

Project 25 Documents & Standards Reference

P25 DSR



Public Safety Communications Research

U.S. Department of Commerce – Boulder Laboratories

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Publication Notice

Abstract

The Project 25 Document & Standards Reference (P25 DSR) tracks the current state of P25 standards documents. The Telecommunications Industry Association (TIA) TR-8 Committee meets quarterly to develop, revise, and approve P25 standards documents. The P25 DSR is updated after each TR-8 Committee meeting to reflect document progress of TIA standards expected to be adopted as part of the Project 25 Standard by the Project 25 Steering Committee.

The P25 DSR is published and maintained by the Public Safety Communications Research program to provide guidance and support for federal, state and local agencies and communications professionals working with the P25 radio communications standards.

About the Public Safety Communications Research Program

Housed within the Department of Commerce Labs in Boulder, Colorado, the Public Safety Communications Research (PSCR) program is a joint effort between the National Institute of Standards and Technology/Office of Law Enforcement Standards (NIST/OLES) and the National Telecommunications and Information Administration/Institute for Telecommunication Sciences (NTIA/ITS). The PSCR program provides research, development, testing, and evaluation to foster nationwide communications interoperability.

The PSCR program performs research on behalf of its sponsors at the Department of Homeland Security/Office for Interoperability and Compatibility (DHS/OIC) and the Department of Justice (DOJ) Community Oriented Policing Services (COPS) office to advance public safety communications interoperability. The PSCR program provides insight to wireline and wireless standards committees developing standards for voice, data, image, and video communications.

Disclaimer

This document is updated quarterly based upon public TIA P25 standards document publication announcements. The PSCR program and its sponsoring organizations make no claims, promises, or guarantees about the accuracy, completeness, or adequacy of the information contained in the P25 DSR. The P25 DSR is not official TIA/TR-8/P25 content and should be used for general reference only.

Contact Information

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Change Log

This document began in October 2005. The following change log covers the last 24 months of changes. The complete change log is available at: http://www.pscr.gov/outreach/p25dsr/change_log.php.

Date	Changes
January 2013	Added TIA-102.CAAB-D (published Jan 2013); TIA-102.CACD-B (published Jan 2013); TIA-102.CAEF (drafting) TIA-102.BACA-B (published Nov 2012). Updated TIA-102.AABF-C-1 (published Jan 2013). Removed TIA-102.CAAB-C (superseded); TIA-102.CACD-A (superseded) TIA-102.BACA-A, TIA-102.BACA-A-1, TIA-102.BACA-A-2, TIA-102.BACA-A-3 (superseded).
October 2012	Added TIA-102.CAAA-D (drafting); TIA-102.AACD-A (drafting); TIA-102.AABD-A-3 (drafting); TIA-102.AABC-C-2 (drafting); TIA-102.BBAC-1 (drafting); TIA-102.AABF-C-2 (drafting). Updated TIA-102.AABD-A-2 (published Sep 2012)
September 2012	Added TIA-102-B (published Jun 2012); TSB-102.BADA-A (published Jun 2012); TSB-102.CBBL (published Jun 2012); TIA-102.CACD-B (drafting), TIA-102.BAEA-B (published Jun 2012). Updated TIA-102.BCAF (published Aug 2012). Removed TIA-102-A (superseded); TIA-102.BAEA-A superseded).
June 2012	Added TIA-102.AAAC-A (drafting); TIA-102.AABD-A-2 (drafting); TIA-102.AABF-C-1 (drafting); TIA-102.BCAF (drafting). Updated TIA-102.BACA-B (drafting, changed from TIA-102.BACA-A-4); TSB-88.1-D (published Apr 2012); TIA-102.BAKA (published Apr 2012). Removed TSB-88.1-C (superseded); TSB-88.1-C-1 (superseded).
January 2012	Added TIA-TSB-88.2-D (drafting). Updated ANSI/TIA-102.AABB-B (published Jul 2011); TSB-102.BACC-B (published Nov 2011); TIA-102.CAEC (published Dec 2011). Removed ANSI/TIA-102.AABB-A (superseded); TSB-102.BACC-A (superseded).
October 2011	Added TIA-102.BAKA (drafting); TIA-102.CAEC (drafting). Updated TIA-102.BCAD (published Sep 2011); TIA-102.CACC-1 (published Aug 2011); TSB-102.CBBE (published Sep 2011); TIA-102.CBBJ-B (published Sep 2011); TIA-102.CCAA (published Aug 2011); TIA-102.CCAB (published Oct 2011). Removed TSB-102.CBBJ-A (superseded). Removed "Project 25" from all in-progress (yellow highlighted) documents.
August 2011	Added TIA-102.BCAD (drafting); TSB-102.CBBE (drafting); TSB-102.CBBJ-B (drafting); TIA-102.BACD-B (published Jul 2011). Updated ANSI/TIA-102.AAAB-A (reaffirmed, Feb 2011); TIA-102.BCAE (published, Jul 2011); TIA-102.CABC-B-1 (published, Jul 2011); TIA-102.BACA-A-3 (published, Jul 2011). Removed TIA-102.BACD-A (superseded).

Date	Changes
May 2011	<p>Added TIA-102.CABC-B-1 (drafting); TIA-102.BAAC-C (published). Updated TIA-102.AABA-B (published); TIA-102.AABC-C-1 (published); TIA-102.AABD-A-1 (published); TIA-102.AACD-1 (published); TIA-102.AACE-A (published). Removed TIA-102.BACD from Section 5.2.2 (corrects placement and name error).</p>
April 2011	<p>Replaced TIA-102.AABF-B (superseded) with TIA-102.AABF-C (published).</p>
February 2011	<p>Several review comments prompted a reorganization of sections 4, 5, and 6 that also resulted in a new section for a total of eight sections now, compared to the original seven. Section 4 maintains its former name, but content has been moved and slightly reorganized for clarity. Section 5 addresses conventional and trunked systems, as well as legacy system compatibility. The focus of section 6 is system security. Section 7 addresses equipment. Section 8 provides decision charts. An attempt was made to remove in-progress documents that were either listed mistakenly or were no longer in progress. The P25 System Interfaces figure now reflects ten system interfaces with the split of CAI into Phase 1 and 2 and the addition of the future work item — Inter-Key Fill Management Facility Interface. Added TIA-102.BCAE (drafting); TIA-102.AABB-B (drafting); TIA-102.AABA-B (drafting); TIA-102.AACE-A (drafting); TIA-102.BAJD (published); TSB-102.CBAA (published).</p>

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1 Project 25 Document Suite

The Project 25 New Technology Standards Project (known as Project 25 or P25) is a multi-phase, multi-year project jointly conducted by the public safety communications community and industry to establish a suite of open standards (known as the Project 25 Standard) that enable the manufacture, procurement, and operation of interoperable digital wireless communications equipment and systems to satisfy the service, feature, and capability requirements of public safety practitioners and other users.

APCO/NASTD/FED Project 25/34 is the formal process name for the Project 25 standards.

- APCO is the Association of Public-Safety Communications Officials – International Inc.
- NASTD is the National Association of Technology Professionals Serving State Government.
- The term FED refers to the participation of the United States Federal Government in the process.

The APCO Project 25/34 Steering Committee and its Co-chairs from APCO and NASTD provide APCO Project 25 management. The Project Director in cooperation with the various committee and task group Chairs provides day-to-day project management.

The Telecommunications Industry Association (TIA) is a standards development organization that produces standards for land mobile radio. The Mobile and Personal Private Radio Standards Committee (TIA TR-8) of TIA's Standards and Technology Department conducts the formal standards development process. The American National Standards Institute (ANSI) accredits TIA to develop voluntary industry standards for a wide variety of telecommunications products.

Project 25 is unique in that it is a user-driven process to develop a family of public safety communications standards based on requirements that state, local and federal government users define. Users determine the functionality and critical interfaces that require standardization to ensure interoperability among manufacturers of Project 25 equipment. The Project 25 Statement of Requirements (P25 SoR) captures the public safety community's feature, function, and interface requirements for interoperable P25 communications. The Project 25 Steering Committee maintains, submits, and approves the P25 SoR. (See [Section 3.1](#) for more P25 SoR information.)

1.1 Introduction

Project 25 is a partnership between the public safety communications community and industry manufacturers. The Project 25 Standard was originally developed as a suite of P25 standards, published by TIA, to enable the offering, procurement, and operation of interoperable, narrowband digital two-way wireless communications P25 products and systems that meet the mission-critical needs of public safety practitioners. The P25 standards were also intended to enable governmental and private sector organizations to implement standardized, narrowband land mobile radio (LMR) products and systems for other communication purposes.

In 2011, the Project 25 Steering Committee and TIA established revised procedures based on their reinterpretation of the 1993 Memorandum of Understanding (MoU) such that TIA now develops and publishes generic, narrowband LMR standards that may be adopted by the Project 25 Steering Committee to become part of the Project 25 Standard. Thus, TIA now develops open standards to serve the broad LMR marketplace, but which may also be adopted by the Project 25 Steering Committee. The TIA TR-8 Committee meets quarterly to develop, revise, and approve TIA LMR standards documents.

1.1.1 User Representative Steering Committee

A steering committee composed of user representatives from federal agencies, and state and local government directs Project 25. The Project 25/34 Steering Committee is comprised of four members appointed by APCO, four members appointed by NASTD, and three members selected by representatives from the various federal agencies that participate in the process.

All activities of the P25 process must be approved by the steering committee and TIA in accordance with the MoU consummated in 1993. Members of the public safety community attend regular meetings of the APCO Project 25 Interface Committee (APIC), which was established under the MoU to facilitate TIA's development of standards that can be adopted as part of the P25 standards suite.

APIC supports both the P25/34 Steering Committee and TIA/TR-8, including its Subcommittees. It also provides an open forum to resolve differences or issues between the P25 user requirements in the P25 SoR — approved by the P25/34 Steering Committee — and the standards needed to support those requirements.

1.1.2 Digital Modulation and Spectrum Efficiency Two-Phase Plan

Project 25 represents the public safety community's overall strategy to develop a digital modulation solution and achieve Federal Communications Commission (FCC) spectrum efficiency mandates calling for migration to narrowband channel spacing in the VHF and UHF bands. This migration to narrowband channelization has already been accomplished in the 700 MHz Band, which comprises 108 megahertz of spectrum from 698 to 806 designated for commercial and public safety uses.

Narrowbanding is an effort to ensure more efficient use of the VHF and UHF spectrum by requiring all VHF and UHF public safety and commercial LMR systems to migrate to at least 12.5 kHz efficiency technology by January 1, 2013. No date has been established by the FCC for further migration to 6.25 kHz channel bandwidth in any current public safety spectrum. Project 25 addresses the FCC's mandate with a two-phase plan.

- Phase 1 defines the necessary technologies to provide for channel reduction from 25 kHz to 12.5 kHz. Phase 1 refers to P25 requirements and standards for a digital common air interface (CAI) based on frequency division multiple access (FDMA) using a 12.5 kHz channel.
- Phase 2 defines an additional 50-percent reduction in channel size to 6.25 kHz equivalency. Phase 2 refers to P25 requirements and standards for a digital CAI using time division multiple access (TDMA) to provide two 6.25 kHz equivalent channels or two slots in a single 12.5 kHz channel.

1.1.3 Requirements Driven

P25 standards are driven by a public safety user-defined Statement of Requirements document known as the P25 SoR ([Section 3.1](#) provides more information) and an over-all approach to the development of the standards via a Project 25 System and Standards Definition document ([Section 3.2](#) provides more information). The organization of the standards divides the suite into documents relating to P25 system interfaces, services, and equipment. For each P25 interface, service, and equipment item a set of documents:

- Describes and specifies the appropriate standards
- Describes tests to demonstrate conformance, performance and interoperability of the offered interface, service, and equipment according to the standards
- Describes the suite of tests selected to demonstrate compliance of the interface, service or equipment with published P25 standards

1.2 Description and Specification Documents

Two types of documents are used to describe and specify the interface, service, or equipment: one type provides an overview; the other type defines the protocols.

- The Overview document — typically a Telecommunications Systems Bulletin (TSB) — describes the operation and function associated with a standard, but it does not prescribe a standard. Thus, the overview document is considered *informative*. The overview document provides background relating to the *Project 25 Statement of Requirements*, shows its relationship to the overall P25 system model, and provides guidance to users, system designers, and manufacturers.
- The Protocol documents are considered *normative*. They provide the required messages, formats, and specifications necessary for the P25 interfaces, services, and equipment to be interoperable and meet the users' *Project 25 Statement of Requirements*.

1.3 Testing Documents

To demonstrate compliance with the protocol specifications, a set of test documents is defined for manufacturers. Users and testing laboratories can also use test documents as a basis for independent assessment of P25 systems and equipment in relation to user requirements.

- The Conformance Test Procedures documents test for conformance to the associated protocol documents. For example, such tests may be used to assess the conformance of P25 services involving the interconnection of different agencies' P25 systems at a P25 reference point.
- The Measurements Methods documents and Performance Recommendations documents quantify service setup times, throughput delay times, bandwidths, co- and adjacent channel factors, etc. for a system component or service to ensure that the radio systems:
 - Conform to radio and network regulations
 - Behave as good neighbors to the systems of nearby agencies
 - Satisfy user performance requirementsExamples of performance assessment are maximum permitted and observed P25 voice service setup times, throughput delay times, bandwidths, and co-channel and adjacent channel factors.
- The Interoperability Test Procedures documents describe tests for operational equipment to assure users that equipment supplied by different manufacturers can indeed be trusted to interoperate under the conditions defined by the standards. For example, such tests may be used to assess the interoperability of P25 services involving the interconnection of different agencies' P25 systems at a P25 reference point.

1.4 Compliance Assessment Documents

Manufacturers, users, and test laboratories use Recommended Compliance Assessment Bulletins (CABs) to assess the extent to which P25 systems and equipment adhere to the protocol specifications in the P25 Compliance Assessment Program (P25 CAP). TIA creates Recommended Compliance Assessment Test (RCAT) documents, which are presented as TIA TSBs and are considered in the development of relevant P25 CAP CABs.

The P25 CAP CABs represent a subset of performance, conformance, and interoperability tests from the overall suite of TIA test standards, in addition to any P25 CAP-developed tests for assessing compliance.

The P25 CAP (see [Section 1.7](#)) enables users to obtain results of testing a particular manufacturer’s P25 product in accordance with P25 CAP CABs.

1.5 Related Documents

Throughout the *Project 25 Documents & Standards Reference*, note that yellow-highlighted documents are unpublished but are under development.

TIA-TSB-88 and TIA-603 offer methodology support for assessing performance and interference in a P25 LMR system.

1.5.1 TIA-TSB-88

TIA-TSB-88 provides a common approach and methodology for the modeling and simulation of wireless communications system performance. This technical service bulletin (TSB) considers both analog and digital practices in all frequency bands of interest. The volumes, or parts, of this TSB describe how to accommodate FCC “spectrum narrowbanding”, assess the impact of efficient band technologies on existing digital and analog technologies and vice versa, and address migration and spectrum management issues in the transition to efficient band technologies.

TIA-TSB-88 also provides information on new and emerging bands, as well as information on narrowband and wideband data. In addition, the TSB provides methodology to minimize interference between noise-limited systems.

