Bridging Earth and sky: Satellite power meets 5G for public safety fleets

A hybrid WAN is the key to always-on connectivity for any terrain, mission, or emergency

First responders need a more reliable network

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Public safety teams rely on digital tools such as GPS, communications systems, onboard sensors, and safety monitoring devices, but these tools only work when the network does. In remote areas or during severe weather events, cell signals may be weak. If teams lose connection, they lose critical time and situational awareness, which can put citizens and responders at risk.

That's when network strength and flexibility matter most.

Agencies are now turning to a more reliable solution, combining 5G and low Earth orbit (LEO) satellite networks such as Starlink and AWS Ground Station. This hybrid approach keeps vehicles and command centers connected anywhere the call takes them — from the highway to remote mountains, to beyond the reach of cell towers.

## Connecting public safety fleets starts with 5G

Today's public safety fleets rely heavily on cellular networks, and 5G is becoming the standard. It offers faster speeds, lower latency, and more substantial support for modern digital tools. For teams operating in populated areas or within tower range, 5G often delivers everything they need to work efficiently.

But 5G has its limits. In rugged terrain or rural areas, cellular coverage may be limited, which can slow down response time and make it harder for teams to stay connected.

LEOs fill the gaps in fleet connectivity

Modern enterprise networks are expected to perform everywhere, whether on the road, in the field, or at the edge. But WAN connectivity breaks down in places where cellular coverage is weak or unreliable. That's where LEO satellites come in.

LEO satellites orbit much closer to Earth — within about 300 to 1,200 miles (480 to 1,931 kilometers) up — compared to traditional satellites at 22,000 miles (35,405 kilometers). That shorter distance means signals travel faster and with less delay, reducing latency. They move continuously across the sky in coordinated constellations, handing off coverage to one another as they go. Companies regularly launch hundreds or thousands of LEO satellites, so theoretically, there's always one nearby.
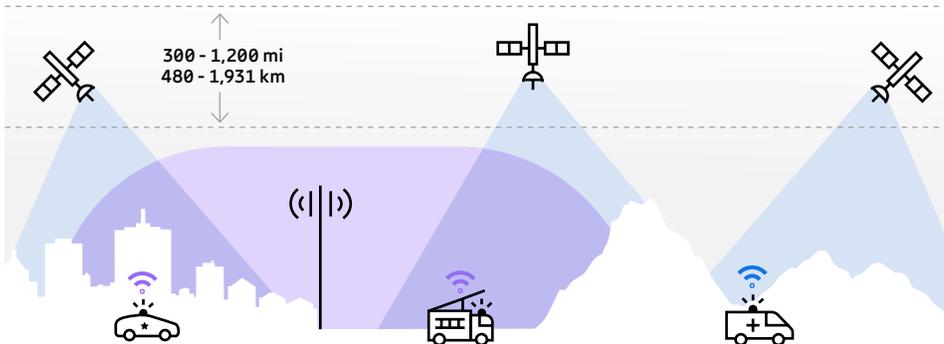
For public safety, LEO satellites keep officers and emergency teams connected in rural areas, remote spaces, and disaster zones where cell service may be limited or down. Patrol units, ambulances, and mobile command centers can stay in contact with dispatch, access mission-critical applications, and share real-time updates, including photos, video, and incident reports. This reliable connectivity helps responders coordinate more effectively, make faster decisions, and improve safety for both the public and personnel.
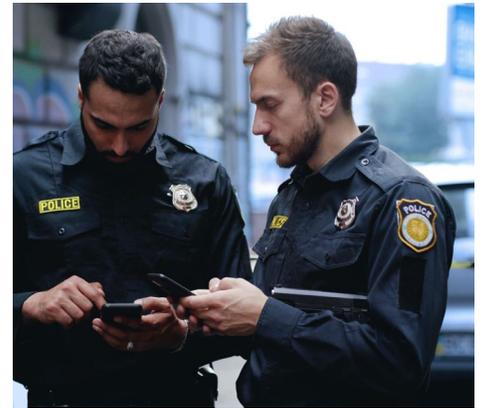
# How LEO satellites fit into modern WANs

LEO satellites work well as a backup or added connection operating alongside cellular, fiber, or other links. These satellites become especially valuable when paired with SD-WAN, which intelligently routes traffic based on performance and application needs. When LEO satellites are paired with SD-WAN for public safety fleets:

