

RSAC

BNSF Control Systems Update



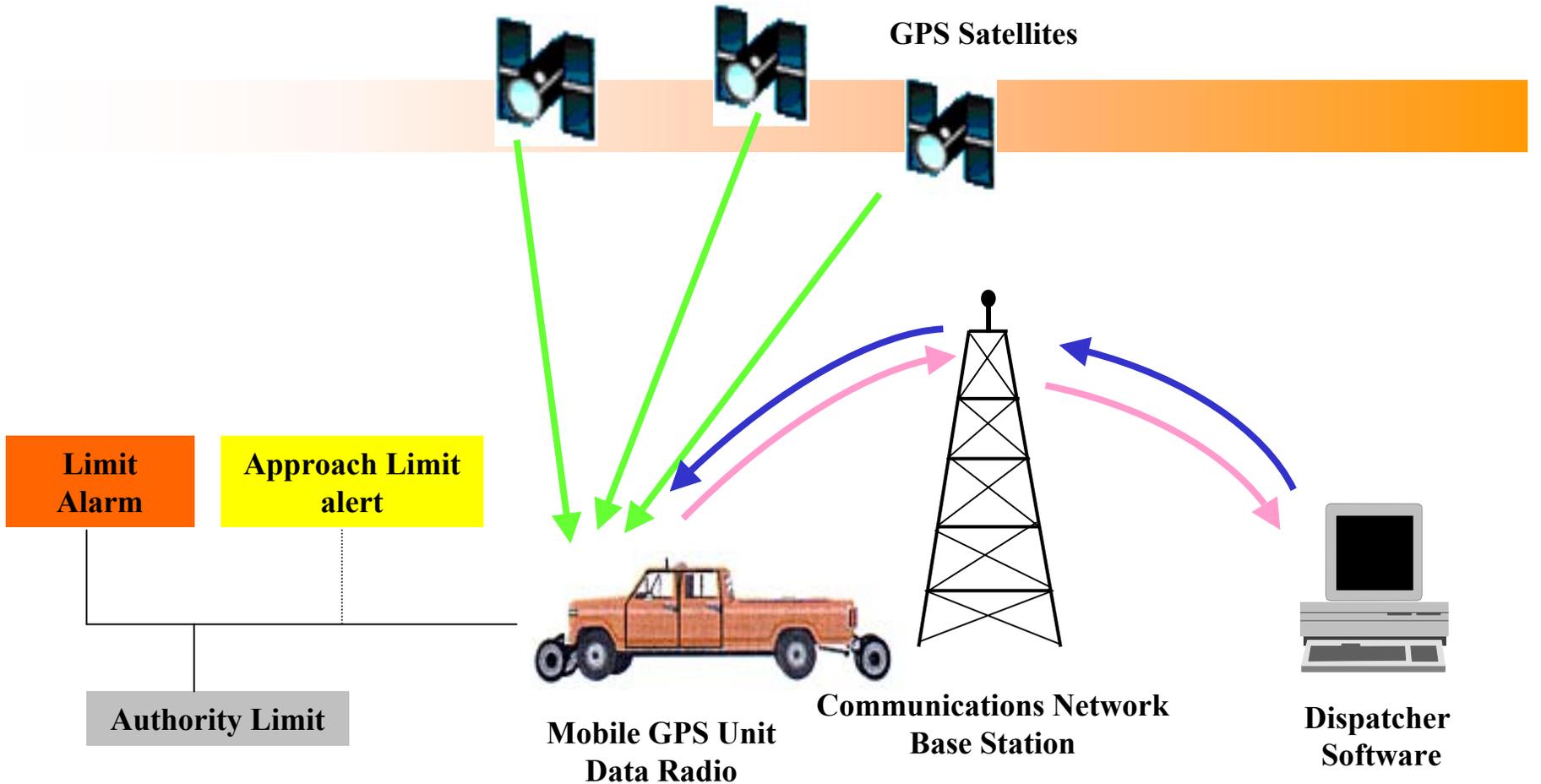
Hyrail Limits Compliance System (HLCS)

