

Wireless - Reshaping the Railroad Terrain

Communication Technology is transforming the highly distance-intensive railroad industry. Speed, Information and Innovation are the rules of the '**Wireless Revolution**' game. From crew-alertness to yard-management systems, this multi-billion-dollar rail market is moving onto the wireless fast lanes to boost productivity and gain a competitive edge.

This article skims through the current mobile/wireless scenario prevailing in the railroad industry and the integrated rail applications that serve as a means to increase their bottom line.

The Driving Force: Spurred by declining profits, railroaders are fast embracing wireless/mobile communications to seamlessly integrate networks for rapid information dissemination. While rail companies are looking for economical ways to enable their existing systems to better manage/track rail and railcar assets; software companies are developing mobile applications (combining the rail expertise) to offer ubiquitous connectivity and integrated wireless data applications.

How does wireless play a vital role in the *rail operations lifecycle*?

Most importantly, wireless technologies track rail and railcar assets such as inventory control, purchasing, preventive maintenance, warranty and repairs and modifications.

A broad spectrum of features covered by wireless includes:

- Work order reporting
- Rail asset tracking
- Crew alertness monitoring
- Crew scheduling
- Travelers advisory systems
- Constant updates and keep operations running on time
- Streamline inventory process

A study reveals that one in five San Francisco Bay Area's BART (Bay Area Rapid Transit) riders have a PDA and 70% of those have a Palm. *A surefire hit for the rail industry to catch on with the wireless wave!*

How does the rail industry gain?

From rail yards to loading ramps, Enterprises can:

- Better manage and control assets
- Improve labor productivity
- Increase railroad economic viability and profits
- Reduce inventory costs
- Prevent collisions and over speed accidents
- Provide greater security
- Increase railroad capacity and asset utilization
- Improve service to railroad customers
- Decrease costs of laying cables under tracks

For Passengers, it means to:

- Offer email and voice services
- Provide data on train schedules, fares and system maps
- Sign-up for email alerts of delays and schedule changes
- Get customers updated on the latest information on cars known as Wireless car tracing

Selecting the Right Technology

Railroaders witness significant cost savings utilizing wireless management solutions. But, there needs to be a proactive approach towards selecting the technology that best fits individual businesses to help curtail costs and improve productivity.

These wireless systems incorporate sensor, computer and digital communication technologies in areas of train control, braking systems, grade crossings, defect detection, planning and scheduling systems etc.

A partial list of mobile/wireless technologies that are developed or are under development for the railroad industry globally are:

- ***Wireless satellite-based systems:*** Monitors refrigerated rail cars by providing data on GPS location, internal cargo space temperatures, compressor fuel and pressure status, voltage levels etc.
- ***Nationwide Differential GPS (NDGPS):*** An extension of the Global Positioning System (GPS), NDGPS provides a few meters positioning accuracy to receivers capable of receiving the differential correction signal.

- **Wireless LANs:** Allows easy access to data, voice and video via RF within the geographically defined wireless networks to support mobile workers. It highly reduces cost of operations and improves performance.
- **Mobile LANs:** Seamlessly connects wireless LANs/terrestrial-based wireless data communication systems with on-board / satellite communication systems, radio links, handheld devices etc. for rapid data transfer.

A few examples are:

- A switchman can use a handheld device to communicate with a locomotive system (using a spread spectrum) to send messages, report work order events, in real-time. These systems are useful in car repair billing, maintenance, and inspection applications.

- Technicians service vehicles fitted with Mobile LAN that allows them to roam in areas around the vehicle, yet maintain communication with the central host database.

- **Microwave systems:** Remotely monitors and controls yard functions. These systems integrate video surveillance systems with microwave communications technology. Multiple video cameras are mounted on towers within the yard, which transmits 'n' frames-per-second via microwave radios, which helps to:

- View tracks in remote areas and give a green signal for approaching trains to proceed.

- Monitor the railroad's diesel service tracks in the yard to constantly assess locomotive positioning and availability for switching.

- **Knowledge Display Interfaces:** The positioning system displays train position and speed, the upcoming route profile, speed control instructions, etc as received over the data communication links from the control centers, on-board locomotive units etc.
- **Car on-board commodity sensors:** Monitors the status of the commodities being carried with respect to temperatures, pressures, load position, radiation and vibrations. The security of shipments is also monitored.
- **Automatic Equipment Identification (AEI):** AEI tags are installed in freight cars and mobile workers use readers to read these tags. When these are integrated with information from NDGPS receivers on locomotives, it enables railroaders to keep a tab on the precise location of every locomotive, car, shipment and train crew member- anywhere, anytime.

- **Travelers Advisory Systems:** Provides information to passengers on their train arrival times. These systems use real-time train location information generated by GPS receivers on locomotives that are transmitted over digital data links to the passengers.
- **Intelligent weather system:** Regular updates and alerts to train control centers, train crews and maintenance crews of the prevailing weather conditions.
- **Car reservation and scheduling systems:** These systems allow customers to reserve freight car capacity thus allowing railroaders to better schedule their cars. The benefits accrued are reduced shipping of empty cars, minimized delays to loads, improved asset utilization etc.
- **Positive Train Control (PTC):** This system brings together digital communications networks, continuous and accurate positioning systems such as DGPS, on-board computers on locomotives etc to improve rail safety. This ensures reduced disasters including rail collisions and damage to equipments.

The Bottom Line

The rail industry is set to improve its operations through robust mobile communications technology to deliver the best value for their transportation dollar spent. However, there is a little bit of caution - challenges to adopting wireless technologies come by way of constantly changing rate plans, handling multiple accounts, increasing difficulties in managing costs etc. ***How to overcome all these bottlenecks!? Give it a proactive, strategic approach... and create a Win-Win!***

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