Project 25 Inter-RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI) Primer

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SAFECOM™ Federal Partnership for Interoperable Communications FPIC NCSWIC®

Executive Summary

Public safety agencies depend upon land mobile radio (LMR) systems for fast, reliable, and available voice and data communications for both non-urgent and emergency voice communications. These critical links are vital to protecting life and property. The mission-critical communications link between first responders in the field and the support services they rely on, as well as with field command staffs, is vital to their own safety and to the public safety mission.

The Inter-RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI) are Project 25 (P25) interconnection standards that overcome barriers to interoperability by allowing systems and components of same and disparate manufacturers to communicate effectively. This provides first responders the ability to roam into neighboring jurisdictions, enhancing operability by extending the coverage of their LMR systems and providing critical interoperability.

As Project 25 (P25) standards-based systems have been implemented throughout the United States and other parts of the world, many public safety agencies have sought to link their systems with neighboring or area-wide systems to enable more effective interoperable communications for mutual aid operations or simply to expand their own coverage. The Inter-RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI) provide the ability to interconnect radio frequency subsystems (RF Subsystems)[1] and console subsystems, even when their manufacturers and software versions differ. This allows public safety agencies to link their networks together to create a "system of systems" architecture.[2]

To help identify the challenges and solutions of the complex tasks involved in implementing ISSI and CSSI, the Federal Partnership for Interoperable Communications (FPIC), with support from the Department of Homeland Security Cybersecurity and Infrastructure Security Agency, formed a focus group to help identify some of the challenges and actionable solutions. The FPIC ISSI/CSSI Focus Group seeks to document the complexities of ISSI/CSSI implementations and is developing several products to help public safety agencies with potential solutions. These efforts are discussed in detail in the Appendix.

This document provides a high-level overview of a broad range of introductory topic areas relevant to ISSI and CSSI, including:

- Overview of ISSI/CSSI technology,
- Benefits of ISSI/CSSI,
- How Project 25 standards address ISSI/CSSI,
- ISSI/CSSI planning and implementation challenges,
- Resources for effective ISSI/CSSI implementation, and
- Current FPIC ISSI/CSSI Focus Group activities (Appendix)

[1] RF Subsystem refers to an individual P25 LMR system and associated components

[2] The "system of systems" concept was initially proposed by the Public Safety Wireless Network (PSWN) program in the late 1990s.

Introduction

Land mobile radio (LMR) has been the backbone of public safety communications for many decades and will remain the primary means of mission-critical public safety voice communications for years to come. As technology continues to advance, it is evident that high-speed data, video, radio/voice over Internet Protocol (IP), and other broadband services are also important tools that are changing the communications landscape for public safety. However, public safety must retain a proven, secure, robust, reliable, and highly available means of instantaneous voice communications to perform their critical and life-saving missions. LMR systems have been providing that service since the 1930s in the form of analog, and now digital, radio systems. Legislators, policy makers, and the public safety community must recognize the continued importance of LMR systems, as well as the need for continued investment in sustaining and improving LMR technology and infrastructure into the foreseeable future.[3]

This document's purpose is to introduce the Inter-RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI) technologies and highlight potential benefits and uses, discuss the existing Project 25 (P25) LMR standards that govern the technologies, briefly introduce some of the challenges associated with the implementation of the standards, and discuss how best to address these challenges in the future.

Background

In the early 1990s, as digital technology continued to mature and new LMR products and services were introduced, it became apparent that an accredited technical standard needed to be developed for manufacturers to build LMR equipment and systems that were interoperable regardless of label or brand. Users expected these systems to meet their expanding requirements *and* effectively interoperate between systems of disparate manufacturers. To address this need, key user agencies and organizations entered into a partnership with the telecommunications industry to begin development of the P25 suite of standards.[4]

Today, several manufacturers produce and market systems and equipment that are built to comply with the P25 Amercian National Standards Institute (ANSI)-accredited technical standards, and public safety agencies throughout the nation have implemented these systems. As a result, the need to interconnect systems and subsystems from disparate manufacturers has become a key requirement for effective public safety operations, mutual aid, and emergency response. In addition to improving interoperability with neighboring jurisdictions, public safety system owners and operators also recognize the operational benefits that interconnections provide by extending coverage using the infrasturcture of neighboring agencies.

