



# Rail & Metro

## FIBERinMOTION® - train-to-ground wireless broadband solution for rail and metro

RADWIN's FiberinMotion® train-to-ground communications solution ensures continuous high-speed wireless connectivity between trains or metros and network control centers.

RADWIN's field-proven FiberinMotion® solution is deployed in railway and metro systems worldwide, powering applications such as Wi-Fi for passengers, real time high-definition CCTV, PIS, signaling and more.

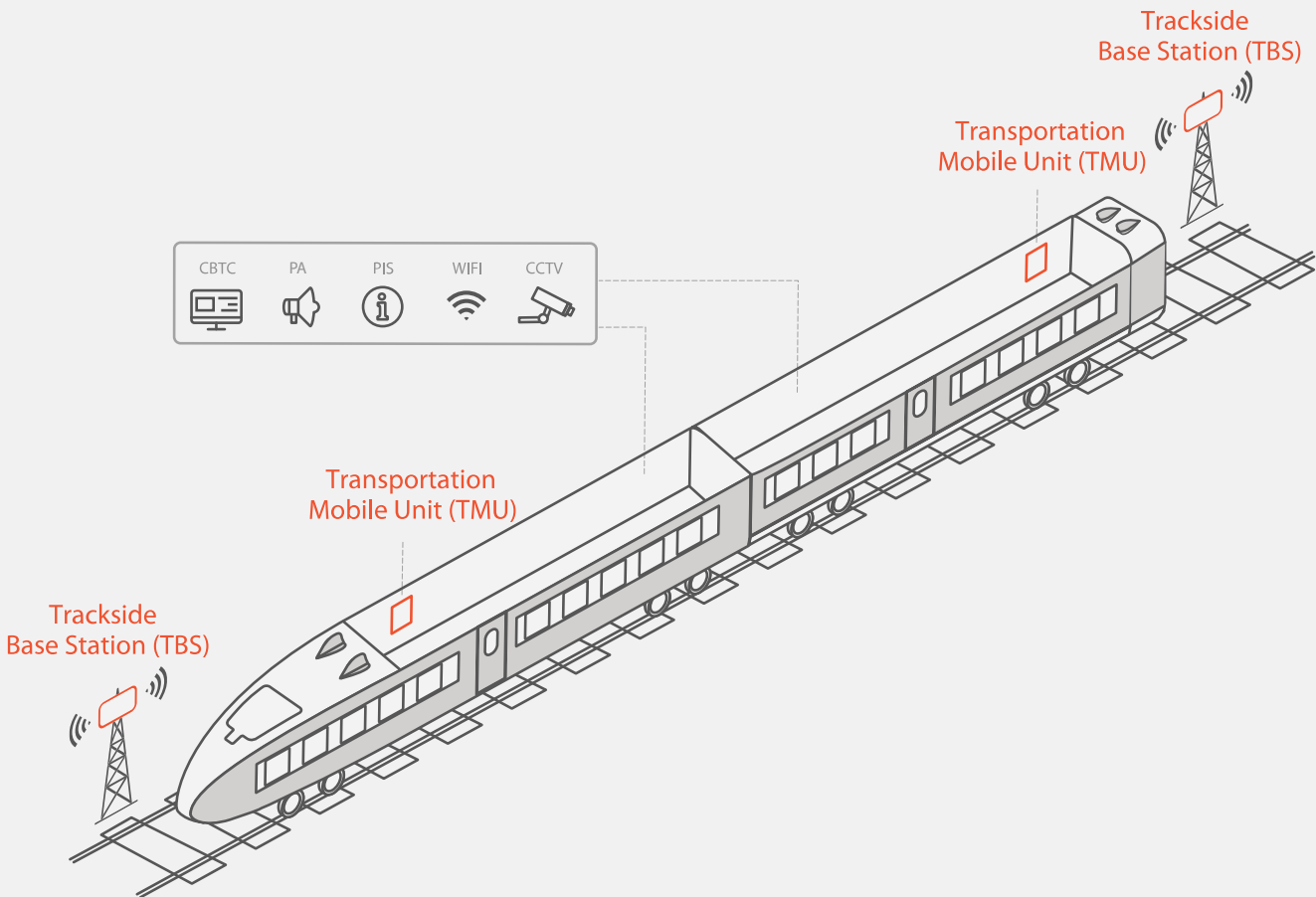
Operating in challenging outdoor conditions and in underground tunnels, FiberinMotion® complies with railway industry standards and delivers unmatched capacity and long-range coverage.

# FIBERinMOTION®

## Overview

The FiberinMotion® train-to-ground communications solution incorporates three primary elements:

- » Transportation Base Stations (TBS) - Deployed along the train route to provide continuous coverage and connectivity to rolling stock. Each TBS is deployed with multiple antennas and operates in auto Diversity/ MIMO modes (based on requirements and topology). Base stations are typically deployed at intervals of up to 1Km (0.6 miles) underground or up to 5Km (3 miles) above ground (based on topology and country regulations).
- » Transportation Mobile Units (TMUs) - Installed on-board the rolling-stock and connected to designated train antennas to assure continuous communications with the nearest TBS. It is possible to install two mobile radio units on-board the train to enhance resiliency and coverage.
- » Suite of Management & Monitoring tools - Including a central network management system, real-time performance monitoring and offline performance analysis applications. These tools have been specifically developed and customized to support large-scale project deployments.



