

Cisco Premium Mobile Broadband 1.0: Multiservice Networking for the Transportation Industry

What You Will Learn

This solution overview describes the Cisco® Premium Mobile Broadband (PMB) 1.0 validated mobile network design. It also explains how the transportation industry can use PMB to boost safety levels, add services, and lower costs through greater network interoperability and automation.

PMB 1.0 is a component of the Cisco Transportation Smart Solution (TSS) for [railways](#), [mass transit](#), public safety, and other sectors of the industry. It provides a validated mobile network architecture that empowers operators, workers, and passengers to move safely and to move efficiently.

Here's how.

Solving Complex Transportation Communication Challenges

PMB 1.0 networking helps you overcome complex communication challenges caused by aging, proprietary networks. For example, transportation workers, passengers, and responders can finally get the multiservice apps and functions that consumers with smartphones now take for granted. These rich video, voice, data, and collaborative communications help first responders do their jobs better by keeping them informed in real time. And they satiate passengers' demand for always-on Internet connectivity and information. Users and responders can get all these services as they roam across private and public networks, both wired and wireless.

Specifically, PMB is a 4G Long-Term Evolution (LTE) network. It serves railways, public safety, mass transit, and other locations in private, public, and hybrid models. The location could be in a railway station, trackside, or aboard a moving train. It could also be in a police car or fire truck. Or at a dangerous scene where a first responder needs situational information on his smartphone.

PMB is also an enabler of the emerging Internet of Things for critical machine-to-machine (M2M) communications, which have many automation applications in the transportation industry.

Specifically, here's what Cisco PMB helps you to do:

- **Unify Costly Proprietary Networks:** Traditional mobile communications networks in transportation environments are fragmented across different frequencies, technologies, and geographic locations. That makes them costly to maintain and prevents communications among them. PMB resolves these issues. It decreases capital and operational expenditures as you consolidate single-function, proprietary networks onto one IP-based multiservice network. The unified network is less expensive to run and lets different organizations share valuable data. It also opens the door to deploying services and automated operational capabilities that weren't previously possible.
- **Boost Public Safety:** With PMB intelligent communications in place, responders, passengers, and citizens are safer. Officers and firefighters, for example, are better prepared to handle situations if they have visibility into the specifics of an incident from their mobile devices as they arrive on the scene. They might get meaningful video or data about a suspect or crime, fire, or disaster site, for instance.

Solution Highlights

Cisco PMB 1.0 has built-in adaptability and flexibility. The holistic architecture is fully validated and supported by Cisco Advanced Services to deliver the following:

- **Multiservice broadband data** - rich, collaborative, connected experiences for operators and passengers
- **Improved operational efficiency** - ability to monitor and track vehicles leading to on-time operations, along with proactive and preventive maintenance
- **Converged networking** - consolidation of disparate networks that are expensive to operate
- **Real-time video systems** - improved safety and security
- **New passenger services** - Wi-Fi connectivity, location-based mobile apps, real-time payment options, and scheduling notifications
- **Increased revenue opportunities** - digital signs for advertising and promotions

The U.S. government is funding a nationwide 4G LTE network for first responders. 4G LTE, which is IP-based, operates at speeds of 50 Mbps downstream and 25 Mbps upstream in the U.S. and at twice these speeds in other parts of the world. Cisco PMB complies with the U.S. public-safety network mandate and can be deployed by other countries building similar nationwide emergency networks. The solution enables roaming among different network types without interruption for greater data sharing and responsiveness: Wi-Fi to 3G and 4G LTE. 3G to 4G. Wired to wireless. Public to private.

- **Leapfrog Current Operational Capabilities:**
You can use PMB to run trains and buses more efficiently and help keep them on schedule. When vehicles can communicate with stop lights and other machines and control centers, for example, slight adjustments can take place automatically, right at the instant needed. Such quick adjustments aren't possible with processes that require manual data correlation.

- **Offer New Passenger Services:** Are you looking for ways to stay competitive and increase revenue streams? Use the multiservice IP network to deliver digital promotion and advertising. Digital signs can improve the passenger experience by offering information services. Meanwhile, your passengers want Wi-Fi for their smartphones and tablets, which you can now offer.

