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Aug 1, 2008 12:00 PM, By Lynnette Luna

Interoperability testing of P25 radios expected to begin soon

More than 15 years ago, U.S. governmental and standards organizations began to develop the Project 25 standard for the public-safety community. The primary objective: to create a set of standards for high-quality interoperable digital radio voice and data communications.

Today, although all of the standardization work isn't done, end users in theory should be able to buy P25-compliant networks, purchase digital radios from any P25 vendor for cost savings and operate those devices on their networks without any complications. But that isn't always the case.

Like all standards, including the all-IP-based WiMAX standard, P25 lets vendors add their own application-layer features — such as encryption software — as long as they don't interfere with interoperability. However, such additions often compromise interoperability, leading critics to say that manufacturers are diminishing the effectiveness of P25 by including proprietary hooks in their products.

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"The dominant manufacturers appear to subscribe to the philosophy that measures should be taken to restrict competition when P25 radio systems are initially sold," said Daryl Jones, owner and president of Telecommunications Engineering Associates, which manages public-safety systems throughout the San Mateo, Calif., area. "This is done by introducing proprietary variants and special features that other manufacturers cannot provide and results in limiting interoperability. This allows the manufacturer to sell system enhancements and subscriber radio equipment for extremely high, non-competitive prices by controlling the client's ability to purchase other brands."

Steve Rauter, executive director of the Western Will County Communications Center in Plainfield, Ill., is ruffling feathers by asserting that manufacturers are embedding certain features in P25 that conflict with the goals of the InterRF Subsystem Interface, or ISSI, which is a component of P25's second phase. The ISSI is designed to connect disparate P25-compliant systems by establishing roaming between authenticated users, including both individual and group calls, via an IP-based software protocol stack that can reside in the users' handsets or in a gateway device.

"I've stumbled across an issue with the roaming dataset," Rauter said. "What I'm finding out is that off-brand radios may not be able to read the brand signature of the manufacturer that is hosting the infrastructure, so a device may not roam correctly."

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P25 manufacturers deny any purposeful use of proprietary software to keep their customers from using competing radios. They say they are responding to what their customers ask for, and sometimes those features go beyond what is spelled out in the standard.

For instance, the super-regional P25 network in Virginia — which covers York, James City and Gloucester counties and is heralded for its unprecedented cooperation, network redundancy and interoperability with government agencies — solely uses Motorola infrastructure and radios, and incorporates encryption software called advanced digital privacy (ADP) that is not cross-compatible, said Terry Hall, communications director with York County. However, the managers of this super-regional network aren't really interested in using other radios on the network as they receive a significant volume discount from Motorola.

Paul May, business development manager with MA/COM, said the notion of using proprietary software hooks to lock in customers is largely a myth that has been propagated throughout the industry. "The radios for the most part are interoperable," he said. "If we add features it's because the standard didn't have anything defined, and we'll go back and offer it up to a committee for standardization."

Still, the burden remains on buyers to determine that the equipment they are purchasing does what it's supposed to do in the field. Manufacturers do their best to make sure they are P25-compliant, but most conduct little to no interoperability testing with other P25 products. Smaller public-safety agencies, which don't have the luxury of buying devices in large volumes yet still desire to shop around for the best price, have a low comfort level with buying disparate equipment for fear the equipment won't work properly, say members of the public-safety community.

May said the P25 industry has tried in the past to invite independent laboratories to test interoperability among P25 products but has had a difficult time attracting interest because of the complexity involved and the relatively small size of the market compared with the massive commercial cellular market.

"It really is up to the vendor to say they are compliant, and that's really not a long-term viable solution," May said. "If we were a larger market, there would be an industry standard lab doing that kind of work. But we're not."

However, federal government agencies have now stepped in to help through the Project 25 Compliance Assessment Program (CAP), a joint program between the National Institute of Standards and Technology (NIST) Office of Law Enforcement Standards (OLES) and the Department of Homeland Security (DHS) Office for Interoperability and Compatibility (OIC). The goal of the partnership is to establish a process for ensuring that P25 equipment complies with the standards and is capable of interoperating across manufacturers. That process involves establishing testing labs so that manufacturers can ensure their products are P25-compliant.

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"We did tests and found that many P25 radios had issues where they did not meet the full suite of the standard," said Dereck Orr, program manager for public-safety communications standards with NIST/OLES. "The proprietary aspects of P25 were created with the thought in mind that you would standardize interfaces but never disallow manufacturers from adding on bells and whistles to differentiate.

"The key was to make sure they don't interfere with standardized product, but it has led to some non-conformance to the standard. … Testing was something that for a long time public safety assumed occurred, but then they realized that their toasters were tested to a higher degree than their radio systems."

CAP is moving forward with plans to have some product information regarding P25 compliance posted online by the end of the year. The test results will help public-safety communications officials make informed decisions about purchases based on whether one vendor's radio interoperates with another vendor's radio or infrastructure, Orr said.

CAP, whose governing board includes federal, state and local public-safety agencies that either manage — or plan to manage — a P25 system, has put together a team of professionals to review and recognize laboratories that will conduct the P25 product testing. The review is based on a long set of testing criteria established by CAP's governing board, and those labs that pass review will receive approval from DHS, Orr said.

The first out of the gate will be vendor laboratories, which not only have to meet the criteria, but also allow other vendors into their labs for multivendor tests. Orr said CAP expects to get independent testing labs on board too, and expects vendors such as Motorola — which already has relationships with labs in the cellular world — to persuade these labs to extend tests to P25 equipment as well. If CAP's timeline holds, lab certifiers will be conducting their assessments by August to formally recognize labs.

The program initially will focus on the Common Air Interface (CAI) which allows for over-the-air compatibility between mobile and portable radios and tower equipment, followed by ISSI products when they become available, Orr said.

The labs then will rate various features of each product using Suppliers Declaration of Compliance (SDoC) forms that provide details on the product tested, the competitive products that were tested against it, and the criteria and procedures used for the tests, according to the NIST handbook on the subject. The reports also will include pass and fail information, as it relates to interoperability, for each radio feature. The information then will be posted online.

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Every vendor in the industry is expected to be involved, primarily because DHS is requiring any agency receiving interoperability grants to purchase equipment that has been tested. "There will be a race to see who can get tested the fastest," Orr predicted.

In the end, Orr believes these compliance labs will lead to the P25 market becoming a more competitive marketplace that drives down prices.

"Our hope is that public safety will feel more comfortable making a different choice with another vendor for other parts of their systems if they have proof that it works," he said. "When you get that kind of activity, it creates a more competitive environment."

WHAT IS REQUIRED FOR P25 COMPLIANCE?

At a minimum, a Project 25 radio system must provide these standard standard components.

The Common Air Interface (CAI): This specifies how information is coded, transmitted and received over the air, enabling users to interoperate and communicate digitally across networks, agencies and vendors.

The Improved Multi-Band Excitation (IMBE) vocoder: This converts speech into a digital bit stream.

Defined standard modes of operation: These enable multivendor interoperability for additional functions, such as trunking, encryption and over-the-air rekeying.

Defined system interfaces: These allow the P25 system elements to communicate with host computers, data terminals and the public switched telephone network (PSTN).
Source: **www.project25.org**

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