ALASKA RAILROAD

Positive Train Control

Project Scope

The Alaska Railroad (ARRC) is pursuing a multi-phased program to design, develop and implement a fail-safe Positive Train Control (PTC) system that prevents human errors that may cause catastrophic results. The PTC system monitors and controls train movements, and provides improved information for decision-making. If warranted, PTC will stop a train if it exceeds safe speeds, moves into areas without authority, or detects potentially unsafe track conditions.

PTC integrates four major segments: office, locomotive, wayside equipment and communications. The PTC project replaces an older outdated Computer Aided Dispatch (CAD) system, and includes an locomotive on-board computer system, 220 megahertz (MHz) VHF packet data radio technology, Global Positioning System (GPS) locator technology, and upgrades to the back-haul fiber and microwave communications. Approaching locomotives interrogate wayside devices (including signals, switches, track integrity) for status.

In 2008, Congress mandated PTC for the nation's largest railroads and for railroads that carry passengers. Failure to meet the mandate will drastically reduce or eliminate ARRC's passenger train operations. The federally-mandated deadline to complete PTC installation is December 31, 2015; however, ARRC and most U.S. railroads cannot meet this deadline. ARRC will likely be able to continue offering passenger services if it can demonstrate a good faith effort to implement PTC.

Benefits

PTC will provide the regulatory-mandated safety functions that prevent:

- train collisions by enforcing authority limits;
- derailments from trains moving too fast in areas with speed restrictions, slow orders, over switches and through turnouts;
- trains entering established maintenance-of-way work zone limits without first receiving appropriate authority and verification; and
- movement of a train through a main line switch in the improper position.

Status

ARRC is implementing PTC in phases. The full PTC build-out as mandated by federal law is expected to be completed by December 31, 2018. The Alaska Railroad is implementing the freight industry standard for PTC, called Interoperable - Electronic Train Management System (I-ETMS®) by Wabtec Railway Electronics (WRE).

Phase I (complete)

- ARRC has implemented a newer CAD system to authorize train movements and deliver speed restrictions. The WRE Train Management & Dispatch System (TMDS) employs Centralized Traffic Control and dark-territory Track Warrant Control as the methods of operation at the Alaska Railroad.

Phase II (underway)

Office Segment: Wabtec is further developing the office system to ensure authorized train movements are received and safe. This involves adding a Back Office Server to the Phase I TMDS. ARRC's nearly 600-mile route includes long stretches of remote, "dark" (non-signalized) territory that require electronic-only distribution of mandatory directives and that replace contingent authorities with dynamic authorities. By installing a fail-safe Independent Validation Server (IVS), the train crew will only see an authority when it is validated as safe by the Office Segment. IVS is scheduled to be implemented when the PTC wayside and communications system upgrades are complete.

Locomotive Segment: Equip 54 power units (51 locomotives, 2 power cabs and 1 self-propelled railcar) with the I-ETMS® Train Management Computer, two computer displays, Meteorcomm LLC 220 packet radio, cellular modem and GPS equipment, and braking system modifications (depending on locomotive type). Most locomotives have been equipped with the PTC hardware, which will allow the system to stop a train if it detects an unsafe condition or situation. Onboard equipment installation will be complete by June 2015.

Along the Tracks Segment ("Wayside"): ARRC is completing installation of wayside devices, switches and signals along a 60-mile pilot corridor from Anchorage to Whittier. The corridor is expected to be ready for field integration testing by mid-2015. Through wayside controllers and interface units, and radios, the PTC system monitors wayside equipment status (switch position, for example) and communicates it to the train and dispatch office. In addition to the pilot corridor, wayside equipment has been installed in areas up to 80 miles north of Anchorage. Wayside installations will be ongoing with rollout continuing through 2018, depending on funding.

Communications Segment: Communications systems and towers have been upgraded in the pilot corridor and some new sites have been constucted to increase reliability and availability of data communications. The upgrades to existing facilities and new base-station / back-haul sites are expected to be 90% complete by the end of 2016.

Systems Integration: ARRC is on target to operate the pilot program (also referred to as revenue demonstration) by first quarter 2016. The system has been tested in the lab and functional field testing in the pilot corridor is scheduled for 2015. PTC will be fully integrated through functional tests in the pilot corridor followed by tests in other areas of the railroad.

The required PTC Safety Plan (PTCSP) will be developed to prove that the system is fail-safe from end-to-end. ARRC expects to submit the PTCSP to the Federal Railroad Administration (FRA) in 2018.

Costs & Funding

Beginning in 1997, ARRC has used a combination of corporate revenues, federal and state funding to develop PTC. Since 2014, ARRC has relied more heavily on state funding due to dramatic declines in both business revenue and federal grants. Total project cost is estimated at $158 million. Project funding received thus far (through 2015) totals $103 million, leaving approximately $55 million needed to complete project work from 2016 through 2018 in order to meet the federal PTC mandate.

Positive Train Control System Overview

Office Segment — Computer-Aided Dispatching, Back Office Servers

Communication Segment — Data Link, Authorities, Location Reports, Data Radio Link

Locomotive Segment — Position Reference, Speed Limit (30), Authority Limit (MP 100, STOP)

Wayside Segment — Track Integrity, Signal Aspect, Switch Position