

IT buyers' guide for mass transit network solutions

Exploring today's connection, security, and management needs for public transportation

Overview

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Connected technologies in public transportation vehicles have become a necessity, not a luxury. Today, on-board devices and applications are essential for providing the operational efficiency and cost savings that mass transit authorities need to stay viable and safe for the people who rely on their services. Further, those same people now expect a variety of features — including rider Wi-Fi, contactless payment systems, and real-time arrival and departure information — for the best possible passenger experience.

None of these advancements in transit work well without reliable and secure mobile connectivity. What’s more, IT teams often don’t have the time, money, or staff to manually make every networking connectivity adjustment or data security upgrade one vehicle at a time.

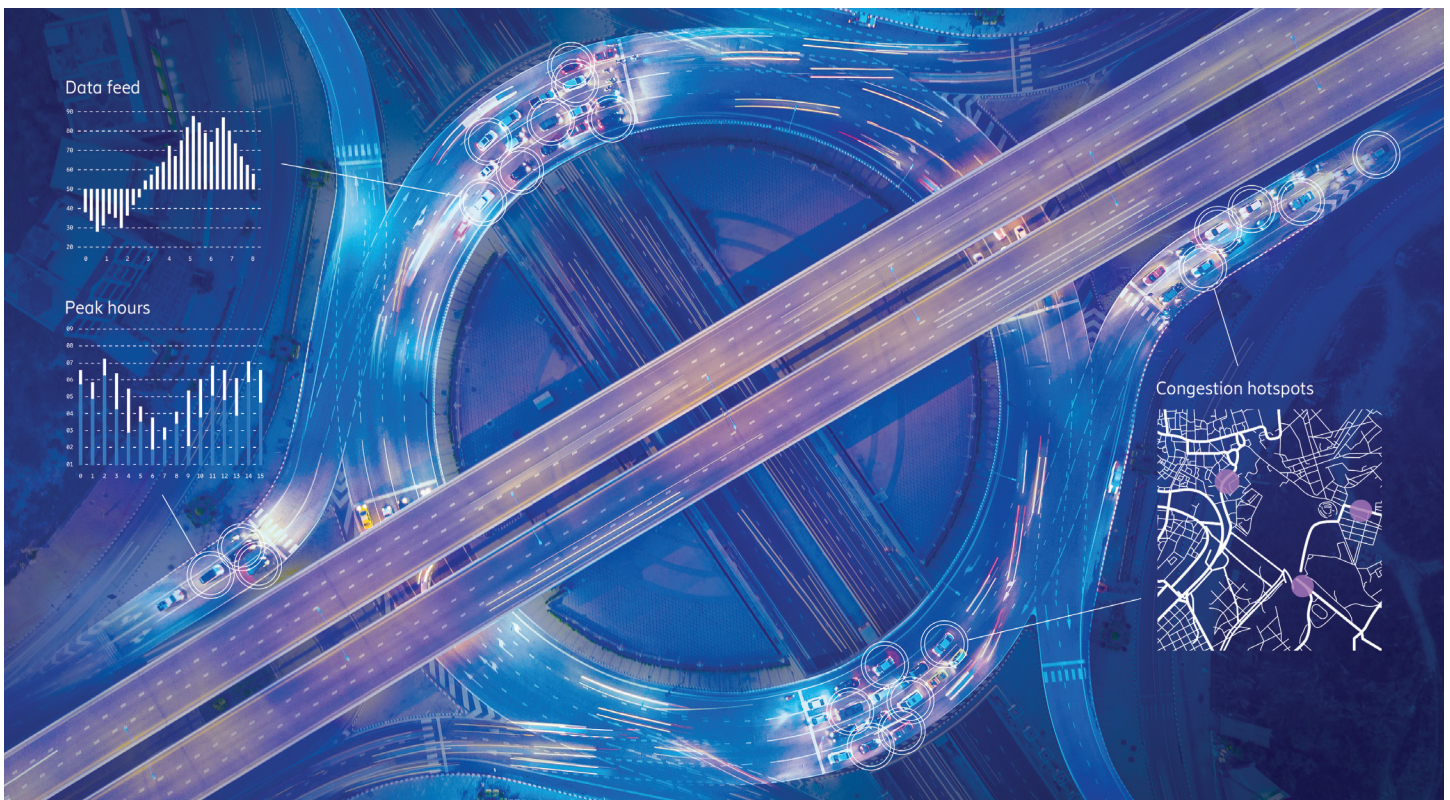
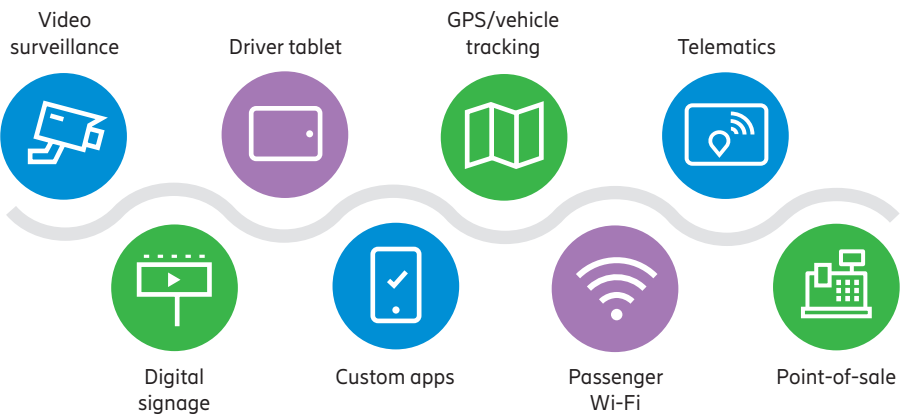
Choosing the right cellular-based in-vehicle networking solution for an organization’s unique needs is critical, with many key factors to consider. This buyers’ guide will provide information about important features and key options so transit authorities can make the best, most informed decision for their communities.



