RAD's Solutions for
Mass Public Transportation Communications

Service Assured Networking

RAD

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RAD's **Service Assured Networking** solutions enable reliable and efficient communications for wireless broadband mobility, station connectivity, automation and operations communications for railways, metros, BRTs and busses. Supporting a wide variety of applications, these solutions ensure resilient communications between control centers, remote installations and fast moving vehicles.

For over 30 years, our customers have relied on RAD's expertise in TDM and Carrier Ethernet packet-based technology, as well as in timing synchronization, sub-6GHz radios and advanced SCADA security firewalls to ensure mission-critical communications for video surveillance feeds, voice, telemetry, signaling, and multimedia streams, among others.

RAD's Turnkey Solution for Mass Public Transportation Communications

In addition to application-specific solutions detailed in the following pages , RAD also offers complementary services and products, such as:

Wireless broadband mobility radio planning	Backhaul network design	Command and Control systems, including video management and video analytics	Cameras, accessories, network provisioning, and maintenance	Project management

Wireless Mobility:
Broadband Connectivity on the Move

RAD's turnkey mobility solution provides continuous broadband connectivity to fast moving vehicles with assured capacity and range and at affordable total cost of ownership (TCO). It ensures uninterrupted connectivity between mobile units mounted on trains and your command and control center, via trackside base stations. RAD's easy-to-deploy mobility ecosystem includes a sub-6 GHz radio system, a fiber optic/wireless backhaul network and high-grade clock synchronization tools to support on-board video surveillance, broadband Internet, infotainment, and location-based services for rail, metro, BRT and busses, as well as railroad/level crossing monitoring.

Solution Highlights

- Turnkey solution with central network management
- Up to 100 Mbps guaranteed bandwidth per base station/mobile unit
- High speed: Continuous connectivity at speeds of up to 200 km/h
- Support for a wide range of sub-6 GHz frequencies with complete online radio system diagnostics
- Configurable uplink/downlink asymmetric traffic per link/user, allowing the use of different applications in each direction
- Long-range coverage: Up to 10 km between base stations

- Seamless handover between base stations ensures extremely low latency supporting VoIP and video-related applications
- Carrier-grade Ethernet-based backhaul ring, featuring ITU-T G.8032v2 ring protection and IEEE-1588 clock for resilient, always-on service with predictable QoS/QoE
- Ruggedized and reliable system, secure network connections
- Compliance with European railway safety standard EN50155

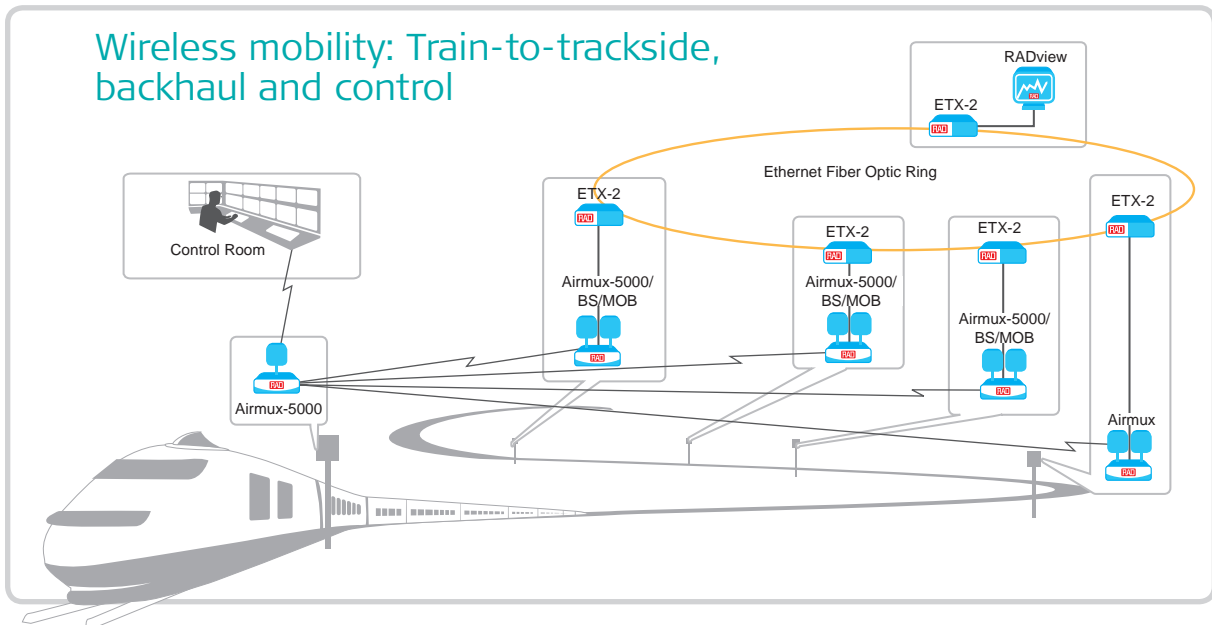## RAD's Wireless Mobility vs. Standard WiFi Solutions:

