VIRGINIA APCO

Leaders in Public Safety Communications

P25 for the Future

New Standards, Interoperability & Security

Jeremy Elder

Director of Product Experience Technology

L3Harris Technologies, Inc.

www.project25.org

Agenda

Presenter: **Jeremy Elder || PTIG Board Member** L3HARRIS® FAST. FORWARD. ***Special thanks for their contributions:*** • ***Steve Nichols | Director Project 25 Technology Interest Group*** • ***Other PTIG contributing members***	**Introductions, About P25, About PTIG, Education Resources, P25 Benefits and Eco-system.**
	P25 Standards Update, LMR-LTE Interworking
	Applications of P25 Standards: GPS location, Enhancements to Emergency Calling, Cybersecurity enhancements, and Interworking with LTE

What is Project 25 (P25)?

- Partnership between government/public safety agencies and manufacturers to develop, maintain, and evolve technical standards for interoperable digital voice and data communications systems
- Standards and specifications help assure public safety, government, military, and critical Infrastructure users that equipment they purchase is truly interoperable

Benefits of Project 25

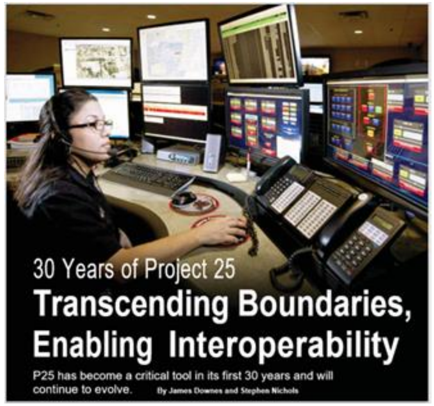
P25 is a well established Suite of Standards
with a User Driven, Evolving Technology

- **A Public Safety Grade Technology** with High Availability through Redundant and Resilient Configurations in VHF, UHF, 700/800/900 MHz.
- **Direct Mode Communications** when Infrastructure is not available
- **Enabling Interoperability** for Multi Agency Sharing of Voice/Data/Location
- **Secure** AES 256 bit Encrypted Communications
- **Ongoing Standards Development** and upgrades with forward and backward compatibility based on User Priorities
- **Large Nationwide Installed Base of P25 Systems:** 3600+including 42+ State-wide.
- **P25 Sharing = Cost Savings & Improved Coverage for Users**
- **Multi-Vendor Sourcing** from 41 Project 25 Product and Service providers

Why P25?

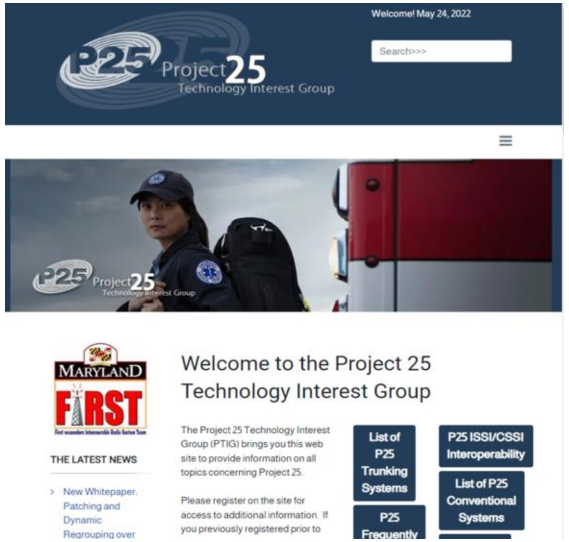
- Interoperability enhances operational efficiency and safety
- P25 standards and capabilities are driven by the user community
- Technical standards open wider options when purchasing systems and equipment
- Testing and certification programs ensure equipment compliance with P25 standards





Who is PTIG ?

- **The Project 25 Technology Interest Group** (PTIG) is a group of individuals and organizations who share the mutual interest of advancing the development, deployment, and applications of Project 25 industry standards.
- <u>PTIG offers a P25 information forum for users and manufacturers</u> with education and training on Project 25 Standards and their applications.
- <u>PTIG members include:</u>
    - **Radio communications subject matter experts**
    - **Public safety and Government professionals**
    - **Equipment manufacturers and LMR engineers**
    - **Service providers and consultants.**