The digital transformation of mass transit

Connected through 5G and LTE, public transportation's future is marked by vast potential — from vehicle and route efficiency, alternative revenue streams, and improved public safety, to fantastic passenger experiences. For metro buses, light rail systems, trolleys, and ferries, there are many connected devices and powerful applications that can help solve difficult challenges.

GPS and vehicle telemetry data drive real-time decisions that improve service and streamline operations. High-definition video cameras help deter illegal and dangerous behavior. Digital signage enables wayfinding and third-party advertising. Guest Wi-Fi helps passengers get work done or relax on long commutes. These technologies and many more are changing how public transportation is delivered.



What to look for in a public transportation router solution

The most important technologies in public transit depend on LTE and 5G connectivity that never stops. When selecting a wireless networking router and overall solution for your mass transit agency, these are some of the most important features to look for:



Router essentials

- Built-in enterprise-grade LTE and/or 5G modem
- Software-defined radio supporting multiple carriers
- Optional second modem for wireless-to-wireless failover
- Support for Ethernet and Wi-Fi as WAN
- Dual-band, dual-concurrent Wi-Fi
- Active GPS
- Support for public safety networks



Hardware protection

- Ruggedization for vibration, shock, dust, splash, and humidity
- Mounting integrated into the hardware for optimal placement and shock resistance
- Automatic router power on and off to mirror vehicle's ignition status
- 9-36 DC voltage input range
- Transient and reverse polarity voltage protection



Software features

- Centralized configurations, updates, and troubleshooting through a cloud-based platform
- Actionable cellular performance analytics
- Zero trust network security, replacing cumbersome traditional VPNs and APNs
- Cloud-based content filtering
- Extensibility with edge compute, SDK, API and third-party integration

Choosing a networking solution for mass transit

Enterprise-grade 5G and LTE routers, ruggedized and purpose-built for fleets, provide secure and reliable in-vehicle connectivity over nationwide cellular networks. With a centralized cloud-based network management platform in place, IT teams can access comprehensive dashboards full of rich connectivity and security analytics to make proactive adjustments and perform key troubleshooting duties, instead of having to visit each vehicle every time a change needs to be made.

Even the best in-vehicle solutions have key differences to account for prior to a fleetwide purchase and deployment. For example, public transit IT teams need to decide whether they need automatic failover and fallback between multiple carriers for increased reliability.

Option 1: Single-modem router

In a wireless router with an embedded modem featuring two SIM slots, the radio can only connect to one active SIM card at a time, which is a cost-effective option for organizations that have a minimal budget for cellular data usage. The presence of a second SIM within a software-defined modem enables IT teams to remotely change the WAN connection — or set policies for automatic switching — in any vehicle, from one cellular carrier to another.

Ericsson's enterprise wireless solutions include SIM Based Auto Carrier Selection. This feature detects the carrier of an installed SIM, loads the correct firmware and configuration settings automatically, then connects.

⚠ Challenge: Blind carrier switching

Technically, wireless failover is possible with single-modem, dual-SIM routers. However, it's not ideal. When the software detects an outage and switches to the secondary SIM, it can take minutes, not seconds. Further, the system cannot predict whether the second carrier will offer a better connection. If a shift back to the first carrier is necessary, the vehicle could be offline for several minutes.

Option 2: Dual-modem router

Using a wireless router with two carriers active within separate modems is the best way to ensure always-on connectivity in public transportation vehicles. This solution is the only option for providing instant wireless-to-wireless failover, or WAN link redundancy. This is an essential service for transit systems, which are constantly traveling in and out of good signal areas for particular cellular carriers.

Ericsson's SD-WAN features constantly monitor and measure both cellular connections, using intelligent path selection based on cellular signal strength, throughput, latency, and data plan consumption. The most important traffic — such as POS, GPS, and AVL data — can be assigned to the stronger link while less important applications remain connected over the weaker cellular signal.



Modems with dual-SIM capabilities enable support for multiple carriers in a single router.

Deployment considerations

It is important to understand the challenges that may arise during deployment, as well as how to mitigate them:

01

Antennas:

Select an antenna that is optimized for the frequency bands the modem uses. Leveraging the most advanced modems with an older antenna may limit connectivity to some bands. Antenna placement ideally should be outside the vehicle, ensuring the best connectivity available. It is ideal to use two separate antennas to increase isolation for instances when there is a need to run two active modems that can both be transmitting at the same time.

02

Installation brackets:

Select installation brackets designed to handle rough terrain, and ensure your router has been tested and verified to MIL STD 810G, SAE J1455, and EN 50155 standards. Alternatively, select a solution that has mounting integrated into the hardware.

03

Choosing a provider:

Unique reception should be studied and evaluated prior to selecting network providers. This study should include a service analysis, route maps, and testing in the field. A site survey can be used to gather reception data and help you evaluate and pick the best network carrier for reliable coverage.

Additional mass transit use cases for cellular connectivity



Real-time geolocation data

5G and LTE routers allow agencies to remotely track where transit vehicles are at all times, for both security and efficiency purposes. Real-time geolocation data also supports the route tracking apps and digital signs that passengers rely on.



Security in vehicles and at stops

Cellular supports security cameras mounted in vehicles, as well on stops and stations, that help companies monitor passenger and driver safety, and hopefully deter dangerous activity. 5G makes live streaming a viable option when needed.



Private cellular at headquarters

Agencies can deploy private cellular network solutions for dependable wireless LAN connectivity across large bus yards and headquarter sites. Private 5G may be the best option for data offload and other on-site applications.

Learn more at [cradlepoint.com](https://www.cradlepoint.com)