Wider frequency range

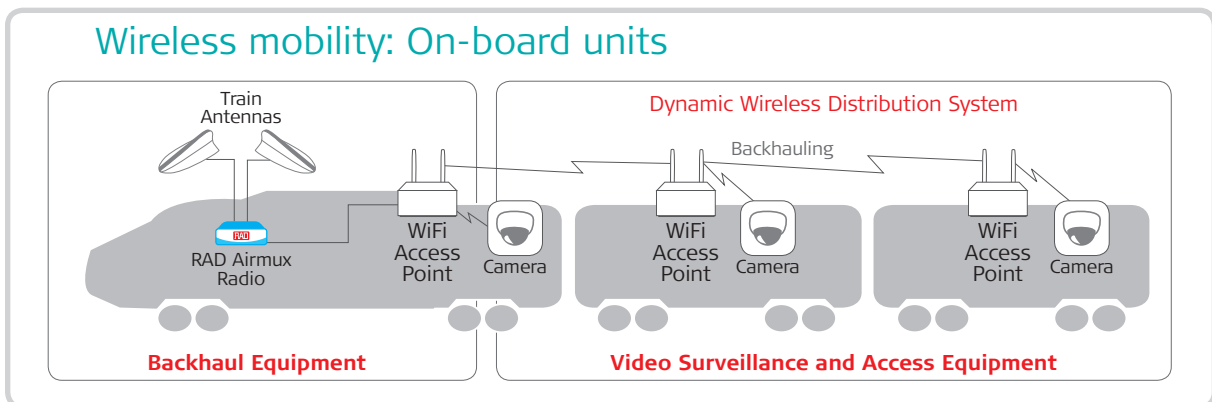Fewer base stations per given distance

Per-vehicle bandwidth guaranty

Low and constant latency

Wireless Broadband Mobility Solution

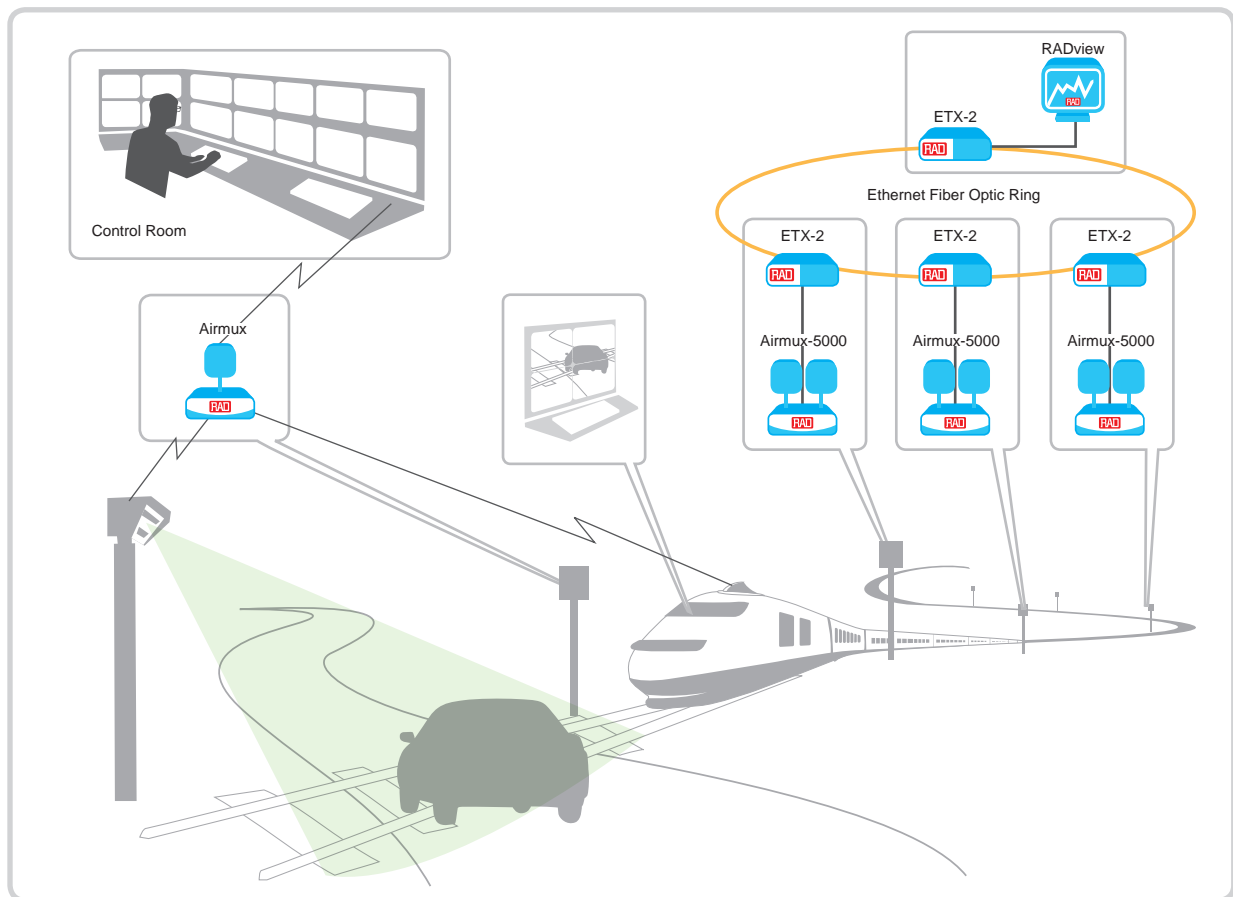## Wireless mobility: Train-to-trackside, backhaul and control

RADview

ETX-2

Ethernet Fiber Optic Ring

ETX-2

ETX-2

ETX-2

ETX-2

Airmux-5000/
BS/MOB

Airmux-5000/
BS/MOB

Airmux-5000/
BS/MOB

Airmux

Control Room

Airmux-5000

Wireless mobility: On-board units

Train Antennas

Dynamic Wireless Distribution System

Backhauling

RAD Airmux Radio

WiFi Access Point

Camera

WiFi Access Point

Camera

WiFi Access Point

Camera

Backhaul Equipment

Video Surveillance and Access Equipment

- Enable security surveillance services for immediate detection and deterrence of in-cabin violence and vandalism using real-time CCTV transmission between moving trains and the control center, local and remote monitoring, tracing, real-time video analytics, and alarm notifications
- Support additional operational applications, such as on-board ticketing and enhanced passenger flow management

- Improve passenger experience with on-board high speed internet access, location-based services, multimedia entertainment, and passenger information systems (PIS) connectivity
- Superior performance in underground tunnels

Railroad/Level Crossing Monitoring

RADview

ETX-2

Ethernet Fiber Optic Ring

Control Room

Airmux

ETX-2   ETX-2   ETX-2

Airmux-5000   Airmux-5000   Airmux-5000

- Enhance security and safety by transmitting real-time video from the railroad/level crossing or train station to the rolling stock driver

- Support accident and collision prevention by delivering critical notifications ahead of time to the train's driver

- Enable continuous high speed wireless connectivity between the rolling stock, the tracks and control center with RAD's comprehensive train-to-wayside communications solution

