### **Positive Train Control (PTC): Alaska Railroad Status**

ITS Alaska Annual Meeting September 6<sup>th</sup>, 2018



# Agenda

- Background \ Review
  - Mandate of PTC program
  - PTC system high level description
- ARRC's current PTC Program status
  - Progress To Date Deadline Extension to 2020
  - Vital Functions Program



# **PTC - Background**



### **2010 PTC Regulation Requirements**

2010 regulations require PTC systems to **reliably** and **functionally** prevent:

- 1) Train-to-train collisions by enforcing authority limits
- 2) Overspeed derailments
- Incursions into established work zone limits



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4) Train movement through a main line switch in the improper position.



### **Items PTC Does Not Address**

PTC is NOT designed to protect against derailments caused by, among other things:

- equipment failures such as broken wheels, pulled drawbars and seized journals;
- infrastructure conditions such as washouts, rock slides and some broken rails and heat kinks; and
- external factors such as grade crossing accidents or deliberate vandalism.





## **ARRC PTC Operations**

PTC is used in conjunction with a railroad's current train operation controls, providing a **safety overlay** to eliminate human errors. ARRC's train operations include:

- **Centralized Traffic Control** Train movement based on signal remotely called by a dispatcher.
- Track Warrant Control Train movement based on dispatcher providing a movement authority and transmitting verbally the limits of the authority.







# **PTC System Overview**

- The PTC system is comprised of numerous technologies organized into four distinct "segments":
  - -Communication
  - -Office
  - -Wayside
  - -Locomotive



# **Communications Segment**

- Provides messaging and data management between the Locomotive, Office and Wayside Segments.
- The ARRC has three communication networks to support PTC:
  - 220MHZ Radio
  - Cellular (AT&T and Verizon)
  - WIFI







### **Office Segment**

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- This segment is the information center for PTC. It is comprised of the following sub systems :
  - Computer Aided
    Dispatch System (CAD)
  - Back Office Server (BOS)
  - Mobile Device Manager (MDM)
  - Wayside Status Relay Service (WSRS)



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# **Locomotive Segment**

- The Locomotive Segment supports all of the navigation and enforcement functions required for PTC operation. It includes:
  - Train Management Computer (TMC)
  - -Cab Display Unit (CDU)
  - -Cutout Switch Box







### Wayside Segment

- The wayside segment monitors the status of each control point, monitored switch, and track circuit.
- Each wayside device sends a status every 3 seconds and if a single status message is missed the status of that device will downgrade to "unknown".
- Wayside statuses are sent to the locomotive and office segments via the communications segment or peer-to-peer.



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#### DEC 31, 2020

Potential Deadline if Railroads Meet Statutory Criteria and Obtain FRA Approval

Congress has allowed railroads to apply for up to a two-year extension to achieve full PTC implementation if certain criteria are met. The railroad must have all spectrum acquired and hardware installation completed by the end of 2018 for an alternative schedule to be considered.

#### OCT 29, 2015

Congress Extends PTC deadline by at least three years

Congress extends the PTC deadline by at least three years to December 31, 2018, with the opportunity for an additional two years if certain conditions are met.



#### OCT 16, 2008

Rail Safety Improvement Act of 2008 Sets December 31, 2015 Deadline Several collisions, including a 2008 collision between a Metrolink passenger train and a Union Pacific freight train, led Congress to require Positive Train Control (PTC) be installed on a majority of the US Railroad network by December 31, 2015.

#### JAN 27, 2016

DEC 31, 2015

Original PTC Implementation Deadline

Revised Implementation Plan Deadline

FRA currently uses the schedules and key installation milestones reported in Railroads' revised PTCIP as the basis for tracking and enforcing PTC implementation progress.

#### DEC 31, 2018

Extended PTC Implementation Deadline

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Based on revised PTC Implementation Plans submitted to FRA in January 2016, a majority of Railroads (81%) are projected to have PTC installed by the end of 2018. The remaining Railroads are projected to reach full implementation by December 31, 2020.

#### Source: https://www.fra.dot.gov/app/ptc/



### Schedule Extension – Criteria ARRC's Progress

	Criteria To Get Approval From FRA	Status
1	Install all positive train control system hardware	Met: Complete
2	Acquired required 220 Mhz Radio Spectrum	Met: Spectrum Acquired
3	Completed all required employee training	<b>Met:</b> 354 of 472 employees trained which meets the 75% threshold.
4	An alternate schedule and sequence for implementing the PTC system.	<b>In Progress.</b> Conceptual plan devised which will be included in notification letter to the FRA.
5	Certification to the FRA that ARRC will be in full compliance to the PTC rule requirements by the alternate timeline completion date.	<b>In Progress.</b> Letter is complete, waiting for RSD to begin and finalize the letter.
6	Have at least 1 subdivision in Revenue Service Demonstration (RSD)	<b>In Progress</b> : Submitted RSD request to FRA July 24 <sup>th</sup> . Will proceed with RSD once FRA approves.



# **Vital Functions Program**

- Just recently ARRC was awarded funds from the CRISI grant program to design and implement a Vital Overlay PTC system.
- These vital functions will provide an additional level of safety to the existing PTC system.
  - Ensure mandatory directives issued by CAD are correct
  - Confirms no data corruption when sending mandatory directives messages to the Locomotive Onboard computer.
- This will allow ARRC to send mandatory directives electronically without the need for the extra step of verbally confirming receipt of mandatory directives between the dispatcher and train crew.
- Train operational efficiencies will also be achieved by reducing the time to issue and confirm mandatory directives to trains and also to more effectively manage Train meets.
- This program will also provide smart mobile computing tools to support MOW staff when they perform their maintenance activities along the track.



#### **PTC – Program Schedule**







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### BACKGROUND







### **PTC 220 MHz Radios**



### **Considerations:**

- Secure spectrum
- Radio availability



## **Onboard System**

### **The Train Management Computer (TMC)**





## **EMD SD70MAC PTC Equipped**





## **Onboard System**

continued

### The Computer Display Unit (CDU)







### **Computer Aided Dispatch System**