Network traffic is routed over the satellite link only when needed, for cost efficiency.
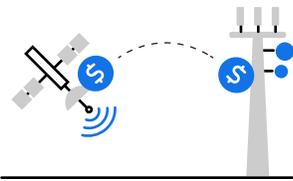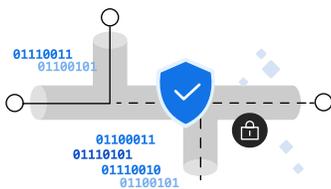

Intelligent routing keeps critical apps like outage management or GIS tools on the fastest network path.
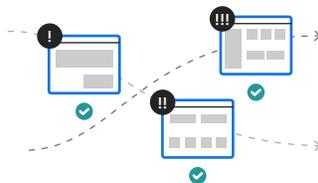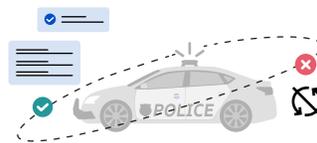

Forward error correction and link bonding keep performance steady during dropouts or network congestion.

Zero trust and traffic encryption secure all connectivity paths.

Automatic failover ensures service vehicles stay operational in the field if a connection goes down.

The limitations of LEO satellites

LEO satellites can be a valuable part of a public safety fleet's connectivity plan, especially in areas where cell service is limited. But on their own, LEO networks aren't designed to meet all the demands of modern fleet operations, due to limitations that affect speed, reliability, and cost.

They can lose signal. Because LEO satellites move quickly across the sky, the signal can drop when one moves out of range, before the next one has taken over. This can cause short interruptions or delays in passing data.

They don't work well through obstructions. To work correctly, endpoints require a clear line of sight to the satellite, so buildings, trees, or even heavy rain or snow can sometimes degrade or block the signal.

The internet connection can be slow or uneven. Sometimes LEO data transmission speeds slow down, especially if many devices are using the network simultaneously. Latency and delays can disrupt video transmission or streaming.

They're expensive when used as the primary connection. LEO satellite plans are costly, especially at higher speeds or with large data allowances.

They lack strong security. LEO satellite systems usually don't have strong protection for sensitive information. That's a problem for public safety or emergency crews that must keep data private. To meet security standards, you'll need additional protection, such as an enterprise-grade zero trust solution to secure traffic and enforce access controls.

LEO satellites are a great backup connection or supplement, but are not a complete replacement for 5G connectivity. Public safety fleets get the best results by combining LEO with 5G using purpose-built, enterprise-grade platforms to manage both.

The hybrid advantage: 5G and satellite for seamless operations

Using only one type of network — either LEO only or 5G only — leaves potential gaps in coverage and functionality. The following table shows why using LEO and 5G together is the best option for keeping public safety teams up and running consistently.

Capabilities	LEO satellite only	5G only	Satellite + 5G together
Works in remote areas	✓	⚠ [1]	✓
Fast data speeds	⚠ [2]	✓	✓
Low latency	⚠ [3]	✓	✓
Works during tower outages	✓	✗	✓
Works in areas with physical obstructions (buildings, trees, weather)	⚠ [4]	⚠ [4]	✓
Built-in security	✗ [5]	✓	✓
Offers a cost-efficient solution	⚠ [6]	✓	✓

[1]5G networks may not be reliable or available in very remote or rural areas without towers.

[2]LEO typically delivers 100–220+ Mbps download and 10–25 Mbps upload speeds, but performance depends on plan, congestion, and line of sight.

[3]LEO offers 25–60 ms, lower than traditional satellites, but not as low as 5G.

[4]Both LEO satellite and 5G are affected by physical obstructions, but in different ways. Satellite signals often require line of sight. 5G performance can vary based on spectrum band and surroundings.

[5]Most LEO setups require an external solution such as an Ericsson Cradlepoint router managed through the NetCloud SASE platform, which provides secure, cloud-based control and enterprise-grade visibility.

[6]Hybrid costs vary upfront but offer savings over time through uptime and performance.

One network to rule them all? Try two.

LEO satellites extend your network footprint into areas 5G can't always reach, like remote mountains, rural roads, or open water. Meanwhile, 5G performs well in populated areas, along highways, and near shorelines. Combined, they close the coverage gaps neither can handle alone. For public safety fleets, the best option for coverage, speed, and reliability is to use both LEO satellite and 5G together.

A hybrid WAN uses intelligent software to select the best connection at every moment, whether that's satellite, 5G, or LTE.

When public safety fleet vehicles are in areas with reliable cellular coverage, 5G can deliver fast, strong internet. But in remote or hard-to-reach locations, 5G signal strength may drop or disappear entirely. That's when the LEO satellite steps in. A hybrid system switches between the two without dropping the connection. That way, public safety personnel stay online the whole time.