ETX-2
Carrier Ethernet Networking and Synchronization
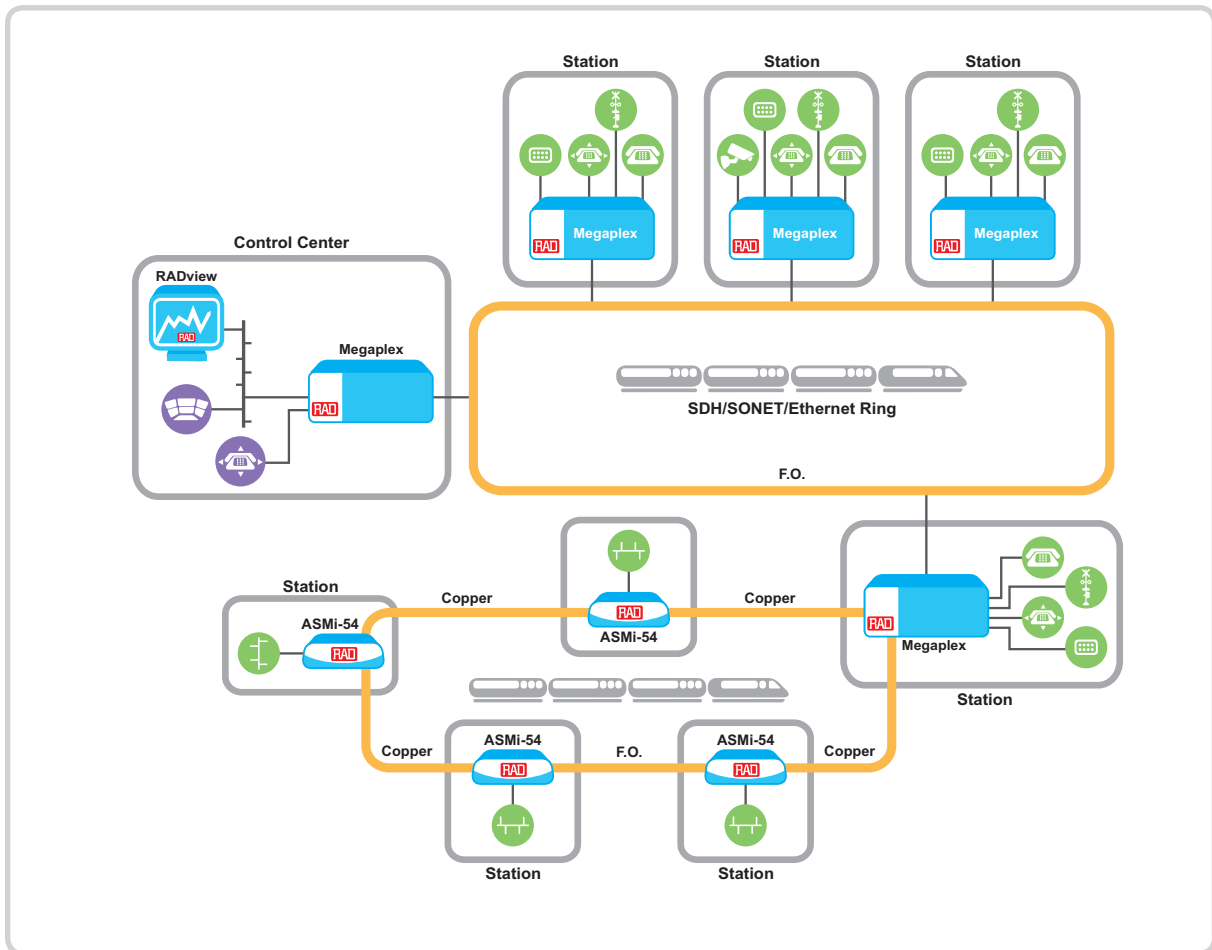
Airmux-5000
Point-to-Multipoint Ethernet Radio