BNSF

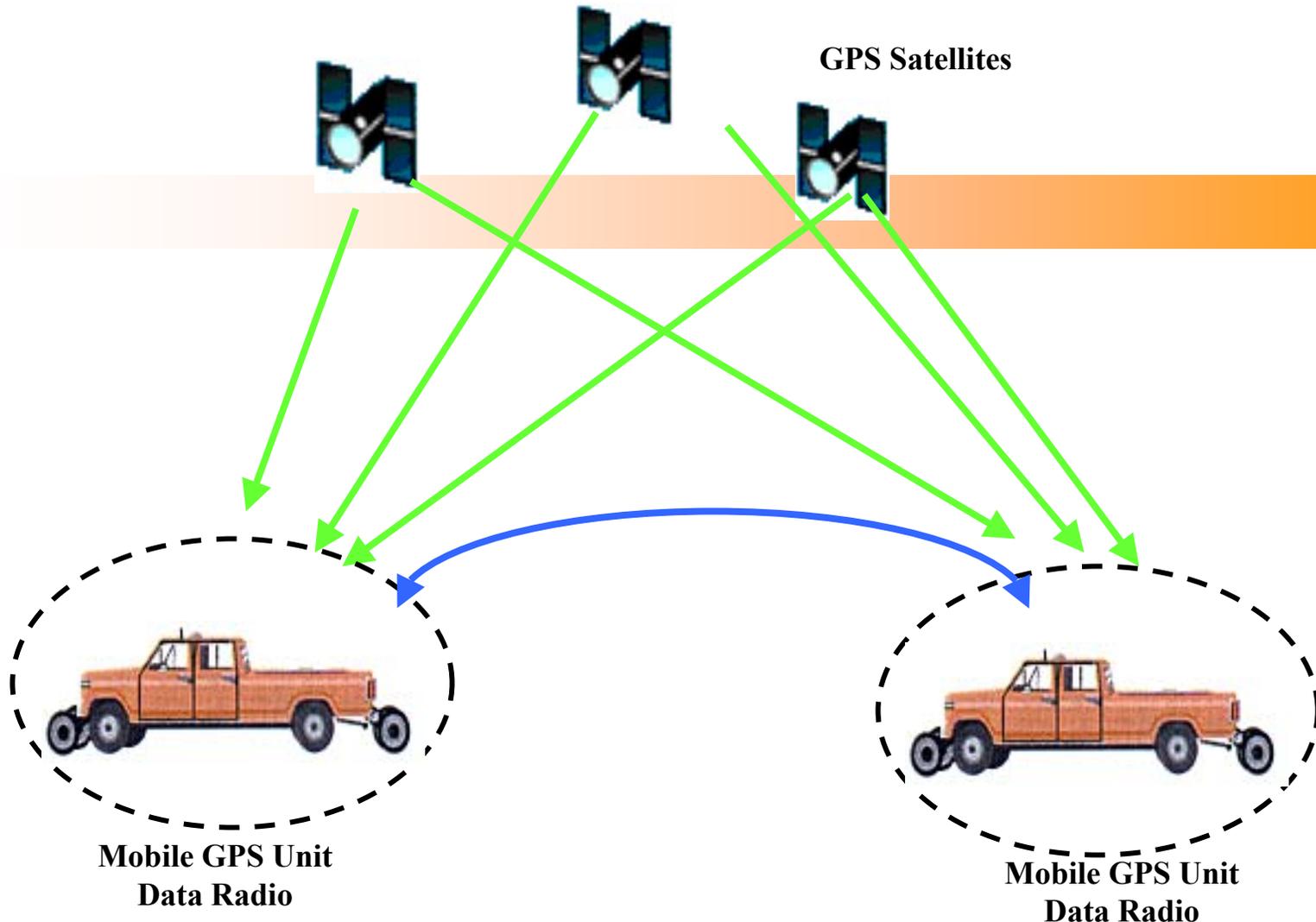


Migration Path

- **HLCS proof of concept pilot**
 - **Fall 2001 and Spring 2002**
- **GIS property in Summer of 2002**
- **Supplemented our telecom network with a low band wireless radio network**
- **Began rollout in fall 2002**



