

# Cisco Positive Train Control



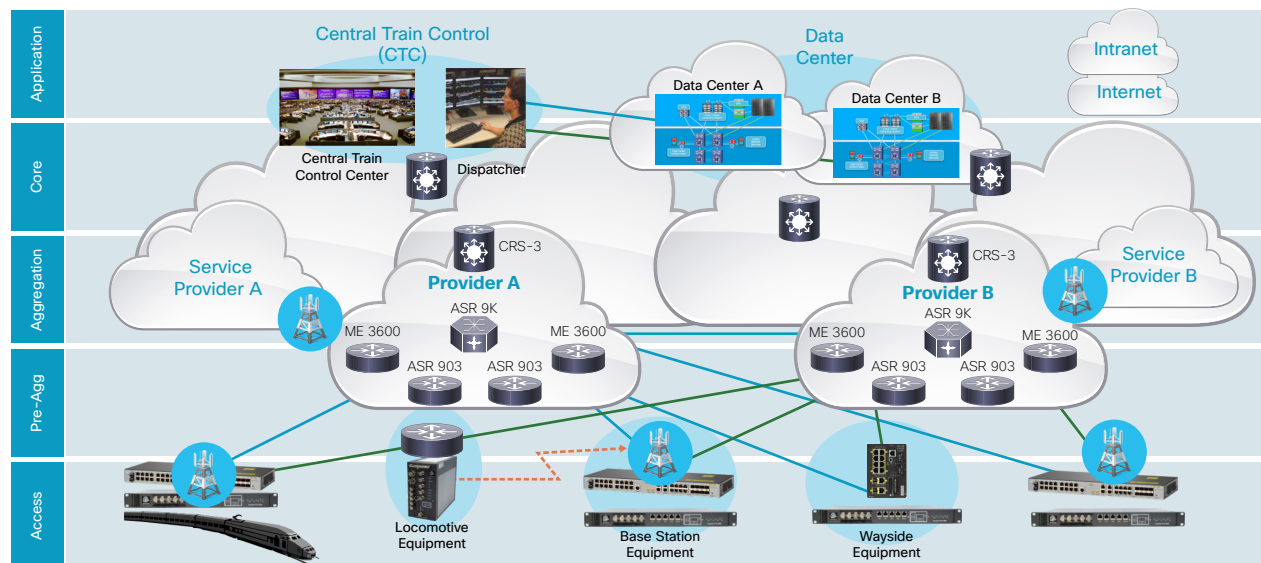
## A Transportation Smart Solution for Improving Rail Safety

Cisco® Positive Train Control (PTC) is a validated network design and product set for a highly secure, end-to-end rail communications network that complies with U.S. Rail Safety Improvement Act requirements. Cisco PTC lowers potential network design and implementation risks, helping prevent rail accidents and loss of life.

Since PTC can be part of a consolidated IP rail communications network, you can deliver new services like video, voice, and wireless communication over the same converged IP network. The result: both cost savings and new service offerings that can increase freight velocity and enhance passengers' experiences.

Figure 1 shows the Cisco Positive Train Control Architecture

**Figure 1.** Cisco Positive Train Control Architecture (Combined Train and Trackside Architectures)



## Reducing Human Error and Rail Accidents

Rail safety has been a concern for many years. Sadly, however, it took a major train collision to prompt legislation. When a Metrolink commuter train collided with a Union Pacific freight train in September 2008, killing 25 people and injuring 135, it prompted the quick passage of the Rail Safety Improvement Act. This federal mandate applies to railways operating in the United States and includes positive train control safety measures. PTC has been designed to help prevent:

- Train-to-train collisions
- Derailments caused by excessive speed
- Train incursions into established work-zone limits
- Trains moving through a track switch left in the wrong position

An effective PTC system determines train location and speed. It augments the engineer's own safety actions by automatically applying brakes if he fails to heed warnings to slow or stop the train. PTC must be installed by the seven U.S. Class I railroads, several regional commuter lines, and some short-line railroads in the U.S. by December 31, 2015. Doing so requires deploying PTC systems on over 80,000 miles of track and more than 20,000 locomotives.

