Land Mobile Radio (LMR) for Project Managers

Part 3: A P25 Primer for Project Managers and Acquisition Managers

Public safety agencies use land mobile radio (LMR) systems as the primary means for transmitting mission-critical voice communications and low-speed data between public safety responders. As LMR systems and technologies have evolved over many decades, there are a variety of communications systems in use today. Traditionally, systems are designed to meet specific agency missions and operate on assigned frequencies/channels within appropriate spectrum bands (e.g., very high frequency [VHF], ultra high frequency [UHF], 700 megahertz [MHz], 800 MHz). Vendors built LMR systems and equipment that were non-standard, and offered vendor-specific features, that could inhibit interoperability with surrounding systems and equipment. As a result, disparate LMR systems emerged, and were not always compatible with each other, making it difficult for public safety agencies to communicate across jurisdictions and disciplines. Public safety recognized a need to standardize systems and equipment, to ensure that, regardless of system or vendor, responders could communicate.

As digital and trunking technologies were introduced in the late 1980s and early 1990s, the public safety community and federal government agencies recognized the need for standards to enhance communications interoperability, and to provide a competitive marketplace for public safety agencies.

DEVELOPING STANDARDS

The Federal government, in partnership with the Association of Public Safety Communications Officials (APCO) and the National Association of State Telecommunications Directors (NASTD), signed a Memorandum of Understanding (MOU) with the Telecommunications Industry Association (TIA) to develop digital LMR standards to develop public safety requirements (1992, amended in 1993).

Federal, state, and local public safety representatives worked with the Telecommunications Industry Association (TIA) to develop standards for LMR systems, known as P25. As a result of this public-private collaboration, the P25 standards have gained worldwide acceptance for public safety, security, public service, and commercial applications. Moreover, P25 standards development is continuous, and ongoing as new features, interfaces, and testing procedures are continuously developed, updated, and released.

ADOPTING STANDARDS

Following the tragic events from 9/11, legislation was passed to improve the interoperability of public safety communications systems and equipment. Congress mandated that new or upgraded equipment must be interoperable and meet certain interoperability standards. As a result, the federal government supported the purchase of P25-compliant LMR equipment through grants and policy, to ensure public safety systems can interoperate, regardless of manufacturer.

It's worth noting that while the purchase of P25 equipment provides the technical ability to connect, there is an equally pressing need to establish standard operating procedures that define roles, responsibilities and appropriate usage of dedicated interoperability resources during response operations. Interoperability requires not only the technical ability to connect, but also the agreement between people, agencies, and other players to communicate and cooperatively respond to emergencies and disaster events. Recognizing the great value of standards-based equipment investments, the federal government supports the purchase of P25 equipment to improve interoperability among public safety agencies.

GUIDANCE FOR PURCHASING P25 EQUIPMENT

The Department of Homeland Security (DHS) collaborates with SAFECOM and the National Council of Statewide Interoperability Coordinators (NCSWIC) to provide annual guidance to grantees investing in emergency communications. The *SAFECOM Guidance on Emergency Communications Grants* provides recommendations, best practices, and resources for grantees purchasing LMR equipment, including detailed information on P25 standards. Specifically, the *SAFECOM Guidance* recommends that grantees:

- **Read the P25 technical standards for LMR.** The published standards approved by the P25 Steering Committee are available to employees of qualified government agencies at no cost by completing the TIA online request form at: http://www.tiaonline.org/all-standards/p25-downloads-application. To date, TIA has published over 90 documents detailing the specifications, messages, procedures, and tests applicable to the 13 interfaces, multiple feature sets, and functions offered by P25. The test documents include performance, conformance, and interoperability test procedures to ensure baseline compliance with the applicable standards. It's not realistic for grantees to read all of these documents; however, project and acquisition managers should read any P25 technical standards documents that are applicable to their system planning or to educate themselves before speaking with P25 vendors.

- **Include P25 in Statement of Requirements (SoR) and vendor inquiries.** There are several resources for grantees to reference when developing SoRs and vendor inquiries. These resources help project and acquisition managers to determine which standards are applicable and ensure proposed projects are compliant with the P25 standards. Resources include:

    - The P25 Technology Interest Group's (PTIG) *Capabilities Guide* provides example project requirements and Requests for Proposals (RFP). This document and other P25 resources are available on the PTIG website following free registration at: http://www.project25.org/.