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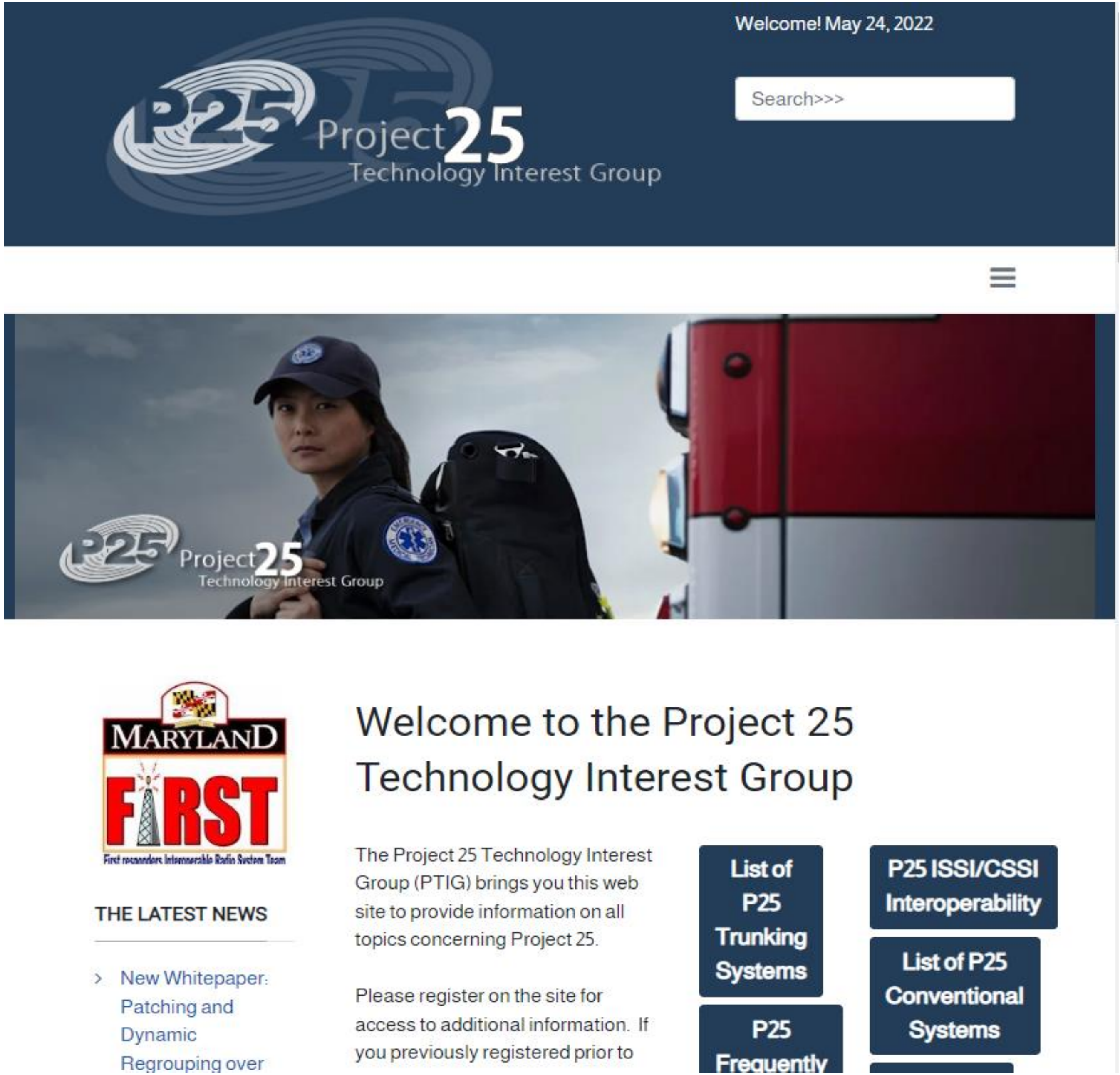

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P25 Resources available on www.project25.org

- P25 System Lists: Trunking and Conventional
- P25 Latest Standards Update Report & List of Standards Documents
- Links to P25 Libraries of Special Interest
    - P25 Security and Encryption   Links to DHS Library
    - ISSI/CSSI Interoperability   Links to DHS Library and Informal Testing Data
    - P25 CAP Testing Program: Links to DHS CAP approved equipment Lists.
- P25 New Products and Services
- PTIG Conference Panel Presentations PPT Slides
- P25 Frequently Asked Questions (FAQ)
- PTIG Commercial Member listing Primary P25 Contact information and company Website link

Founding Members

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Project 25 Technology Interest Group

