

Inter-RF Subsystem Interface (ISSI) Fact Sheet

What is an ISSI?

The Inter Radio Frequency (RF) Subsystem Interface (ISSI) provides a standards-based Internet Protocol (IP)-based connection between two or more ISSI-capable Project 25 (P25) networks to form a “system of systems.”¹

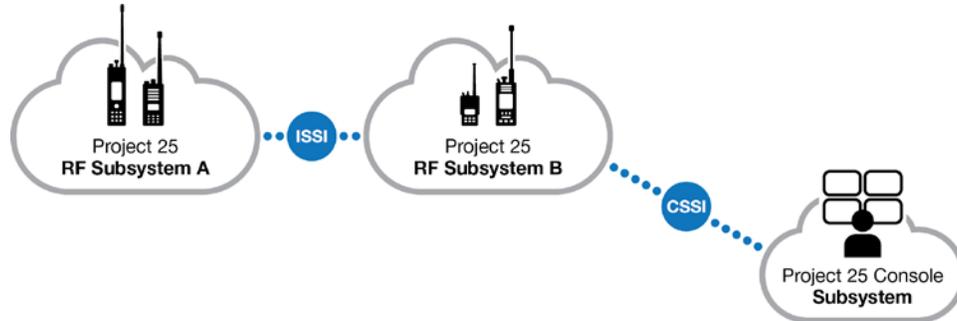


Figure 1 Connecting RF Subsystems Using ISSI and CSSI

The ISSI greatly amplifies the capabilities of P25 Land Mobile Radio (LMR) Systems by connecting radio systems and associated resources from partnering agencies while maintaining an appropriate level of local control. When paired with appropriate systems planning, testing, and management, standard operating procedures, and recurring training, the ISSI can be an invaluable tool to increase the efficiency and reliability of interoperable communications during emergency response and daily operations.

Why do I need an ISSI?

ISSI connections may be used to enhance interoperability, extend coverage, and permit system-to-system roaming between 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 and large-scale events, ISSI connections allow users to maintain connectivity to their home system and talkgroups while roaming. When systems are connected via the ISSI, dispatchers can maintain visibility of, and communications with, their users even if they have roamed outside of their radio system’s coverage area. From a technical perspective, another benefit of the ISSI system is that all communications crossing the ISSI bridge can be digitally encrypted for security.

How does it work?

Analogous to voice roaming across modern cellular networks, the ISSI allows a subscriber unit (SU) from System ‘A’ to call SUs from System ‘B.’ If System ‘A’ SUs can support the same channels, frequencies, numbering plan, and talkgroups of System ‘B,’ then roaming can be accomplished. In that scenario, System ‘B’ SUs will be able to authenticate and make calls while in the System ‘A’ coverage area and vice versa.

Voice and data capabilities available through the ISSI are developed by the Telecommunications Industry Association Engineering Committee (TIA TR-8²) and implemented by P25 vendors. Current efforts to advance ISSI interoperability include the development of additional ISSI standards through the P25 standards-development process, conformance testing requirements from the [P25 Compliance Assessment Program](#), and ongoing discussions for interworking between LMR and long term evolution (LTE).

What are some current limitations of ISSI?

¹ A system of systems connects radio systems from different owners into a single, interoperable network capable of maximizing limited spectrum, financial, and human resources.

² [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.

Due to the complexities of ISSI, there is a learning curve for implementers and manufacturers alike to fully understand the capabilities, expectations, and applicability of P25 ISSI standards.



- 1. There must be a physical connection between the networks being connected.**
FACT. Yes, a physical backhaul connection must be maintained between the connected systems. Additionally, the complexity of an ISSI connection may necessitate IP networking expertise beyond what is required for many traditional LMR systems.
- 2. The ISSI is just a box you plug into your networks.**
FICTION. Depending on the manufacturer, the ISSI may be a separate piece of equipment, but it is often simply a capability or functionality built into other hardware. Much of the ISSI is reliant on the vendor-specific software built into the system core.
- 3. You just turn on the ISSI between systems, and it works!**
FICTION. ISSI implementation requires extensive planning and engineering to deliver the expected level of performance. However, technology is only one part of the solution. Agencies must also take into consideration governance, operational planning, network planning (e.g., network capacity), SU planning (e.g., talkgroup assignments), and maintenance and upgrade planning.
- 4. An ISSI between two systems by the same manufacturer might have challenges.**
FACT. Even a configuration between two systems by the same manufacturer could encounter issues such as incompatible software versions or IP network configuration issues.
- 5. My users are guaranteed to retain all home-system features when roaming.**
FICTION. Features and functionality are dependent upon how the providing vendor(s) implements the P25 standards as well as what they have developed and are currently supporting. Just because RFSSs are connected via an ISSI, users and system implementers should not assume that all features and functionalities will be available or seamless on the visited system without robust interoperability testing and validation.
- 6. ISSIs come with ongoing operational expenses.**
FACT. Over the course of the system lifecycle, an ISSI requires costs associated with software updates, fleet mapping and planning, subscriber programming, networking, and training, among others. For example, an ISSI installation or upgrade on either side of the ISSI connection may require new SUs and/or re-programming of existing SUs. These potential costs should be considered during initial ISSI planning.
- 7. My agency can handle any outstanding issues after the vendor handoff.**
FICTION. If your agency does not have internal resources and/or contractual “hooks” to resolve outstanding issues, then the best time to identify ISSI misunderstandings and limitations is during the acquisition process. This allows for potential issues to be validated and addressed during implementation and testing. For multi-vendor systems, it is important to bring the different vendors together and identify issues BEFORE the system is turned over to your agency.

ISSI implementation can be a time-consuming, challenging, and often-times expensive process for all involved; however, a successful implementation is ultimately rewarding and can provide additional capabilities and long-term cost savings. As a relatively new technology, the ISSI will continue to mature with continued interest from the public safety community and providing vendors.

This fact sheet was developed in collaboration with SAFECOM, NCSWIC, and the FPIC ISSI/Console Subsystem Interface (CSSI) Focus Group