RADview
Carrier-Class Network Management System

Hybrid Station Communications

- Support voice, video and data over an SDH/SONET/dark fiber/copper or PSN core network
- Ensure seamless migration to PSN, as well as service resiliency with RAD's Traffic Duplication solution, transporting real-time, mission-critical traffic streams over SDH/SONET and PSN networks in parallel
- Single device for both operational and IT traffic
- Bi-directional broadcast for control and signaling traffic
- Field-proven solution, successfully implemented in railway networks worldwide for over 20 years
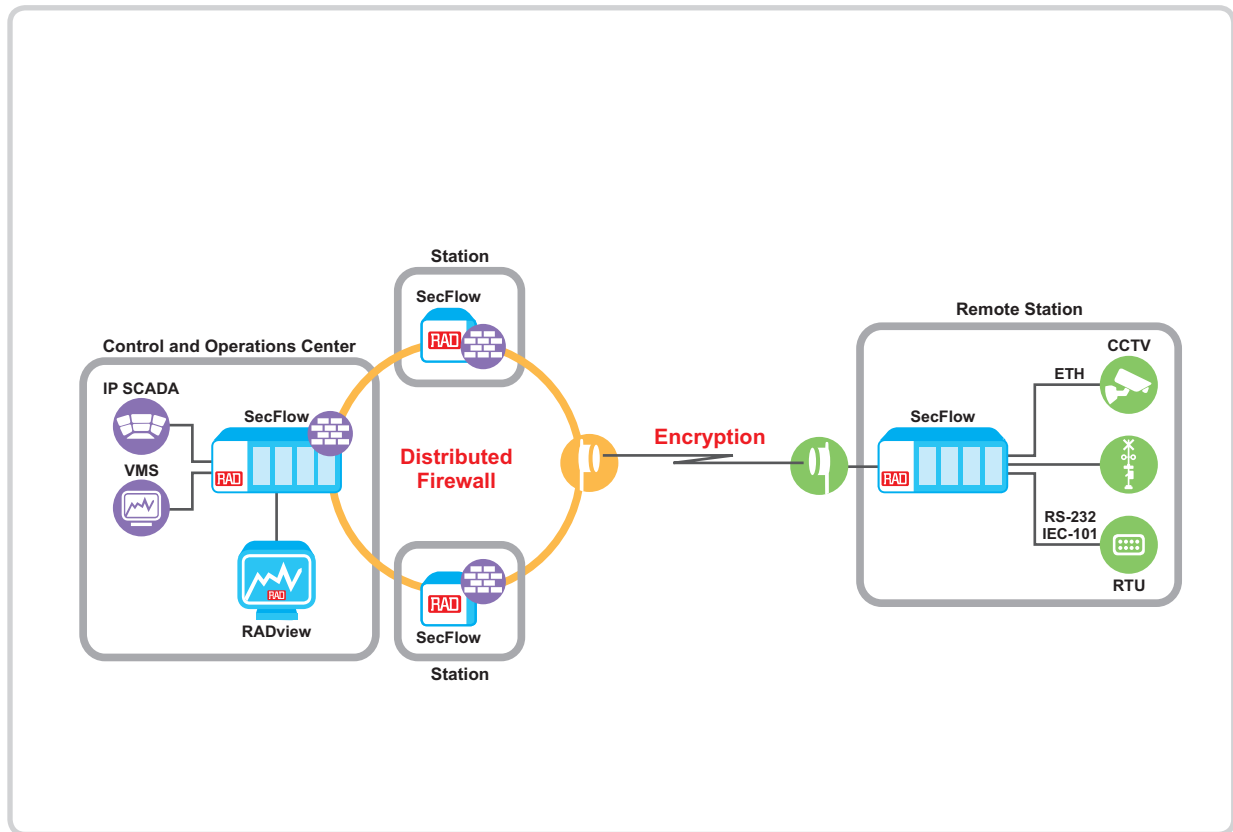

Megaplex-4
Hybrid Cross-Generation Multiservice Multiplexer

RADview
Carrier-Class Network Management System

Secure Automation and Operations Communications

- Build a secure network for delivering SCADA, CCTV and signaling traffic over a protected ring based on a combination of wireless and fiber optics
- RAD's SecFlow industrial Ethernet switches and IP switches installed in cabinets along the path
- Support a mixture of Ethernet, serial and discrete (dry contacts) devices with a distributed Modbus firewall for secure access
- Seamless connectivity with next-gen SCADA using protocol conversion from serial to IP SCADA
- Secure mobile access from trains to control center using distributed device authentication methods
- PoE for direct connectivity of IP CCTV cameras

SecFlow
Secure Industrial Ethernet Switch/Router

RADview
Carrier-Class Network Management System

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