One key benefit of 5G availability is network slicing. Network slicing gives public safety teams their own prioritized lane on the 5G network, helping ensure reliable performance even during storms or major grid events..

Pairing 5G and LEO satellite networks solves some of the most significant communication problems for public safety fleets. This kind of reliable, always-on connection makes a critical difference in the field, especially when lives are on the line.

No more dead zones. Public safety responders can use their connected devices, such as tablets, radios, or laptops, wherever they are, even in places with no cell towers.

Faster response times. Dispatch sees what's happening in real time. No delays waiting for the connection to be reestablished.

Better team coordination during emergencies. If several agencies respond to a wildfire or search-and-rescue call, they can all share the same mobile command center with reliable Wi-Fi and secure access.

Improved safety for first responders. Staying connected means public safety personnel can call to request backup or report in to dispatch from any location.

Images courtesy of Adobestock

The foundations of public safety fleet connectivity

Behind every reliable connection is the right technology doing its job. Public safety teams need the best tools in place to keep fleet vehicles connected. Ericsson's cloud-managed network solutions remove complexity to keep devices and applications running smoothly, securely, and without interruption.

Simplified tech control

Fortified built-in security

Link bonding

SD-WAN

Purpose-built in-vehicle routers
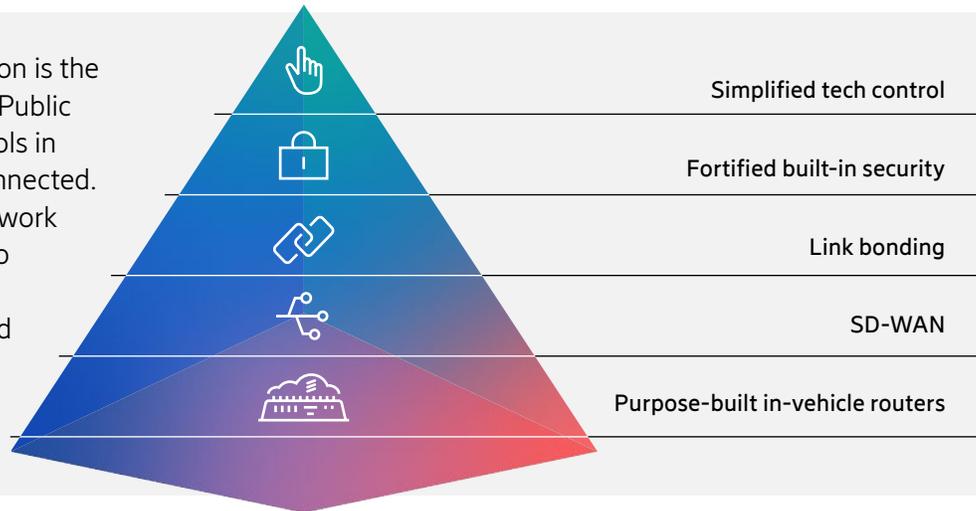
Purpose-built routers in every vehicle

Each patrol car, truck, or mobile command center is fitted with ruggedized routers built for tough jobs and rough conditions. These routers, combined with Ericsson NetCloud Service:

- Connect to both satellite and cellular networks and intelligently switch between them as needed to maintain the best connection.

- Select the best available signal when SD-WAN or link bonding is enabled, switching automatically if performance drops.

- Switch between networks automatically based on established network policies.

- Run lightweight onboard applications using containers and SDKs to alleviate some bandwidth needs.

SD-WAN: The intelligent traffic control system

SD-WAN manages how data flows in and out of the vehicle, like a smart traffic control system built into the router. It makes intelligent, real-time decisions to keep apps running smoothly, especially in challenging network conditions. It does this by:

- Identifying which apps need the fastest or most stable connection and assigning priority when bandwidth is limited.

- Monitoring satellite and cellular links for latency, jitter, and packet loss, then switching to the best-performing path.

- Using techniques such as forward error correction and packet duplication to reduce lag and prevent disruptions.

- Keeping sessions alive by instantly switching between networks if one link drops or slows down.

Link bonding: Combining connections for better performance

Link bonding improves network performance by combining multiple WAN links, such as satellite and 5G, into a single, more resilient connection. It works at the session or data unit level to keep traffic moving, even when one link is weak or unstable. This approach offers several key benefits:

- Aggregates bandwidth from multiple connections to increase overall throughput (WAN link aggregation).

- Distributes traffic across links to reduce congestion and smooth out performance (flow balancing).

