

BNSF Railway

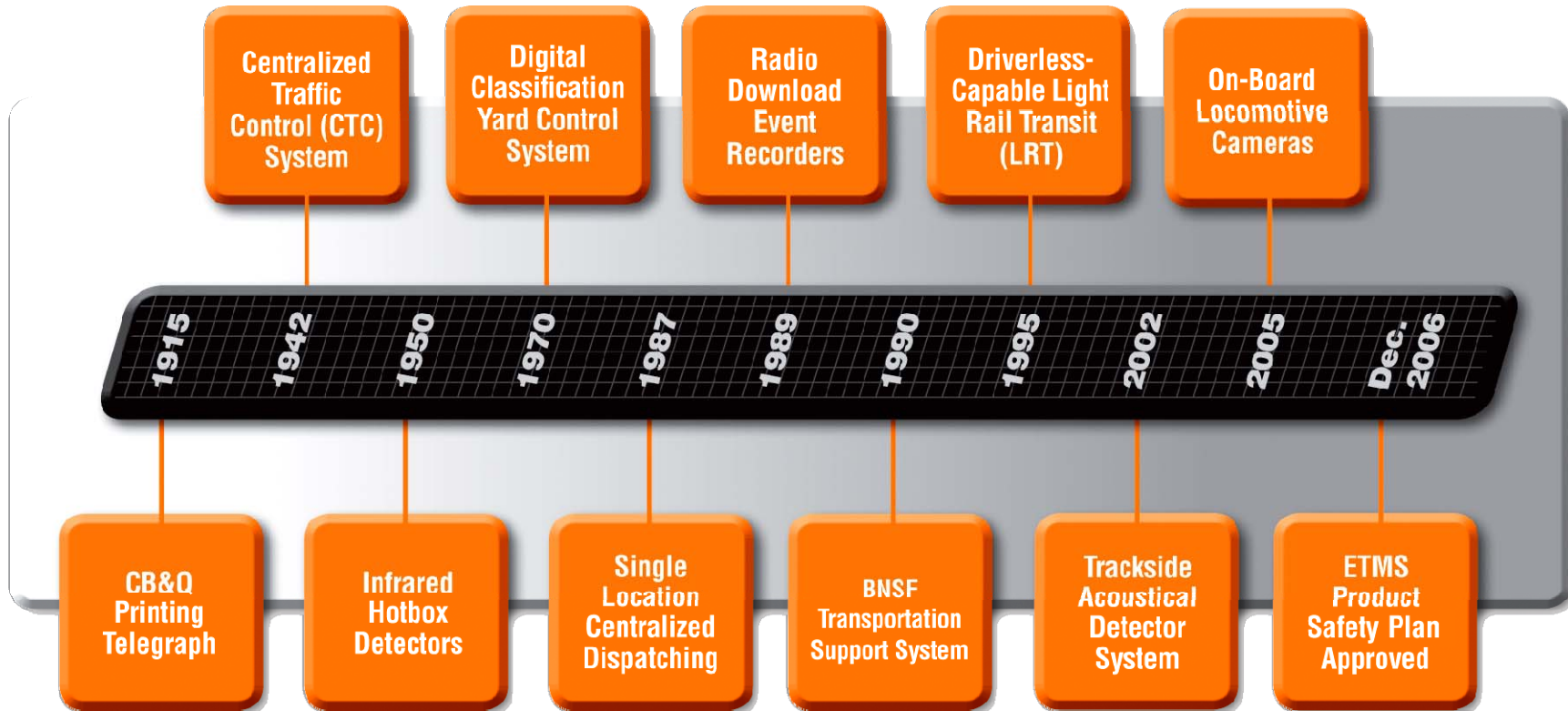


Electronic Train Management System (ETMS)



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Network Control Systems

Operations Technology History



Positive Train Control (PTC)

Rail Safety Improvement Act of 2008 defines Positive Train Control as:

“a system designed to

prevent train-to-train collisions,

over-speed derailments,

incursions into established work zone limits, and

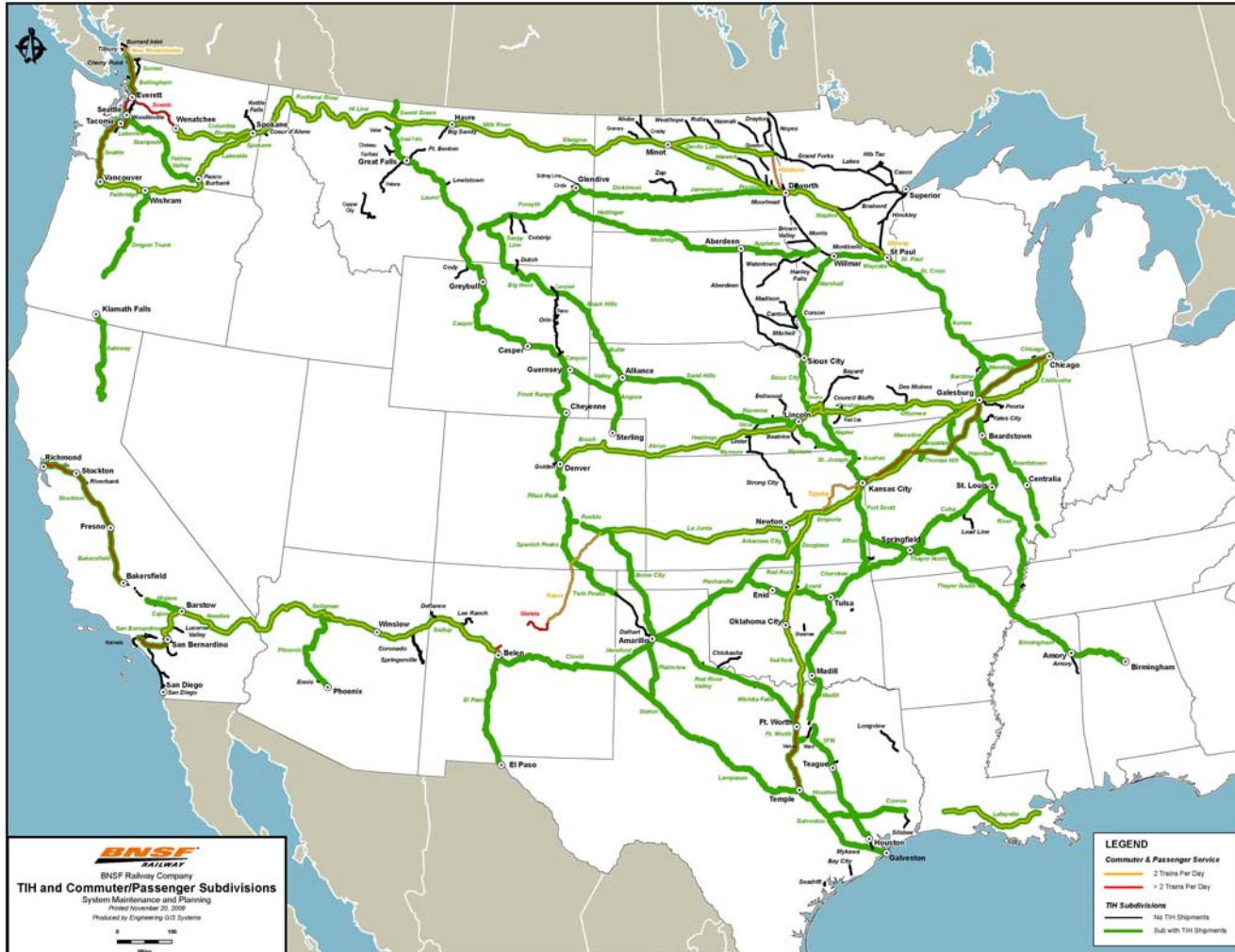
the movement of a train through a switch left in the wrong position”