Over the past decade, the P25 ISSI and CSSI standards have been developed to interconnect P25 LMR systems with one another and interconnect non-native consoles with P25 systems. These standards become especially important when interconnecting radio cores or radio frequency subsystems (RFSS) and console systems from disparate manufacturers. Given the inherent complexities in interconnecting RFSSs and navigating the implementation of standards-based

[3] FirstNet Government Affairs Director Congressional Testimony, October 12, 2017. https://homeland.house.gov/hearing/assessing-first-responder-communications/

[4] See http://www.project25.org/index.php/technology/what-is-p25-technology for more information.

technology, the Federal Partnership for Interoperable Communications (FPIC), with support from the Department of Homeland Security Cybersecurity and Infrastructure Security Agency Emergency Communications Division, formed an ISSI/CSSI Focus Group to specifically explore the ISSI/CSSI technology environment. This group serves as a resource for current and prospective ISSI/CSSI users as they plan and implement ISSI and CSSI solutions. The details of this group and its current activities are available in the Appendix.

Technology Descriptions

ISSI and CSSI both provide a standards-based IP connection between two or more ISSI/CSSI-capable P25 networks to form a "system of systems." [5] The ISSI connects radio cores/RFSS, and the CSSI connects "foreign" consoles to an RFSS(s) as shown in Figure 1.

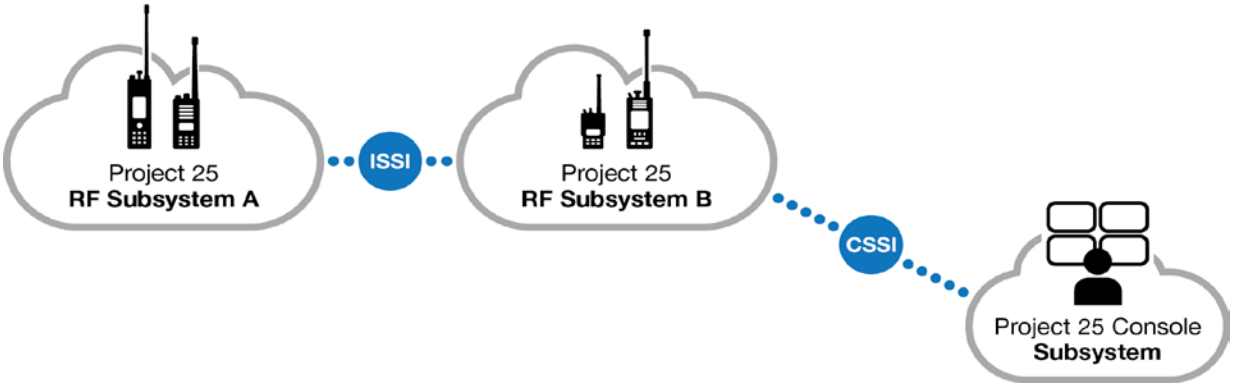

Figure 1. Connecting RF Subsystems Using ISSI and CSSI.

Inter-RF Subsystem Interface (ISSI)

The ISSI amplifies the capabilities of P25 LMR systems by connecting radio core systems and associated resources between partnering agencies while maintaining appropriate levels of local control. When paired with appropriate system planning, testing, and management, and with standard operating procedures (SOP) and periodic training, the ISSI can be an invaluable tool to increase the efficiency and reliability of interoperable communications during emergency response and daily operations.

P25's open standards define the interfaces, features, and functions of P25-compliant radio systems. Voice and data standards for features and functionality available through the ISSI are developed by the Telecommunications Industry Association Engineering Committee (TIA TR-8[6]) and implemented by P25 manufacturers. As one of eleven component interfaces currently defined in the P25 suite of standards, the ISSI provides a standardized, non-proprietary IP connection of two or more P25-compliant trunked systems. These ISSI-enabled RFSSs may be from different manufacturers, may operate in different frequency bands (e.g., very high frequency, ultra high frequency, 700/800 megahertz), and may use different versions of P25 (Phase 1 or Phase 2). The basic requirement is that each RFSS must incorporate an ISSI. In other words, ISSI technology

[5] A system of systems connects radio systems from different owners/operators into a single, interoperable network capable of maximizing limited spectrum, financial, and human resources.

