

Railway Transportation: An Industry Transformed

“Connected Train” Enables Better Customer Service and Agile Operations

Executive Summary

CUSTOMER

Bombardier Transportation

INDUSTRY

Transportation

CHALLENGES

- Need for cost containment in a low-margin, high-risk industry
- Lack of industrywide standards and interoperability
- Need for differentiation in increasingly competitive industry

SOLUTIONS

- Internet Protocol-based architecture and a communications “bus” onboard the train
- Networking components to connect to the wayside
- Process change—from proprietary to open, standards-based operations
- Dozens of services related to passenger comfort, train safety, and train performance

RESULTS

- Materials costs reduced by 10 percent
- Predictive maintenance can reduce system failures, saving up to EURO€1 million in penalties per fleet
- Integration of wayside services provides safety and convenience offerings such as Internet connection, real-time video surveillance, and real-time train visibility

Railway transportation has emerged as a fast, convenient, safe, clean, and low-cost alternative to air and road travel. In Europe alone, high-speed rail traffic has more than tripled over the past decade, and rail has surpassed air travel in the short-haul trip segment, according to an analysis of data by the Cisco® Internet Business Solutions Group (IBSG). Because of this, rail operators are focusing on growth and on strategies to improve customer service and increase the efficiency and productivity of their operations.

At the forefront of these efforts is Berlin, Germany-based Bombardier Transportation, the world’s largest rail equipment manufacturer. Since 2004, Bombardier and Cisco IBSG have collaborated on the concept of the “Connected Train”—a strategy to transform the industry through Internet Protocol (IP)-enabled business architecture.

This new IP architecture enables dozens of services, including onboard Internet access and other passenger services, remote train diagnostics, preventive maintenance, train management and control, communications, safety and security monitoring, and staff training.

Collaboration with Cisco IBSG has cemented Bombardier’s reputation as an innovator, and has improved its operations and lowered costs in three important areas: the train commissioning process, railcar maintenance, and wayside applications.

Challenges

Making fundamental changes in rail transportation is extraordinarily challenging. The industry as a whole is conservative about adopting new processes and methods of operation—understandable, given the magnitude of potential losses if something goes wrong. In Europe in particular, government regulation, liberalization, and restructuring only add to the complexity.

From a manufacturing standpoint, Bombardier faced another set of challenges:

“Every new train assembled by Bombardier today has an Internet Protocol bus embedded on it. Cisco IBSG helped us transform our business.”

Åke Wennberg

President, Locomotives and Equipment

Bombardier Transportation

- **Cost containment:** Rail manufacturing is a low-margin, high-risk industry. Containing costs and maintaining flexibility are crucial, because economic and operating conditions can change dramatically over the long lifecycles in rail (10-year vehicle delivery cycles, 30-year operating cycles). This lag leads to obsolescence, especially in electronics.
- **Lack of industrywide standards and interoperability:** In Europe, each country has adopted its own systems for rail transport, although the European Union is instituting a fully interoperable system over the next 20 years. Incompatibility among the various information systems and processes on trains, and between trains and the wayside, creates a complex networking environment. Furthermore, it is challenging to provide consistent services among different rail systems and across multiple countries.
- **Need for differentiation:** Rail industry expansion, liberalization, and increased competition are driving the need for rail companies to innovate to capture new market share.

Solutions

Cisco IBSG engaged with Bombardier to help develop the vision for the “Connected Train,” an open-standards-based onboard architecture. This represented a monumental shift for the railcar maker, where engineers continued the long-held tradition of developing products—including switching and routing systems—in-house. By refocusing on off-the-shelf information technology, engineers become experts in integrating solutions rather than inventing them. Cisco IBSG demonstrated to Bombardier how a common network platform for carrying data, voice, and video traffic would reduce complexity, increase standardization and interoperability, and lower operating costs.

Cisco IBSG assisted Bombardier in identifying nearly 100 application services and related processes that take advantage of this advanced connectivity platform. These services fall into seven categories:

- Passenger convenience (Internet access, entertainment)
- Communications (telephony, announcements)
- Safety (passenger, crew, bystander) and security (mobile- and fixed-asset monitoring, information security)
- Staff information and training
- Remote asset management (control center)
- Remote diagnostics (maintenance, repair, inventory management)
- Vehicle operation (monitoring and controlling)

Teams from the two companies also identified business benefit areas for the key players in the extended rail system—passengers, operators, and the manufacturer. Cisco IBSG led workshops with industry experts and business analysts in Europe, Canada, and the United States, and the two companies brought their engineering teams together for brainstorming. Cisco engineers provided Bombardier with extensive education on open-standard IP opportunities and trends, and conducted several live tests.

As a result, Bombardier adopted the Connected Train vision and implemented the business strategy. The company is already generating benefits for its operation, and providing an exciting platform and solution. Said Åke Wennberg, president, Locomotives and Equipment, Bombardier Transportation, “Every new train assembled by Bombardier today has an Internet Protocol bus embedded on it. Cisco IBSG helped us transform our business.”

Results

Although the Connected Train initiative is still in its early stages, Bombardier is already realizing significant benefits in its three most important arenas: train production and commissioning, maintenance, and wayside operations.

- **Production and commissioning:** A typical train contains more than 6.5 tons of cable, and cables are a very expensive part of a train. By using IP-based technology to reduce the number of networks and cables, Bombardier has identified potential savings of up to 10 percent.
- **Maintenance:** Predictive maintenance, which allows real-time monitoring of components such as doors, brakes, and air conditioning, is one of the new capabilities of the Connected Train. A sensor on a brake, for example, can notify crews that the brake is wearing out so they can pull it for service before it causes a problem. By using train-to-wayside connectivity and data collection, Bombardier Transportation has reduced the number of mission-critical failures during operations by 15 percent. This can save the company up to EURO€1 million in penalties per fleet.
- **Wayside:** In addition to enabling onboard services, the IP foundation provides seamless integration of trains with the wayside infrastructure. This important capability enables a set of advanced services not previously available in an integrated solution. For example, passengers can connect to the Internet while riding the train. Real-time video surveillance provides improved safety and security. Real-time train visibility and positioning enable critical decision making in the control room and increase punctuality.

Conclusion

The rail transportation industry is characterized by a great degree of operational and technological complexity, and that has made it historically slow to change. But the “Connected Train” vision jointly developed by Cisco IBSG and Bombardier Transportation has set in motion an unprecedented level of innovation, not unlike that of enterprise computing 15 to 20 years ago.

By moving to an IP-based foundation and open-standard, off-the-shelf technology, Bombardier is reducing its production costs while providing dozens of new services to improve customer experience, safety, and security. And these revolutionary advances are just the beginning. As the operations and IT sides of the industry integrate more closely, they lay the groundwork for the next wave: incorporating innovations occurring in mobility, video, and the social web for an even stronger focus on customer service and passenger experience.

More Information

Cisco Internet Business Solutions Group (IBSG), the company’s global consultancy, helps CXOs from the world’s largest public and private organizations solve critical business challenges. By connecting strategy, process, and technology, Cisco IBSG industry experts enable customers to turn visionary ideas into value.

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