    - The P25 Steering Committee, in coordination with the P25 User Needs Subcommittee, publishes the *P25 Statement of Requirements* that addresses user needs on an annual basis. Although the SoR reflects the user needs for LMR specifications and standards, it is not a part of the TIA-P25 standards and may contain requirements that are not addressed in the standards and are not applicable to available products. It should be noted that the SoR should not be a replacement for detailed engineering specifications. Updates to this document are available on the PTIG website at: http://www.project25.org/.

- **Select P25 eligible equipment.** To improve interoperability across LMR systems, project and acquisition managers should ensure that digital voice LMR systems and equipment purchased are compliant with the P25 standards. The P25 Compliance Assessment Program (CAP) is a formal, independent process, created by DHS and operated in collaboration with the National Institute of Standards and Technology, for ensuring that communications equipment that is declared by the supplier to be P25-compliant, in fact, is tested against the standards with publicly available results. As a voluntary program, P25 CAP allows suppliers to publicly attest to their products' compliance with a selected group of requirements through Summary Test Report (STR) and Supplier's Declaration of Compliance (SDOC) documents based on the Detailed Test Report from the DHS-recognized laboratory that performed the product testing. In turn, P25 CAP makes these documents available, along with a list of grant-eligible equipment, to the public safety community to inform their purchasing decisions at: http://www.FirstResponder.gov/P25CAP.

- **Obtain documented evidence of P25 compliance.** Grantees, project managers, and acquisition managers can obtain evidence in one of two ways:

    - Through documented evidence that the equipment has been tested and passed all the applicable, published, and normative P25 compliance assessment test procedures for performance, conformance, and interoperability as defined in the latest P25 CAP's *Compliance Assessment Bulletins* for testing requirements. Before purchasing equipment, managers should confirm whether the vendor has participated in equipment testing consistent with the P25 CAP.

    - If documentation for applicable equipment is not yet available through the P25 CAP, managers should obtain documented evidence from the manufacturer, as part of the RFP/RFQ Response, stating that the applicable tests were conducted in accordance with the published test procedures in the P25 suite of standards. It is suggested the manager review the published tests procedures/standards provided by TIA to specifically identify the appropriate tests and results.

- **Ensure additional features purchased are P25-compliant.** Grantees should ensure that added equipment, features, or capabilities are P25-compliant. Vendor-specific features may not be P25-compliant and as a result, may hinder interoperability with other equipment and devices that do not share those features. Managers should request the vendor provide a list of non-standard features/functionality and ascertain there is no comparable standard and the use of the feature/function will not impede interoperability with P25 compliant equipment systems. In addition, when federal grant funds are used to purchase P25 LMR equipment and systems that contain non-standard features or capabilities, where there is a comparable P25 feature or capability available, grantees must ensure the standards-based feature or capability is included as well.

- **If encryption is required, ensure compliance with the P25 standard for the Advanced Encryption Standard (AES), when applicable.** To ensure interoperability of encrypted communications between public safety agencies, devices used by responders must share a common encryption key and algorithm. The following provides additional guidance on encryption:

    - Grantees using federal funds to purchase encryption options for new or existing communications equipment should ensure that encrypted capabilities are compliant with the current publication of ANSI/TIA-102.AAAD *P25 Block Encryption Protocol* standard.

    - Grantees investing in encryption are strongly encouraged to implement the AES 256-bit Encryption Algorithm as specified in the *P25 Block Encryption Protocol*. The P25 suite of standards references the use of AES as the primary encryption algorithm, but continues to allow Data Encryption Standard-Output Feedback (DES-OFB) for backwards compatibility and interoperability with existing systems. The current version of the *P25 Block Encryption Protocol*, referenced above should be identified in all procurement actions when encryption is required.

    - Grantees seeking to use federal grant funds to purchase non-standard encryption features or capabilities for new or existing equipment must ensure 256-bit AES is also included to ensure their devices have the capability to interoperate in an encrypted mode.

    - Grantees currently using DES-OFB should no longer invest in this encryption method unless the AES (256 bit) encryption is also provided. . The continued use of DES-OFB or other non-standard encryption algorithms is strongly discouraged. Grantees should include the anticipated timeline to complete the migration to AES. The federal government recognizes AES as a more robust encryption algorithm and strongly recommends entities migrate to AES as it will enhance interoperability with federal entities, as well as state and local public safety agencies implementing encryption in the future.