[6] TIA TR-8 is the engineering committee responsible for developing the TIA-102 series of P25 Standards in collaboration with the P25 Steering Committee and public safety users.

allows for multiple radio cores/RFSSs to link together and form larger wide-area networks, supporting the "system-of-systems" concept.

A system-of-systems approach relies on an agency's ability to own and manage an independent system while collaborating and sharing resources with other agencies' systems. Using this approach, each individual system becomes a component (or subsystem) in an extended system, which could potentially span a county, region, state, or even a nationwide grouping of additional systems. Each system can be connected to others if jurisdictions and agencies work collaboratively to establish governance structures, identify compatible technology and equipment, develop and implement SOPs, and regularly conduct exercises and drills on the system.

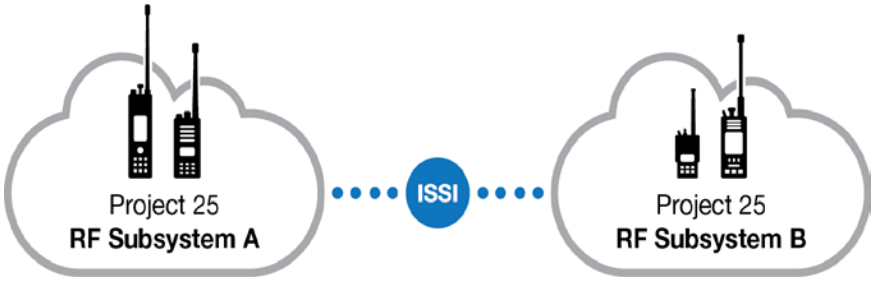

Figure 2. ISSI

Current efforts to advance ISSI interoperability include the development of additional ISSI standards through the P25 standards-development process, implementing conformance testing requirements from the P25 Compliance Assessment Program (CAP), and ongoing discussions for interworking between LMR and broadband long term evolution (LTE/5G) technology. These amendments and enhancements to existing P25 ISSI standards, in conjunction with new standards, will allow the ISSI connection to support additional P25 features and functions.

As technology advances and broadband systems become an increasingly integral part of the public safety technology tool kit, it is critical that the public safety community pay increasing attention to providing an interconnect capability with both public (FirstNet) and private LTE technology through a common, standards-based interworking function. Such a function may leverage the ISSI where appropriate. Additionally, as more non-P25 LMR systems are implemented in the public services sector, the ISSI feature sets should be expanded to include the ability to interconnect these systems with P25 systems through the ISSI.

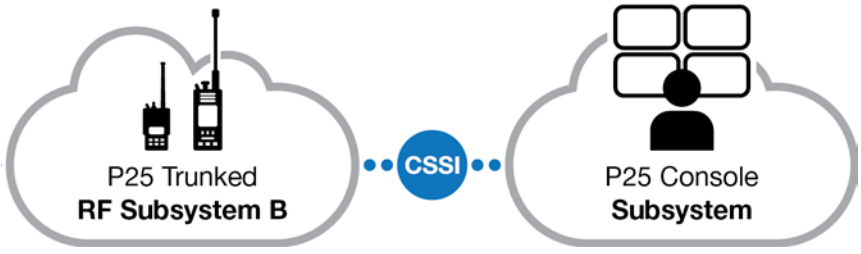

Figure 3. CSSI

Console Subsystem Interface (CSSI)

The CSSI is another wireline interface included in the P25 suite of standards, which provides a standardized IP connection between the RFSS and console equipment. Prior to the development of the Digital Fixed Station Interface (DFSI) standard for P25 conventional systems, public safety communications centers had limited choices for console system solutions. Each vendor had its own proprietary solution for connecting console equipment to the RFSS. Prior to P25's move toward digital IP connectivity, console systems had typically linked to the RFSS via analog signaling. The creation of the CSSI standard brought the same level of standardized IP connectivity to the P25 trunked RFSS environment. This provides for improved interoperability between multiple dispatch console vendors and system infrastructure manufacturers, which enables interested agencies to consider third-party P25 console options and allows implementing agencies to have additional console equipment choices during the acquisition process.

