Project 25 Wireline Standards Update

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An EADS North American Company
Project 25 “Wireline” Interfaces

- **Subscriber Data Peripheral Interface** (e.g. MDT)
- **Fixed System Interface (FSI)**
- **Gateway**
- **Data Interface e.g. Databases**
- **PSTN Network Manager**
- **Telephone Interconnect (PSTN)**
- **Repeaters**
- **System**
- **Consoles**
- **Common Air Interface (CAI)**
- **P25 RF SubSystem (RFSS)**
- **Inter RF SubSystem Interface (ISSI)**
- **Console SubSystem Interface (CSSI)**

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What and how much documentation comprises a P25 Standard?

• In general interfaces documentation consists of:
  – Overview – describes high level interface requirements
  – Protocol Document(s) – detailed technical description
  – Measurements – what and how to measure
  – Performance – what to expect in the measurements
  – Conformance – did it do the job per the spec
  – Interoperability – does it work with other manufacturers
  – Compliance – existing tests deemed necessary for assessing manufacturer interoperability by P25 CAP labs

Depending on the interface and it’s maturity and/or complexity, each of these documents may not be needed for all interfaces.
P25 Wireline Interfaces Documentation

- Current status end of 2010

<table>
<thead>
<tr>
<th>P25 Wireline Interface</th>
<th>Label</th>
<th>Conv</th>
<th>Trunked</th>
<th>Ovw</th>
<th>M&amp;P</th>
<th>Meas</th>
<th>Perf</th>
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<th>Interop</th>
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Several existing documents are currently under revision, adding additional material, or developing addendums.

Conv = Conventional; Ovw = Overview; M&P = Measurements & Procedures (protocol); Meas = Measurements; Perf = Performance; Interop = Interoperability; Comp = Compliance Recommendations
P25 ISSI Benefits

- Establish long term interoperability option with neighboring networks, regardless of how they evolve and change
- Connectivity while maintaining autonomy
- Delivering Task Force Interoperability
- DHS interoperability grant funding
- Support of mixed vendor backbones
- Coverage extension

P25 Network of Networks

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P25 CSSI Benefits (protocol integrated into ISSI spec)

- P25 CSSI adds console connectivity & interoperability to a P25 network
- Standard interface for basic console voice interoperability
- Supports basic P25 feature functionality
- Supports P25 console to console operations
- Supports conventional & trunked operations

Leverages ISSI protocol for console interface to RFSS
P25 FSI Benefits

• Applies to *conventional systems* only

• Allows a P25 digital base station repeater to be connected to a console using a standard protocol
  – Also describes analog console to analog repeater connectivity

• Utilizes P25 ISSI RTP voice frames transport
  – Full rate IMBE vocoders – baseline & enhanced

Leverages ISSI protocol for P25 base station repeater to conventional console Interface
P25 Telephone Interconnect Benefits

• Facilitates PSTN interconnect
• Supports conventional & trunked operations
• Features or characteristics
  – Support for dialed digits & overdialing
  – Call setup and teardown messaging
  – Transcoding from P25 to PSTN voice required
    • Loss of end-to-end encryption
  – Call limit timer recommended

Limited deployment due to “telephone call” network loading
P25 General Systems Model
Focus on P25 ISSI Operations

Four P25 Wireline Interface Types
1. Inter RF Sub-System Interface (ISSI)
2. Console Sub-System Interface (CSSI)
3. Conventional Fixed Station Interface (FSI)
4. Telephone Interconnect

Three P25 Common Air Interface (CAI) Types
1. Trunked P25 Phase 1 FDMA CAI
2. Trunked P25 Phase 2 TDMA CAI
3. Conventional P25 CAI

Adopted from TIA-102.BACA-A, Page 28, § 2.1 Architecture Overview
ISSI Architecture

• The ISSI architecture is based on the concept of a “Home” and a “Serving” RFSS:
  – The “home” RFSS represents the home based location and radio coverage area under which a particular talk group and/or individual operates.
  – A “serving” RFSS represents a foreign location and radio coverage area to which a talk group (or certain members of a talk group) and/or individual has roamed, and is away from the home-based radio coverage area

• ISSI TIA 102.BACA-A Messages & Procedures
  – ISSI Messages and Procedures defines the basic ISSI protocol for trunked voice and mobility management operations
  – Based on SIP for session/call setup, control, and teardown
  – Uses RTP for transmission of P25 IMBE voice packets and PTT floor control
P25 ISSI – Single Frequency Band

- Users from Agencies A&B can roam and communicate anywhere in System A+B coverage area
- Both consoles monitor calls
- ISSI maintains End to End Encryption across the two systems

Selected system A & B users are members of Inter-System Talk Group 4 (ISTG4)

Agency A: Art, Les, Andy, Roy, Jon
Agency B: Deb, Tom

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P25 ISSI – Multiband Coverage

• Agencies on different RF Bands
• The ISSI “glues” the networks together so that radios from different networks communicate as if they are on one network.
• Each network (& consoles) can monitor all the traffic simultaneously
• Multi-band operation allows multi-band radios to roam between the networks

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P25 Wireline Interfaces Summary

• Interface interoperability standards
  – Inter-RF Sub-System Interface – ISSI
  – Console Sub-System Interface – CSSI
  – Fixed Station Interface - FSI
  – Telephone Interconnect

• Preserves basic P25 functionality beyond the air interfaces

• Provides standard interconnections:
  • Between P25 networks – including consoles
  • P25 networks to PSTN
Currently Available TIA/APCO P25 Wireline Standards Documents

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<th>Project 25 Wireline Document</th>
<th>TIA Published Document</th>
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Commercial Users – purchase from [www.ihs.com](http://www.ihs.com) or [http://engineers.ihs.com/](http://engineers.ihs.com/)

PS Users – available at no cost – contact the TIA at [www.tiaonline.org](http://www.tiaonline.org)