Table 1: TIA-TSB-88 Documents

Documents
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 1: Recommended Methods for Technology-Independent Performance Modeling</i>, TIA-TSB-88.1-D (Apr 2012). See also, optional CD.
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 2: Propagation and Noise</i>, TIA-TSB-88.2-C (Apr 2009)
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 2: Propagation and Noise</i>, TIA-TSB-88.2-D (Projected TR-8 approval date to publish, TBD.)
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 3: Performance Verification</i>, TIA-TSB-88.3-C (Jan 2008)
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 3: Performance Verification — Addendum 1</i>, TIA-TSB-88.3-C-1 (Jan 2010) (Corrects the value of p in Equation (2) of sub-clause 5.2.1 defined incorrectly as the <i>Target Service/Covered Area Reliability</i>. The Addendum provides the corrected definition, which is <i>Predicted Area Reliability</i>, and includes some minor edits for clarity.)
<ul style="list-style-type: none"> ■ <i>Wireless Communications Systems – Performance in Noise and Interference – Limited Situations Part 4: Broadband Systems</i>, TIA-TSB-88.4-C (TR-8 approval date to publish, TBD)

1.5.2 TIA-603

TIA-603 provides definition, methods of measurement, and performance standards for radio equipment used in the private (dispatch) LMR services that employ FM or PM modulation, for transmission of voice or data using analog or digital techniques, with a frequency of 1 GHz or less.

Table 2: TIA-603 Documents

Documents
<ul style="list-style-type: none"> ■ <i>Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, TIA-603-D (Jun 2010)</i>

1.6 Standards Completion

For most cases, a P25 interface, service, or equipment standard is not complete until all documents that provide the Overview, the Protocol Specifications, the Protocol Conformance Test Procedures, the Performance Measurements Methods, the Performance Recommendations, and the Interoperability Test Procedures are published or are approved for publication by the appropriate TIA TR-8.n committee.

However, because constant change is the nature of technology, standards are, in truth, never complete. Standards development is in fact, a living process. This is a practical result since there will be design improvements in the protocols, which will require changes to the protocol specifications (sometimes after products are developed or implemented). Similarly, the development of new technologies or the enactment of new regulations will cause users to modify their requirements, which results in new specification and testing standards. Thus, P25 standards will not remain fixed but will evolve with time and circumstances.

1.7 Compliance Assessment Program

The Project 25 Compliance Assessment Program (P25 CAP) provides emergency response agencies with evidence that the communications equipment they are purchasing meet P25 standards for performance, conformance, and interoperability. Equipment suppliers can participate in the voluntary program to formally demonstrate their products' compliance with a select group of requirements within the P25 suite of standards. The program requires test laboratories to demonstrate their competence through a rigorous and objective assessment process. Such a process promotes the user community's confidence in, and acceptance of, test results from recognized laboratories.

All equipment suppliers that participate in the P25 CAP must use recognized laboratories to conduct performance, conformance, and interoperability tests on their products. Those who participate submit Supplier's Declaration of Compliance (SDoC) documents and Summary Test Reports to the Responder Knowledge Base (RKB) web site (<https://www.rkb.us/>) for Department of Homeland Security/Office for

Interoperability and Compatibility (DHS/OIC) review and approval of eligibility for grant procurement. Table 3 provides more information about the P25 CAP.

Table 3: Key Project 25 CAP Documents

Documents
<ul style="list-style-type: none"> ■ Charter for the Project 25 Compliance Assessment Program (Apr 2008) Web link: http://www.pscr.gov/outreach/safecom/p25_cap/charter.php The P25 CAP charter outlines the roles and responsibilities of the parties involved in the P25 CAP program. It includes an overview of the program including what is required of testing laboratories, vendors, and other participants.
<ul style="list-style-type: none"> ■ Compliance Assessment Requirements (Mar 2010) Web link: http://www.pscr.gov/outreach/safecom/p25_cap/cap_reqs.php This document provides the requirements for the P25 CAP, including an overview of the P25 interfaces that are currently covered by the P25 CAP, and when the applicable SDoC documents and Summary Test Reports are required.
<ul style="list-style-type: none"> ■ Supplier’s Declaration of Compliance Requirements (Sep 2009) Web link: http://www.pscr.gov/outreach/safecom/p25_cap/sdocs.php This CAB identifies uniform format requirements for use in preparation of SDoC documents. These documents are submitted to the RKB for DHS/OIC review and approval.
<ul style="list-style-type: none"> ■ Summary Test report Requirements (Sep 2009) Web link: http://www.pscr.gov/outreach/safecom/p25_cap/sumtest_rpt.php This Compliance Assessment Bulletin (CAB) identifies uniform format requirements for use in preparation of Summary Test Report documents. These documents are submitted to the RKB for DHS/OIC review and approval.
<ul style="list-style-type: none"> ■ <i>Project 25 Product Compliance Assessment Overview</i>, TSB-102.CBAA (Oct 2010) This document provides an informative overview of the TIA and P25 activities and documents supporting the development of product compliance assessment documents, including Recommended Compliance Assessment Test (RCAT) Telecommunications Standards Bulletins (TSBs). The document briefly describes compliance assessment of TIA-102/P25 products. The document includes a very brief overview of the DHS/OIC P25 CAP and a very brief overview of assessment outside the DHS/OIC P25 CAP.
<ul style="list-style-type: none"> ■ <i>Supplier’s Declaration of Compliance (SDoC) Template</i>, TSB-102.CBAB (Jun 2009) This document describes the format for a SDoC document submitted to document Project 25 compliance.

Once approved, SDoC documents and associated Summary Test Reports can be viewed publicly at the RKB. Follow these steps to view approved SDoCs and associated Summary Test Reports at the RKB:

1. Go to the Certifications and Declarations page (<https://www.rkb.us/search.cfm?typeid=5>) of the RKB.
2. Click P25 SDoCs in the left column.
3. Click the title of the supplier’s equipment for which you want to view declaration information.
4. At the bottom of the page under Additional Information, click the SDoC and Summary Test Report links.

Performance, conformance, and interoperability issues are likely to occur in all communications technologies and especially in ones like P25 with protocols that constantly adapt to changing user

requirements. Such problems should be resolved within the P25 CAP, and notably, before product launch and deployment. Further, the declaration of compliance-related documents developed by program participants will provide useful technical information about the equipment.

The P25 CAP will provide emergency response agencies nationwide with a consistent and tractable perspective of P25 product compliance. It will also provide a means of verifying that Federal Grant dollars are being invested in standardized solutions and equipment that promotes interoperability.

1.8 Project 25 Communications Resources

Many resources are available for learning more about Project 25, public safety communications interoperability, and how to procure a P25 system. Following are just a few places to start.

1.8.1 Information about Project 25

The following links provide further Project 25 information.

- TIA — http://www.tiaonline.org/standards/technology/project_25/
- P25 Technology Interest Group — <http://www.project25.org/>

1.8.2 Attaining Project 25 Documents

Follow these links to attain Project 25 standards and technical service bulletins (TSBs):

- P25 documents are available for purchase from <http://global.ihs.com/>.
 - 1.) Enter a specific document number in the **Document Number...** field.
Alternatively, enter Project 25 in the **Title or Keyword...** field.
 - 2.) Click the search arrow.
- P25 documents are available to U.S. local, state, and Federal, agencies free of charge upon request. Please contact TIA at standards@tiaonline.org to receive additional information.

1.8.3 Public Safety Communications Interoperability

Follow this link for information about interoperability:

- SAFECOM — <http://www.safecomprogram.gov/interoperability/>

1.8.4 Procurement

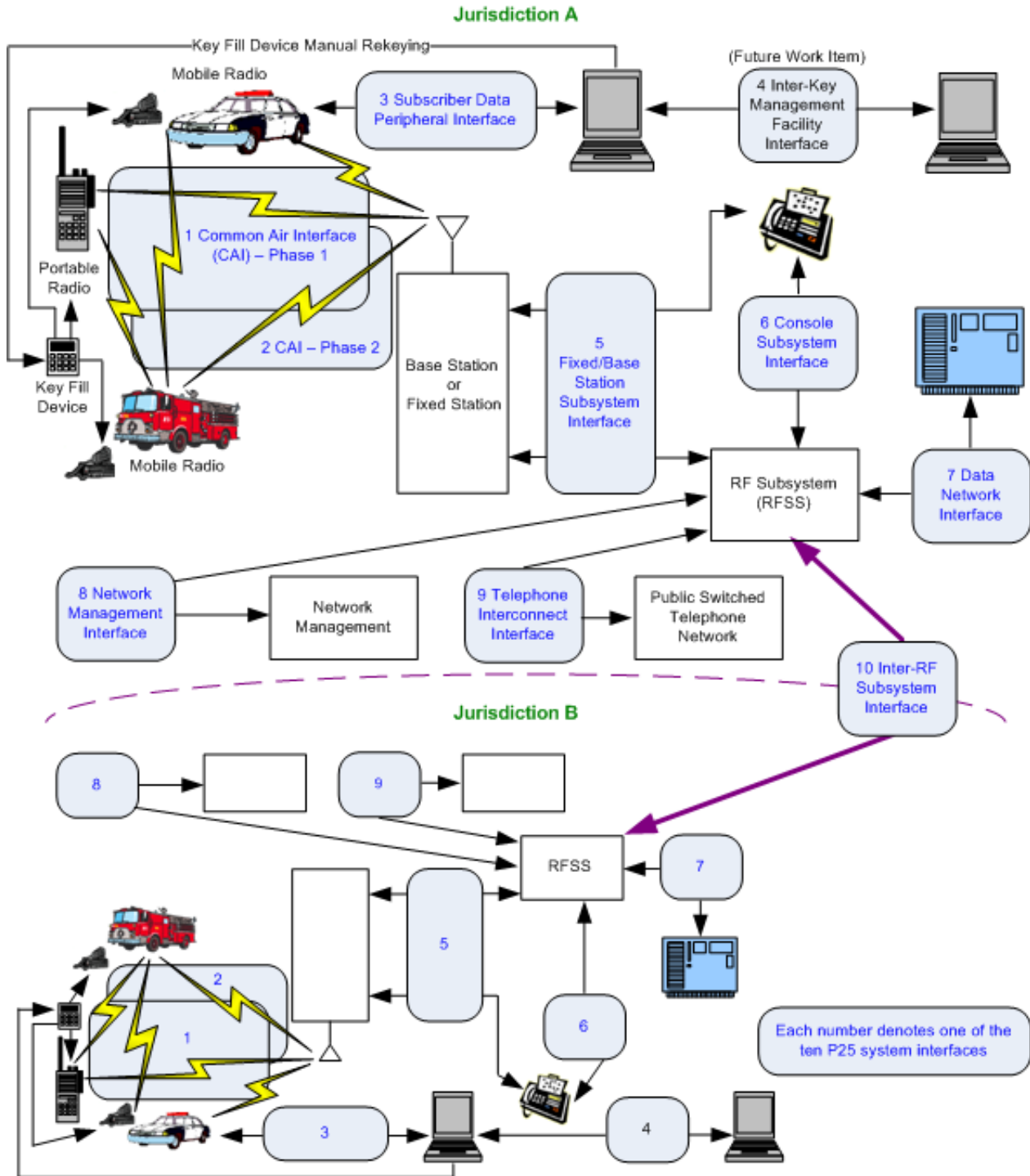
Follow these links for help procuring a Project 25 system or equipment:

- Grants and funding — <http://www.safecomprogram.gov/grant/>
- Grant guidance decision charts — http://www.pscr.gov/outreach/safecom/grant_guidance/grant_charts.php
- Guidelines for developing requests for proposals — <http://www.safecomprogram.gov/oecguidancedocuments/>

2 Project 25 Interfaces and Legend for Standards

The following figure identifies ten P25 system interfaces. Section 2.1 describes each interface.

Figure – P25 System Interfaces



P25 interfaces enable interoperable voice and data communications between and among different public safety agencies. An example is communications between police and firefighters in a particular jurisdiction. A further example is communications among agencies in different jurisdictions, such as when incidents require the response of agencies from two or more jurisdictions. Standardized P25 interfaces are the “glue” enabling interoperable mission-critical communications between and among radios and infrastructure equipment procured from different manufacturers that compose public safety P25 land mobile radio (LMR) networks.

2.1 Interfaces Described

Dividing the LMR network at defined interfaces lets manufacturers develop interoperable products specific to their areas of expertise. This frees users to buy products that meet their specific needs.

For example, a manufacturer might build fixed-location radios (identified as base station or fixed station), in which case the product must meet the requirements of two P25 interfaces (both the CAI and the FSSI; described in the next bullet list). In addition, that manufacturer might offer non-standardized, value-added features as an extension to their P25 fixed radio offering, such as operation over large temperature spans (ideal for radios on mountaintop locations in isolated areas). Such a feature might be very important to a particular user. In another scenario, a manufacturer might highlight pricing considerations by offering a functionally limited fixed radio that still satisfies all of the mandatory P25 interface requirements. Again, this may be appealing to users for some applications.

The goal is to provide users the ability to choose from various manufacturers’ offerings to build out their P25 systems. P25-compliant equipment offerings must satisfy all mandatory and, as applicable, optional requirements. (These requirements are noted as Mandatory and Standard Option features in *Project 25 Statement of Requirements (SoR)*. See [Section 3.1.](#)) This way, users can be confident that their P25 systems will work across the interface with other P25-compliant equipment regardless of manufacturer.

Following is a description of each P25 interface.

- Common Air—Phase 1 and Phase 2—Interface (CAI)

Enables digital wireless communication (voice and data) directly between P25 mobile and portable subscriber units (i.e., P25 radios) and between P25 mobile and portable subscriber units via a fixed/base station (and many times another radio, called a repeater, which is a component of the P25 equipment infrastructure).

- Phase 1 refers to P25 requirements and standards for a CAI based on frequency division multiple access (FDMA) using a 12.5 kHz channel. Phase 1 defines the necessary technologies to provide for channel reduction from 25 kHz to 12.5 kHz.

- Phase 2 refers to P25 requirements and standards for a CAI based on time division multiple access (TDMA) using a 6.25 kHz equivalent channel, two slots in a 12.5 kHz channel. Phase 2 defines an additional 50-percent reduction in channel size to 6.25 kHz equivalency.

Implementation of Phase 2 necessitates that a P25 system be configured and deployed as a trunked radio system with backward compatibility to Phase 1 FDMA conventional mode. Compatibility with analog and Phase 1 FDMA trunked radio systems is optional.

- Subscriber Mobile Data Peripheral Interface

Enables interconnection via a direct wireline of a P25 radio with laptops, terminals, or other data peripherals. A data peripheral connected to a vehicular mobile radio is referred to as a Mobile Data Peripheral (MDP).

- Fixed/Base Station Subsystem Interface (FSSI)

Enables voice and control information to be transferred between an RF subsystem (RFSS) or console subsystem and a fixed/base station.

- Console Subsystem Interface (CSSI)

Enables voice and control information to be transferred between an RFSS and a console subsystem (a console is equipment that a dispatcher or a supervisor uses to oversee and control mission-critical voice communications among field personnel).

- Network Management Interface

Enables administrators to comprehensively control and monitor P25 functional elements via RFSS connectivity.

- Data Host Network Interface

Enables data to be communicated to/from external computers, data networks, data sources, etc., via RFSS connectivity.

- Telephone Interconnect Interface

Enables field personnel to make connections through the public switched telephone network (PSTN) via RFSS connectivity by using their radios rather than, for example, using cellular telephones.

- Inter-RF Subsystem Interface (ISSI)

Enables different manufacturers' RFSS equipment to interoperate, and includes support for roaming of P25 radio subscribers among different jurisdictions, agencies, cities, etc.

