

CSX Transportation Stays on Track With IP Mobility

Customer View

“An IP platform allows us to extend our enterprise to the mobile environment so that every employee becomes part of our enterprise platform.”

—Lynn Jarrett,
Director of Advanced Engineering,
CSX Transportation

CSX Transportation is an innovator in the railroad industry, changing the way it manages its business by launching an IP mobility platform that enables enterprisewide applications to further improve communications, efficiency, and safety. Resulting financial benefits are projected to be measured in the hundreds of millions of dollars.

BACKGROUND

CSX Corporation came into being with the merger of the Chessie System Railway and the Seaboard Coast Line Railroad in 1980. Since then, through its subsidiaries, CSX Corporation has grown to be a multimodal freight transportation company that provides rail and intermodal transportation services across North America.

CSX Transportation operates the largest rail network in the eastern United States. CSX Intermodal provides transportation services across the United States and into key markets in Canada and Mexico. Automakers, steel fabricators, food and grain shippers, concrete makers, and many, many other industries rely on CSX Corporation and its subsidiaries every day.

CHALLENGE

Historically, the railroad industry has not moved quickly from one generation of technology to the next, due to the enormous capital costs of operating multistate infrastructure and maintaining locomotive and car fleets. And, the concept of steel wheel on steel rail has endured as an economically viable and efficient means of transportation for more than 150 years. But low-cost applications with significant potential have prompted railroads such as CSX to re-examine how technology can help improve efficiencies.



Prepared by Cisco Systems, Inc.
Internet Business Solutions Group

According to the October 2004 issue of *Air Cargo World*, “Experts indicate that a reduction of one mile per hour in average train velocity creates an artificial need for another 250–300 rail-cars.” Another study shows that if the average velocity could be raised to 30 miles per hour, total profits would double. “One of the things our company has been doing is trying to figure out how to get more utilization out of our large capital investment,” says Lynn Jarrett, director of advanced engineering, CSX Transportation. “What we are finding is that highly successful applications of IT, with significant productivity benefits, are coming from industry-specific applications with direct impact on the core activities of the industry,” says Pravin Raj, director, Cisco Internet Business Solutions Group (IBSG).

“WHAT WE ARE FINDING IS THAT HIGHLY SUCCESSFUL APPLICATIONS OF IT, WITH SIGNIFICANT PRODUCTIVITY BENEFITS, ARE COMING FROM INDUSTRY-SPECIFIC APPLICATIONS WITH DIRECT IMPACT ON THE CORE ACTIVITIES OF THE INDUSTRY.”

Pravin Raj, Director, Cisco Internet Business Solutions Group (IBSG)

In addition to optimizing its existing physical infrastructure and reducing costs, CSX also identified improved safety and communication as key drivers in its mission for consistent, continuous change. In the past, when work teams headed out of the yard for the day, they were armed with two-way radios and paper-based instructions that they used to coordinate logistics between locomotives, repair crews, and other events. However, the 30-year old UHF/VHF communication system is voice only and occasionally has “dark areas” in some of the diverse territories through which the tracks run.

The paper-based instructions were not supported by real-time information. For example, typically train crews receive work orders in the form of a fax, which they review and put into their pockets. This form of communication serves as the primary instruction for the crew from the time of departure until the destination is reached. During the course of the journey any changes that might be requested by central dispatching were communicated over the voice radio. CSX clearly needed a better method of end-to-end communications that would be available everywhere it was needed to everyone who needed it, and would also enable convergence of voice and data for the most up-to-date status of track conditions, engine and car conditions, and other important variables.

In its quest to become more efficient while improving communication and safety, individual departments within CSX began exploring wireless technology. However, without an overarching vision and strategy, they were realizing only small pockets of improvements in the overall situation. “There was a lot of duplication of effort,” Jarrett says.