Current Limitations of ISSI and CSSI

Currently, not all features and functionalities available in P25 standards-based systems are supported for use across an ISSI or CSSI connection. Agencies considering the implementation of either interface should conduct sufficient research to ensure that their identified connectivity, interworking, operability, and interoperability requirements can be met with the current capabilities afforded by the ISSI or CSSI solution under consideration.

Benefits of ISSI Implementation

ISSI connections may be used to enhance interoperability, extend coverage, and permit system-to-system roaming among partnering agencies. If implemented properly, the ISSI provides a flexible and scalable approach to the long-standing challenge of communications interoperability between different radio systems of the same or disparate manufacturers.

During complex large-scale incidents or planned special events, ISSI connections allow users to maintain connectivity to their home system and talkgroups while roaming. When systems are connected via the ISSI, telecommunicators can maintain connections to, and communications with, their users even if they have roamed outside of their RFSS's coverage area into extended coverage provided by a partnering agency's system. Another benefit of the ISSI is that all communications crossing the ISSI bridge can be encrypted for security.

Similar to voice roaming across modern cellular networks, the ISSI allows a radio subscriber unit (SU) from RF Subsystem A to communicate with SUs from RF Subsystem B. If RF Subsystem A SUs can support the same channels, frequency bands, numbering plan, and talkgroups of RF Subsystem B, then roaming can be accomplished. In that scenario, RF Subsystem B SUs will be able to authenticate and make calls while in the RF Subsystem A coverage area, and vice versa.

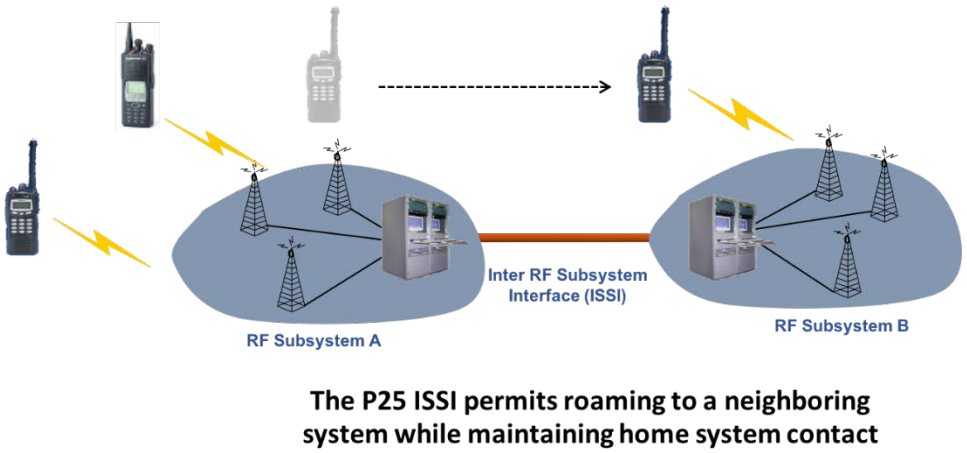

Figure 4. Subscriber Unit Roaming[7]

It is important for interested agencies to understand the purpose of pursuing an ISSI connection with other agencies. Some agencies seek this solution as a means of achieving interoperability with neighboring systems for mutual/automatic aid in response to planned and unplanned incidents while maintaining ownership and control of their system. In one implementation, the ISSI "enables the respective agency to deploy a radio system from its preferred vendor rather than joining a statewide system, but at the same time honor its interoperability obligations by connecting to the statewide system via the ISSI."[8] Others leverage ISSI to extend their coverage footprint using the RFSS infrastructure of a neighboring agency. For example, one western city established an ISSI connection to extend radio coverage outside the city to the county jail, which is approximately 20 miles away. This implementation provides an extended coverage solution that improves officer safety and negated the need for additional capital expenditures to extend system coverage.

ISSI and CSSI connections provide increased interoperability and radio coverage; however, the implementation process can be complicated, expensive, and time-intensive. Jurisdictions can help determine if an ISSI/CSSI is appropriate by contacting the FPIC ISSI/CSSI Focus Group or directly engaging with other public safety agencies that have implemented an operational ISSI/CSSI to discuss needs, challenges, and lessons learned. Information-sharing and collaboration with other users can also help the jurisdiction anticipate and mitigate potential challenges in its own impelmentation.