- Key Fill Device – Mobile Radio Interface (KFR-MR)

(Future work item) Enables manual P25 encryption rekeying between a key fill device and a P25 radio to provision the radio with encryption keys or other key management-related information.

- Inter-Key Management Facility Interface (IKI)

(Future work item) Once adopted, will enable the interconnection of P25 Key Management Facilities (KMFs) for secure exchange of P25 encryption keys in a P25 system. The IKI will employ open, standards-based cryptographic techniques for key protection and exchange based on P25 user requirements.

2.2 Legend for P25 Standards Document Status

Document tables in this reference guide identify the most current documents related to the P25 suite of standards. Tables list each document's title, document number, publication date, and a brief description of the document's purpose by summarizing the document's topics in parenthesis. [Section 3](#) lists the documents that describe the P25 user requirements and the P25 standards structure. [Sections 4 through 8](#) list the documents related to P25 interfaces and systems, security, and equipment. The documents are listed under three major divisions:

- Description and Specification Documents — This includes Overview (Informative) and Protocol (Normative) documents.
- Testing Documents — This includes Conformance Test Procedures, Measurement Methods, Performance Recommendations, and Interoperability Test Procedures documents.

- Compliance Assessment Documents — This lists the CAP documents, which reference the testing documents necessary to demonstrate compliance for a given P25 standards suite.

One or more TIA-published documents are identified with each category of Overview, Protocol, Conformance Test Procedures, Measurement Methods, Performance Recommendations, and Interoperability Test Procedures. A category will list no documents if none are necessary or applicable, if none are planned, or if none are under development. See the “Document Status” section in Table 4 for notation information.

Note: Yellow-highlighted documents are unpublished but are under development by the TR-8 Committee. For each unpublished document, the TR-8 Committee Chairs have supplied best-estimate target dates for release as an approved TR-8 Committee document for publication and distribution by TIA. Be cautious of purchasing products without the benefit of published P25 standards.

The following legend provides document identifier conventions.

Table 4: Legend for P25 Standards

Item	Description
***-NNN.xxxx	
Where *** Can be:	ANSI/TIA/EIA — A full standard TIA — A TIA-only standard (the current objective is to move TIA standards to full ANSI standards) TSB — A TIA Telecommunications Systems Bulletin that is not a standard but is useful to P25-compliant equipment manufacturers and users
Where NNN can be:	102 — P25 standards and system definition 902 — P25 wideband services in the 700 MHz band 603 — Analog FM equipment
Where xxxx can be:	Axxx — P25 services category Bxxx — P25 systems category Cxxx — P25 equipment category
Document Status	
No documents are currently under development	Documents might be planned, but are not yet under development
No documents are planned	Documents might be necessary, but are not yet planned
No documents are necessary or applicable	Currently, no documents are necessary or applicable
Task Groups	
APWG	Audio Performance Working Group
CAPPTG	Compliance Assessment Process and Procedures Task Group
CITG	Console Interface Task Group, where <i>Console Interface</i> is the same as <i>Console Subsystem Interface</i>
DTG	Data Interface Task Group

Table 4: Legend for P25 Standards (Continued)

Item	Description
ETG	Encryption Task Group
FSITG	Fixed Station Interface Task Group, where <i>Fixed Station Interface</i> is the same as <i>Fixed Station Subsystem Interface</i>
ISSI TG	Inter-RF Subsystem Interface Task Group
STG	Systems Task Group
TDMA TG	Time Division Multiple Access Task Group
VTG	Vocoder Task Group

3 Project 25 User Requirements and Standards Structure

3.1 Project 25 Statement of Requirements

Public safety communication system users are responsible for providing and maintaining their user needs in the form of a system requirements document. The Steering Committee, with the involvement of its Project 25 User Needs Subcommittee (P25 UNS), establishes the priorities and scope for technical development by TIA of new and revised P25 standards.

The P25 UNS' ongoing development of the Project 25 Statement of Requirements (P25 SoR), as approved by the Steering Committee, plays an essential role in not only developing standards that meet users' needs but also to establish the basis upon which equipment and systems can be assessed as being compliant with the P25 standards. The P25 SoR also establishes a feasible migration path for P25 equipment and systems to take advantage of emerging technologies. As a result, the P25 SoR establishes a balance between user needs and what industry is able to implement based on current physical, technological, and regulatory constraints. [Table 5](#) lists current P25 SoR documents.

Table 5: Project 25 Statement of Requirements Documents

Documents
<ul style="list-style-type: none"> ■ <i>Project 25 Statement of Requirements</i>, (Mar 2010) (Project 25 Overview, Detailed Standards Suite Proposed [Common Air Interface, Data Interface, Inter-RF Subsystem Interface, Network Management Interface, Open Console Interface, and Open Fixed/Base Station Interface], P25 System Overview, Encryption, Subscriber Equipment, Interoperability, Migration) This document is available from your web browser at: http://ftp.tiaonline.org/TR-8/APIC/P25 UNS/Public/Current Approved Project 25 Statement of Requirements/

3.2 Project 25 System Description and Organization

P25 system overview documents describe how the users and manufacturers envision the P25 system, the logical interfaces and services the standards will specify, and the documents needed to completely characterize the P25 standards suite. Project 25 provides this information in TSB overview documents. These documents provide an overview of the entire suite of standards for all interfaces and give a functional description for the current set of Common Air Interface features. (Note that the P25 documents suite contains overviews of individual interfaces and services, as well.) [Table 6](#) lists the current documents.

Table 6: Project 25 System Description and Organization Documents

Documents
<ul style="list-style-type: none"> ■ <i>Project 25 TIA-102 Documentation Suite Overview</i>, TSB-102-B (Jun 2012) (Overview, General System Model, Services, System Elements and Open System Interfaces, and Standards Organization)

4 Standards Suite for Project 25 Interfaces and Systems

This section discusses the suite of standards documents for the (currently) nine interfaces of a P25 system. (See [Section 2](#) for a description of each how each interface fits in a P25 system.) For each of the interfaces, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

4.1 Common Air Interface

The P25 Common Air Interface (CAI) specifies two access methods:

- Frequency division multiple access (FDMA) using a 12.5 kHz channel — mandatory for all P25 Phase 1 systems. Phase 1 refers to P25 requirements and standards for a digital CAI that provides for channel reduction from 25 kHz to 12.5 kHz.
- Time division multiple access (TDMA) using two 6.25 kHz equivalent channels or slots in a single 12.5 kHz channel — optional (mandatory if supporting Two-Slot TDMA Trunked Digital features) for all P25 Phase 2 systems. Phase 2 refers to P25 requirements and standards for a digital CAI that provides two 6.25 kHz equivalent channels or two slots in a single 12.5 kHz channel.

Operation in a conventional mode is mandatory for P25, while operation using a trunking mode is optional. [Section 5.2](#) lists FDMA and TDMA trunking documents.

4.1.1 General CAI Documents

Mandatory The following general CAI documents provide guidance necessary to meet the mandatory P25 CAI standard.

Table 7: General Common Air Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are currently under development)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Common Air Interface Reserved Values</i>, ANSI/TIA-102.BAAC-C (Apr 2011) (Special reserved values for particular fields of information, such as Network Access Code, Link Control Format, Key ID, Algorithm ID, etc.)
Testing Documents	
Conformance Test Procedures:	(No documents are currently under development)

Table 7: General Common Air Interface Documents (Continued)

Document Type	Documents
Measurement Methods:	(No documents are currently under development)
Performance Recommendations:	(No documents are currently under development)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
(No documents are currently under development)	

4.1.2 FDMA Air Interface—Phase 1

Sections 5.1.2 and 5.2.1 list FDMA documents for conventional and trunking Phase 1 P25 systems, respectively.

4.1.3 TDMA Air Interface—Phase 2

Section 5.2.2 lists TDMA documents for a Phase 2 P25 trunking system.

4.2 Inter-RF Subsystem Interface

Table 8 lists current P25 Inter-RF Subsystem Interface (ISSI) description, specification, and assessment documents.

- Optional** The following documents provide guidance necessary to meet the optional (mandatory if connecting P25 RFSSs using the ISSI) P25 protocol standards defining ISSI support of P25 trunked voice service among multi-jurisdictional systems. This includes support for roaming subscriber equipment among multi-jurisdictional systems, with the following objectives:
- Mobility management
 - Call control
 - Push-to-talk management
 - P25 supplementary data service (e.g., call alert)
 - P25 packet data on the Data Network Interface (including Over-The-Air-Rekeying (OTAR))
 - ISSI support of the P25 Console Subsystem Interface (CSSI)
 - P25 conventional voice service (including mixed trunked/conventional voice service)

Table 8: Inter-RF Subsystem Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 – Inter-RF Subsystem Interface Overview</i>, TSB-102.BACC-B (Nov 2011) (ISSI Overview)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice, Mobility Management, and RFSS Capability Polling Services</i>, TIA-102.BACA-B (Nov 2012) (Describes the architecture, protocol suite, messages, parameters, state models, and procedures to support the following services among RFSSs over the ISSI. Voice services: group voice service for both confirmed and unconfirmed group calls, SU-to-SU voice service for both direct calls and calls requiring prior RF availability check. Mobility management functions: mobile SU registration, mobile SU tracking, group affiliation by mobile SUs and consoles, group tracking, authentication credential distribution, SMDCP Context registration. Optional ISSI support functions: RFSS service capability polling.) ■ <i>Project 25 Inter-RF Subsystem Interface (ISSI) Messages and Procedures for Supplementary Data Services</i>, TIA-102.BACD-B (Jul 2011) (Overview of Architecture and Protocol Suite, SIP Messages and Parameters Definition, Mobility Management, Supplementary Data Procedures, Message Sequence Charts (Informative)) ■ <i>Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data services</i>, TIA-102.BACF (Oct 2009)
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Conformance Test Procedures</i>, TIA-102.CACC (Jan 2009)
	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Conformance Test Procedures</i>, TIA-102.CACC-1 (Aug 2011) ■ <i>Inter-RF Subsystem Interface Conformance Test Procedures for Supplementary Data</i>, TIA-102.CACx (ISSI TG approval, TBD; TR-8.19 approval, TBD)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface (ISSI) Measurement Methods for Voice Services</i>, TIA-102.CACA (Apr 2007) (ISSI Voice Services Performance Models, Performance Parameters, and Measurement Procedures)

Table 8: Inter-RF Subsystem Interface Documents (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Measurement Methods for Voice Services — Addendum 1 — Trunked Console ISSI</i>, TIA-102.CACA-1 (Dec 2008)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Performance Recommendations for Voice Services</i>, TIA-102.CACB (Apr 2007) ■ <i>Project 25 Inter-RF Subsystem Interface Performance Recommendations for Voice Services — Addendum 1 — Trunked Console</i>, TIA-102.CACB-1 (Dec 2008)
Interoperability Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Interoperability Test Procedures for Trunked Systems</i>, TIA-102.CACD-B (Jan 2013) (This standard defines procedures for testing the interoperability of RFSSs operating in trunked voice mode.) ■ <i>Inter-RF Subsystem Interface Interoperability Test Procedures for Trunked Console</i>, TIA-102.xxxx (ISSI TG approval, TBD; TR-8.19 approval, TBD) ■ <i>Inter-RF Subsystem Interface Interoperability Tests for Packet Data</i>, TIA-102.CACx (ISSI TG approval, TBD; TR-8.19 approval, TBD) ■ <i>Inter-RF Subsystem Interface Interoperability Tests for Conventional</i>, TIA-102.CACx (ISSI TG approval, TBD; TR-8.19 approval, TBD) ■ <i>Inter-RF Subsystem Interface Interoperability Tests for Supplementary Data</i>, TIA-102.BAxx (ISSI TG approval, TBD; TR-8.19 approval, TBD)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Assessment Tests – Trunking ISSI Interoperability</i>, TSB-102.CBBK-A (Mar 2010)

4.3 Fixed Station Subsystem Interface

Optional The following documents provide guidance necessary to meet the optional (mandatory if using an RFSS) P25 Fixed Station Subsystem Interface (FSSI) standard.

Table 9: Fixed Station Subsystem Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are currently under development)

Table 9: Fixed Station Subsystem Interface Documents (Continued)

Document Type	Documents
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Fixed Station Interface, Messages and Procedures</i>, TIA-102.BAHA (Jun 2006) (Defines a Conventional Fixed Station Interface (CFSI) between a conventional fixed station of a Fixed Station Subsystem and a Conventional Fixed Station Host (CFSH), voice services only) (CFSI Architecture, CFSI Analog Interface, and CFSI Digital Interface)
	<ul style="list-style-type: none"> ■ <i>Fixed Station Interface, Messages and Procedures</i>, TIA-102.BAHA-A (Projected TR-8 approval date to publish, TBD)
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Fixed Station Interface Conformance Test Procedure</i>, TIA-102.CADA (Apr 2007) (Conventional Systems, Voice Services only)
Measurement Methods:	(No documents are currently under development)
Performance Recommendations:	(No documents are currently under development)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
	(No documents are currently under development)

4.4 Console Subsystem Interface

Sections 5.1.3 and 5.2.3 list current P25 Console Subsystem Interface (CSSI) documents for conventional and trunking systems, respectively.

4.5 Subscriber Mobile Data Peripheral Interface and Data Host Network Interface

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting data interface features) P25 Subscriber Mobile Data Peripheral Interface standard and P25 Data Host Network Interface standard.

Table 10: Subscriber Data Mobile Peripheral Interface and Data Host Network Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are planned)

Table 10: Subscriber Data Mobile Peripheral Interface and Data Host Network Interface Documents

Document Type	Documents
<p>Protocol (Normative):</p>	<ul style="list-style-type: none"> <li>■ <i>Project 25 Data Overview</i>, ANSI/TIA-102.BAEA-B (Jun 2012) (Data Services, Packet Data Interfaces, Packet Data Bearer Services, and Packet Data Configurations) <li>■ <i>Project 25 Packet Data Specification</i>, ANSI/TIA-102.BAEB-A (Mar 2005) (Network Management Overview, Radio Control Protocol (RCP), Simple Network Management Protocol (SNMP), ASN.1 MIB Definition (normative), Network Management Mapping (informative), Network Management Functional Area Mapping for RCP and SNMP) <li>■ <i>Packet Data Specification</i>, ANSI/TIA-102.BAEB-B (Projected TR-8 approval date to publish, TBD) (Network Management Overview, Radio Control Protocol (RCP), Simple Network Management Protocol (SNMP), ASN.1 MIB Definition (normative), Network Management Mapping (informative), Network Management Functional Area Mapping for RCP and SNMP) <li>■ <i>Project 25 Radio Management Protocol</i>, (also known as Radio Control Protocol — RCP), ANSI/TIA-102.BAEE-B (May 2010) (RPC: Protocol Characteristics, Request, Response, and Report Class Service Data Units, Simple Network Management Protocol (SNMP): Overview, P25 SNMP Node and RMP MIB Definitions)
Testing Documents	
<p>Conformance Test Procedures:</p>	<p>(No documents are currently under development)</p>
<p>Measurement Methods:</p>	<p>(No documents are currently under development)</p>
<p>Performance Recommendations:</p>	<ul style="list-style-type: none"> <li>■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
<p>Interoperability Test Procedures:</p>	<p>(No documents are currently under development)</p>
Compliance Assessment Documents	
	<ul style="list-style-type: none"> <li>■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance)

4.6 Network Management Interface

Optional The following documents provide guidance necessary to meet the optional (mandatory if using an RFSS) P25 Network Management Interface standard.