- **Provide written justification required for non-P25 purchases.** In the event a grantee is using federal funds to purchase equipment that is not compliant with P25 standards, written justification should be provided to the grantor. Authorizing language for most emergency communications grants strongly encourages investment in standards-based equipment. Many granting agencies will not approve non-standards-based equipment unless there are compelling reasons for using other solutions.

    - Funding requests by public safety agencies to replace or add radio equipment to an existing non-P25 system (e.g., procuring new portable radios for an existing analog system) will be considered if there is a compelling reason why such equipment should be purchased and written justification of how the equipment will advance interoperability and support eventual migration to interoperable systems. Written justification should also explain how that purchase will serve the needs of the applicant better than equipment or systems that meet or exceed such standards. **Absent compelling reasons for using other solutions, public safety agencies should invest in standards-based equipment.**

CONCLUSION

Standards-based systems enable interoperable communications between responders from various disciplines, jurisdictions, and levels of government in the event they need to communicate during day-to-day incidents, emergencies, and disaster responses. In order to promote interoperability, the federal government strongly encourages public safety agencies to purchase P25-compliant LMR equipment. The *SAFECOM Guidance* and other resources are available to assist grantees in planning emergency communications projects.

ABOUT SAFECOM/NCSWIC

SAFECOM is comprised of more than 70 members representing federal, state, local, and tribal emergency responders, and major intergovernmental and national public safety associations, who aim to improve multi-jurisdictional and intergovernmental communications interoperability through collaboration with emergency responders and policymakers across Federal, State, local, tribal, territorial, and international partners. SAFECOM members bring years of experience with emergency communications during day-to-day operations, and natural and man-made disasters. SAFECOM members offer insight and lessons learned on governance, planning, training, exercises, and technologies, including knowledge of equipment standards, requirements, and use. SAFECOM members also provide input on the challenges, needs, and best practices of emergency communications, and work in coordination with OEC to share best practices and lessons learned with others.

The National Council of Statewide Interoperability Coordinators (NCSWIC) is comprised of Statewide Interoperability Coordinators (SWIC) and their staff from the 56 states and territories. NCSWIC assists states and territories with promoting the critical importance of interoperable communications and sharing best practices to ensure the highest level of interoperable communications across the Nation.

This document was developed by the SAFECOM/NCSWIC Funding and Sustainment Committee, with the support of the Department of Homeland Security (DHS) Office of Emergency Communications. This document reflects the expertise and knowledge of SAFECOM and NCSWIC members, and the coordination efforts of OEC in bringing stakeholders together to share technical information, best practices, and lessons learned in funding and deploying public safety communications systems.

For more information on SAFECOM, see: http://www.dhs.gov/SAFECOM
For more information on NCSWIC, see: http://www.dhs.gov/SAFECOM/NCSWIC

Resources for Public Safety Agencies Investing in P25 Equipment

SAFECOM Guidance on Emergency Communications Grants
The SAFECOM Guidance provides information for grantees developing emergency communications projects for federal funding. Decision makers and grantees should read the SAFECOM Guidance, coordinate proposals with the Statewide Interoperability Coordinator, and encourage compliance with the recommendations contained therein. For Department of Homeland Security (DHS) grants, grantees must comply with the SAFECOM Guidance as a condition of funding.

P25 Technology Interest Group (PTIG)
The PTIG website provides information on all topics concerning P25 standards. Free registration is required to view content.

P25 Suite of Standards
The Telecommunications Industry Association's website contains P25 standards development activities that address all technical matters for private radio communications systems and services, including definitions, interoperability, compatibility, and compliance requirements. P25 standards documents are available for purchase. Qualified government entities may obtain copies of P25 standards via the PTIG website.

P25 Compliance Assessment Program (CAP)
The P25 CAP establishes a process for ensuring that equipment complies with P25 standards and is capable of interoperating across manufacturers. P25 CAP is helping emergency response officials make informed purchasing decisions by providing manufacturers with a method for testing their equipment for compliance with P25 standards.

Questions on this paper can be directed to the DHS Office of Emergency Communications at oec@hq.dhs.gov.