## A Comprehensive Solution for Compliance

Cisco PTC is the industry's first comprehensive solution for PTC compliance. It integrates onboard, trackside, wayside, signaling, and back-office systems. Interaction between devices on these systems relies on a redundant and resilient bidirectional communications network.

- **Validated network design:** The Cisco PTC validated design lowers potential design and implementation risks. It also supports network interoperability using proven technologies.
- **Flexibility:** No two railroads have identical requirements. Although the Cisco PTC network design is well defined, it's also flexible. Cisco PTC offers multiple communication interfaces, including Ethernet, Wi-Fi, 220-MHz PTC Radio, and 3G/4G cellular. You can easily configure radio interfaces through software. The same digital data link and network used to meet PTC safety mandates can also transmit information to train crews. It can also monitor completed work and send real-time diagnostic locomotive information.
- **Transport resiliency:** The transport network is built on a Cisco Unified MPLS Mobile Transport (UMMT) Validated Design for high reliability. It includes access, aggregation, and core network layers with field-proven ruggedized Ethernet switching at the edge. A multipath backhaul delivers subsecond reconvergence for high performance.



- **Leading innovation partner:** Lilee Systems is the rail industry's top innovator in software-defined radio (SDR) communications equipment. Cisco partners with Lilee Systems and its TransAir family of technologically advanced products for an industry-leading PTC solution. For simplified ordering, you can procure all Lilee PTC components directly from your Cisco account team for an end-to-end PTC solution.

## Gain Compliance...and More

The Cisco PTC solution offers a tested, validated solution for meeting PTC compliance requirements. But that's not all. Railroads also can:

- **Minimize deployment risk:** Validated network designs and proven products minimize deployment risk. And Cisco offers Strategy and Analysis, Assessment, Design, Deployment, Optimization, Product Support, Solution Support, and Operations Management services to help. Accelerate deployment, optimize efficiency, and simplify ongoing management of your PTC solution with confidence – through Cisco Services.
- **Improve operational efficiency:** Cisco PTC solutions are engineered by industry-leading technology experts. We pretest your solution with you, so that you can confidently expect optimum performance when deployed.
- **Save money while future-proofing:** Because you can integrate multiple capabilities over the PTC transport network, you save money and it's easy to add new services. For instance, add video surveillance to improve operations or passenger and asset security. Deliver secure mobile Wi-Fi services to train crews or passengers. Give station and trackside employees new mobile communication capabilities. One network. More options. Reduced cost and complexity.

## Cisco PTC Solution Components

- Validated network design
- Cisco Unified MPLS for Mobile Transport (UMMT) backhaul network
- Cisco ASR Aggregation Services Routers (ASR 901, ASR 903, and ASR 9000)
- Cisco Carrier Routing System
- Cisco IE 2000 and IE 3000 Series Industrial Ethernet Switches
- Cisco ME 3600X Series Ethernet Access Switches – built specifically for the convergence of wireless and wireline services
- Lilee Systems (Cisco OEM) TransAir SDR radios for onboard locomotives, base stations, and wayside yards
- Lilee Systems (Cisco OEM) TransAir wayside messaging server and mobility controller
- Cisco Prime™ IP Next-Generation Network (NGN) network management system

## Network Security

As the multitude of connected sensors and devices grows and video surveillance and other applications move to IP, the importance of physical and network security becomes even more critical.

Network-aware intelligence and end-to-end physical security for video and all networked applications are at the heart of a Cisco Transportation Smart Solution. Cisco understands the importance of network security and continues to lead the industry in standardization and protocol development. Cisco Validated Designs based on proven technologies not only reduce implementation risks but also are designed to meet the highest levels of security.

## Why Turn to Cisco?

Cisco has been collaborating closely with rail customers and industry experts for the past several years. We listen to their input and have made major investments in our validated designs.

We're shaping the future of rail. And we're committed. Only Cisco offers an end-to-end integrated solution that enables you to meet PTC compliance requirements while also reducing costs and adding new service flexibility. You can also meet freight industry and passenger demands for mobility with high-quality experiences. And we're opening the door to new revenue-generating opportunities and partnerships 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

For more information about Positive Train Control and Cisco's Connected Rail solutions, visit <http://www.cisco.com/go/connectedrail> or contact your local Cisco account representative.