Part of a Comprehensive Transportation Solutions Portfolio

Cisco PMB 1.0 is one component of the Cisco TSS set of validated designs. Currently, the other primary component is [Cisco Connected Rail](#), which contains several applications and subcomponents, including a unified mobile and Multiprotocol Label Switching (MPLS) backhaul transport network.

Our flexible, holistic architecture is what makes these transportation communications solutions unique. Government organizations and other enterprises need one-stop shopping so they don't get buried under massive integration challenges when trying to merge networks, radios, and services. The TSS, including Cisco PMB, delivers this integration with validated network designs created through collaboration with transportation industry leaders. We continue to collaborate with the industry to be sure to enhance transportation communications systems the right way, now and in the future.

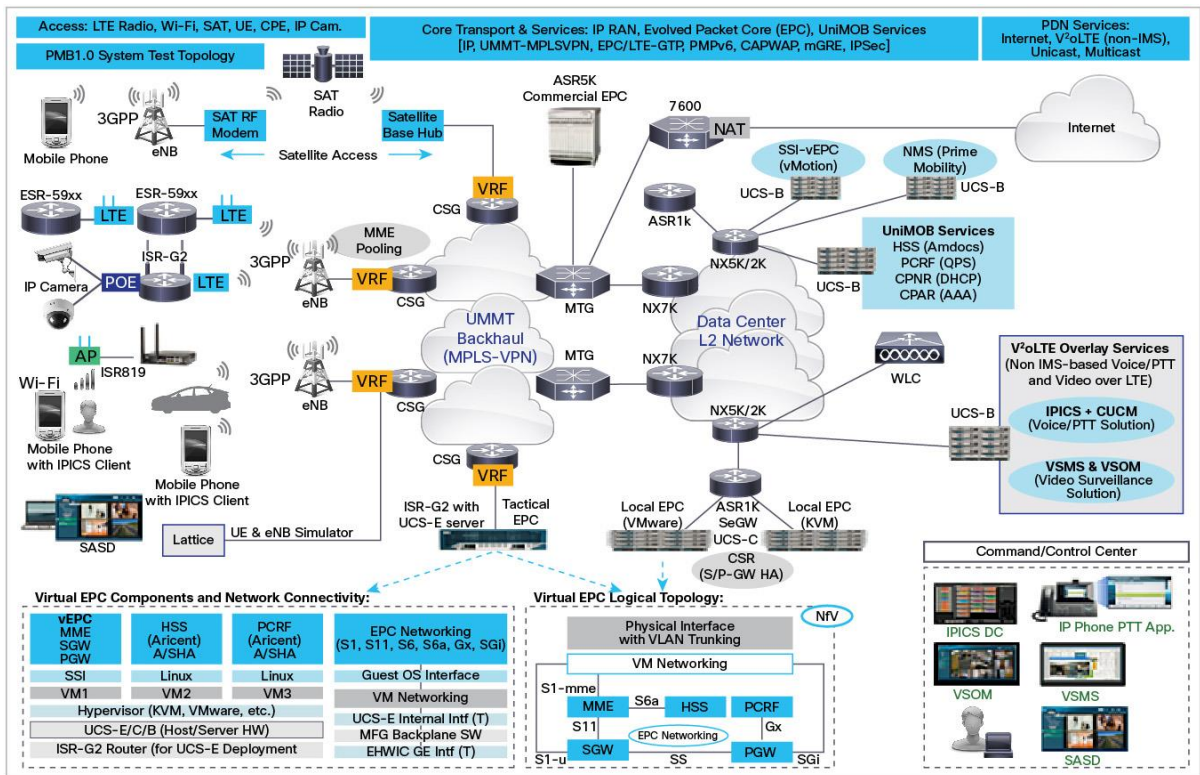
Here are key validated subcomponents and applications in Cisco PMB 1.0:

- **Evolved Packet Core (EPC):** You can run a virtualized packet core right in a Cisco Integrated Services Router (ISR) or in a Cisco Unified Computing System™ (UCS®) server in your data center. This setup means you enjoy all the benefits of virtualization - reduced capital costs, dynamic ability to turn on new services, and lowered aggregate power consumption, for example - as you build out your integrated transportation networks.

