Train Manufacturer Builds Future into Transit Customers' Railcars

Industrial intelligence enables Bombardier to deliver trains with operational optimization and enhanced passenger experience.

EXECUTIVE SUMMARY
BOMBARDIER TRANSPORTATION
• Industry: Rail Transportation Manufacturing
• Location: Pittsburgh, PA, USA
• Number of Employees: 36,200 at 62 sites in 25 countries
CHALLENGE
• Design trains that support transit agencies' needs today and tomorrow
• Provide networking capabilities that enhance passenger experience
• Create network design that can be easily replicated with minimal modification
SOLUTION
• Cisco IE3000 and Cisco IE3010 Industrial Ethernet Switches
RESULTS
• Created replicable design for fast, resilient, ruggedized networks that are highly scalable and configurable
• Enable Bombardier's customers to provide passengers with video, voice, and wireless access services
• Converge train system monitoring over same network to reduce costs and cabling

Challenge

Bombardier builds complete, environmentally sustainable rail transport systems. The company's technologies are designed for urban, airport, and mainline rail operations and include a comprehensive portfolio of rolling stock, propulsion, and control systems. Bombardier's customers are transit agencies around the world, and the company must continually innovate to help its customers operate trains efficiently, safely, and with a superior passenger experience.

Each train car relays critical operational, environmental, and geographic data to trackside terminals, enabling its owner to optimize operation and performance. At the same time, each car must support communications for delivering information to passengers, generating advertiser revenue, transmitting security video to Central Control, and communicating emergency instructions. Because the network carries operational and passenger communication data, it must be available at all times during train operation. However, trains are demanding environments for networking equipment with extreme temperatures and vibration.

Bombardier came to Cisco for assistance in developing an onboard networkthat will give its customers efficient, cost-effective capabilities that enhance the passenger experience. The network design also had to allow Bombardier to easily replicate the network architecture with minimal modification between customer orders.

"Transit agencies purchase their railcar systems with the expectation of them lasting for many years," says Erik 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."

Solution

Industrial intelligence enables organizations to more intelligently and responsively manage transportation operations from a global perspective. In many transportation deployments, industrial intelligence solutions use IP networking to connect sensors and controllers, operational processes, and people. Connected trains enhance safety and energy awareness while supporting secure, responsive processes.

> "There are numerous options for basic connectivity and passing train control and sensor information. However, Cisco brought its vast expertise in networking, voice, and video, together with a deep understanding of our business and goals to the project. We simplified and future-proofed our offerings while retaining the flexibility to customize trains to our customers' needs."
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> **—Erik Larsen, Engineering Specialist II, Network Communications and Security**

Bombardier's network solution is based on Cisco® Industrial Ethernet 3000 (IE 3000) and IE 3010 Series switches. The switches are deployed in the front and back of each car so that cars can be easily coupled together to create a complete network. The network design uses Cisco Resilient Ethernet Protocol (REP), which is designed to provide network application convergence within 50 ms. An REP design creates a highly reliable network ring on a completed train, so that if a device fails, traffic is switched to a second switch without interrupting communications.

Cisco IE 3000 and 3010 Series switches are ruggedized for harsh environmental conditions, such as the temperature extremes and vibrations inherent in train transport. With a flexible, modular design and the ability to use DC power, the Cisco IE 3000 and 3010 Series switches work with the DC power used by the train without requiring electrical adaptation. Switches offer multiple form factors and rack mounting to fit into the various sized closets available on a train.

Various port densities enable Bombardier to meet various customers' needs, from minimal port requirements to large aggregation points. The Cisco IE 3010 switches also provide power over Ethernet (PoE) to power devices such as wireless access points, voice over IP devices, and closed-circuit television cameras.

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For example, an IP network with industrial intelligence works hand in hand with new cloud-based services that converge voice, video, and data streams on a common platform. The combination gives transit agencies tremendous new collaboration and decision-making powers, as well as the ability to offer new onboard services to passengers.

Results

With the Cisco IP network, Bombardier trains can support the widest range of services. Voice over IP solutions can be implemented for passenger safety with features such as Emergency Call. The network connects train sensors to enable door monitoring, train controls, surveillance, and other functions. Video streaming capabilities can be used to deliver entertainment, advertising, transit agency information, and other passenger information. Wireless access solutions enable train controls and passenger devices to use the network with high service quality, while wireless bridging solutions pass data to trackside terminals. Bombardier customers can offer convenient services to their passengers with high performance and reliability and help ensure that operational data is always flowing.

> **PRODUCT LIST**
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> **Routing and Switching**
> - Cisco Industrial Ethernet 3000 Series Switches
> - Cisco Industrial Ethernet 3010 Series Switches

With a highly replicable architecture based on the Cisco IE 3000 and 3010 Series switches, Bombardier has reduced the time needed to design the train network and individual car layouts.Bombardier also expects to convert more systems to IP and add them to the network.With help from Cisco, Bombardier has put its customers on a fast track to the future.

For More Information

To find out more about Cisco IE 3000 Series switches, visit: www.cisco.com/go/ie3000.

To learn more about Cisco Industrial Intelligence, visit: www.cisco.com/go/industrial.

This customer story is based on information provided by Bombardier Transportation and describes how that particular organization benefits from the deployment of Cisco products. Many factors may have contributed to the results and benefits described; Cisco does not guarantee comparable results elsewhere.

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