

Electronic Systems for Trains of the Future

Utilizing Today's Available Systems and Planning for
Future Advancements

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The NGEC will provide national leadership in standardization,
acquisition, financing and management of passenger rail equipment.

Overview

Today's computers and electronic systems provide numerous methods by which passenger trains can enhance:

Customer's Experience

Fleet Maintenance/Improved Reliability

Transportation Management

The following presentation is to provide design concepts for the NGEC to consider and possibly integrate into the NGEC specifications for new rolling stock



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Agenda

- Issues to Consider
- Enhanced Customer's Experience
- On-Board Fleet Maintenance Locomotives
- On-Board Fleet Maintenance Cars
- Transportation Management
- Intra Train Communication
- Summary
- Recommendations



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Issues to Consider

- Life Cycle
 - Rolling Stock –Planned Approximately 30 Years
 - Electronic Hardware-Upgrades every 3-5 Years
 - Software-Upgrades – variable timelines
- Software
 - Unique to the Application
 - Proprietary Formats
 - Licensing Fees



Enhanced Customer's Experience

- WiFi- High speed connection to the Internet
 - Control Data Streaming?
- Entertainment- movies, TV shows, music to passenger owned devices (on board server to WiFi)
 - Licensing Agreements with Entertainment Providers
- On Board Information Systems – Train status updates
 - Location, speed, arrival time, schedule performance
 - Train schedule connection opportunities
 - An ADA enhancement
- Features of the Future-Unknown



Fleet Maintenance On-Board Status Locos

- Fault Codes
 - Engine
 - Propulsion
 - Air Compressor
 - Cab Signals
- Equipment/Operational Status Updates
 - Ride Quality
 - External Cameras
 - Internal Cameras
 - Engine Idling or on ground power

Amtrak communicates these faults wirelessly to terminals and stations in advance of locomotive arrival and to a data server to analyze potential fleet failures



Fleet Maintenance On-Board Status Cars

- Passenger Cars Faults
 - HVAC Systems
 - Ride quality
 - Public Address Systems
 - Wheel Slip
 - TADs
 - Automatic Doors
 - Toilets
 - Refrigeration
 - ot Box
- Equipment Status Updates
 - Temperature Monitoring of Cars in the Yard/Station
 - Freezing (Winter)
 - Cabins too Warm (Summer)

These faults could be stored for maintenance troubleshooting, can be electronically communicated to terminals in advance of train arrival, and stored on servers to analyze failures



Transportation Management

- Train Location and Speed
- On Time Performance
- Diesel Fuel Level
- Ticket Processing
- Customer Head Count
- Train Inventory
 - Food
 - Consumables
- Security
 - Internal Facing Cameras



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Intra-train Communication

- Digital Train Line Communication
 - Increased bandwidth
 - Standardize cabling and connectors
 - Future expansion for safety systems
 - Utilize one WiFi/Cellphone connection per train
- Software
 - Standardized format and language (internet approach)
 - Open Source Code
 - To support interchangeability of rolling stock



Summary

- Electronic/ Computer Systems Are Becoming an Integral Part of Rolling Stock Equipment. Influencing:
 - *Customer's Experience*
 - *Fleet Maintenance*
 - *Transportation Management*
- Planning Required for Life Cycle Differences Between Rolling Stock and Computer Systems
 - Multiple Computer System Upgrades During Life Cycle of Rolling Stock
- Rolling Stock Specifications Need to Include Provisions for Computer System Applications and Inter-Car Communications



Recommendations

- Create Technical Team to Define Enhancements
 - For Customer's Experience
 - For Fleet Maintenance
 - For Transportation Management
- Interface with IT Organizations
- Edit existing new rolling stock specifications
- Investigate retrofit capabilities



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