Table 11: Network Management Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Network Management Interface Overview</i>, TSB-102.BAFA-A (Jul 1999) (Network Management Hierarchy, Transport Medium for Network Management Info, System Management Functional Areas)
Protocol (Normative):	(No documents are necessary or applicable)
Testing Documents	
Conformance Test Procedures:	(No documents are planned)
Measurement Methods:	(No documents are planned)
Performance Recommendations:	(No documents are planned)
Interoperability Test Procedures:	(No documents are planned)
Compliance Assessment Documents	
(No documents are currently under development)	

4.7 Telephone Interconnect Interface

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting telephone interconnect features) P25 Telephone Interconnect Interface standard.

Table 12: Telephone Interconnect Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Telephone Interconnect Overview (Voice Services)</i>, TSB-102.BADA-A (Jun 2012) (Describes how telephone service is accessed by an LMR system through the Project 25 Telephone Interconnect Interface.)

Table 12: Telephone Interconnect Interface Documents (Continued)

Document Type	Documents
Protocol (Normative):	<ul style="list-style-type: none"> <li>■ <i>Project 25 Telephone Interconnect Requirements and Definitions (Voice Services)</i>, ANSI/TIA-102.BADA (Mar 2000) (General Subscriber Equipment and RF Subsystem Operations, Optional Analog and Digital Interfaces, Appendix A Project 25 Mandatory vs. Optional Tables) <li>■ <i>Project 25 Telephone Interconnect Requirements and Definitions (Voice Services) — Addendum 1 — Conventional Individual Calls</i>, ANSI/TIA-102.BADA-1 (Apr 2006) (General Subscriber Equipment and RF Subsystem Operations, Annex A Project 25 Mandatory vs. Optional Tables (Normative), Annex B Message Sequence (Informative)) <li>■ <i>Telephone Interconnect Requirements and Definitions (Voice Services) — Addendum 1 — Conventional Individual Calls</i>, ANSI/TIA-102.BADA-A (TR-8 projected approval date to publish, TBD) (General Subscriber Equipment and RF Subsystem Operations, Annex A Project 25 Mandatory vs. Optional Tables (Normative), Annex B Message Sequence (Informative))
Testing Documents	
Conformance Test Procedures:	(No documents are currently under development)
Measurement Methods:	(No documents are currently under development)
Performance Recommendations:	(No documents are currently under development)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
(No documents are currently under development)	

5 Standards Suite for Project 25 Conventional and Trunked Systems

This section discusses the standards suite documents for Project 25 conventional and trunked radio systems.

- Project 25 conventional (non-trunking) digital systems promote spectrum efficiency. Project 25 conventional radio systems also provide support for backward compatibility with non-P25 analog legacy systems.
- Project 25 digital trunking systems have radio control channels that provide further spectrum efficiency and simplify multi-jurisdictional radio communications.

Tables for both systems identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

5.1 Project 25 Conventional Systems

Operation in a conventional mode is mandatory for P25, while operation using a trunking mode is optional. [Section 5.2](#) lists frequency division multiple access (FDMA) and time division multiple access (TDMA) trunking documents.

5.1.1 Legacy System Compatibility

Analog Frequency Modulation (FM) used in 25 kHz and 12.5 kHz bandwidths is mandatory in all P25 Phase 1 subscriber equipment — hand-held (portable) and vehicular (mobile) transceivers — to provide compatibility with non-P25 systems.

Mandatory Analog FM capabilities are mandatory for P25 Phase 1 subscriber equipment to provide backward compatibility with non-P25 systems. [Section 7.1](#) lists the documents associated with this P25 equipment feature. The analog FM air interface is not a part of the Project 25 Standard, but tests are specified for analog FM transceiver performance. ([Section 1.1.2](#) describes Phase 1.)

5.1.2 FDMA Conventional Digital—Phase 1

Mandatory The following documents provide guidance necessary to meet the mandatory P25 FDMA conventional digital standard for Phase 1. (Section 1.1.2 describes Phase 1.)

Table 13: FDMA Conventional Digital Documents—Phase 1

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Location Services Overview</i>, TSB-102.BAJA-A (Feb 2010)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 FDMA Common Air Interface</i>, ANSI/TIA-102.BAAA-A (Sep 2003) (Voice Coder, Voice Formats, Data Packets, Data Error Correction, Channel Access, Modulation, Transmit Bit Order) ■ <i>Project 25 Conventional Procedures</i>, TIA-102.BAAD-A (Feb 2010) (Unit Addressing, Repeater Addressing, Voice Transmit and Receive Operation, Packet Data Transmit and Receive Operation) ■ <i>Project 25 Tier 1 Location Services</i>, TIA-102.BAJB (Feb 2009) ■ <i>Project 25 Tier 2 Location Services</i>, TIA-102.BAJC (Oct 2010) ■ <i>Project 25 TCP/UDP Port Number Assignments</i>, TIA-102.BAJD (Oct 2010) (TCP/UDP Port Number Assignment) ■ <i>Project 25 Link Control Word Formats and Messages</i>, TIA-102.AABF-C (Mar 2011) (Part of Voice Message, Conventional and Trunked: Link Control Messages, Field Definitions, and Word Usages) ■ <i>Link Control Word Formats and Messages — Addendum 1</i>, TIA-102.AABF-C-1 (Jan 2013) <li style="background-color: yellow;">■ <i>Link Control Word Formats and Messages — Addendum 2</i>, TIA-102.AABF-C-2 (Projected TR-8 approval date to publish, TBD) ■ <i>Project 25 Conventional Control Messages</i>, TIA-102.AABG (Apr 2009) (Defines control messages that may be applied to conventional systems: Emergency Alarm, Call Alert, Radio Check, Inhibit and Uninhibit, status Update and Request, Message, Telephone Interconnect Dialing, Radio Unit Monitor)

Table 13: FDMA Conventional Digital Documents—Phase 1 (Continued)

Document Type	Documents
Conformance Test Procedures:	Testing Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Common Air Interface Conformance Test, ANSI/TIA-102.BAAB-B (Mar 2005)</i> (Transmit Voice Format Tests, Transmit Data Format Tests, Receiver Tests) ■ <i>Project 25 Conformance Profile – Level One Basic Conventional Operation, TIA-102.CAEA (Apr 2009)</i> ■ <i>Project 25 Conformance Profile – Level Two Advanced Conventional Operation, TIA-102.CAEB (Dec 2009)</i>
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods, ANSI/TIA-102.CAAA-C (Sep 2008)</i> (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator, ANSI/TIA-102.CAAA-C-1 (Jun 2010)</i>
	<ul style="list-style-type: none"> ■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD)</i> (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
	<ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation, ANSI/TIA-102.CAAB-D (Jan 2013)</i> (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics) ■ <i>Project 25 Enhanced Vocoder Methods of Measurement for Performance, TIA-102.BABG (Mar 2010)</i>
Interoperability Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Interoperability Test Procedures Conventional Voice Equipment, TSB-102.CABA (Feb 2002)</i> (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests) ■ <i>Project 25 Interoperability Testing for Voice Operation in Conventional Systems, TIA-102.CABA (Oct 2010)</i>
	Compliance Assessment Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Assessment Tests — Conventional Operation, TSB-102.CBBE (Sep 2011)</i> (Tests to demonstrate compliance)

5.1.3 Console Subsystem Interface for Conventional Systems

Optional The following documents provide guidance necessary to meet the optional (mandatory if using an RFSS) conventional P25 Console Subsystem Interface (CSSI) standard for voice and control services.

Table 14: Conventional Console Subsystem Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Console Subsystem Interface Overview</i>, TSB-102.BAGA (Feb 2008) (CSSI Connectivity Requirements; CSSI Services: Voice Services, Supplementary Services, Encryption Services, and Other Console Features; Functions Related to Other Interfaces: Console Subscriber Key Management – Not Part of CSSI, Console Encryption Key Fill/Update, Packet Data Services, Complexity 1 CSSI Conventional Control Services)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Messages and Procedures for Conventional Operation</i>, TIA-102.BACE (Jun 2008) (Overview of Architecture and Protocol Suite, Application Protocols – Complexity 1, Call and Transmission Control, Timer Values and Constants, Transmission Control Call Flows)
Testing Documents	
Conformance Test Procedures:	(No documents are currently under development)
Measurement Methods:	(No documents are currently under development)
Performance Recommendations:	(No documents are currently under development)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
(No documents are currently under development)	

5.2 Project 25 Trunking Systems

Project 25 allows an option to use trunking to increase radio system efficiencies. One trunking scheme uses the radio channels in a frequency division multiple access (FDMA) mode. A second scheme uses the FDMA traffic channels in a time division multiple access (TDMA) mode to further increase the spectrum efficiencies. The next two sections list the documents for these schemes.

5.2.1 FDMA Trunked Digital—Phase 1

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting FDMA Trunked Digital features) Phase 1 P25 FDMA Trunked Digital standard. (Section 1.1.2 describes Phase 1.)

Table 15: FDMA Trunked Digital Documents—Phase 1

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are planned)
Protocol (Normative):	<ul style="list-style-type: none"> <li>■ <i>Project 25 – Trunking Overview – Digital Radio Technical Standards</i>, ANSI/TIA-102.AABA-B (Apr 2011) (Trunking Overview, Voice and Data Services) <li>■ <i>Project 25 Trunking Procedures</i>, TIA-102.AABD-A (Dec 2008) (Control and Traffic Channels, Random Access Procedures, Control Channel Acquisition and Retention, Registration and Authentication, Voice Call, Data Call, Wide Area Call, Supplementary Services, and System Status Procedures) <li>■ <i>Project 25 Trunking Procedures — Addendum 1</i>, TIA-102.AABD-A-1 (Apr 2011) <li>■ <i>Project 25 Trunking Procedures — Addendum 2</i>, TIA-102.AABD-A-2 (Sep 2012) <li style="background-color: yellow;">■ <i>Trunking Procedures</i>, TIA-102.AABD-A-3 (Projected TR-8 approval date to publish, TBD) <li>■ <i>Trunking Control Channel Formats</i>, TIA-102.AABB-B (Apr 2011) (Control Channel Designation and Modes, Inbound Control Channel Access, Packet and Information Block Structures) <li>■ <i>Project 25 Trunking Control Channel Messages</i>, ANSI/TIA-102.AABC-C (Nov 2009) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes) <li>■ <i>Project 25 Trunking Control Channel Messages — Addendum 1 — for ISSI Supplementary Data</i>, ANSI/TIA-102.AABC-C-1 (Feb 2011) <li style="background-color: yellow;">■ <i>Trunking Control Channel Messages — Addendum 2 — for ISSI Supplementary Data</i>, TIA-102.AABC-C-2 (Projected TR-8 approval date to publish, TBD) <li>■ <i>Project 25 Link Control Word Formats and Messages</i>, TIA-102.AABF-C (Mar 2011) (Part of Voice Message, Conventional and Trunked: Link Control Messages, Field Definitions, and Word Usages)

Table 15: FDMA Trunked Digital Documents—Phase 1 (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> <li>■ <i>Link Control Word Formats and Messages — Addendum 1</i>, TIA-102.AABF-C-1 (Jan 2013) <li>■ <i>Link Control Word Formats and Messages — Addendum 2</i>, TIA-102.AABF-C-2 (Projected TR-8 approval date to publish, TBD) <li>■ <i>Project 25 Conventional Control Messages</i>, TIA-102.AABG (Apr 2009) (Defines control messages that may be applied to conventional systems: Emergency Alarm, Call Alert, Radio Check, Inhibit and Uninhibit, status Update and Request, Message, Telephone Interconnect Dialing, Radio Unit Monitor) <li>■ <i>Project 25 – Digital Land Mobile Radio – Link Layer Authentication</i>, TIA-102.AACE-A (Apr 2011) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
Conformance Test Procedures:	<p>Testing Documents</p> <ul style="list-style-type: none"> <li>■ <i>Project 25 – Conformance Profile – Basic Trunked Operation</i>, TIA-102.CAEC (Dec 2011) (Procedure Signaling Parameter and Values, Procedure Signaling (including Control Channel Signaling and Voice Traffic Channel Signaling), and the following Procedures: Unit Registration Request, Group Affiliation, Location Update, Unit to Group Call Setup, Group Call Termination, Announcement Group Call, Broadcast Group Call, Emergency Group Call, Encrypted Group Call, Unit-to-Unit Availability Check Setup, Unit-to-Unit Direct Setup, Unit-to-Unit Call Termination, Emergency Unit-to-Unit Call, Emergency Alarm)
Measurement Methods:	<p>No specific documents planned for FDMA Trunked Digital, but the following document also applies:</p> <ul style="list-style-type: none"> <li>■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) <li>■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator</i>, ANSI/TIA-102.CAAA-C-1 (Jun 2010) <li>■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)

Table 15: FDMA Trunked Digital Documents—Phase 1 (Continued)

Document Type	Documents
Performance Recommendations:	<p>No specific documents planned for FDMA Trunked Digital, but the following documents also apply:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics) ■ <i>Project 25 Enhanced Vocoder Methods of Measurement for Performance</i>, TIA-102.BABG (Mar 2010)
Interoperability Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems</i>, TIA-102.CABC-B (Nov 2010) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification) ■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems — Addendum 1 — TDMA Mode</i>, TIA-102.CABC-B-1 (Jul 2011) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance) ■ <i>Project 25 Recommended Compliance Tests Trunked Mode Fixed Station</i>, TSB-102.CBBH (Jan 2009) (Tests to demonstrate compliance) ■ <i>Project 25 Recommended Compliance Tests – Trunking Interoperability</i>, TSB-102.CBBJ-B (Sep 2011) (Tests to demonstrate compliance) ■ <i>Project 25 Compliance Assessment Program Trunking Interoperability Summary Test Report Guidelines</i>, TSB-102.CBAF (Apr 2009) (Tests to demonstrate compliance)

5.2.2 Two-Slot TDMA Trunked Digital—Phase 2

Optional Support for Time Division Multiple Access (TDMA) trunked digital capabilities is optional (mandatory if supporting TDMA Trunked Digital features) for Phase 2 P25 systems. (Section 1.1.2 describes Phase 2.)

The following documents provide guidance necessary to meet the Phase 2 P25 Two-Slot TDMA Trunked Digital standard.