ISSI and CSSI in the Project 25 Standards

The P25 suite of standards was developed (and continues to be developed) to meet the ever-increasing need for interoperable communications and provide a baseline for future LMR development. The standards have given rise to cross-vendor solutions, including ISSI and CSSI,

[7] Project 25 Interest Group presentation to IWCE 2018, P25 Foundations: Applications and System Technology updates for 2018

[8] U.S. Department of Homeland Security, Office of Emergency Communications, *Emergency Communications Forum*, Volume 19, 2016, page 5, https://content.govdelivery.com/attachments/USDHS/2016/05/26/file_attachments/557233/DHS%2BOEC%2BECF%2BVolume%2B19.pdf.

providing a wider selection of compatible P25 solutions and equipment along with the ability to provide end users with greater interoperability and operational dexterity.

The standards associated with ISSI and CSSI are developed by the TIA Engineering Committee TR-8.19 (Wireline Systems Interface Subcommittee). The core ISSI/CSSI standards documents have been developed for Frequency Division Multiple Access (FDMA), and the Time Division Multiple Access (TDMA) standards are under development. **Table 1** lists the core documents from the ISSI/CSSI suite of standards, which specify procedures for handling mobility management, voice services, and supplementary data functions. The standards also provide recommended conformance and interoperability testing procedures for both manufacturers and users. Using the current suite of ISSI standards, several vendors have demonstrated ISSI functionality and implemented ISSI connections. Similarly, the CSSI has been successfully implemented by several major console manufacturers and radio network manufacturers.

Table 1. Core Documents from the ISSI/CSSI Suite of Standards.

Document	Description
TSB-102.BACC-B - Project 25 Inter-RF Subsystem Interface Overview	Provides an overview of key technical aspects of the ISSI and serves as an umbrella document for the ISSI document suite
TIA-102.BACA-B - Project 25 Inter-RF Subsystem Messages and Procedures for Voice Services	The primary ISSI standard that provides the detailed specification of the messages and procedures for voice services and SU mobility management
TIA-102.BACD-B - Project 25 Inter-RF Subsystem Messages and Procedures for Supplementary Data	Defines messages and procedures to provide Supplementary Data Services over the P25 ISSI
TIA-102.CACA - Project 25 Inter-RF Subsystem Measurement Methods for Voice Services	Defines measurement methods recommended for assessing the performance of ISSI voice services provided by P25 RFSSs interconnected with the ISSI
TIA-102.CACB - Project 25 Inter-RF Subsystem Performance Recommendations for Voice Services	Specifies performance parameters defined in the ISSI Measurement Methods standard, specifying minimum levels of performance
TIA-102.CACC - Project 25 Inter-RF Subsystem Conformance Testing Procedures	Describes a series of conformance tests for the ISSI, further defined into functional groups
TSB-102.BAGA - Project 25 Console Subsystem Interface Overview	Provides an overview of key technical requirements and standards supporting specification of the CSSI

The level of detail and complexity in the standards means that properly educating users and manufacturer teams is a critical component of successful implementation. Manufacturers are *not* required to implement a feature that is defined in an accredited technical standard, and there are instances in which the standard does not specify *how* a feature is implemented. This can result in discrepancies between manufacturers in how they implement the ISSI/CSSI standards.[9] **These discrepancies can introduce implementation issues, especially when attempting a connection**

[9] It is important to note that implementation decisions typically occur separately from the standards-making process. How and if each vendor implements the P25 standards is not governed by the P25 standards-making body.

between disparate manufacturer's systems. The current P25 technical standards do not necessarily address how to overcome these obstacles, but efforts are underway to simplify interoperability testing and reporting among manufacturers and to establish CAP testing bulletins for ISSI. Future proposed standards will likely clarify existing features (as necessary), specify additional user features, and streamline ISSI testing procedures.

Primary Planning and Implementation Challenges

The FPIC established the ISSI/CSSI Focus Group to explore the ISSI/CSSI technology environment, document the complexities of ISSI/CSSI implementations, and identify actionable solutions (see Appendix for additional details). The Focus Group has demonstrated value in its ability to bring current and prospective ISSI/CSSI users together with manufacturers and facilitate candid discussions around planning and implementation challenges. For some of these challenges, the Focus Group identified best practices, which are addressed in the ISSI/CSSI Best Practices documents; some of these best practices are briefly introduced here as well. For other challenges, the Focus Group has identified potential solutions or next steps to pursue solutions.

