HIGHLIGHTS FROM THE MAY 2008 ISSUE

PTC closes in on interoperability

Through AREMA, suppliers are tackling the task.

By Bill Petit, for Railway Age

Late last year, the FRA provided a grant through the Office of Railroad Development to demonstrate the operation of an Interoperable Communication-Based Signaling (ICBS) system as defined by AREMA Recommended Practices on Communication-Based Signaling (CBS), the term that's now widely accepted as covering PTC (Positive Train Control) and other variations of advanced-technology signaling and train control. This includes demonstrating the ability of multiple suppliers to achieve and demonstrate interoperability by following the Recommended Practices.

The ICBS idea started in 2005 when railroad signaling leaders asked AREMA Committee 37 (Signal Systems) to consider developing a set of Recommended Practices for

interoperability of radio-based signaling. One of the more interesting tasks was getting the major North American suppliers of safety-critical signaling equipment to agree to support these Recommended Practices, including modifying their equipment to meet them in response to market demand. The first set of Manual Parts has been approved by AREMA Committee 37 and will be published in the 2009 AREMA C&S Manual. It's expected that lessons learned from this demonstration project will be used to enhance and expand these Manual Parts. The Manual Parts cover functional requirements, safety and environmental requirements, system architecture, communications protocols, messages, and an infrastructure database.

The ICBS approach can be viewed either as a complementary enhancement or an alternative to overlay systems being tested. Overlay systems are safety-justified based on the underlying method of operation, whether rules-based (dispatcher-issued train orders) or signals-based (CTC). Without the ability to change the underlying method, it becomes more difficult to achieve such operating efficiencies as closer train spacing, increased velocity, or the ability to support following moves between switching points. Since ICBS is based on well-accepted signaling principles, and implementations are based on proven safety-critical architectures, it can be used as a stand-alone system allowing replacement or enhancement of the existing method of operation. Removing the physical limitations of existing wayside-based CTC systems provides for improved performance, like the ability to increase traffic density by shortening block length or by increasing the number of signal aspects available. Additional capabilities through the use of digital radio transmission allows for continuous onboard display of signal aspects, allowing them to be updated mid-block, as well as providing continuous speed enforcement.

The FRA grant covers a laboratory demonstration of the system with each supplier providing interoperable equipment based on the AREMA Manual Parts. GE Transportation Systems, Safetran Systems, and Union Switch & Signal will each have a portion of their expenses paid through the grant. Alstom Signals has recently joined the project at its own expense. Critical Link is providing the test environment.

The territory to be simulated consists of four contiguous double-track segments. Each contains one siding, one single crossover, one universal crossover, and one scissors crossover. A dispatch office based on existing US&S control office technology provides simulated office control for routing trains and tracking movement. Onboard Logic Processors (OBLP) are being provided by Alstom, GETS, and US&S, and will be based on their existing onboard platforms. A Vehicle Simulator will be used for each of the OBLPs for controlling train movements. Each is providing Signaling Logic Processors (SLP) and Wayside Appliance controllers (WA), based on their existing interlocking controllers or object controllers. The SLPs perform the signaling logic to move the trains through the territory and interface to the office over a standard US&S GENISYS interface. The WAs are used to control and monitor wayside devices.

Communications will use the messages and protocols defined in the AREMA Manual Parts. The messages will be transported over an IP network through a communications

simulator that will be used to introduce errors and limit bandwidth to that which would be provided by various over-the-air RF communication infrastructures.

When fully integrated, the demonstration will show the ability of trains controlled by different suppliers' OBLPs (each simulating a different railroad) to seamlessly move through the four territory sections, each of which is controlled by equipment from a different supplier. Each supplier will use a common database for describing the territory. Demonstrations are planned for the end of this year. For additional information, visit www.billpetit.com and select the ICBS link.

Photo by BNSF Railway