Authority Limits Warning



Proximity Warning Peer to Peer

Hyrail Limits Compliance System (HLCS) - Status

- **32,000 miles surveyed (207 subdivisions)**
- **1700 hy-rails installed to date**
- **1000 Additional to install in 2005**
- **27 Exceeds in 2004**
 - **14 Movement Beyond Limits**
 - **6 TWC Rollup**
 - **4 Authority Revoked by Dispatcher**
 - **3 Missed Repeats**

Electronic Train Management System (ETMS)

BNSF



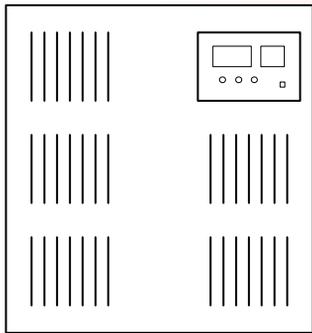
ETMS – What Is It?

- **A safety-overlay system that works in conjunction with existing methods of train operations. ETMS enforces compliance with existing methods of operation and rules.**
- **Provides a “safety net” for train operations while retaining the existing operations and rules as a primary means of train control.**
- **Enforces compliance with train movement authorities, speed restrictions, and work zones.**

ETMS – How Does It Work?

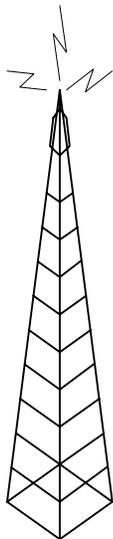
- **Integrates and interlocks information from existing systems that affect the safe movement of trains into the cab of the locomotive.**
- **Comprised of Four Segments:**
 - **Office Segment**
 - **Communication Segment**
 - **Locomotive Segment**
 - **Wayside Segment**

ETMS – How Does It Work?



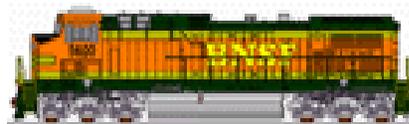
**OFFICE
SEGMENT**

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



**COMMUNICATION
SEGMENT**

- Meteorcomm Low Band
 - 802.11 High Band



**Locomotive
Segment**

**WAYSIDE
SEGMENT**



**Signal
Aspects**



**Track
Integrity**



**Switch
Position**

- On-Board Computer
- On-Board Display
- GPS, Radio & Locomotive Computer Interfaces

Video

ETMS - Benefits

- **Safety Related –**
 - **Train vs. Train Collisions**
 - **Roadway Worker Protection**
 - **Speed Compliance**
 - **Broken Rail Protection**
 - **Switch Position Verification**

Pilot Overview

- **Pilot contract signed July 10th, 2003**
- **50 Locomotives; 40 C44-9, and 10 GP39-2**
- **134 miles of track, Beardstown to Centralia, Illinois (Beardstown Sub)**
 - **Single track with 10 passing sidings**
 - **72 Wayside devices**
 - **35 Switch sites**
 - **33 Switch and Signal combined sites**
 - **2 Broken Rail Detection Circuits**

ETMS Authority Types

● CTC (13.0 miles)

- Beardstown to East Concord ~12.2 miles (MP 114.3X – MP 0.1)
- Winston-NS Xing to NS Jct. ~0.6 miles (MP 65.6 – MP 66.2)
- Sorento ~0.2 miles (MP 77.7 – MP 77.9)

● TWC (118.1 miles)

- CTC Concord to CTC Winston-NS Xing ~65.5 miles (MP 0.1 – MP 6)
- CTC NS Jct. to CTC Sorento ~ 11.5 miles miles (MP 66.2 – MP 77.7)
- CTC Sorento to CTC Centralia ~ 41.1 miles (MP 77.9 – MP 119.0)

● Restricted Limits (7.0 miles)

- Beardstown Yard ~ 2.0 miles (MP 116.3 – MP 114.3)
- Centralia Yard ~ 5.0 miles (MP 119.0 – MP 124.0)