Federal Mandate for PTC

Positive Train Control must be implemented by 2015

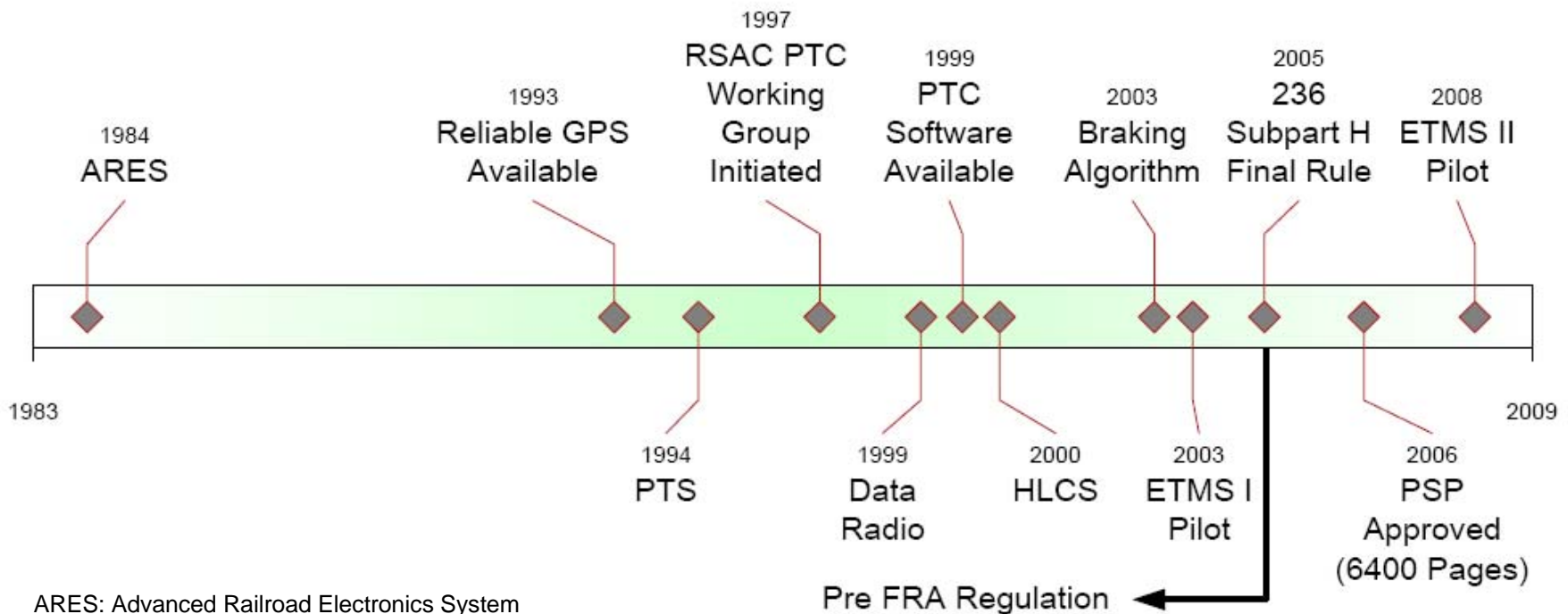
- **Rail Safety Improvement Act 2008 states –**
 - **PTC is required by December 31, 2015 for:**
 - **Intercity rail passenger or commuter rail passenger main lines**
 - **Poison- or toxic-by-inhalation hazardous materials main lines (5 million or more gross tons of total rail traffic annually)**
 - **Such other tracks as the Secretary may prescribe**
 - **An Implementation Plan is required from Class I Carriers and entities providing commuter/ passenger service not later than 18 months after enactment (April 2010)**

BNSF must implement PTC on the majority of its network by 2015



ETMS Development

Federal Railroad Administration's involvement, approval is required to advance each step of ETMS



