IT Buyers' Guide for In-Vehicle Network Solutions

A Comprehensive Comparison of Solutions for Vehicle Fleets

Overview

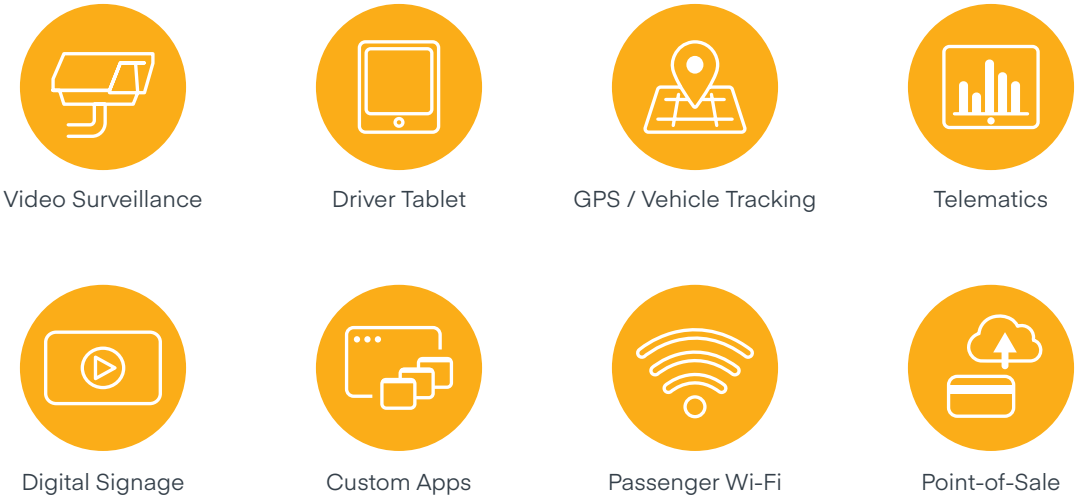
The continued expansion of digital technologies and applications in vehicle fleets has gone hand-in-hand with reliance on wireless technology. From mass transit and school buses to ambulances, police cruisers, and fire apparatuses to taxis, food trucks, and delivery vehicles, many fleets today cannot function without constant LTE connectivity everywhere they go.

Vehicles are equipped with a broad range of connected technologies, including IoT devices such as surveillance cameras, Point-of-Sale devices, and digital signs; Wi-Fi channels for staff and passengers; AVL and telematics systems; and much more.

Luckily, many of today's in-vehicle routers and network management platforms are flexible enough to support such diverse needs. However, it's important to match your unique fleet connectivity needs with the best possible solution — taking into account the importance of automatic failover between multiple cellular carriers, data security features, and centralized network management. This buyers' guide will provide information about important features and key options for your organization to consider.

The Digital Transformation of Vehicle Fleets

In every industry that relies on vehicles, technology and connectivity matter more than ever. Businesses that focus on customer service — including mass transit, private transportation, food trucks, and more — now must have guest Wi-Fi and advanced POS systems, along with the ability to add remotely managed digital signage for displaying key messages or advertising. First responder agencies use a variety of ruggedized tablets, computers, devices, and applications to reduce response time and keep everyone safer. And most organizations that depend on vehicles — from service trucks to school buses — can find ways to improve efficiency based on surveillance cameras, telemetry data, and real-time GPS information.



What to Look for in an In-Vehicle Networking Solution

The most important technologies for vehicles depend on LTE connectivity that never stops. When selecting a wireless networking router and overall solution for your fleet, these are some of the most important features to look for:

Router Essentials

- Built-in enterprise-grade LTE 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

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
- Wide voltage input range with reverse polarity and transient voltage protection
- Transient and reverse polarity voltage protection

Software Features

- Centralized and cloud-controlled configurations, updates and upgrades, and troubleshooting
- Robust LTE uptime and performance analytics for actionable insights
- Support for an Intrusion Protection and Detection System (IDS/IPDS) that defends against network breaches
- Content filtering
- Expansive cloud-delivered data security dashboards

Choosing a Networking Solution for Vehicle Fleets

Enterprise-grade LTE routers that are purpose-built for vehicles provide secure, reliable connectivity over nationwide cellular networks. And with a cloud-based network management platform in place, IT teams can use dashboards full of rich connectivity and security analytics to centrally 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, IT teams need to decide whether they need automatic failover and failback 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 easily and remotely change the WAN connection in any vehicle from one cellular carrier to another.

Cradlepoint's NetCloud Service for Mobile and wireless edge routers 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 vehicles. This solution is the only option for providing instant wireless-to-wireless failover, or WAN link redundancy. This is an essential service for vehicles that are constantly traveling in and out of good signal areas for particular cellular carriers.

Cradlepoint'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:

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

Cradlepoint's Wireless Edge Solutions for Vehicle Fleets

Cradlepoint's NetCloud Service for Mobile and wireless edge routers unlock the power of LTE and 5G cellular networks to transform operations and rider experiences.

Keep vehicles connected

Ensure constant connectivity with SD-WAN intelligence optimizing network traffic across Wi-Fi and multi-link Gigabit-Class LTE — enabling in-vehicle connectivity for employees, guest Wi-Fi, and telemetry data for fleet efficiency.

Protect critical information

Confidently send and receive sensitive data including public safety information, customer and payment data, and telemetry information from a highly secure, best-in-class edge solution.

Centrally manage the network

Use one cloud platform to configure, deploy, and manage all of your wireless edge routers from anywhere. Advanced analytics provide visibility into cellular, application, and Wi-Fi utilization and security.

Use purpose-built mobile routers

Because vehicles are like offices operating in wide-ranging locations, Cradlepoint's mobile routers are built to withstand extreme environments. They offer Gigabit-Class LTE, Wi-Fi, and services such as location and telematics applications.

One platform for your entire network

Treat mobile networks as part of your organization's converged edge. Monitor and manage all of your wireless in-vehicle, branch, and IoT routers through the same cloud-based management platform.

Rely on flexible LTE performance

Count on Cradlepoint's advanced modems and proprietary software technologies, with support for a wide variety of carriers and nationwide first responder networks, to unlock the capabilities of Gigabit-Class LTE and 5G.

Learn more at cradlepoint.com/mobile-routers