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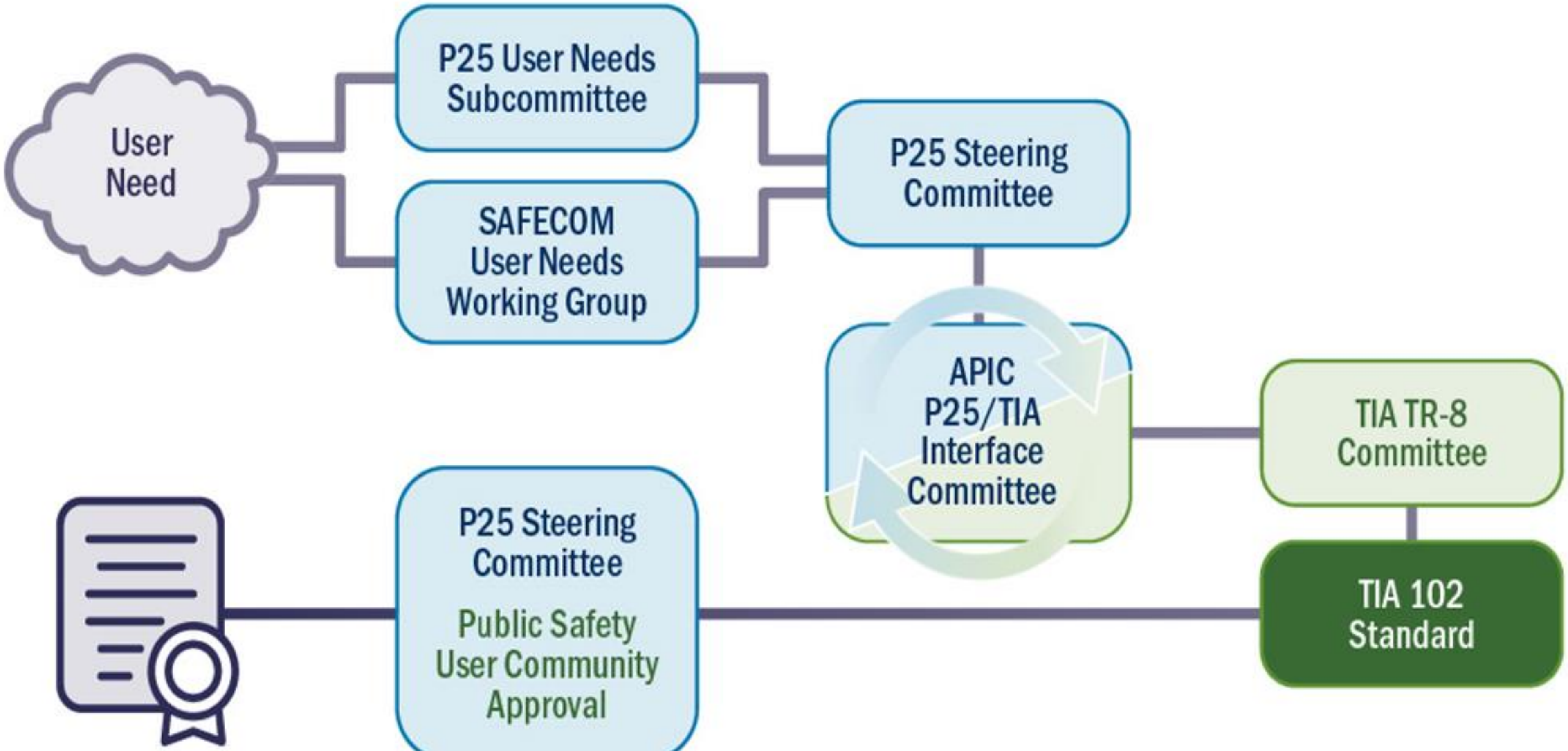
P25 Standards/TIA TR-8 Introduction.

To date, TIA TR-8 (Mobile and Private Radio Engineering Committee) has created and maintains all documents included in the P25 Suite of Standards (80+ documents).

- **Air Interfaces** - Frequency Division (FDMA) for trunking/conventional voice and packet data services and Time Division (TDMA) for trunking voice and control channel;
- **Wireline Interfaces** - Inter Sub System Interface (ISSI), Console Sub System Interface (CSSI) and conventional Fixed Station Interface (FSI);
- **Security services**; Over the Air Rekeying (OTAR), Subscriber Authentication, AES256 Voice and Data Encryption; Link Layer Encryption (LLE) in development)
- **Location services**; Tier 1 (conventional) and Tier 2 (trunking or conventional)

Standards enable interoperability between multiple government agencies and jurisdictions as well as equipment of different manufacturers.