ARES: Advanced Railroad Electronics System

GPS: Global Positioning System

PTS: Positive Train Stop

RSAC: FRA Railroad Safety Advisory Committee

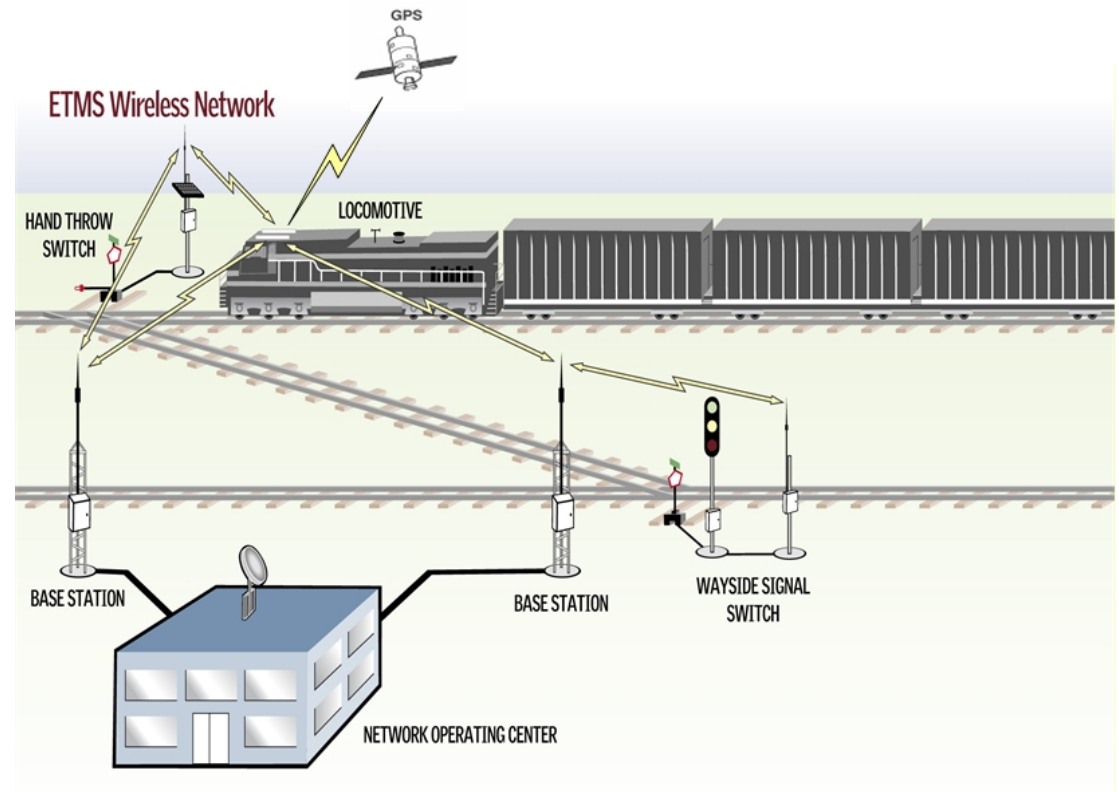
HLCS: Hi-rail Limits Compliance System

PSP: Product Safety Plan

What is ETMS?

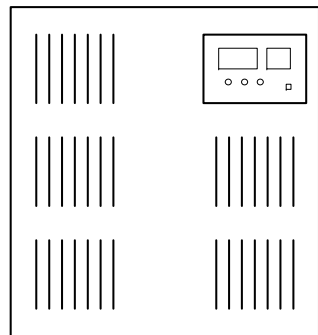
ETMS integrates existing technologies overlaid with current methods of train operation

- **ETMS Monitors:**
 - Authority limit
 - Speed limit
 - Switch position
 - Signal aspect
- **ETMS enforces compliance with existing methods of operation and rules**



What are the components of ETMS?

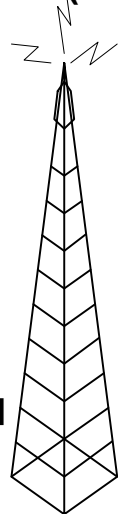
Component installations and modifications required for implementation



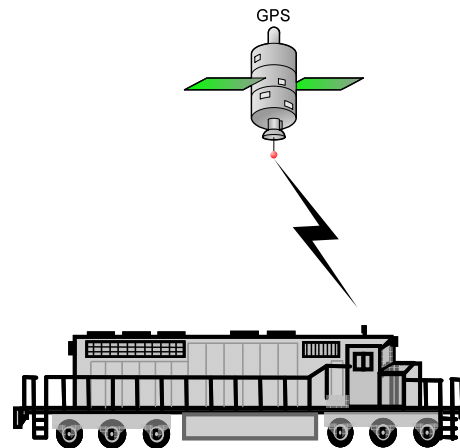
**OFFICE
SEGMENT**

- Train Dispatch System
- Track Bulletin System
- Transportation Support System (TSS)
- Geographic Information System (GIS)