- Duplicates critical data units across both links to prevent freezing or interruption (flow duplication).

- Keeps GPS, video, and other real-time tools running without lags or delays, even in rugged or remote areas.

Fortified built-in security

Network security should be based on a zero trust approach. Zero trust means no device or user is automatically trusted with broad access to the network. Each must be continuously verified, and permissions are only granted at the level necessary. This keeps the network more secure because:

- Each user and device is restricted to only the network areas they're approved to access.

- Lateral movement across the network is contained, which limits the ability of bad actors to breach the network.

- Data is encrypted so outsiders can't read it.

- IP addresses are hidden to protect identities and systems.

Simplified tech control

IT teams can manage all the routers in the field at scale from one dashboard using Ericsson NetCloud Manager. This saves deployment time and keeps fleet vehicles on the road. It also scales easily, giving agencies the flexibility to support a growing number of connected vehicles without overloading IT resources. NetCloud Manager gives IT teams complete visibility and control at scale to:

- Monitor performance in real time and push updates across the entire fleet from a single dashboard.

- Use built-in geolocation tools to create coverage heat maps, locate assets, and identify nearby cellular services.

- Easily scale the technology as the fleet grows without overloading IT resources.

- Deploy networks using zero-touch provisioning and use AI tools for proactive troubleshooting.
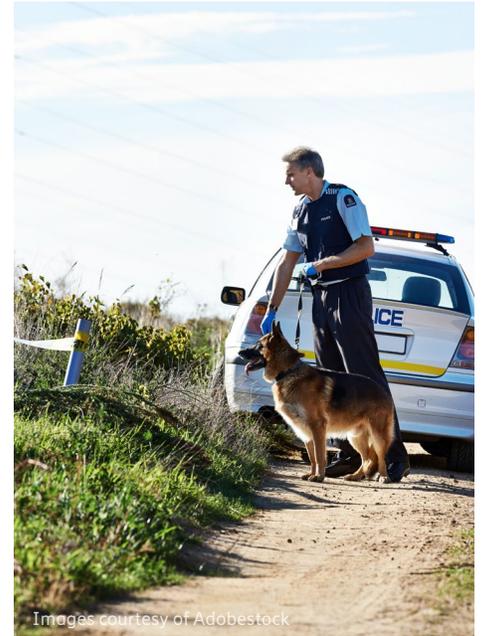
Images courtesy of Adobestock

Real-world results: Wyoming Highway Patrol's hybrid WAN

With a footprint of nearly 100,000 square miles, the Wyoming Highway Patrol (WHP) covers one of the largest and most rugged states in the U.S. Wyoming State Troopers patrol remote highways, national parks, and areas where cellular service is unavailable. This makes it hard for them to stay in touch with dispatch, rely on GPS navigation and digital tools, and get help quickly in emergencies.

To improve coverage and better support mission-critical tools, WHP equipped each of its patrol vehicles with Ericsson Cradlepoint dual-modem routers managed through Ericsson NetCloud. The routers come with unique capabilities, including:

- Connecting to two cellular networks (such as Verizon and AT&T)

- Automatically switching to the best cellular network

- Fall back to LEO satellite connectivity if both cellular options fail

Wyoming Highway Patrol also built a mobile command center with a router that connects to LEO satellite and 5G networks, which they use during emergencies, such as wildfires and search-and-rescue missions. As many as 10 people from different agencies can use the command center router at once, even in vast areas like Yellowstone National Park.

Since switching to this hybrid system, WHP has seen significant improvements.

- **No more dropped connections.** Troopers stay connected, even in remote areas. They can use laptops, radios, and video tools without worrying about losing the signal.

- **Faster response and better teamwork.** The mobile command center lets agencies work together in one connected space. It has secure Wi-Fi, printers, and video calling.

- **Easier management for the IT team.** Tech professionals can manage all routers from one screen using NetCloud Manager. They can update routers across the entire fleet of vehicles in just a few clicks.

Image courtesy of Getty Images

"Since we began using the new routers, we no longer get calls about the lack of connectivity. That's impressive, especially with how remote our troopers work."

A.J. Meyers, Applications Support Program Manager, Wyoming Highway Patrol

Images courtesy of Adobestock

In public safety, seconds count. First responders need reliable connectivity no matter where they are. Dependence on just one type of network is no longer enough. By combining 5G and LEO satellite networks, agencies gain the peace of mind that comes with always-on, secure connectivity built to perform wherever the call leads.

Learn more about enterprise wireless solutions