Planning

Before implementing an ISSI or CSSI, an agency and its potential partners must understand and agree on the features and functionality they expect to be able to support for both operability and interoperability, under what circumstances, and for what purposes. Agencies can and should seek to educate themselves on the ISSI or CSSI technology itself via manufacturers' in-depth technical courses and identify venues, such as the FPIC ISSI/CSSI Focus Group, to engage other current or prospective users. Furthermore, agencies should also engage in ongoing dialog with their respective consultants and vendors and must craft detailed procurement/acquisition documents that clearly define critical elements, including requirements, acceptance testing procedures, and a project schedule.

> *"Interoperability is about relationships. The use of the ISSI and/or CSSI requires the users to have a thorough knowledge and reasonable expectation – ahead of time – of what they are trying to accomplish as well as a working relationship with their partner agency. It also requires committed support from the vendor and the manufacturer to be successful."*
>
> — FPIC ISSI/CSSI Focus Group Member

Another challenge is managing expectations. If agencies have unrealistic expectations or expect to have features or functionalities that are not supported by the technical standards or have not been implemented by manufacturers, they may be disappointed with the final product. Agencies must set realistic expectations with stakeholders that are rooted in the standards and in the manufacturer offerings that are technically capable of interfacing with the existing systems.

Implementation

Through its working sessions and teleconferences, the Focus Group has developed a list of implementation challenges. The list in **Table 2** is by no means inclusive of all potential challenges, but it serves as an introduction to common issues that agencies may encounter.

Table 2. ISSI/CSSI Implementation Challenges.

Challenge	Description	Notes
Software Compatibility	• Users experienced interoperability issues between different system software revisions at initial implementation, as well as with system upgrades • Especially noticeable in multi-vendor environments	• *Past Solution:* Manufacturers have had to rewrite portions of their respective software • *Mitigation*: Appropriately plan for system upgrades to mitigate software compatibility issues • *Mitigation*: If possible, do not allow manufacturers to beta test software releases in production environments; request lab testing to ensure compatibility prior to any live testing and have mitigation plans crafted for expected results/situations
Network Considerations	• Appropriately configuring IP-based networks presented a challenge for some users • Some implementations required extensive network and software troubleshooting and coordination with manufacturers to, for example, open the right combination of network equipment ports or align timing	• *Mitigation*: Catalog available, in-house technical resources (e.g., knowledge, skills, abilities) to determine if you need to budget to hire outside resources or request that vendors also provide certain knowledge/skill sets • *Mitigation*: Engage agency and partner networking professionals from the very beginning in planning discussions to identify, develop, and potentially provide connectivity resources, troubleshooting, and maintenance of required networking elements to effectively support the ISSI/CSSI connectivity. This requires ongoing dialogue and communications with the successful vendor and all partner agency networking professionals
Automatic Roaming	• Users are experiencing on-going challenges implementing roaming between ISSI connected systems • Manufacturers that offer the feature implemented the standard differently • A litany of configurations and circumstances can impact a subscriber unit's ability to roam from system to system supported by the ISSI connection	• *Mitigation*: Through available resources, develop a thorough understanding of manufacturer approaches to roaming to set realistic expectations vice having the ability to affiliate directly with other systems non-dependent upon the ISSI connection
Emergency Alarm/Button Functionality	• Users experienced issues clearing activated emergencies across multi-vendor ISSI connections • The standard allows for two different emergency types: emergency alarm and emergency call, which impact	• *Partial Solution:* TIA TR-8 issued an addendum in 2016 for additional emergency alarm signaling, which requires the emergency cancel be sent across the ISSI to connected systems. However, not all manufacturers have implemented the standards-based modification to effectively cancel the emergency activation

Challenge	Description	Notes
	the system's functionality differently • The standard defines the cancel message but does not define what to do with the cancel message once it is received	• *Next Step:* As this is a life-safety feature commonly used in most P25 public safety systems, it is of tantamount importance that the feature performs flawlessly regardless of the use of ISSI/CSSI connection to same vendor or disparate vendor systems. As this deficiency in feature performance was identified in 2010 and remains unresolved today, the public safety user community should take every opportunity to emphasize to manufacturers (directly or through procurement/acquisition documents) the first responder life safety implications