HOW A USER NEED BECOMES A STANDARD



“Study of Interworking between P25 LMR and 3GPP (MCPTT) Mission Critical Services”

- The JLMRLTE Interworking Study document describes how standardized services (features) work in P25 Trunking, P25 Conventional, Analog FM and 3GPP and how the standard features in the two different technologies may be made to interoperate. This includes generic message exchange, media translation and identity translation expected of an IWF.
  - This enables 3GPP or TIA work to define the necessary messages and procedures to enable interoperable implementations.
- The study document also identifies P25 features that do not have analogous 3GPP features and may not be expected to interoperate.
- **The Phase 7 Study document was published by ATIS/TIA March 14, 2025.**
- Planned New Work: Phase 8.

LMR-LTE Interworking Document Published by ATIS/TIA

"Study of Interworking between P25 LMR and 3GPP (MCPTT) Mission Critical Services".

The First Edition was published by ATIS/TIA March 14, 2025.

To Get a copy of the document:

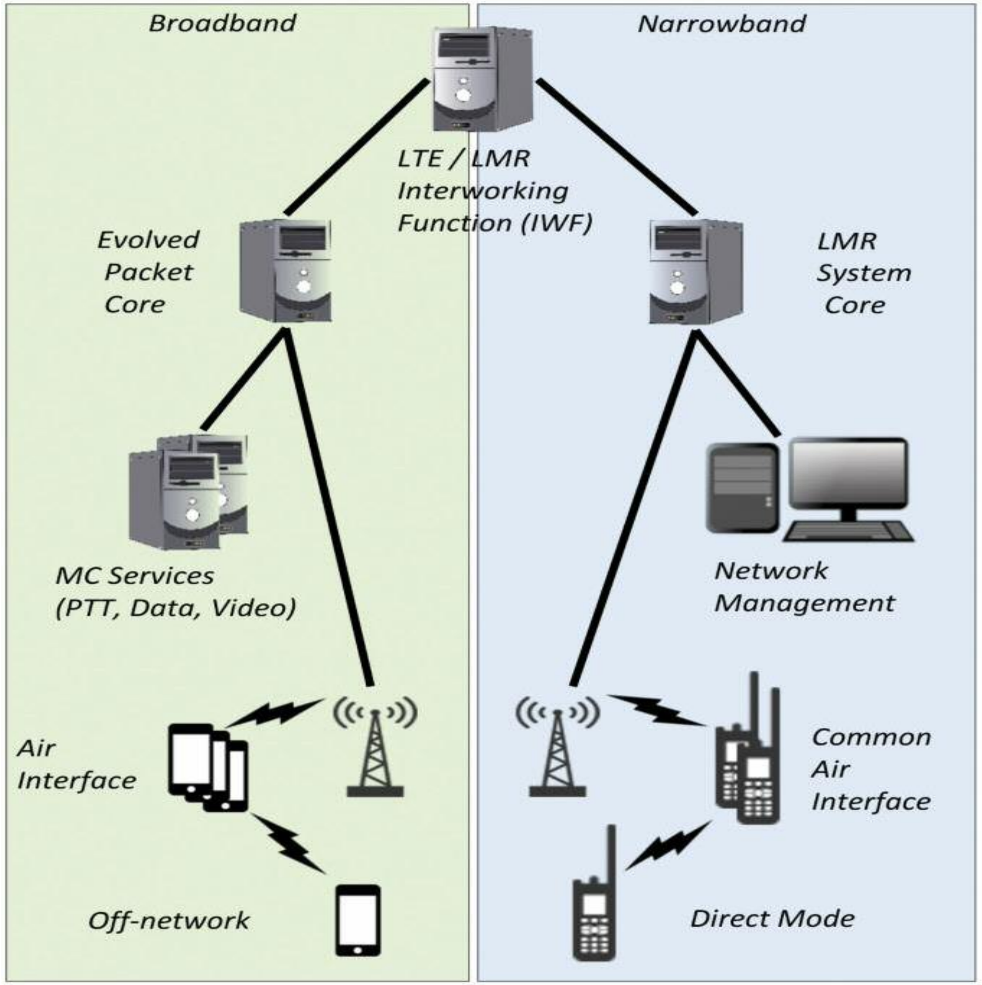
Copies of the Document are free to Government Agencies in the United States. Follow this link for an application form https://tiaonline.org/wp-content/uploads/2020/11/20240730-P25-Request-Form.pdf

