The Buckingham Branch Railroad, a family-owned short line railroad in Central Virginia, decided to use Ritron's tri-mode capable clean cab radios based on their performance, price and flexibility to meet the latest NXDN standard as its developed.

Railroads Benefit From Affordable Narrowband Radio

While there are multiple ways to narrowband compliance –there is a unique solution that's perfect for the regional and short line railroads

Clean cab locomotive radios, the radios used for two-way voice communications to and from the locomotive engineer in the cab, have become a hot topic now that the narrowbanding deadline is approaching.

All locomotives at interchange or run-through service must be equipped with narrowband capable clean cab radios to meet the railroad industry's self-imposed deadline of July 1, 2010, and after January 1, 2013, no wideband operation at all is allowed, as mandated by the FCC.

On track for the long haul

While railroads of all sizes are affected by this change, shortline, regional and transit railroads are especially hard-pressed by the capital outlays since many buy radios only once a decade or so. Railroads must also factor into their decision the longer-term transition to digital operation, which the FCC has outlined but has not yet set a deadline for.

What's more, going to narrowband operation does not, as one might expect, significantly increase the number of radio channels available—the real motivation behind the transition. Analog operation on narrowband channels causes interference to the frequencies adjacent to the one being used, which severely limits the hoped-for benefit of going narrowband. But going to narrowband digital reduces the adjacent channel issue making it of great interest to the railroads—even without a deadline. In addition to the issue of the transition itself, it's a requirement that any clean cab radio also support existing wideband operation.

So many choices, so little time

Clean cab radios that support both existing wideband operation and narrowband analog operation (as required by the FCC and the railroads themselves) are termed dual-mode, while those that also support narrowband digital operation are termed tri-mode. When it comes to new narrowband-compliant clean cab radios, all railroads basically have the same three choices.

Ritron's clean cab radio, designed specifically for the railroad industry, is a dual mode radio with an easy upgrade path to digital operation. Railroads are taking advantage of this economical option since it can be quickly upgraded to tri-mode with the addition of a circuit board and a software upgrade.

They can go with a "temporary fix", which involves a third-party add-on board. This choice is suitable only for some older-model radios, making the radio narrowband compliant, but not ever digital capable—meaning that a new radio purchase is in the near future.

Another option is to go with a clean cab radio shell with a commercial-grade land mobile radio embedded inside. The second choice allows railroads to choose either a dual-mode or tri-mode radio. However, if one were to purchase a dual-mode radio and later want digital operation, the clean cab radio would have to be completely replaced with a tri-mode radio.

The third choice is one that is unique in the industry – a clean cab radio designed specifically for the railroad industry – a dual-mode radio with an upgrade path to digital operation. This option allows a railroad to purchase an economical, high performance, railroad specific, clean cab radio that can be easily upgraded to tri-mode with the addition of a circuit board and a software upgrade.

The choice of a railroad-specific design with tri-mode upgradeability is the approach taken by Ritron, Inc. of Carmel IN – a U.S. designer and manufacturer of wireless electronic devices that has been designing wireless products for the railroad market for over a decade. Rather than replacing or overhauling an embedded dual-mode mobile radio for tri-mode, each Ritron tri-mode capable radio can be quickly upgraded to digital operation via an easily accessible add-on board and a software upgrade via a connection to a host-computing device. As a charter member of the NXDN forum, a group dedicated to advancing the use of the NXDN radio standard, Ritron is committed to becoming an expert on NXDN digital voice operation.

According to Steve Rice, president of Ritron, "The decision to go with a clean sheet design was an approach that we were uniquely able to make. Ritron has expertise in the design of high-performance radio equipment and experience with the unique demands of the railroad environment. For example, we did not use a land mobile two-way radio as the core of the design – instead we designed a very rugged RF front-end, specifically tuned to the railroad frequencies – which yields exceptional immunity to numerous types of interference. And we added special features, including an antenna fault indication, since this was specifically requested by the railroads." Rice adds that since Ritron's in-house engineering team writes the software, future modifications and changes requested by railroads—even an individual railroad—can be easily accommodated.

Ritron's tri-mode capable radio was tested by a class 1 railroad and passed onsite quality inspections with very high marks. The radio was even thrown off the train several times and it continued working. This durability is important, since the smaller regional railroads are working with limited funds and they are looking for radios that are going to continue working for the long haul.

On track to savings

When the Buckingham Branch (BB) Railroad, a family-owned short line in Central Virginia, aimed to comply with the transition to narrowband and beyond, none of their locomotive radios could be retrofitted.

Gordon Ragland, Information Technology Manager of the BB Railroad, chose not to "jury rig" standard mobile radios for the train environment because he felt that would lead to "endless workarounds."

Ragland considered hardware-based tri-mode radios, but had concerns over their high price and whether they'd be able to smoothly adapt to any changes in NXDN protocol between the time of purchase and the time that the evolving digital 6.25-KHz standard ultimately takes effect.

"If we bought high-priced, hardware-based tri-mode radios, they may not even survive until the digital 6.25-KHz changeover occurs," says Ragland. "There are just too many variables to commit a lot of dollars to, so we decided we wouldn't pay more for a hardware-based tri-mode radio than we would for a dual mode one."

After researching the possibilities, Ragland turned to tri-mode capable clean cab radios by Ritron for the BB's 14 locomotives.

"They're built as a complete RF platform for the locomotive environment, not as a shell with a mobile radio inside of it," says Ragland.

"With the tri-mode capable radios, our locomotives get crystal clear 25-KHz and 12.5-KHz communication right now, and with a slight change we'll be ready for digital 6.25-KHz when that's finalized," says Ragland. "Compared to hardware-based tri-mode radios, we're saving thousands per radio. We won't have to replace or overhaul our radios again because we have the flexibility to meet the latest NXDN standard as it's developed."

"Ritron makes the outside of the radio work as well as the inside," concludes Ragland. "It's clear that the company thinks about their railroad users."

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