Table 16: Two-Slot TDMA Trunked Digital Documents—Phase 2

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Two-Slot TDMA Overview</i>, TSB-102.BBAA (Mar 2010) (TDMA Trunking Overview, Voice and Data Services)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Two-Slot TDMA Common Air Interface – Physical Layer Specification</i>, TIA-102.BBAB (Jul 2009) (Modulation, Structure of the Different Types of Bursts, Channel Coding, Time Division Multiplex (TDM) Timing Requirements, and Definition of Scrambling) ■ <i>Project 25 Two-Slot TDMA Common Air Interface – MAC Layer: Procedures and Messages</i>, TIA-102.BBAC (Dec 2010) (Logical Channels Structure, MAC Protocol Description, MAC Protocol Data Units (PDUs), Physical Layer Services Required by the MAC Layer) ■ <i>Two-Slot TDMA Common Air Interface – MAC Layer: Procedures and Messages</i>, TIA-102.BBAC-1 (Projected TR-8 approval date to publish, TBD)
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Phase 2 Two-Slot Time Division Multiple Access – Trunked Voice Services Message and Procedures Conformance Specification</i>, TIA-102.BCAE (Jul 2011) ■ <i>Project 25 Phase 2 Two-Slot Time Division Multiple Access – Trunked Voice Services Common Air Interface Conformance Specification</i>, TIA-102.BCAD (Sep 2011) ■ <i>Project 25 Phase 2 Two-Slot Time Division Multiple Access – Voice Channel Conformance Specification</i>, TIA-102.BCAF (Aug 2012) (Provides tests for key aspects of the operation of the TDMA subscriber unit and RFSS equipment.) ■ <i>Phase 2 Two-Slot Time Division Multiple Access – Voice Channel Conformance Profiles</i>, TIA-102.CAEF (Projected TR-8 approval date to publish, TBD)

Table 16: Two-Slot TDMA Trunked Digital Documents—Phase 2 (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 – Conformance Profile – Basic Trunked Operation</i>, TIA-102.CAEC (Dec 2011) (Procedure Signaling Parameter and Values, Procedure Signaling (including Control Channel Signaling and Voice Traffic Channel Signaling), and the following Procedures: Unit Registration Request, Group Affiliation, Location Update, Unit to Group Call Setup, Group Call Termination, Announcement Group Call, Broadcast Group Call, Emergency Group Call, Encrypted Group Call, Unit-to-Unit Availability Check Setup, Unit-to-Unit Direct Setup, Unit-to-Unit Call Termination, Emergency Unit-to-Unit Call, Emergency Alarm)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Two-Slot Time Division Multiple Access Transceiver Measurement Methods</i>, TIA-102.CCAA (Aug 2011) (Methods of Measurements for Receivers, Transmitters, Unit Characteristics)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Enhanced Vocoder Methods of Measurement for Performance</i>, TIA-102.BABG (Mar 2010) ■ <i>Project 25 Two-Slot Time Division Multiple Access Transceiver Performance Recommendations</i>, TIA-102.CCAB (Oct 2011) (Standards for All Equipment: Receiver Section, Transmitter Section, Unit Characteristics)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Compliance Assessment Program Trunking Interoperability Summary Test Report Guidelines</i>, TSB-102.CBAF (Apr 2009) (Tests to demonstrate compliance) ■ <i>Project 25 Recommended Compliance Tests – Trunking Interoperability</i>, TSB-102.CBBJ-B (Sep 2011) (Tests to demonstrate compliance) ■ <i>Project 25 Recommended Compliance Assessment Tests — Two-Slot TDMA Trunking Voice Channel Interface</i>, TSB-102.CBBL (Jun 2012) (Tests to demonstrate compliance)

5.2.3 Console Subsystem Interface for Trunked Systems

Optional The following documents provide guidance necessary to meet the optional (mandatory if using an RFSS) trunked P25 Console Subsystem Interface (CSSI) standard for voice and control services.

Table 17: Trunked Console Subsystem Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Console Subsystem Interface Overview</i>, TSB-102.BAGA (Feb 2008) (CSSI Connectivity Requirements; CSSI Services: Voice Services, Supplementary Services, Encryption Services, and Other Console Features; Functions Related to Other Interfaces: Console Subscriber Key Management – Not Part of CSSI, Console Encryption Key Fill/Update, Packet Data Services, Complexity 1 CSSI Conventional Control Services)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice, Mobility Management, and RFSS Capability Polling Services</i>, TIA-102.BACA-B (Nov 2012) (Describes the architecture, protocol suite, messages, parameters, state models, and procedures to support the following services among RFSSs over the ISSI. Voice services: group voice service for both confirmed and unconfirmed group calls, SU-to-SU voice service for both direct calls and calls requiring prior RF availability check. Mobility management functions: mobile SU registration, mobile SU tracking, group affiliation by mobile SUs and consoles, group tracking, authentication credential distribution, SNDCP Context registration. Optional ISSI support functions: RFSS service capability polling.)
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> ■ <i>Console Subsystem Interface Conformance</i>, TIA-102.xxxx (TR-8.19 approval, TBD)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface (ISSI) Measurement Methods for Voice Services</i>, TIA-102.CACA (Apr 2007) (ISSI Voice Services Performance Models, Performance Parameters, and Measurement Procedures) ■ <i>Project 25 Inter-RF Subsystem Interface Measurement Methods for Voice Services — Addendum 1 — Trunked Console ISSI</i>, TIA-102.CACA-1 (Dec 2008)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Performance Recommendations for Voice Services</i>, TIA-102.CACB (Apr 2007)

Table 17: Trunked Console Subsystem Interface Documents (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Inter-RF Subsystem Interface Performance Recommendations for Voice Services — Addendum 1 — Trunked Console</i>, TIA-102.CACB-1 (Dec 2008)
Interoperability Test Procedures:	<ul style="list-style-type: none"> ■ <i>Console Subsystem Interface Interoperability Testing Procedures</i>, TIA-102.xxxx (CAPP TG approval, TBD)
	Compliance Assessment Documents
	(No documents are currently under development)

6 Standards Suite for Project 25 System Security

This section discusses the suite of standards documents for Project 25 system security. For each security element, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

Two encryption algorithms are available for use with P25 systems. Data Encryption Standard (DES) is oldest algorithm for which there are P25 standards documents. However, since May 2005, the Federal Government no longer endorses DES for secure communications. The most recently endorsed algorithm is Advanced Encryption Standard (AES). All federal agency communications systems implementing encryption must use AES. To best ensure interoperability between federal, state, and local responders, it is recommended that state and local agencies also transition to AES. An encryption implementation in any new P25 system should use AES.

The following subsections define the two algorithms and their use, a standard key fill device to manually load encryption keys into P25 radios, and a standard over-the-air-rekeying (OTAR) procedure to automatically rekey P25 radios.

Encryption is an option for P25 systems but when it is desired, the following standards apply.

6.1 Advanced Encryption Standard

With exception of equipment using National Security Agency (NSA)-approved encryption, or equipment for markets where the supply of strong encryption is subject to import/export restrictions, all Project 25 equipment implementing Type 3 encryption must use Advanced Encryption Standard (AES) for interoperability purposes. AES key length is 256 bits for encryption of P25 user information (i.e., P25 voice and P25 packet data).

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting AES features) Project 25 Standard for advanced encryption.

Table 18: Encryption – Advanced Encryption Standard Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are planned)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Security Services Overview</i>, ANSI/TIA-102.AAAB-A (Reaffirmed, Feb 2011) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management)

Table 18: Encryption – Advanced Encryption Standard Documents (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Block Encryption Protocol</i>, ANSI/TIA-102.AAAD-A (Aug 2009) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm — DES Triple Data Encryption Algorithm (TDEA), and AES) ■ <i>Project 25 – Digital Land Mobile Radio – Link Layer Authentication</i>, TIA-102.AACE-A (Apr 2011) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
	Testing Documents
Conformance Test Procedures:	(No documents are currently under development)
Measurement Methods:	<p>No specific documents planned for AES, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator</i>, ANSI/TIA-102.CAAA-C-1 (Jun 2010) ■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	<p>No specific documents planned for AES, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	<p>No specific documents planned for AES, but the following documents also apply:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Interoperability Test Procedures Conventional Voice Equipment</i>, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)

Table 18: Encryption – Advanced Encryption Standard Documents (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> <li>■ <i>Project 25 Interoperability Testing for Voice Operation in Conventional Systems</i>, TIA-102.CABA (Oct 2010) <li>■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems</i>, TIA-102.CABC-B (Nov 2010) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification) <li>■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems — Addendum 1 — TDMA Mode</i>, TIA-102.CABC-B-1 (Jul 2011) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification)
	<p style="text-align: center;">Compliance Assessment Documents</p> <ul style="list-style-type: none"> <li>■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance)

6.2 Data Encryption Standard

The Federal Government no longer endorses the Data Encryption Standard (DES) algorithm (since May 2005) for secure communications. However, for backward interoperability purposes or to satisfy import/export restrictions, DES optionally may be available in Project 25 equipment implementing encryption, but only as a secondary algorithm to Advanced Encryption Standard (AES). Because DES has reached the end of its useful cryptographic life, its use in new systems is strongly discouraged.

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting DES features) Project 25 Standard data encryption.

Table 19: Encryption – Data Encryption Standard Documents

Document Type	Documents
Overview (Informative):	Description and Specification Documents
	(No documents are planned)

Table 19: Encryption – Data Encryption Standard Documents (Continued)

Document Type	Documents
<p>Protocol (Normative):</p>	<ul style="list-style-type: none"> ■ <i>Project 25 Security Services Overview</i>, ANSI/TIA-102.AAAB-A (Reaffirmed, Feb 2011) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management) ■ <i>Project 25 Block Encryption Protocol</i>, ANSI/TIA-102.AAAD-A (Aug 2009) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm — DES Triple Data Encryption Algorithm (TDEA), and AES) ■ <i>Project 25 – Digital Land Mobile Radio – Link Layer Authentication</i>, TIA-102.AACE-A (Apr 2011) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
<p>Conformance Test Procedures:</p>	<p style="text-align: center;">Testing Documents</p> <ul style="list-style-type: none"> ■ <i>Conformance Test for Project 25 DES Encryption Protocol</i>, ANSI/TIA-102.AAAC (Apr 2007) (Test Parameters, Transmitter Tests, and Receiver Tests) ■ <i>Conformance Test for Project 25 DES Encryption Protocol</i>, ANSI/TIA-102.AAAC-A (Projected TR-8 approval date to publish, TBD) (Test Parameters, Transmitter Tests, and Receiver Tests)
<p>Measurement Methods:</p>	<p>No specific documents planned for DES, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator</i>, ANSI/TIA-102.CAAA-C-1 (Jun 2010) ■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)

Table 19: Encryption – Data Encryption Standard Documents (Continued)

Document Type	Documents
Performance Recommendations:	<p>No specific documents planned for DES, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	<p>No specific documents planned for DES, but the following documents also apply:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Interoperability Test Procedures Conventional Voice Equipment</i>, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests) ■ <i>Project 25 Interoperability Testing for Voice Operation in Conventional Systems</i>, TIA-102.CABA (Oct 2010) ■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems</i>, TIA-102.CABC-B (Nov 2010) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification) ■ <i>Project 25 Interoperability Testing for Voice Operation in Trunked Systems — Addendum 1 — TDMA Mode</i>, TIA-102.CABC-B-1 (Jul 2011) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification)
Compliance Assessment Documents	
<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance) 	

6.3 Key Fill Device

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting Key Fill features) P25 Key Fill Device standard.

Table 20: Encryption – Key Fill Device Documents

Document Type	Documents	
Description and Specification Documents		
Overview (Informative):	(No documents are necessary or applicable)	
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Project 25 Key Fill Device (KFD) Interface Protocol</i>, TIA-102.AACD (Feb 2005) (Manual Rekeying Overview, Interface Protocol Definition) ■ <i>Project 25 – Key Fill Device (KFD) Interface Protocol Addendum 1 – Key Fill for Link Layer Authentication</i>, TIA-102.AACD-1 (Apr 2011) ■ <i>Key Fill Device (KFD) Interface Protocol</i>, TIA-102.AACD-A (Projected TR-8 approval date to publish, TBD) (Manual Rekeying Overview, Interface Protocol Definition) ■ <i>Project 25 TCP/UDP Port Number Assignments</i>, TIA-102.BAJD (Oct 2010) (TCP/UDP Port Number Assignment) ■ <i>Key Management Facility (KMF)-to-KMF Interface Protocol</i>, TIA-102.BAKA (Apr 2012) (Architecture Overview, Standards Profiles, Application Level PDUs and Procedures, Recommended PKI Implementations (Informative), Example Application Level PDUs, Inter-KMF Message Schema, Open SSL Configuration) 	
	Testing Documents	
	Conformance Test Procedures:	(No documents are necessary or applicable)
	Measurement Methods:	(No documents are necessary or applicable)
	Performance Recommendations:	(No documents are necessary or applicable)
Interoperability Test Procedures:	(No documents are necessary or applicable)	
Compliance Assessment Documents		
(No documents are currently under development)		

6.4 Over-the-Air Rekeying

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting OTAR features) P25 OTAR standard.

Table 21: Encryption – Over-the-Air Rekeying Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are planned)
Protocol (Normative):	<ul style="list-style-type: none"> <li>■ <i>Project 25 Over-the-Air Rekeying (OTAR) Operational Description</i>, TIA-102.AACB (Nov 2002) (Key Management Overview, OTAR Concepts, Key Management Definitions and Using OTAR) <li>■ <i>Over-the-Air Rekeying (OTAR) Operational Description</i>, TIA-102.AACB-x (Projected TR-8 approval date to publish, TBD) (Key Management Overview, OTAR Concepts, Key Management Definitions and Using OTAR) <li>■ <i>Project 25 Over-the-Air Rekeying (OTAR) Protocol</i>, TIA-102.AACA (Apr 2001) (Overview of Key Management Techniques, Overview of Protocol – Mandatory and Optional Key Management Procedures, Definition and Use of Response Kinds) <li>■ <i>Project 25 Over-the-Air-Rekeying (OTAR) Protocol — Addendum 1 – Key Management Security Requirements for Type 3 Block Encryption Algorithms</i>, TIA-102.AACA-1 (Nov 2002) (Encryption Modes, Annex A and B (Normative)) <li>■ <i>Project 25 Over-the-Air Rekeying (OTAR) Protocol — Addendum 2 – Data Link Independent OTAR</i>, TIA-102.AACA-2 (Mar 2003) (Key Management Techniques, Protocol – Mandatory and Optional Key Management Procedures, Definition and Use of Response Kinds, Annex A and B (Normative)) <li>■ <i>Over-the-Air Rekeying (OTAR) Protocol</i>, TIA-102.AACA-A (Projected TR-8 approval date to publish, TBD) (Overview of Key Management Techniques, Overview of Protocol – Mandatory and Optional Key Management Procedures, Definition and Use of Response Kinds) <li>■ <i>Project 25 TCP/UDP Port Number Assignments</i>, TIA-102.BAJD (Oct 2010) (TCP/UDP Port Number Assignment)

Table 21: Encryption – Over-the-Air Rekeying Documents (Continued)

Document Type	Documents
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> ■ <i>Conformance Tests for Project 25 Over-the-Air Rekeying (OTAR) Protocol</i>, ANSI/TIA-102.AACC-A (Aug 2006) (Test Parameters: (Packet Data Parameters, Encryption Parameters, Key Management Message (KMM) Common Parameters, and OTAR Input Data File Parameters), KMM Generation Tests, and KMM Receiver Tests)
Measurement Methods:	<p>No specific documents planned for OTAR rekeying, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator</i>, ANSI/TIA-102.CAAA-C-1 (Jun 2010) ■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	<p>No specific documents planned for OTAR rekeying, but the following document also applies:</p> <ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	<ul style="list-style-type: none"> ■ <i>Project 25 Interoperability Test Procedures – Over-the-Air Rekeying (OTAR)</i>, ANSI/TIA-102.CABB (Aug 2003)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance)

7 Standards Suite for Project 25 Equipment

This section discusses the suite of standards documents for the equipment types of a P25 system. For each of the equipment types, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

P25 radio equipment must meet certain performance standards set by spectrum regulators and by P25 system designers to ensure the radio equipment will behave predictably and act as good neighbors with nearby systems. The required performance will depend upon the modulation and access method used by the system. Further, the P25 radio equipment is expected to meet standards for audio tones and audio interfaces. The next sections relate to the various configurations.

7.1 Analog FM Transceivers

Mandatory The following documents provide guidance necessary to meet the mandatory P25 Phase 1 Analog FM Transceiver standard, which provides backward compatibility with non-P25 radio systems. The analog FM air interface is not a part of the Project 25 Standard, but tests are specified for analog FM transceiver performance. (Section 1.1.2 describes Phase 1.)