- 220 MHz *
- 802.11 High Band
- Meteorcomm Low Band



**COMMUNICATION
SEGMENT**



**LOCOMOTIVE
SEGMENT**

- WAYSIDE
SEGMENT**
- Wayside Radios *
 - Interface Modules *



**Signal
Aspects**



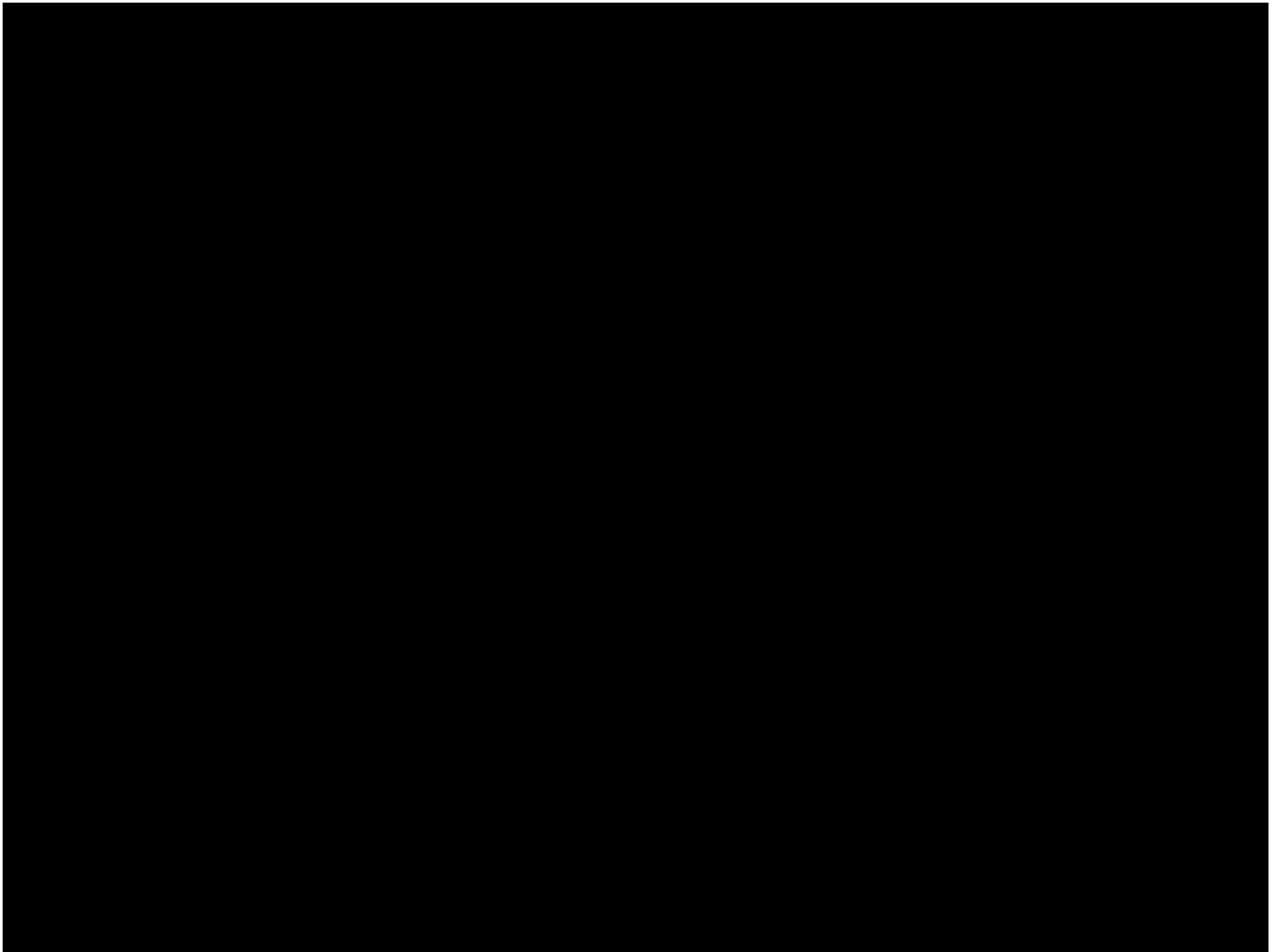
**Track
Integrity**



**Switch
Position**

- On-Board Computer *
- On-Board Display *
- GPS, 220 MHz Radio & Locomotive Computer Interfaces *

* Installations and/or modifications required for ETMS implementation



ETMS: Next Steps and Enhancements

Next steps include work to further deploy the system and make incremental enhancements on the base ETMS technology

Next Steps:

- Interoperability
- Additional Development
- Implementation



Future Enhancements:

- Maintenance of way-
Employee in charge (EIC)
terminal integration
- Grade crossing horn
sequencing
- Driver assist integration

BNSF
RAILWAY