SOLUTION

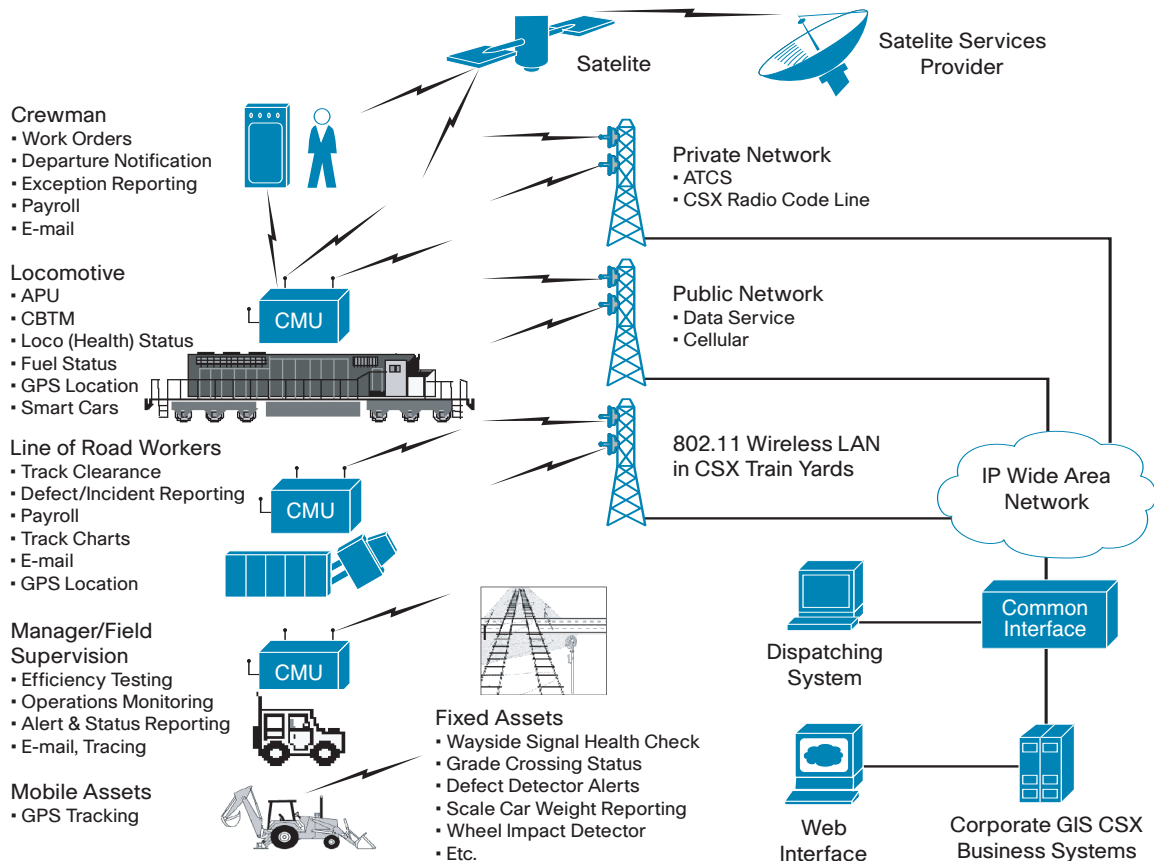
“About three-and-a-half years ago our CIO, John West [then VP Applications Development], asked me to head up a wireless team to look into the potential of using **wireless technologies** to support our business,” says Bill Everett, director of engineering for communications solutions, CSX Technology. “The idea was to look at business needs and applications from a holistic perspective.”

Everett and Jarrett put together a corporate wireless team focused on creating a strategic differentiation. The cross-functional team included representatives from every key area of the business, from IT and customer service to engineers, dispatchers, and mechanics. “The intent was to come up with an enterprise vision for wireless communications,” Jarrett says.

“Our purpose was to identify how to leverage wireless applications across business processes and prioritize the business processes that made the most sense to mobilize,” Everett adds. “The ones that touched the customer were the most important.”

As part of this effort, Everett and Jarrett engaged with Cisco Systems® to analyze the possibilities of a mobile IP platform. “We worked together through some business process mapping focused on what would be possible if the various functions were wirelessly enabled,” Everett says. “Out of that came a process spreadsheet that became the cornerstone of our wireless vision.”