- **Cisco 819H Integrated Service Router:** This hardened router connects vehicles and offices using 4G LTE cellular networks. It withstands the extreme temperatures and vibration commonly found in transportation for uninterrupted communications at speeds to 100 Mbps.
- **Cisco IE 2000 and IE 3000 Industrial Ethernet Series Switches:** These switches are suited to harsh outdoor environments. The IE 2000 and IE 3000 switches provide a rugged, highly secure infrastructure with standards-based security, Power over Ethernet (PoE) flexibility, and industrial design and compliance.
- **Cisco Video Surveillance 6000 Series IP Cameras:** These cameras are high-definition (HD) with an open, standards-based design.
- **Cisco Aironet® 3600 Series Access Points:** These Wi-Fi access points, with CleanAir® interference-avoidance technology, serve high-performance mission-critical applications. They create a self-healing, self-optimizing wireless network.
- **Cisco Connected Mobile Experiences (CMX):** This solution is built on location intelligence from the Cisco Wi-Fi network and Cisco Mobility Services Engine (MSE). With location analytics, transportation organizations can learn about their customers' behavior, such as how they move through a station, and identify high-traffic areas. Operators can send them context-specific texts, such as scheduling updates, or other content through location-enabled apps or browser capabilities developed by Cisco partners.

Figure 1 shows an overarching diagram of the Cisco PMB 1.0 validated design.

Figure 1. Cisco PMB 1.0 Validated Design



Dream a Little...

If you are a railway or mass-transit operator, you might prefer to merge your networks into a single, connected experience. Today, if you're like most organizations, humans handle correlation between your systems with the swivel-chair approach of looking from screen to screen - a process that's limiting and error-prone. How might a merged capability translate into a real-world function?

Case Study: Bombardier Builds Trains to Customer Needs

Bombardier builds rail transport systems. The company turned to Cisco with some big challenges. It wanted to optimize train operations and also dramatically improve the passenger experience on those trains. In other words, the company needed to design trains that supported transit agencies' needs today and would continue to support those that will emerge tomorrow.

Cisco developed an onboard network comprising Cisco IE 3000 and IE 3010 Industrial Ethernet Switches. Now Bombardier's passengers enjoy video, voice, and wireless access services. And train system monitoring takes place over the same converged network to reduce costs.

"Transit agencies purchase their railcar systems with the expectation of lasting for many years," says Eric Larsen, Engineering Specialist II, Network Communications and Security for Bombardier. "Cisco helped us design a network that provides leading-edge industrial intelligence to support agencies' strategies for attracting and maintaining ridership, while easily scaling to meet their changing needs over time."

Consider a bus that's running late on its route. And it can now communicate with the city's traffic light system. The bus has intelligence onboard showing it's behind schedule by three minutes. It automatically communicates this situation to the traffic-light control system. A series of traffic lights on the route automatically shortens waits by 10 seconds to allow the bus to get back on schedule.

In public safety, imagine the PMB-enabled officer who now has the same capabilities consumers expect on their smartphones and tablets. A first responder needs contextual awareness, descriptions of suspects and buildings, and other life-saving data and video in real time. So the ability for the officer to see inside a building or get the history of a suspect can influence the outcome of the incident.

PMB helps you integrate and augment the older, proprietary communication systems that are very costly to operate and that create limiting islands of communications. Instead, now people communicate with people, machines communicate with machines, and people communicate with machines onboard trains, in buses, in emergency vehicles, and on the street. Across network boundaries.

Why Turn to Cisco?

Cisco offers several validated PMB network deployment models, and we're in the transportation market to stay. We've made a major investment with our validated Cisco designs. And we continue to collaborate with key transportation industry companies and specialists to ensure that the designs specifically address real-world needs. This approach lowers your risk and accelerates your deployment time. Our complete end-to-end architecture and service provider relationships set us apart from our competitors. That translates into longer-term benefits and new business models for you.

Cisco Services

From strategy to execution, we help you plan, build, manage, and support your Cisco Transportation Smart Solution. We apply our industry leading experience to help you improve system operational efficiency, scalability, security, and profitability with an end-to-end approach that aligns outcomes to your business goals.

For More Information

Learn more about the Cisco Premium Mobile Broadband by visiting

<http://www.cisco.com/c/en/us/solutions/collateral/service-provider/mobile-internet/white-paper-c11-730950.html>.

You can discuss your organization's mobility initiative and requirements by contacting your local Cisco representative or Cisco partner.




Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

 Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)