Table 22: Analog FM Transceiver Documents—Phase 1

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	(No documents are necessary or applicable)
Testing Documents	
Conformance Test Procedures:	(No documents are necessary or applicable)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, ANSI/TIA-603-D (Jun 2010)</i> (Methods of Measurement and Performance Standards for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, ANSI/TIA-603-D (Jun 2010)</i> (Methods of Measurement and Performance Standards for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)

Table 22: Analog FM Transceiver Documents—Phase 1 (Continued)

Document Type	Documents
Interoperability Test Procedures:	(No documents are necessary or applicable)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Transceiver Performance Summary Test Report</i>, TSB-102.CBAC (Apr 2009)

7.2 Digital Project 25 Phase 1 Transceivers

Mandatory The following documents provide guidance necessary to meet the mandatory P25 Phase 1 Transceiver standard. (Section 1.1.2 describes Phase 1.)

Table 23: Digital Phase 1 Transceiver Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	(No documents are necessary or applicable)
Testing Documents	
Conformance Test Procedures:	(No documents are necessary or applicable)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics) ■ <i>Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods — Addendum 1 — Faded Channel Simulator</i>, ANSI/TIA-102.CAAA-C-1 (Jun 2010) ■ <i>Digital C4FM/CQPSK Transceiver Measurement Methods</i>, ANSI/TIA-102.CAAA-D (Projected TR-8 approval date to publish, TBD) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation</i>, ANSI/TIA-102.CAAB-D (Jan 2013) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)

Table 23: Digital Phase 1 Transceiver Documents (Continued)

Document Type	Documents
Interoperability Test Procedures:	(No documents are necessary or applicable)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> ■ <i>Project 25 Recommended Compliance Tests Conventional Mode Subscriber</i>, TSB-102.CBBA (Feb 2009) (Tests to demonstrate compliance) ■ <i>Project 25 Recommended Compliance Tests – Transceiver Performance – Conventional Mode Fixed Station</i>, TSB-102.CBBC (Feb 2009) (Tests to demonstrate compliance) ■ <i>Project 25 Transceiver Performance Summary Test Report</i>, TSB-102.CBAC (Apr 2009)

7.3 Digital Project 25 Phase 2 Transceivers

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting Digital P25 Phase 2 Digital Transceiver features) Digital P25 Phase 2 Transceiver standard. ([Section 1.1.2](#) describes Phase 2.)

Table 24: Digital Phase 2 Transceiver Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	(No documents are necessary or applicable)
Testing Documents	
Conformance Test Procedures:	(No documents are necessary or applicable)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Two-Slot Time Division Multiple Access Transceiver Measurement Methods</i>, TIA-102.CCAA (Aug 2011) (Methods of Measurements for Receivers, Transmitters, Unit Characteristics)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Two-Slot Time Division Multiple Access Transceiver Performance Recommendations</i>, TIA-102.CCAB (Oct 2011) (Standards for All Equipment: Receiver Section, Transmitter Section, Unit Characteristics)

Table 24: Digital Phase 2 Transceiver Documents (Continued)

Document Type	Documents
Interoperability Test Procedures:	(No documents are necessary or applicable)
Compliance Assessment Documents	
	<ul style="list-style-type: none"> <li>■ <i>Project 25 Recommended Compliance Tests Trunked Mode Subscriber</i>, TSB-102.CBBF (Feb 2009) (Tests to demonstrate compliance) <li>■ <i>Project 25 Transceiver Performance Summary Test Report</i>, TSB-102.CBAC (Apr 2009)

7.4 Vocoder

Mandatory The following documents provide guidance necessary to meet the mandatory P25 system voice services vocoder standard.

Table 25: Vocoder Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are planned)
Protocol (Normative):	<ul style="list-style-type: none"> <li>■ <i>Project 25 Vocoder Description</i>, ANSI/TIA-102.BABA (Dec 2003) (Multi-Band Excitation Speech Model, Speech Input/Output Requirements, Speech Analysis, Parameter Encoding and Decoding, Bit Manipulations, Spectral Amplitude Enhancement, Adaptive Smoothing, Parameter Encoding Example, Speech Synthesis) <li>■ <i>Project 25 TDMA Half-Rate Vocoder Annex — Addendum 1</i>, TIA-102.BABA-1 (Jul 2009)
Testing Documents	
Conformance Test Procedures:	<ul style="list-style-type: none"> <li>■ Project 25 Vocoder Evaluation Mean Opinion Score Test, TSB-102.BABE (May 2007) (Vocoder Descriptions, Radio Channel Model, Acoustic Background Noise, Speech Database Requirements, Speech Database Reference Conditions, Production of Digital Vocoder Recorded Files, Subjective Evaluation of Speech Quality, MOS Result Analysis) <li>■ <i>Project 25 Vocoder Mean Opinion Score Conformance Test</i>, ANSI/TIA-102.BABB (May 1999) (Speech Data Bases, Production of Digital Vocoder Recorded Tapes, Subjective Evaluation of Speech Quality, MOS Result Analysis)

Table 25: Vocoder Documents (Continued)

Document Type	Documents
	<ul style="list-style-type: none"> ■ <i>Project 25 Vocoder Reference Test</i>, ANSI/TIA-102.BABC (Apr 1999) (A25VCTS Operation Manual, Test Computer Hardware and I/O Circuitry, Test Computer Software, Objective Performance Requirements) ■ <i>Project 25 Vocoder Selection Process</i>, TSB-102.BABD (May 1996) (Evaluation procedures for assessing various digital voice coding technology proposals for Project 25)
Measurement Methods:	<ul style="list-style-type: none"> ■ <i>Project 25 Experiment 3 MOS Test Plan for Vocoder Technology for Project 25, Phase 2</i>, TSB-102.BABF (Mar 2008) (Methodology to evaluate the voice quality of LMR systems using various vocoders under a variety of noise levels and operating conditions, including fire truck and police cruiser noise levels with and without sirens, helicopters, and Coast Guard outboard boats.)
Performance Recommendations:	<ul style="list-style-type: none"> ■ <i>Project 25 Enhanced Vocoder Methods of Measurement for Performance</i>, TIA-102.BABG (Mar 2010)
Interoperability Test Procedures:	(No documents are currently under development)
Compliance Assessment Documents	
(No documents are currently under development)	

7.5 Mobile Radio Push-to-Talk and Audio Interface

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting Push-to-Talk and Audio Interface features) P25 Push-to-Talk and Audio Interface standard.

Table 26: Mobile Radio Push-to-Talk and Audio Interface Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	<ul style="list-style-type: none"> ■ <i>Project 25 Mobile Radio Push-to-Talk and Audio Interface – Definitions and Methods of Measurement</i>, TSB-102.CAAC (Sep 2002) (Physical and Electrical Interfaces, Standard Test Conditions, and Methods of Measurement)
Protocol (Normative):	(No documents are necessary or applicable)
Testing Documents	
Conformance Test Procedures:	(No documents are necessary or applicable)

Table 26: Mobile Radio Push-to-Talk and Audio Interface Documents (Continued)

Document Type	Documents
Measurement Methods:	No specific documents planned for Mobile Radio Push-to-Talk and Audio Interface, but the following documents also applies: <ul style="list-style-type: none"> ■ <i>Project 25 Mobile Radio Push-to-Talk and Audio Interface – Definitions and Methods of Measurement</i>, TSB-102.CAAC (Sep 2002) (Physical and Electrical Interfaces, Standard Test Conditions, and Methods of Measurement)
Performance Recommendations:	(No documents are necessary or applicable)
Interoperability Test Procedures:	(No documents are necessary or applicable)
Compliance Assessment Documents	
(No documents are currently under development)	

7.6 Audio Tone Signaling

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting Audio Tone Signaling features) P25 Audio Tone Signaling standard.

Table 27: Audio Tone Signaling Documents

Document Type	Documents
Description and Specification Documents	
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	<ul style="list-style-type: none"> ■ <i>Mobile Audio Tone Signaling Definition and Requirements</i>, TIA-102.CAAD (TR-8.1 approval, TBD)
Testing Documents	
Conformance Test Procedures:	(No documents are necessary or applicable)
Measurement Methods:	(No documents are necessary or applicable)
Performance Recommendations:	(No documents are necessary or applicable)
Interoperability Test Procedures:	(No documents are necessary or applicable)

Table 27: Audio Tone Signaling Documents (Continued)

Document Type	Documents
	Compliance Assessment Documents (No documents are currently under development)

8 Project 25 Radio System Decision Charts

Use the decision charts in this section to find the P25 standards relevant to a given public safety communications component.

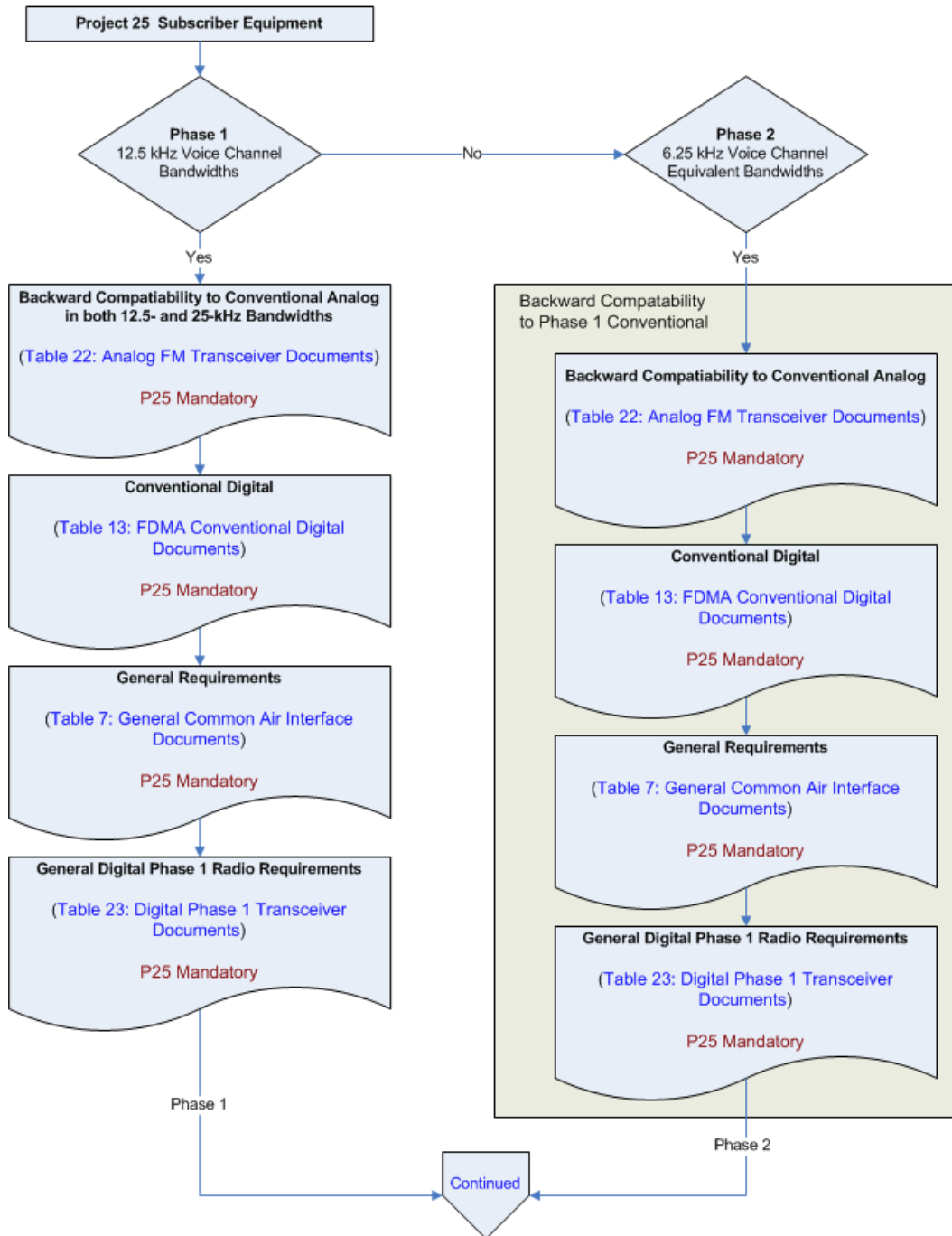
The P25 decision charts span over the next several pages. Graphical arrows denote a break to the next page or a continuation from the previous page.

Note: In the decision charts, click a table's title to jump to that table in this document.

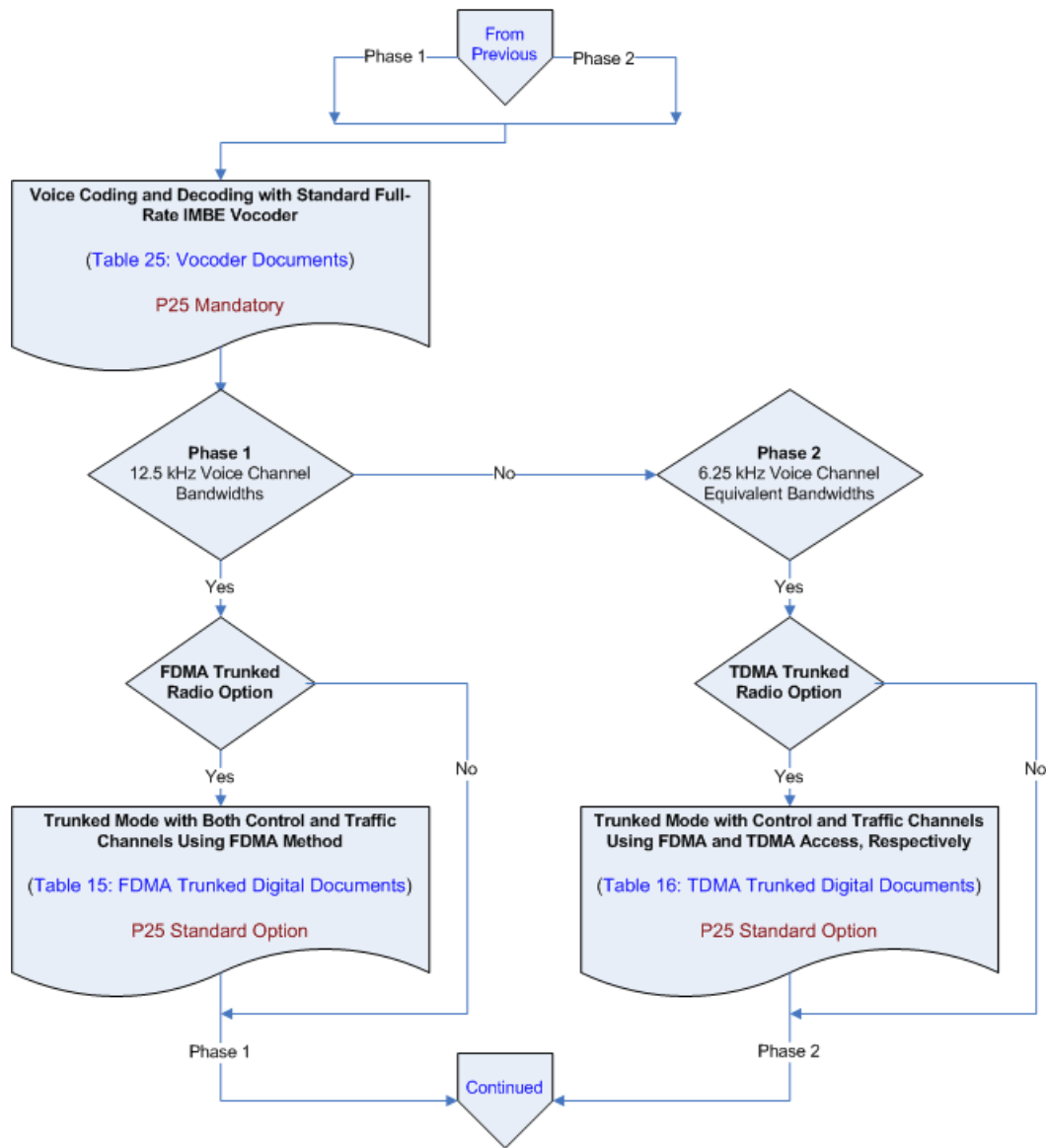
See [Section 2.2, “Legend for P25 Standards Document Status,”](#) on page 11 for information about the identifier convention used for document names.

