



Inter RF Subsystem Interface Technology: Interconnecting Networks

Project 25 (P25) is an open-architecture, user-driven suite of digital radio communications standards developed and used by Federal, State, territorial, and local public safety agencies to enable two-way radio interoperability. When public safety radios transitioned from analog to digital technologies in the 1990's, users found it difficult to communicate information across jurisdictions and agencies due to varying digital protocols implemented by different manufacturers. P25 open standards define the interfaces as well as the features and functions of P25-compliant radio systems. As one of eleven component interfaces identified during P25 standards development, the Inter Radio Frequency (RF) Subsystem Interface (ISSI) provides a wireline interface capability to connect P25 ISSI-capable networks manufactured by different manufacturers. In other words, ISSI technology allows for multiple RF subsystems to link together and form larger wide-area networks, supporting the "system of systems" concept. Information below provides details on the benefits of P25 ISSI, issues complicating the use and coordination of the initial technology, and future upgrades to the original interface standards.

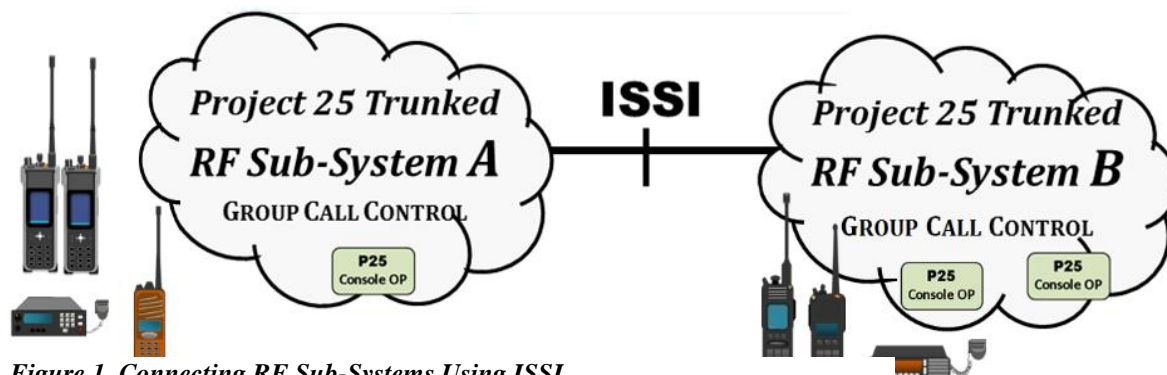


Figure 1. Connecting RF Sub-Systems Using ISSI

ORIGINAL ISSI TECHNOLOGY: BENEFITS AND USER RELUCTANCE

Multiple vendors have tested and demonstrated successful interoperable communications using ISSI gateway technology. Utilizing ISSI to connect disparate P25 radio networks has resulted in a variety of benefits for users, such as the following:

- **ISSI enhances interoperability across interconnected systems.** This is particularly relevant in task force situations, when multiple radio systems users in geographically-disparate locations may need to communicate. ISSI also allows for the ability to communicate in areas where networks overlap, potentially allowing for intra-State and inter-State interoperability.
- **ISSI enhances communications capabilities across systems regardless of jurisdiction.** The technology, coupled with appropriate systems planning and management, standard operating procedures, operational doctrine, and recurring training, can enhance and provide more feature- and function-rich communications capabilities across multiple land mobile radio (LMR) systems irrespective of jurisdictional boundaries.

Despite capabilities of the ISSI offerings and an apparent need, the initial adoption rate of interface gateway technology among public safety agencies was less than expected.

Below are several reasons agencies decided not to implement ISSI technologies.

- **ISSI is a demand-based system:**
 - *Increased deployment of statewide and regional P25 systems.* Cities and States have, instead, refocused demand toward larger geographic borders (e.g., region-to-region). Wide-area Project 25 systems are developed to be a single system and users in such systems do not experience the same difficulties as they do when trying to navigate between different systems from multiple vendors.
 - *Infrequency of large-scale disasters.* Agencies do not prioritize equipment purchases for what they may deem as “unlikely events”.
 - *Dependence on the broad existence of P25 systems.* Many agencies are delaying the purchase of interface technology until the larger wide-area network is more broadly deployed.
- **ISSI technology purchases depend on sufficient funding:**
 - *A tighter fiscal climate.* Agencies may be less likely to purchase ISSI, including paying licensing fees, when there is no clear return on investment.
 - *Prioritizing expenditures.* Public safety agencies must prioritize funds for critical equipment purchases, sustaining existing resources, and maintaining the existing system.
- **Initial ISSIs offered limited functionality:**
 - *Manual system access.* User roaming access to another system was assigned statically rather than dynamically. This required constant upkeep for system administrators to ensure that the right users had the proper access before an event occurred.

Automatic roaming impacts the operation of the ISSI as well as subscribers and the infrastructure. Quite often, there are unique implementations and associated complications due to either a particular software version’s limited implementation of automatic roaming or a user’s limited purchase of automatic roaming. These factors affect efforts to implement ISSI and require a significant amount of coordination through formal governance and training.

NEXT GENERATION ISSI: WHAT’S NEXT?

The upcoming release of next generation ISSI technology, based upon the newly released P25 standard, may reduce the workload and costs required to interconnect LMR infrastructures. These improvements could make ISSI a competitive choice for States and local agencies considering how best to integrate systems and enhance participation in the provision of mutual aid across jurisdictional boundaries. The updated Project 25 ISSI will allow system administrators to designate a group of Unit ID’s for roamers who are authorized to access their network. Unit ID’s will be assigned to units authorized to roam on certain sites and to utilize certain talkgroups. However, the new technology will still require system administrators to consider and adopt significant program, operations, and training adjustments to take full advantage of the new technology offerings. The public safety community has expressed increased interest in the ISSI, particularly applications to expand the “systems of systems” concept in a given State or region where multiple systems have been implemented. Users are increasingly working with the P25 User Needs Subcommittee to identify potential shortcomings of the ISSI addressed, to some extent, in the standards.

State and regional systems managers should continue to identify the needs and potential benefits of the ISSI as well as carefully consider costs and potential return on investment. It is important for system administrators to lead evaluation efforts when confirming the impact of ISSI technologies on more than one system.

Practitioners, as well as some equipment providers, view the ISSI as a potential bridge between the Digital LMR Technology (i.e., P25) and evolving broadband technology. Although outcomes of this rationale are still being considered, there are currently no definitive short-term plans to address the standard.