional passive systems with long RF cables and centralised routers struggle with:

- Signal loss (up to 6 dB from RF cabling)
- Complex, costly installation
- Heavy and bulky infrastructure
- Limited scalability for 5G and MIMO

The active antenna solution –

Each unit combines antenna, modem, router, and SIM – all in one compact, roof-mounted device.



Replaces:

- 7 x RF cables (4 x cellular, 2 x Wi-Fi, 1 x GNSS)
- A separate train-to-ground router
- Long-distance coaxial runs

Connects with:

- Ethernet cable (1 GBit/S & POE+)
- Data + Power + Control
- Easier retrofits with minimal roof penetration

Installation & maintenance benefits

Benefit	Active Antenna	Passive antennas
System weight	80% lighter	Heavy coaxial, filters and rack for router
Mounting time	75% faster	Multi-component setup
Troubleshooting	60% faster	Many failure points
Upgrade time	33% faster	Labor-intensive

This comparison is based on one active rooftop antenna versus a passive architecture excluding the ethernet switch.

Real-world performance



Live results comparing Active vs Passive

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Powered by Fleet Connect

Patented and hardware neutral software Fleet Connect, developed by Motion Applied (formerly McLaren Applied), runs on each active rooftop antenna and supports remote commissioning, monitoring, and updates.

- mFLARE – Load balancing, link aggregation over 3G/4G/5G, Wi-Fi & satellite
- mSIM – Optimises network usage and data costs in real time
- mQOS – Prioritises traffic and maintains service quality

Built for the future

- 5G-ready, including private campus networks
- Modular and scalable – one antenna per operator
- Fits tight retrofit constraints – 50% less space needed
- Reduced weight – no server rack or extra cabling

Long-term savings

Over the life of a train, active antenna system can reduce total cost of ownership by up to 50% through simplified infrastructure, lower maintenance, and scalable design.

Project references:



Active architecture includes:

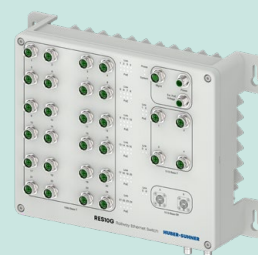
- SENCITY® Rail ACTIVE rooftop antenna



- SENCITY® Rail ACTIVE in-carriage antenna



- Railway ethernet switch:



- Ethernet cable assemblies