# FiberinMotion® Highlights:

- » FiberinMotion® incorporates a field-proven air interface and advanced technologies. The solution operates in near and non line-of-sight (nLoS/NLoS) conditions and in environments where there is high interference.
- » High capacity, up to 500 Mbps per TBS or TMU.
- » Extended coverage per TBS, reducing the number of track-side installations required and saving upon substantial infrastructure costs (e.g. poles, electricity, network) as well as on-going maintenance. Infrastructure requirements are reduced by a typical ratio of 1:5 to 1:15 when compared with other Wi-Fi/mesh Wi-Fi based solutions.
- » Supports train speeds of up to 350 kmh / 220 mph.
- » Seamless handover between radio base stations with a handover time of < 50msec.
- » Fully synchronized network that operates on a common time base for all radio base stations, eliminating potential mutual radio interference. This capability is essential for maintaining high and consistent throughput along all routes and operational scenarios.
- » Low and fixed latency and jitter critical for delay sensitive applications such as video and VoIP.
- » Over-the-air QoS enabling service transmission prioritization with assured SLA.
- » A suite of real-time and offline software analysis applications designed specifically for train and metro operations.

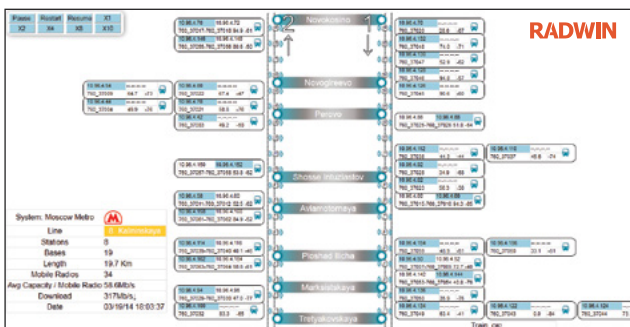
Transportation  
Base Station (TBS)



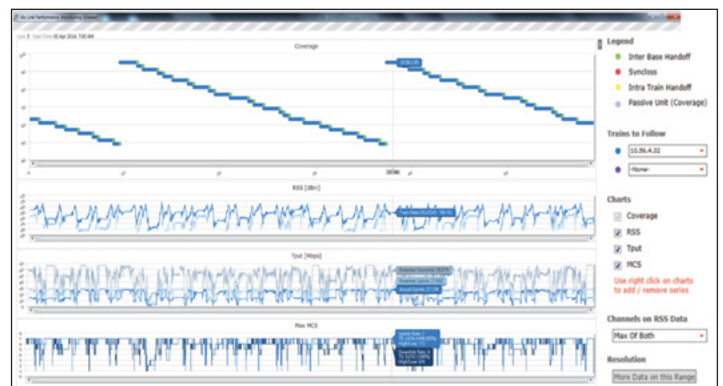
Transportation  
Mobile Unit (TMU)



# Network Management & Monitoring Tools



Real-Time Monitoring Tool



Air Link Performance Monitoring Tool



### Moscow Metro DeployS RADWIN

Delivering Wi-Fi to Millions of Passengers

- » Daily download of over 70 Terabytes
- » 90 Mbps net throughput per train
- » 1.2 million unique Wi-Fi users daily
- » 12 lines, 750 trains, 600 Km of tracks



### Utah Transit Authority (UTA) – Frontrunner

Delivering connectivity throughout the route

- » Total length of 88 miles (142 km)
- » Daily ridership of 16,800
- » Speed up to 79mph (127km/h).

## FIBERinMOTION® Key Features

- » Configurable uplink/downlink bandwidth ratio enabling a variety of services over the same infrastructure.
- » Multi-band radio supporting 4.9 to 6.9 GHz (per relevant regulations). Additional frequency bands are also available including customized options.
- » High reliability - MTBF > 47 yrs.
- » IP-67 radios for operation in harsh outdoor environments.
- » Complies with railways standards including EN50155, EN61373, EN50121 and IEC 60571.
- » Advanced encryption (AES 128).

RADWIN is a leading provider of sub-6 GHz wireless Point-to-Point and Point-to-Multipoint solutions that deliver voice, video and data with unmatched high-capacity for long ranges. Deployed in over 170 countries, RADWIN's solutions serve the needs of service providers, enterprises and rail and metro operators.

RADWIN's industry-leading FiberinMotion® train-to-ground solution powers a range of applications including high-speed Wi-Fi for passengers, real-time CCTV, PIS and infotainment services, and CBTC.

# RADWIN

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