Each ISSI or CSSI implementation is different and may present its own unique set of planning and implementation challenges. The ISSI/CSSI Focus Group continues to provide an important forum for current and prospective users to share, troubleshoot, and attempt to mitigate or solve these challenges. The ISSI/CSSI Working Group, which includes ISSI/CSSI Focus Group members and key manufacturers, then allows users to discuss these challenges directly with manufacturers in a non-attributional environment that encourages critical thinking and collaborative problem solving.

Summary and the Road Ahead

"Installing an ISSI was a game changer for us. Our first responders can now communicate seamlessly over two different manufacturers' networks, operating in both P25 Phase 1 and 2, including end-to-end AES encryption on critical talkgroups. The ISSI has improved communications for our first responders, helping them better protect and serve our citizens."

— Justin Evans, Montgomery County (TX) Hospital District, ISSI/CSSI Foucs Group Member

ISSI and CSSI connections can greatly enhance emergency communications interoperability between different radio systems of the same or disparate manufacturers. Hundreds of ISSI and CSSI connections have been implemented across the country, allowing public safety agencies to extend their LMR networks, roam into neighboring communications systems while maintaining connectivity to their home systems, and seamlessly communicate with responders from different jurisdictions and agencies. These connections have facilitated critical mutual aid communications during planned events and emergencies. For example, during the recent active shooter incident in Santa Fe, Texas, Harris County and Montgomery County used their ISSI link to support the response. They also leveraged their ISSI link for response and recovery efforts during and after Hurricane Harvey and the resulting flooding across the region. ISSI and CSSI also provide organizations with the flexibility to purchase communications equipment from multiple vendors and maintain independent systems while connecting to other agency networks, if necessary. Agencies looking to expand LMR coverage and enhance interoperability among partner agencies and jurisdictions should further research ISSI and/or CSSI to determine if these connections would be a viable solution.

As discussed in this paper, implementing an ISSI or CSSI in a P25 system can be challenging. It is a highly technical process that requires both the users and the manufacturers to be familiar with all aspects of P25 systems that may be supported by the ISSI or CSSI technologies. Success also depends on what the agency expects the ISSI/CSSI to provide for its users. The challenges discussed can be mitigated with careful user education so that potential issues can be identified and addressed before a contract is executed. Information sharing with other user agencies is key to this process. While there may be challenges to implementing an ISSI or CSSI, these connections can provide valuable benefits and a much-needed solution for communications interoperability.

The FPIC ISSI/CSSI Working Group and Focus Group will continue to provide a venue for both users and manufacturers to discuss these challenges and develop solutions to benefit future implementations. As the number of P25 systems in use continues to increase, the opportunity and need to interconnect these systems to realize the "system of systems" concept increases exponentially. Parties interested in participating in the FPIC ISSI/CSSI Focus Group or contributing to the on-going efforts to implement and improve these interoperability solutions should contact FPIC@hq.dhs.gov.

Appendix: FPIC ISSI/CSSI Focus Group

The FPIC is a coordination and advisory group that serves to address technical and operational wireless challenges relative to interoperability within the public safety communications community, interfacing with representatives from the federal, state, local, territorial, and tribal organizations.[10] The FPIC addresses important issues facing the community by establishing subcommittees, working groups, and focus groups. These groups are established to "focus" on specific topics of interest to the community and help resolve challenges through collaboration.

The FPIC established the ISSI/CSSI Working Group (comprised of users and manufacturers) and the Focus Group (users only) to explore the ISSI/CSSI technology environment, including (but not limited to) connecting single and multiple manufacturer ISSI or CSSI systems, collecting user and manufacturer implementation procedures, disseminating troubleshooting methods, and identifying best practices. The focus group meets regularly to discuss individual implementation experiences, success stories, reoccurring challenges, and ongoing efforts. The group amplifies the voice of the ISSI/CSSI user community and is actively working with manufacturers to improve both operability and interoperability using ISSI and CSSI technologies.