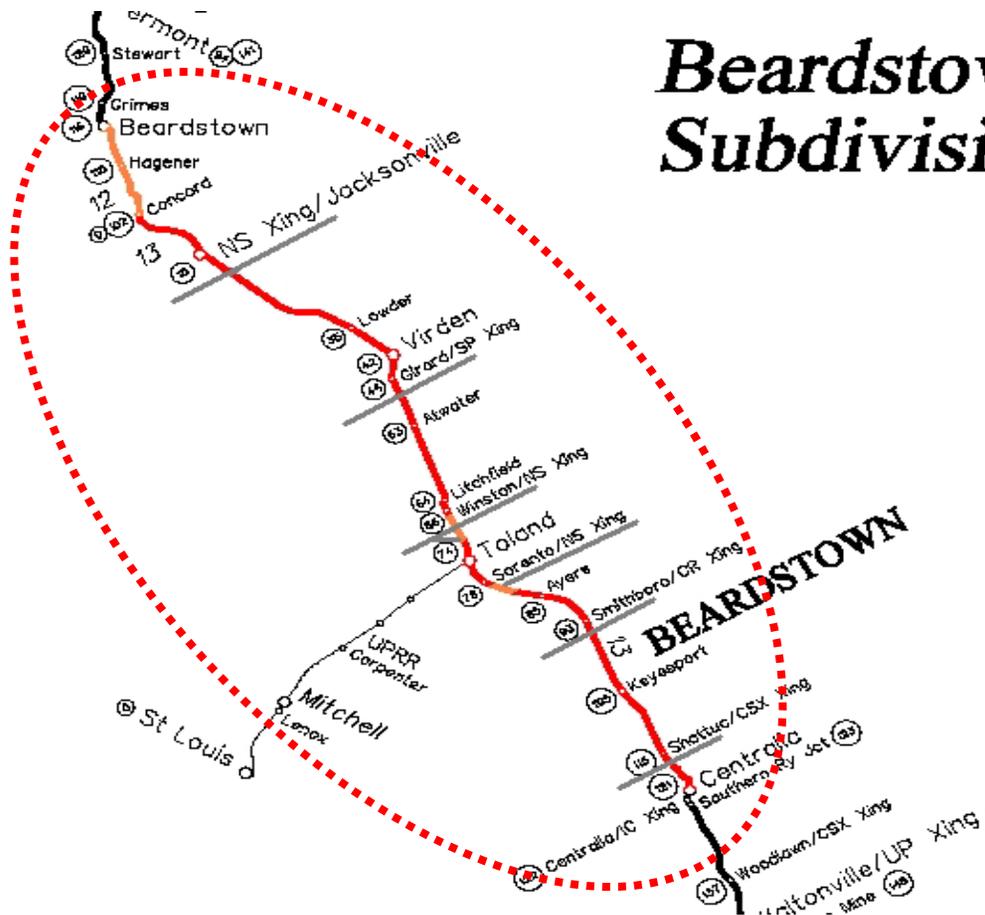
● Interlockings

- Jacksonville NS-M
- Girard UP-M (IDOT Track)
- Winston-NS XING-M
- Smithboro CSX-M (CR)
- Shattuc CSX-A



Girard-UP Xing Interlocking

ETMS – Where Is It Located?



Beardstown Subdivision

ETMS – Testing Status

- **System Testing Complete July 2, 2004**
- **417 scripted tests completed over 16 weeks.**
- **Over 2500 pages of test documentation and evaluation reports generated for ETMS**
- **Regression Tests Completed October 4, 2004**

ETMS – Program Status

- **Pilot Began October 12, 2004**
- **Broken into phases**
 - **Phase 1 –**
 - **Complete 666 Runs in Revenue Demonstration Service**
 - **Complete Concept of Operations and Data Collection Plans**
 - **Closure of Category 1 and 2 Software Trouble Reports**
 - **Phase 2 –**
 - **Complete 666 Runs in Revenue Demonstration Service**
 - **Additional Data Collection Requirements**
 - **Closure of All Software Trouble Reports**
 - **Phase 3 –**
 - **Implement ETMS in Extended Revenue Demonstration**

ETMS Program to Date

- **539 Trains Operated as of January 20th**
- **38 Engineers Qualified**
- **6300 Track Warrants Delivered**
 - **5700 Delivered Enroute**
- **7000 Speed Restrictions**
- **49% of Trains on Beardstown Sub. ETMS Equipped**

Questions?