Figure 1. Enterprise Mobility Platform for the Future



In working with the functional representatives, Everett and Jarrett drove discussions around “what if” scenarios to prompt ideas for process change. “We didn’t want them to just think about automating what they do today,” Everett says.

From these discussions came requirements for a suite of applications including position reporting, work orders, event recorder downloading, and train control that led to the concept of a Communications Management Unit (CMU) that is enabled by a [Cisco Mobile Access Router \(MAR\)](#). CSX began a series of pilots to test the mobile IP-based CMU architecture under field operating conditions.

RESULTS

Today, CSX has five projects either in pilot, in full production, or with funding approved and has several more in the planning stages. The first wireless mobile IP enterprise project, which is now fully operational, was the *Onboard Work Order Reporting System (OBRS)*. CSX launched this first because updating what had been a manual system will yield major efficiencies in data handling and rail car utilization by inputting data once and then moving it wirelessly. The onboard work order management system keeps 200 rail conductors in constant contact with workflow progress reports and freight scheduling updates, eliminating the reworking and handling of manual data and increasing workforce productivity, uniform job reporting, and data accuracy.

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An application in pilot mode is the *Communications-Based Train Management System (CBTM)*, intended to improve safety within train operations. An economic evaluation done by CSX projects a return on investment from applying a CMU to the CBTM system of up to thirty percent in reduced communications infrastructure. “What we looked for was a platform that could scale to include all these applications and more and that would build on the technology we already had installed,” Everett says.

A third application is *Equipment Health Monitoring System (EHMS)*, which connects standalone devices that are placed approximately every 30 miles along CSX’s right of way. EHMS monitors and reports on the health of the train, either in the form of looking for hot bearings and journals on locomotives and freight cars, high impacts on the rail caused by flat spots on the wheels, load shifts, and other problems. With this real-time information, decisions can be made to slow speeds, divert trains to alternate tracks, and take other actions to improve the reliability and safety of railroad personnel and customer cargo.

The *Event Recorder Automated Download* is another important application that records and downloads information from freight locomotives about each journey using wireless 802.11 technologies. And the *Asset Tracking System (ATS)* uses satellite communications to report the location of CSX locomotives, enabling the company to precisely track a key asset. The fact that the CMU can use multiple modes of communication technology—satellite, 802.11 WLAN—means that applications requiring real-time connectivity all the time use satellite, while those that can be batched use 802.11 WLAN. All in all a compelling business case for the CMU.

Mobile IP: A Fitting Strategy

The strategy to move to a standard IP infrastructure is proving to be the right one for CSX. “Over the last few years there has been a quantum leap in the capabilities of the wireless technical environment,” Everett says. “Things you couldn’t do four years ago, you can do cost-effectively now.”

The mobile IP concept is showing returns in the ability to efficiently and cost-effectively use different communications options, such as streamlining the work order process. With the wireless solution, CSX has improved the data accuracy, uniformity, and timeliness of job reporting. Now conductors can enter data once from the field as it happens. The average lag time in delivery reporting has been cut by two-thirds, which is important to customers who track shipments. By eliminating manual data entry and improving the timeliness of customer orders, CSX found it could improve the accuracy of work order reporting while creating new efficiencies in inventory management and revenue capture.

NEXT STEPS

Once the pilots are completed successfully, CSX plans to continue its innovative approach to doing business. “We’re keeping an eye on the things that will position us for change, and that includes video,” Everett says.

Also, because the [Federal Communications Commission \(FCC\)](#) has mandated a change in the radio systems railroads use by 2013, CSX plans to build on its IP network. Although the railroads have interoperability for voice through their private VHF network, an IP platform is the route to ensure interoperability of data. “We plan to replace our radio system with a very flexible digital radio system that will allow us to use frequencies for voice and data,” Jarrett says. “As part of that process, we will extend our wireless IP network infrastructure all the way to the portable device. We’ve already begun adding routers to the base station controllers; the next phase will be to replace those base stations with radio systems that have appropriate over-the-air protocols to support moving to IP all the way to the mobile unit itself.”

MORE INFORMATION

For further information on Internet business solutions, visit <http://www.cisco.com/go/ibsg>



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