For government agencies outside of the United States, please contact Victoria Mitchell at TIA using the link vmitchell@tiaonline.org

Documents for Commercial Entities can be ordered at: https://store.accuristech.com/tia

LMR/LTE Inter Working Function (IWF)

- The 3GPP Interworking architecture defines an interworking functional entity (IWF).
- From the 3GPP side, the IWF acts as another 3GPP mission-critical system, and from the LMR side, the IWF acts as another LMR system.
- The IWF is the functional entity responsible for conversion of media, identities and control signaling between 3GPP mission critical and LMR technologies to enable interoperable services.
- This IWF supports interworking between LMR systems and 3GPP mission critical systems using standard TIA LMR interfaces and the standard 3GPP IWF interfaces.
- **For LMR, the P25 Inter-RF Subsystem Interface (ISSI/CSSI) and Digital Fixed Station Interface (DFSI) have been chosen by TIA.**
- End to End encryption is supported.



P25 LMR & Broadband: Better Together.

P25 LMR and Cellular broadband (FirstNet) are different Technologies;

You do not need to choose one or the other.

P25 LMR and Broadband are Better Together!

- The rollout of 3GPP broadband services is expected to continue to progress.
- **<u>For the foreseeable future, both technologies (LMR and Broadband) are strongly anchored into the public safety ecosystem and markets.</u>**
- This coexistence creates a need for Interworking of these technologies.
- The joint ATIS/TIA working group will continue to expand the Study document to enable interworking of the technologies.
- Work will continue in TIA to maintain and update P25 standard services.
- Work will continue in 3GPP to maintain & update 3GPP mission critical standard services.

GPS location, Enhancements to Emergency Calling, Cybersecurity enhancements, and Interworking with LTE

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P25 Location Services - Tier 2 Location

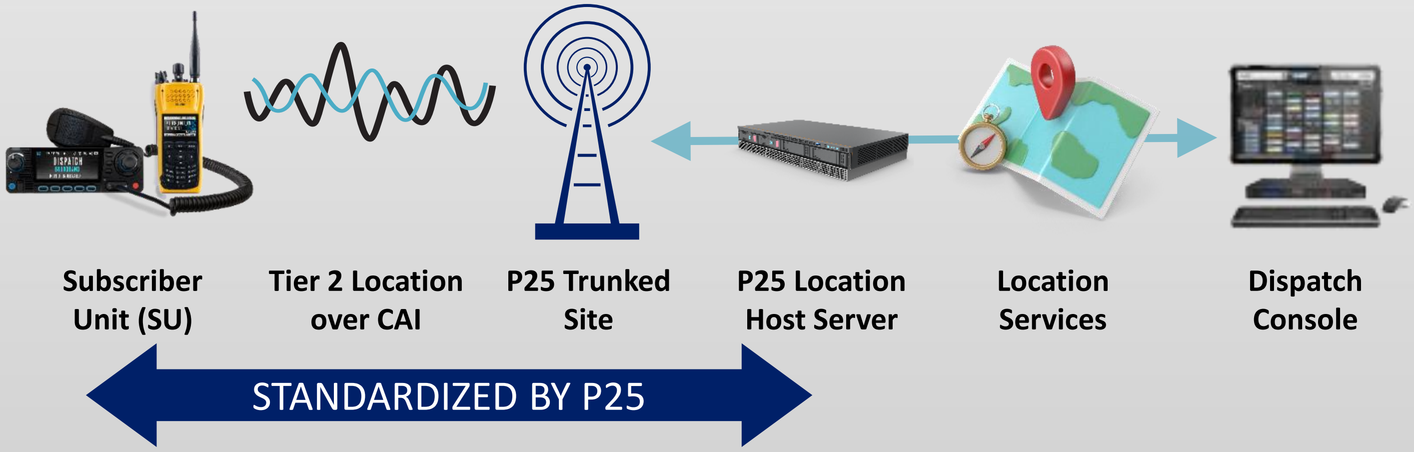
WHAT IS IT?

P25 standard interface between P25 SUs and the Location Host Server (LHS) for location reporting. Requires dedicated data channels on the P25 network.

Supports a variety of triggers including Periodic, Distance Change, Emergency, Power On/Off, Host Request and User Request.

KEY CUSTOMER VALUE

Telecommunicators are provided with refreshed locations while communicating with a first responder – especially in emergencies.