8.1 Project 25 Subscriber Equipment

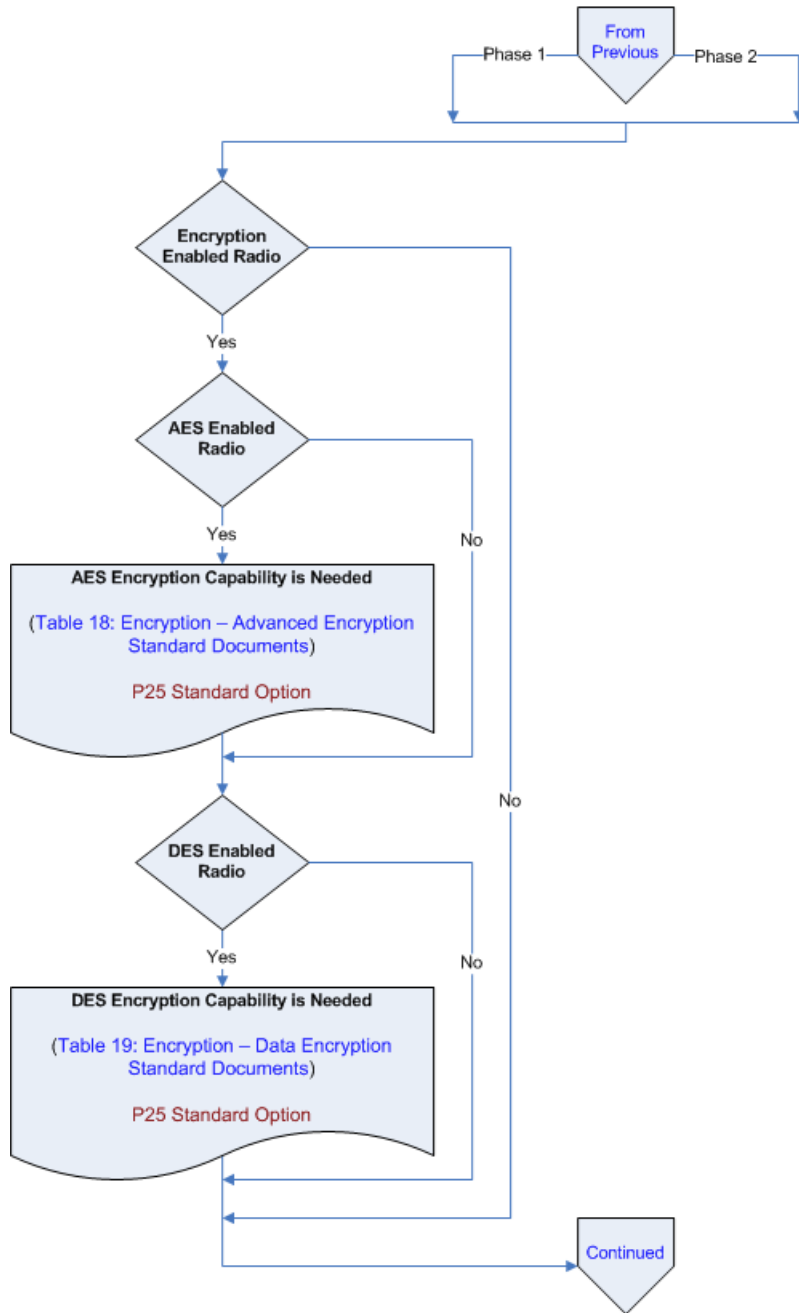
1. Project 25 Subscriber Equipment



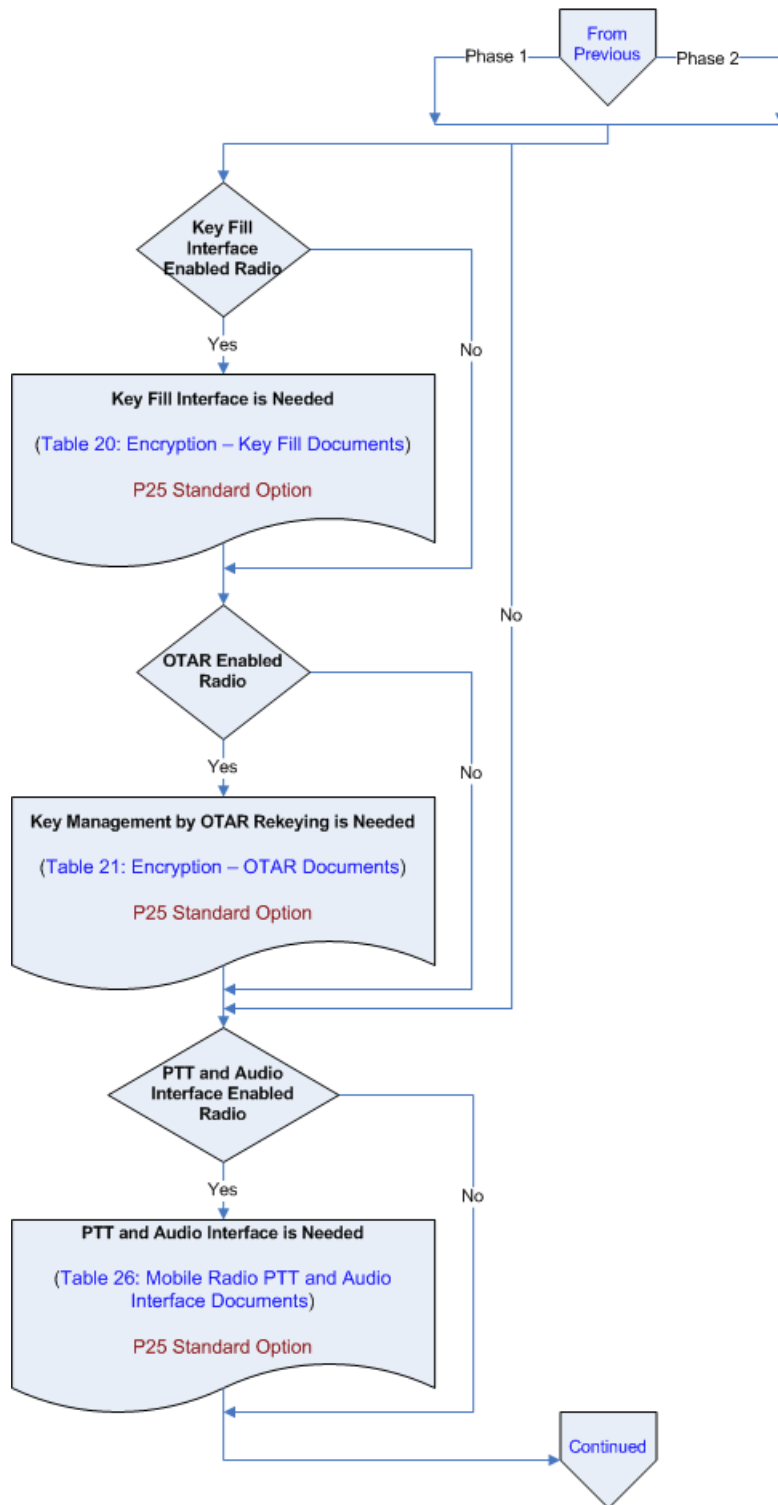
1. Project 25 Subscriber Equipment (continued)



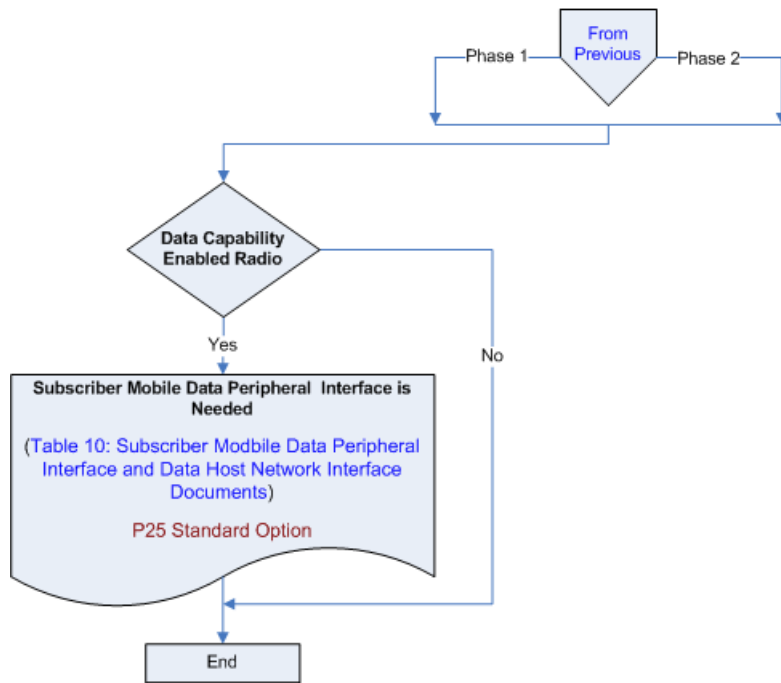
1. Project 25 Subscriber Equipment (continued)