The Focus Group's original list of action items included:

- Understand resource implications of ISSI/CSSI implementation and alternative solutions
- Identify implications of ISSI system topology/design
- Discuss how standards allow implementation differences that may affect interoperability
- Address a defined set of basic features that are supported or need to be supported by the standards, and recommended testing for all vendors consistent with the applicable P25 standards for ISSI/CSSI
- Identify governance and policy issues for ISSI/CSSI implementations
- Determine how the focus group can assist both the TIA TR8 and Program Manager of P25 CAP to accelerate ISSI CAP testing
- Develop a method to capture detailed ISSI/CSSI implementation issues and solutions that can be used to resolve future issues

The first user-focused working session in May 2016 allowed public safety communications professionals to have frank discussions regarding experiences with the development, implementation, and operations of both ISSI and CSSI. This working session also facilitated candid discussions with ISSI/CSSI manufacturer representatives regarding the successes and continued challenges of implementing this P25 standardized offering. The robust discussion of the initial meeting demonstrated the critical need for the formalization of an ISSI/CSSI User Focus Group to contiune these important and productive disucssions.

The focus group hosted a second user-focused working session in September 2017 to continue exploring the specific implementation and testing challenges previously identified by focus group members. On day one, public safety users discussed implementation and capabilities concerns and

[10] For more information regarding the FPIC, see https://www.dhs.gov/safecom/fpic

value of ISSI/CSSI technology and shared their implementation and operational experiences. On day two, P25 equipment manufacturers joined the group to address user concerns and questions.

The most recent working session in July 2018 featured ongoing conversations among users and manufacturers regarding implementation and testing challenges, standards gaps, and potential solutions. Users again had the opportunity to collaborate and speak candidly in user-focused sessions before and after the open sessions with manufacturers. This working session also included detailed discussions of focus group products currently under development (see **Table A-1**).

As a result of the in-person working sessions and regular conference calls, the focus group has initiated a number of projects to help improve the information sharing among public safety agencies who have or are planning to implement a P25 ISSI or CSSI. The focus group established several product development groups (PDG) to execute the efforts identified during the three working sessions; these PDGs are outlined in the table below.

Table A-1. Working Session Products and Status.

Focus Group Working Session	Action Items / Proposed Products	Status
May 2016 (Denver, CO)	Interoperability Tracker	Established and updated regularly
September 2017 (Arlington, TX)	Best Practices	In progress; Volume 1 to be published in September 2018
	Baseline Interoperability Requirements	Closed; transformed into Features and Functions product
	Information Sharing Portal	Complete; Homeland Security Information Network (HSIN) portal available for user and manufacturer use
July 2018 (Denver, CO)	Features and Functions	In progress; redefined Baseline PDG
	Requirements and Priorities	In progress through the FPIC Requirements and Priorities Working Group
	White Paper	Complete with the publication of this document

The descriptions below further define each of the PDGs and their respective products.

- **Information Sharing PDG:** The purpose of this PDG is to enable information-sharing among the ISSI/CSSI user community, to include updates, fixes, and common implementation challenges. The group successfully worked with the Homeland Security Information Network (HSIN) staff to develop a portal specifically for the ISSI/CSSI user and manufacturer community.
- **Best Practices PDG:** The purpose of this PDG is to develop a summary best practices document for ISSI/CSSI implementations based on interviews and focus group discussions. The Best Practices document will be published in multiple volumes that will include detailed descriptions of user best practices with manufacturer input, along with stand-alone checklists and tools for jurisdictions contemplating ISSI or CSSI implementation.
- **Baseline Interoperability Requirements PDG:** The purpose of this PDG was to identify the set of features or capabilities that a user must retain when he or she moves across an ISSI from the home to a foreign system. During the July 2018 working session, participants

opted to refocus this effort on what the "out of the box" ISSI experience should be and renamed the group "Features and Functions PDG".

- **Features and Functions PDG:** The purpose of this PDG is to gather and analyze stakeholder input to develop a document that defines what the "out of the box" ISSI experience should be given the features and functions currently included in the ISSI standards, as well as desired future functionality. Understanding that every agency and jurisdiction is different, the PDG will attempt to build consensus among stakeholders to develop a focused list of features and functions that can ultimately be shared with the manufacturers to potentially shape future manufacturer offerings.