(NEW) GPS on PTT Location

WHAT IS IT?

Allows a P25 subscriber unit to send its GPS location with each Push-to-Talk over the voice channel without using extra channel capacity or needing dedicated data channels.

KEY CUSTOMER VALUE

Telecommunicators are provided with refreshed locations while communicating with a first responder – especially in emergencies.

Subscriber Unit (SU)

PTT: Voice + GPS Location

P25 Trunked Site

Location Services

Dispatch Console

(NEW) Caller Alias on PTT Solution

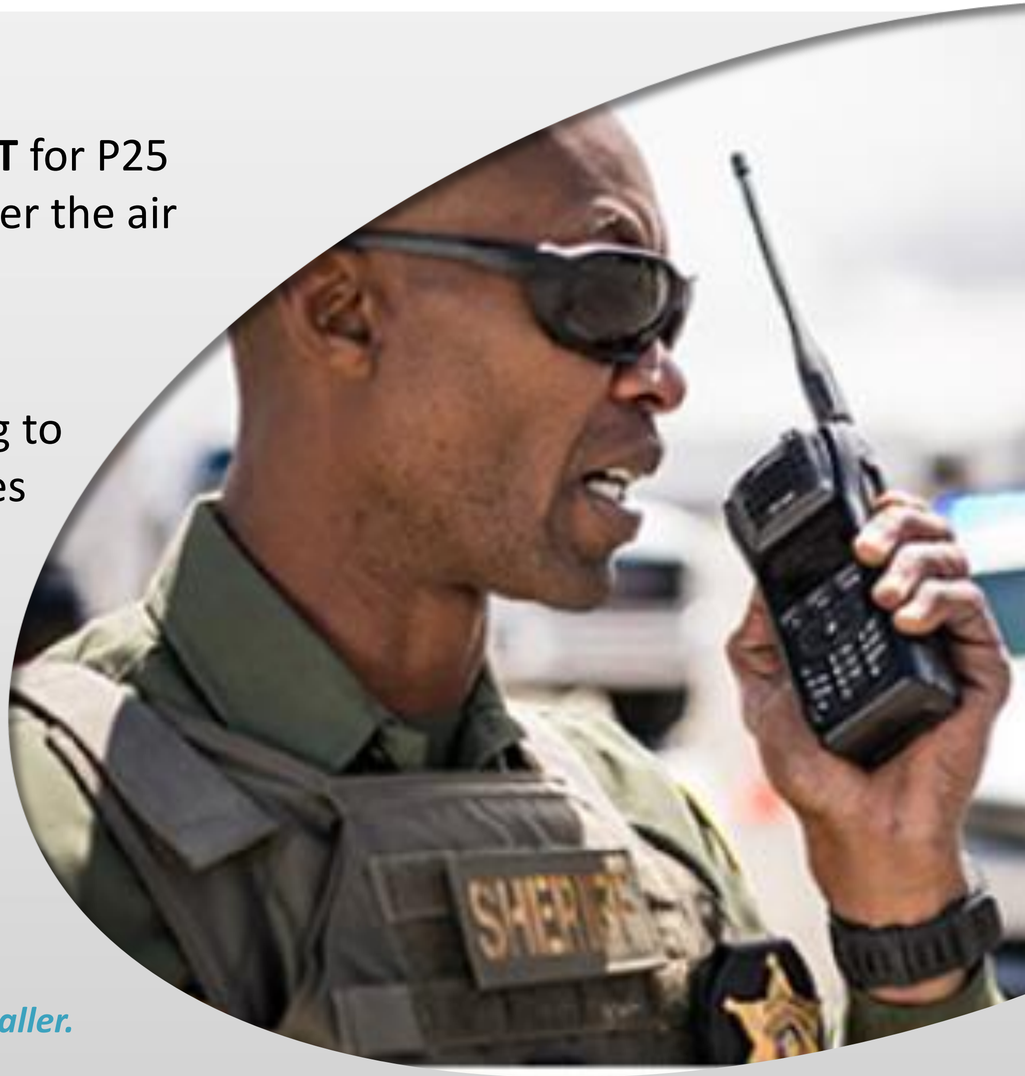
WHAT IS IT?

The new standard permits a P25 RFSS to **include Caller Alias in each PTT** for P25 subscriber units without using extra channel capacity, transmitting it over the air interface rather than just via ISSI.

KEY CUSTOMER VALUE

First Responders get **real-time Caller Alias** on their SUs without needing to manage alias lists. This works for P25 subscriber units, Dispatch Consoles and other types of callers.

