



**Alaska Railroad VPTC  
Turnagain Arm, Alaska**

**Customer: Alaska Railroad Corporation**  
**Contractor: Union Switch & Signal Inc.**  
**Award / Start Date: June 2004**  
**Completion Date: Scheduled for February 2009**

**Project Overview**

Union Switch & Signal Inc. (US&S®) has been awarded a contract to deploy the next generation dispatch and Vital Positive Train Control (VPTC) for signaled and dark territory for the Alaska Railroad Corporation (ARRC).

The contract has a two-phase approach in which US&S will provide a complete VPTC system, including US&S's latest Computer-Aided Dispatching (CAD) system, vital Office Safety Server (OSS), and vital Onboard Computer (OBC). The project will be the first vital dark territory implementation of positive train control in the industry. During Phase 1, US&S provided a VPTC-ready CAD system, including non-vital GPS train tracking. Upon completion of Phase 2, ARRC will have a complete VPTC system. ARRC's data radio network, supplied by Meteor Communications Corp.® (MCC), will provide railroad-wide VHF packet data radio coverage and DGPS corrected position information to the system.

The VPTC system objectives are:

- Prevention of train-to-train collisions
- Enforcement of both temporary slow orders and permanent speed restrictions
- Protection for roadway workers and their equipment operating under specific authority

Mandatory Directives (MDs), including authorities and bulletins, are sent from the office to the OBC via a vital communication protocol. The VPTC system is designed to operate in dark or CTC territory, with the ability to make a seamless transition from one territory type to the other without any impact on operations. Additionally, it interfaces with a variety of devices, including signals in centralized traffic control, manually monitored switches and track integrity systems in direct traffic control, and wayside defect detectors.



*VPTC Onboard Computer and Locomotive Display Unit*

The vital communications protocol and vital OSS and OBC subsystems allow for digital transmissions without requiring the traditional read back associated with MDs. The soft-key based Locomotive Display Unit (LDU) displays context-appropriate information to enable the train crew to operate efficiently and safely with less verbal communication. The MDs' rules and the state of wayside devices are factored into speed and movement authority profiles in the OBC to provide a speed profile to the next target. The system is expandable, allowing for an interface with US&S's Optimizing Traffic Planner™ and CAD Enterprise Services™ products.

## VPTC Product Details

The system is based on the US&S next generation CAD product. The basic product includes security, traffic control, train sheets, authorities, bulletins, priority-based planning, and reports. ARRC-specific features include an advanced direct traffic control authority subsystem, PIN-based protection for work authorities, support for MCC's hy-rail limits compliance system, and an interactive train graph for planning. The CAD system is scheduled to be deployed at a number of Class 1 railroads. The system is scalable from one to hundreds of users, with a large number of redundancy and disaster recovery options.

The vital OSS is based on the US&S MicroLok® II platform, providing an industry-leading vital computing platform for validation of train authorities, speed restrictions, work authorities, dark territory switch positions, and encoding of MDs for delivery. The vital protocol has been developed to operate with conservative data radio bandwidth requirements. Flexibility in block design, with the ability for the customer to change the system's configuration, provides the customer with the ability to grow and change the railroad in the future.

The vital OBC is based on the US&S MicroCab® platform, which provides positive limit of authority and speed enforcement. This means that any function



VPTC Office Safety Server

that is protected by the system will be enforced vitally, stopping the train in advance of the target. For example, if a freight train is crossing the crest of a hill with a speed restriction on the down side, the profile braking system will calculate the maximum authorized speed based upon the grade on which the train is operating, the consistency of the train, the current speed, the speed restriction, and the braking capacity of the train. The OBC also presents the distance to the target and the time to penalty at the current speed. The OBC system will always vitally enforce the protection function, regardless of the non-vital operation of the LDU. The LDU allows access to a large number of important, but non-safety-related functions. Options for redundant data radios and WiFi event log uploads are available.

US&S provides world-class customer support 24/7/365. Our customer support engineers are on call to answer customer support questions and recover system disturbances. US&S's commitment is to employ the necessary resources to support each product in order to meet rigorous railroad operational demands.

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