Subscriber Units (SU) | **PTT: Voice + Caller Alias** | **P25 Trunked Site** | **P25 Core** | **Dispatch Console**



Passes a name like "Jane Smith" vs. a complicated id number like "BEE00.1.1021" for the caller.

Improved Emergency Capabilities

The P25 standard now supports richer alarm reason codes and remote activation capabilities, further strengthening LMR communications in critical situations.

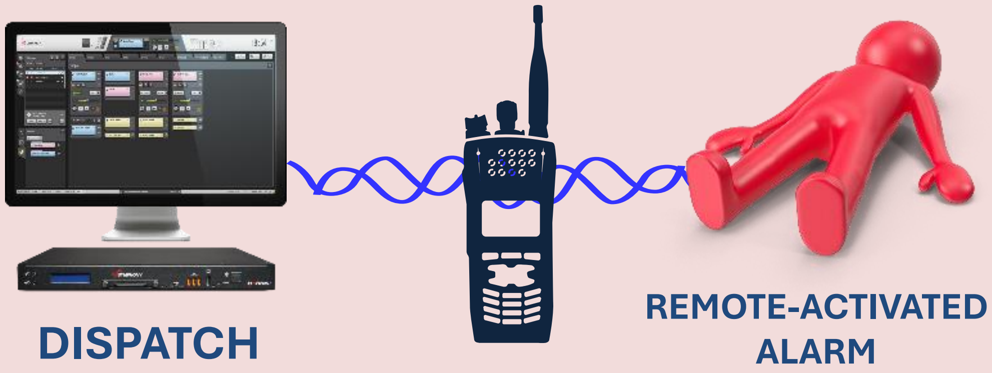
Updated Subscriber Emergency Alarm Signaling

Use Case: Signal Reason Codes for Emergency Alarms

- Man-Down Condition
- Vehicle-Sensed Emergency
- Accessory-Sensed Emergency (e.g., pierced vest)

Remotely Activated Emergency Alarm

Use Case: Allows a telecommunicator (*<u>or another privileged radio unit</u>*) to remotely activate an emergency alarm for a subscriber who cannot activate their own emergency.



P25 Encryption Concepts

P25 offers **Defense-in-Depth** through multiple layers of security services

DEFENSE-IN-DEPTH

Security Service	User Benefit/Protection	Available?
End-to-end AES Encryption	Secure, interoperable exchange of voice and data	☑
Link Layer Authentication (LLA)	Authenticate subscriber units (SUs) and Infrastructure to ensure they are legitimate	☑
Link Layer Encryption (LLE)	Protect over-the-air signaling from interception	**Not Yet**
Over-the-air-Rekeying (OTAR)	Stage new key material over P25 common air interface	☑
Inter-KMF-Interface (IKI)	Transfer key material online or offline between separate systems/KMFs	☑
Key Fill Device (KFD)	Transfer key material securely from portable key fill to P25 subscriber units	☑

Project 25 Inter-Key Management Facility Interface (IKI)

What is the IKI?

A: The IKI is the **interface between multiple P25 key management facilities**, regardless of manufacturer.

Is there a standard for the IKI?

A: Yes – the "Project 25 KMF-to-KMF Interface" which standardized the **IKI was published in April 2012**. P25 updates in-progress to resolve some early deployment interop items.

Does the P25 IKI require an IP network connection between KMFs?

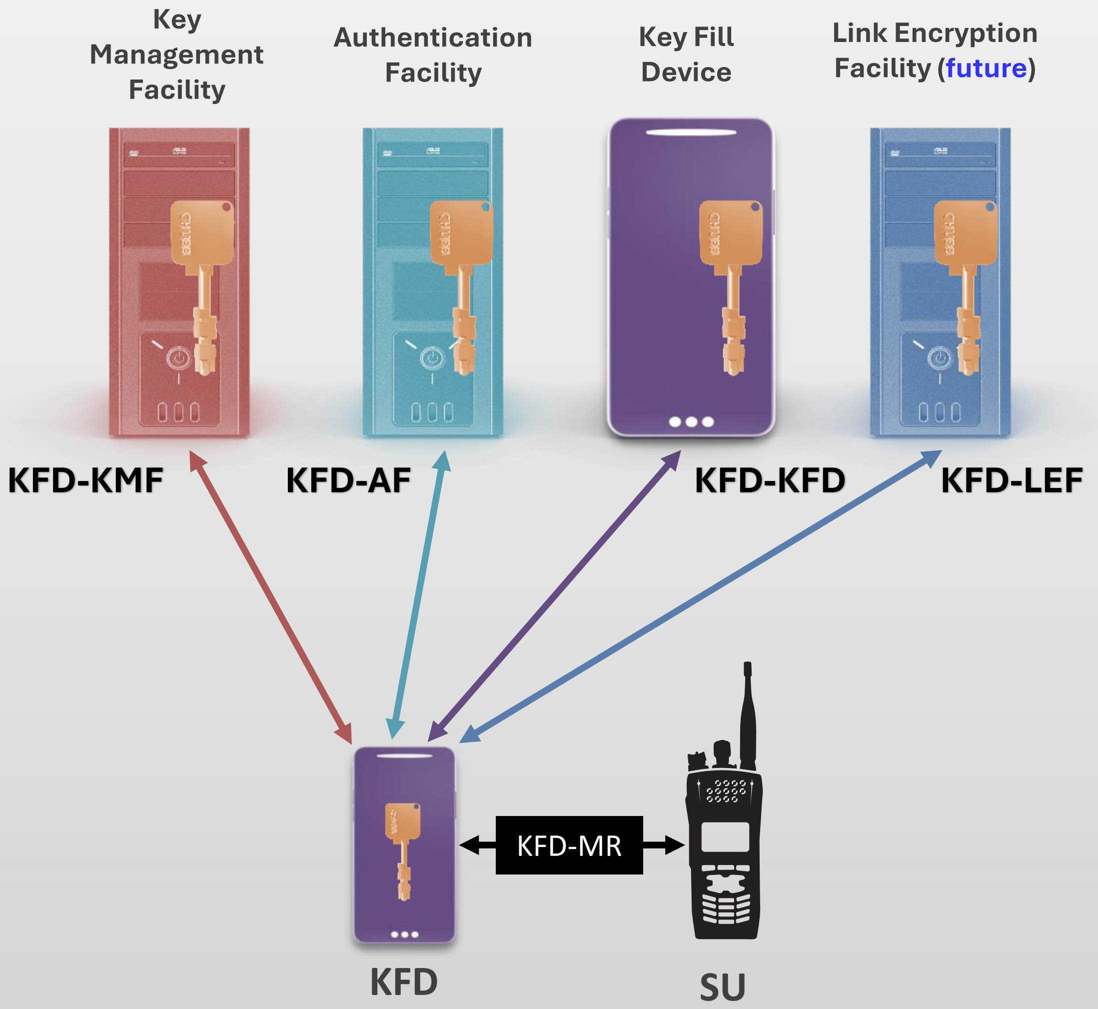
A: Not necessarily… the P25 IKI supports an **offline (file-based) transfer** of keys and an **online transfer of keys** over a network.

If the standard was published long ago, why are we just now hearing about the P25 IKI?

A: Manufacturers are **beginning to field IKI solutions** due to increased customer demand for a secure method to share keys.

KMFs that support the IKI are entering the market and manufacturers beginning to test implementations in the field.

Key Fill Device Enhancement



Enhancing P25 Key Fill Interoperability:
Standardized Interfaces & USB Integration*

I. Adds new standardized interfaces between a P25 Key Fill Device and the following P25 services:
   - Key Management Facility (KMF)
   - Authentication Facility (AF)
   - Another Key Fill Device (KFD)
   - Link Encryption Facility (LEF) - future

II. Includes unassigned keys – to ease sharing interop keys

III. Improves key loading for P25 Subscribers by adding:
   - Standardized USB interface
   - Forwarding Key Management Messages (KMMs) from KMF & AF

* Standard on-track for publication this year.
New products typically follow 12-18 months after publication.

Link Layer Encryption Solution

Link Layer Encryption (LLE) "protects" the over-the-air signaling in P25 Conventional and Trunking system configurations – including direct mode.

LLE addresses 3 principles of the security triad.

LLE STANDARD STATUS

Future-Ready, Backward-Compatible

I. Completion of standard is not expected for until late 2026 - usually 12-18 months after that is when equipment is available

II. The standard has no impact on users that don't require LLE

III. The standard ensures compatibility with previously deployed radios that do not support the LLE feature
- ✓ Interoperability with legacy radios
- ✓ Seamless transition when LLE enabled

P25 for the Future

New Standards, Interoperability & Security

CELEBRATING
35
YEARS OF
INTEROPERABILITY

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