1. Project 25 Subscriber Equipment (continued)

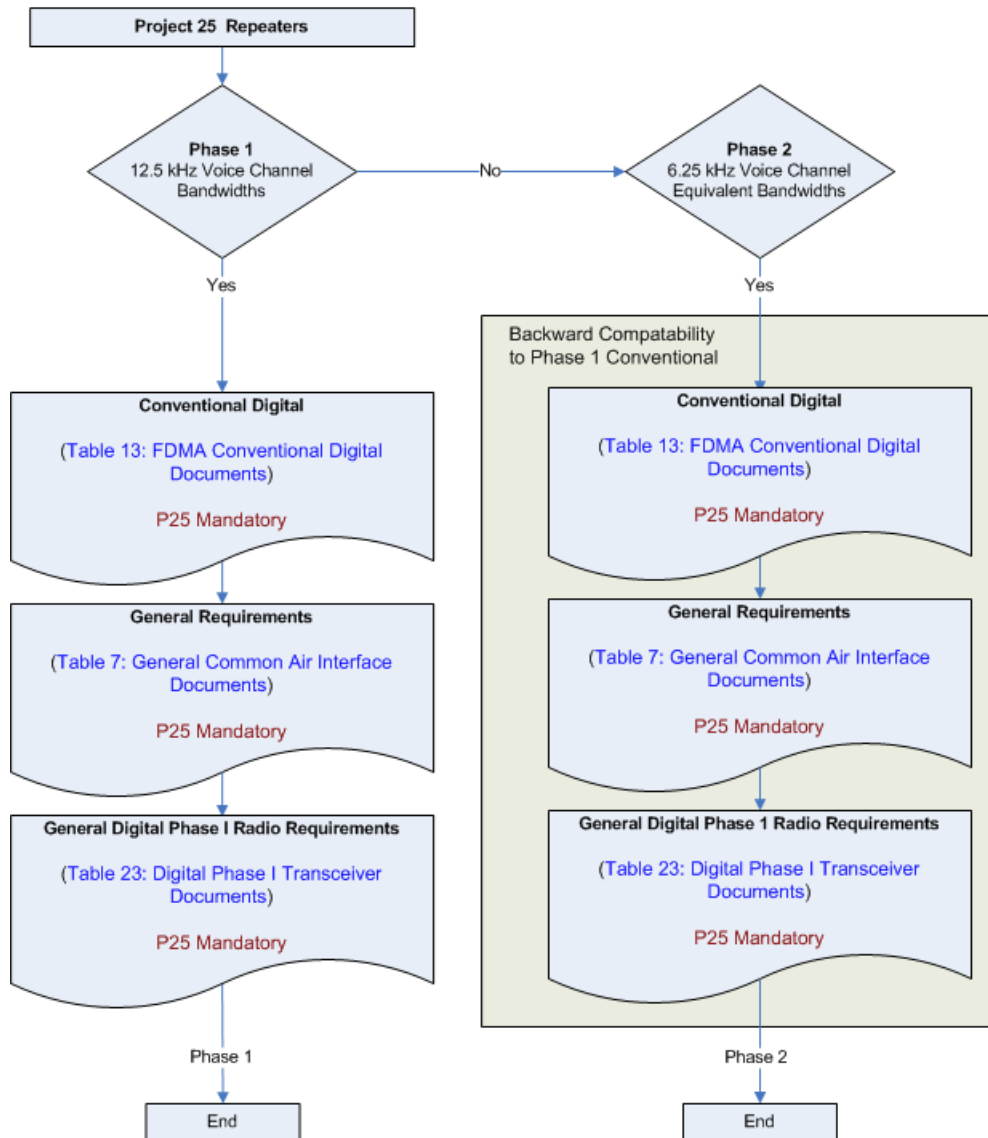


1. Project 25 Subscriber Equipment (continued)



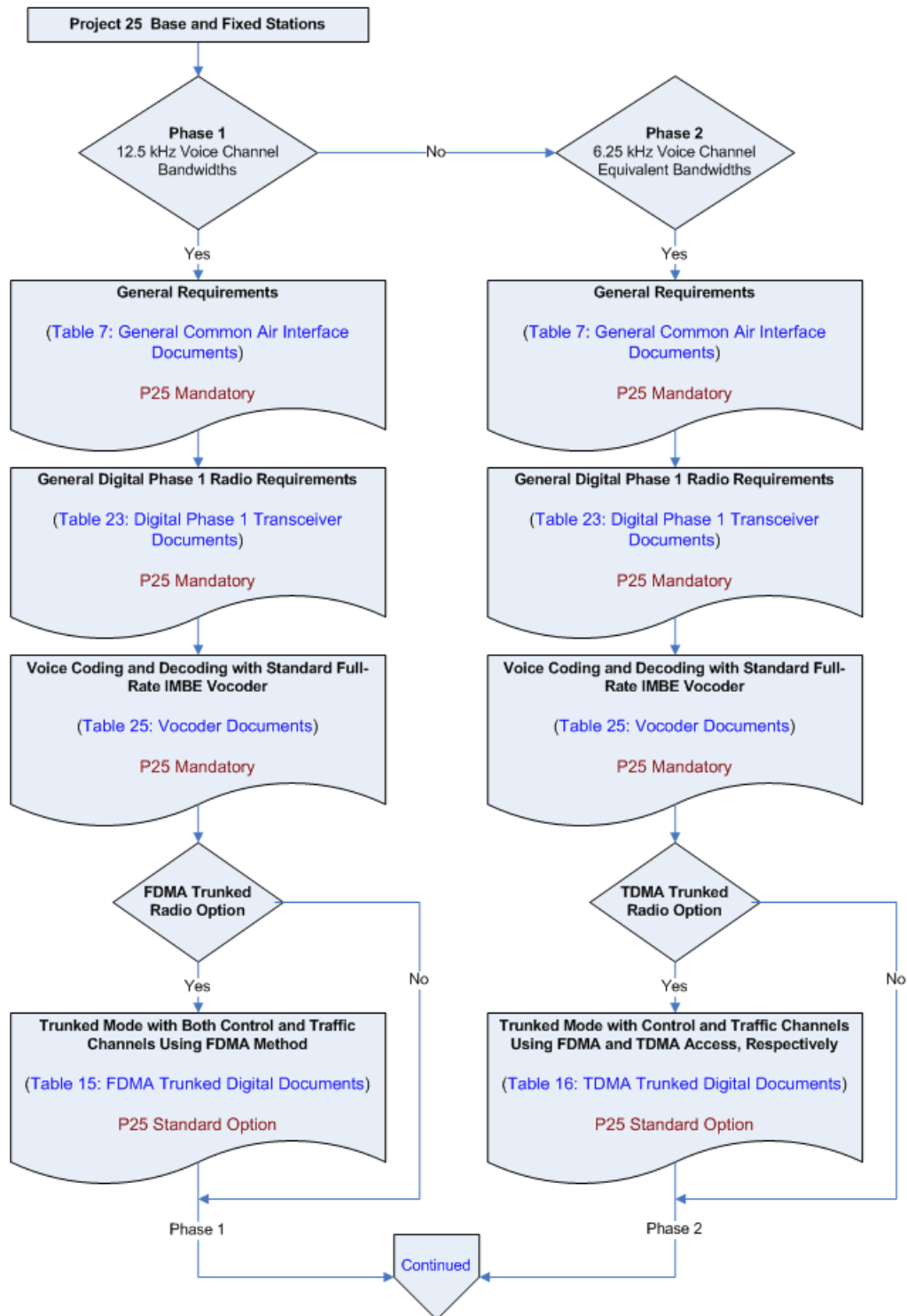
8.2 Project 25 Repeaters

2. Project 25 Repeaters

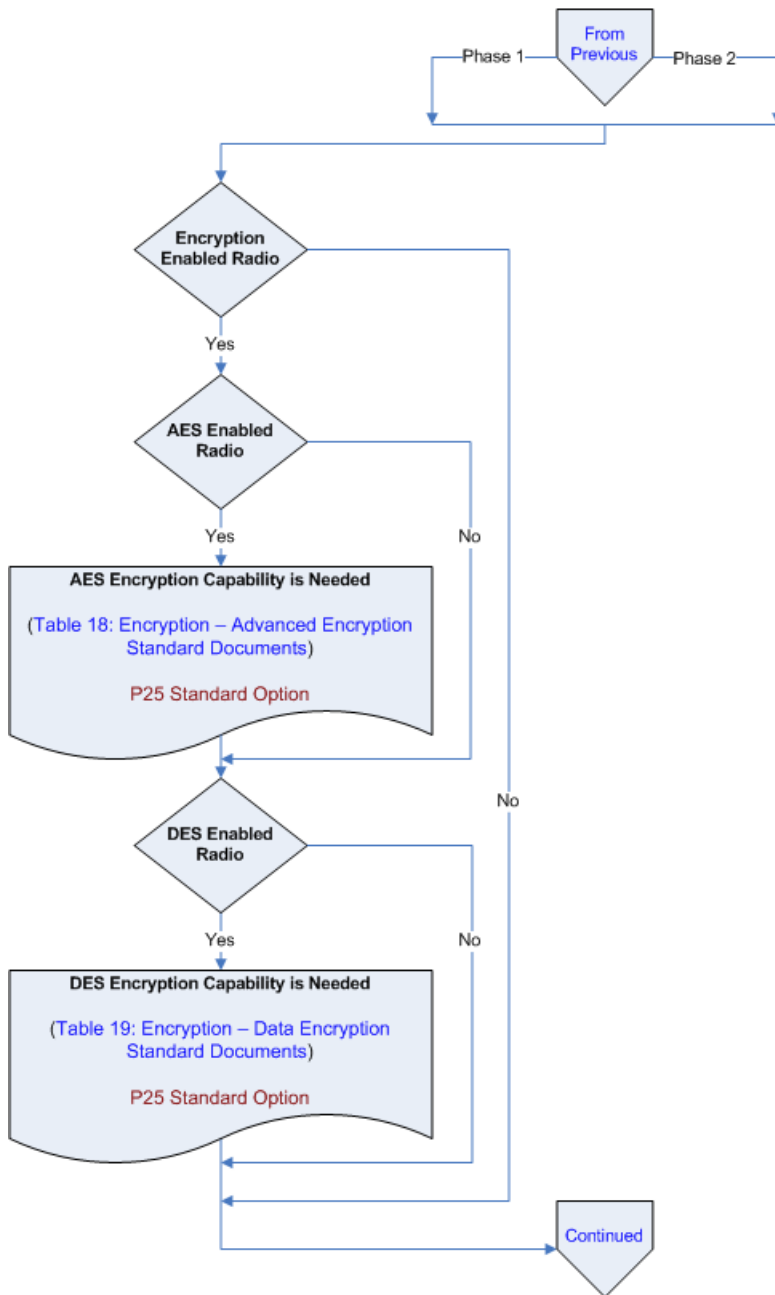


8.3 Project 25 Base and Fixed Stations

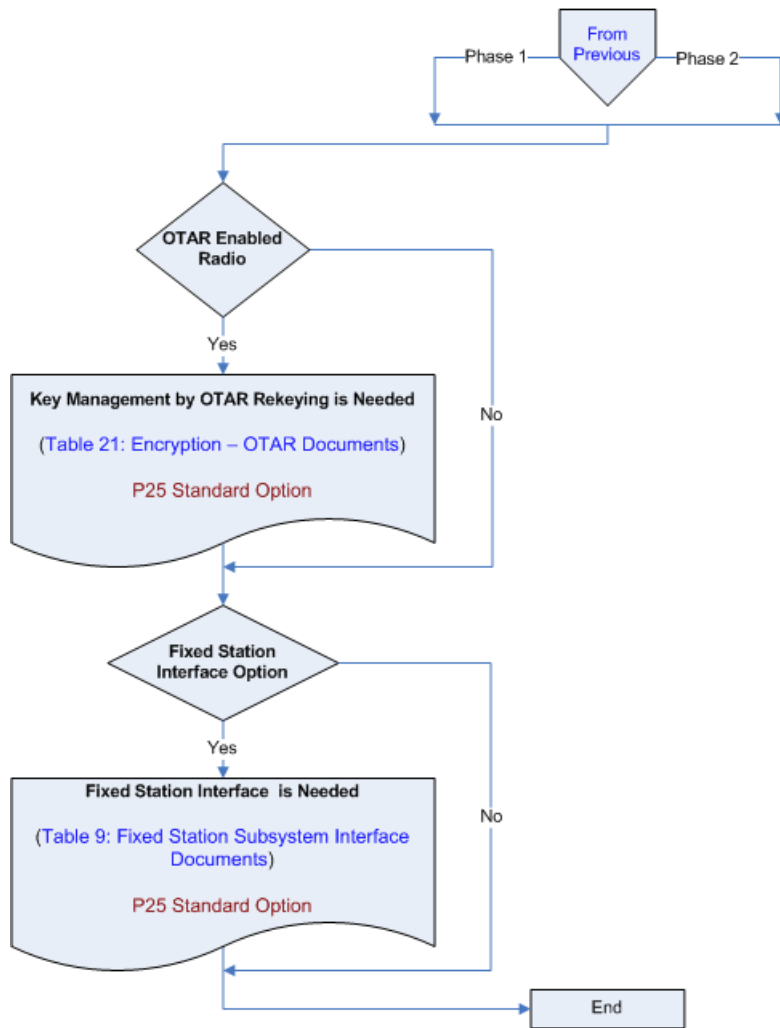
3. Project 25 Base and Fixed Stations



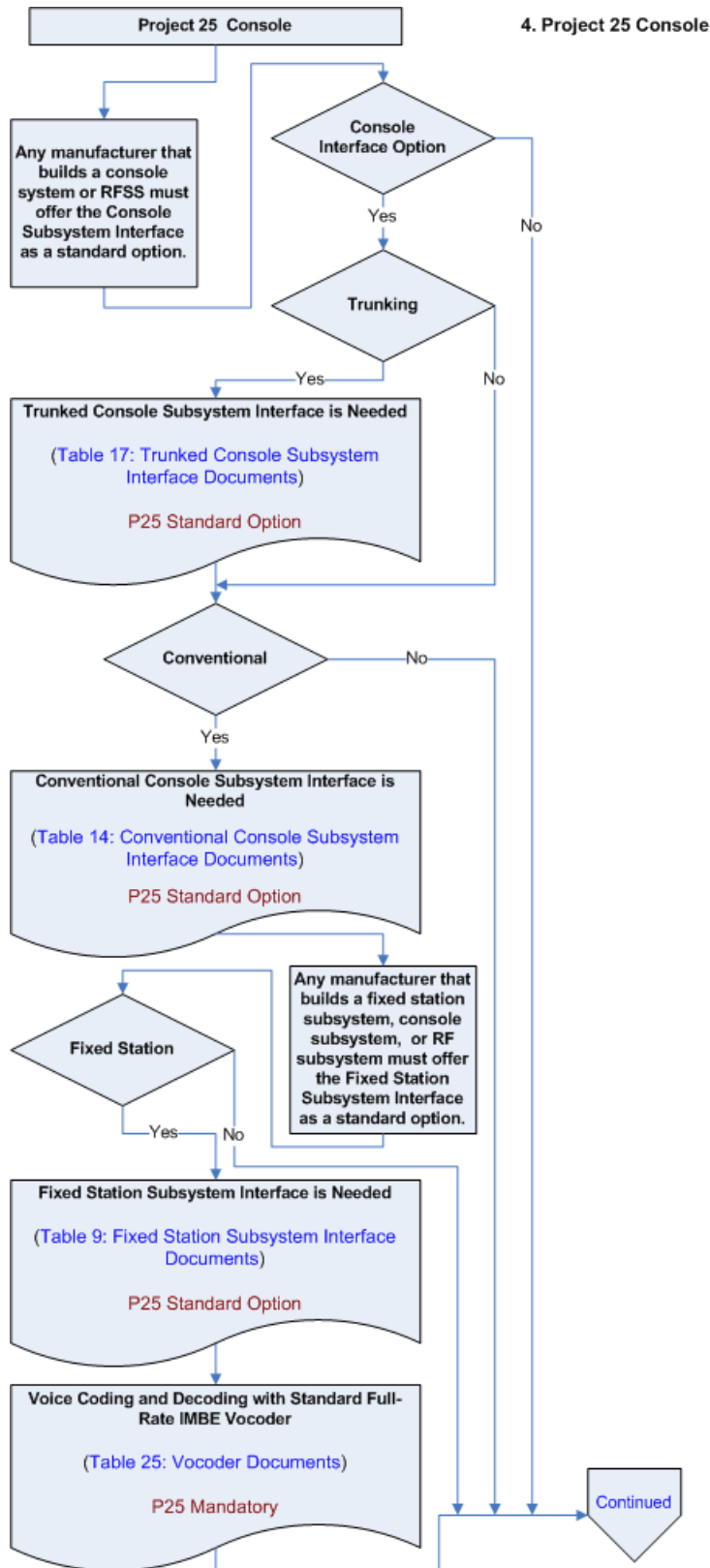
3. Project 25 Base and Fixed Stations (continued)



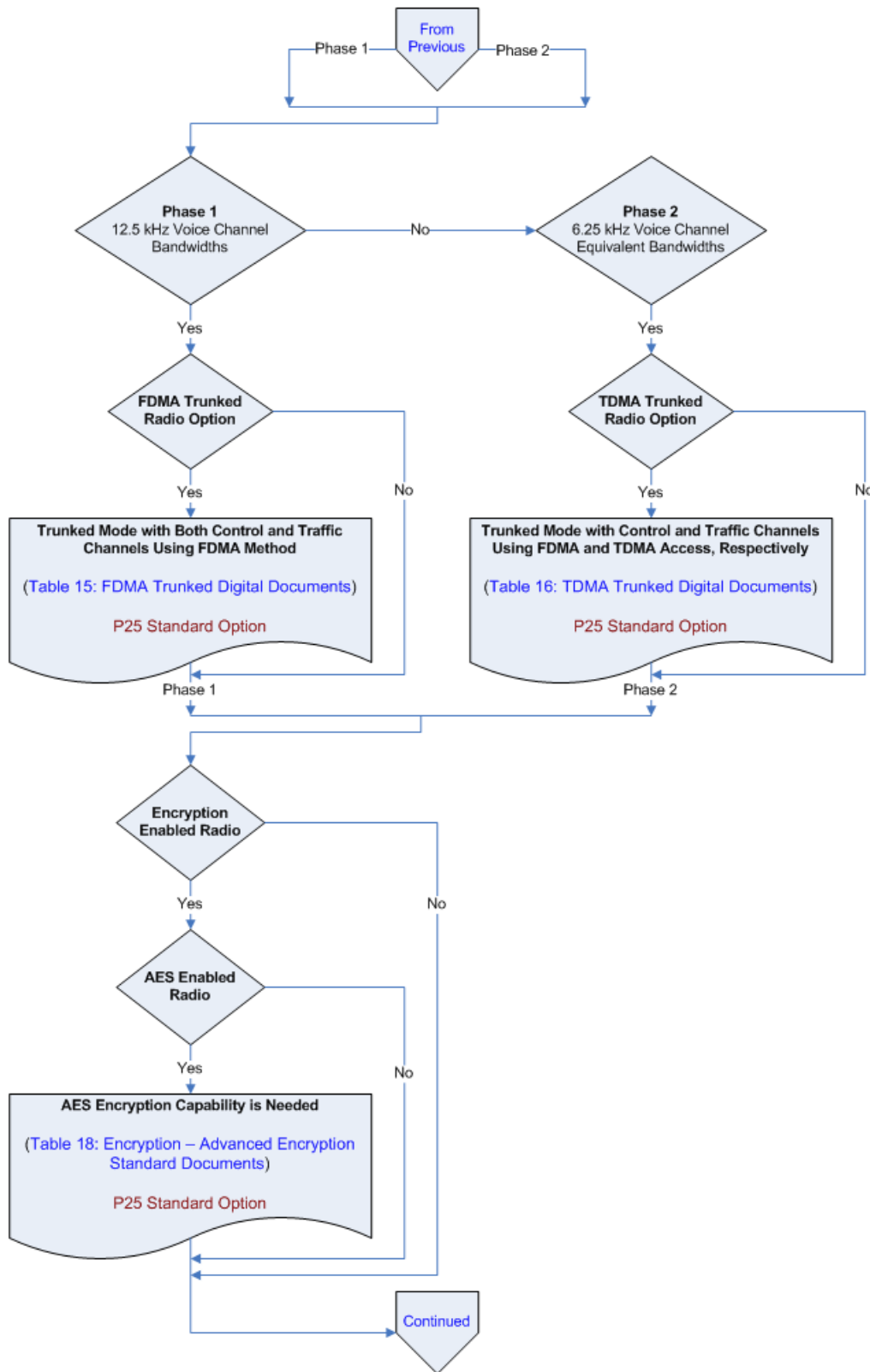
3. Project 25 Base and Fixed Stations (continued)



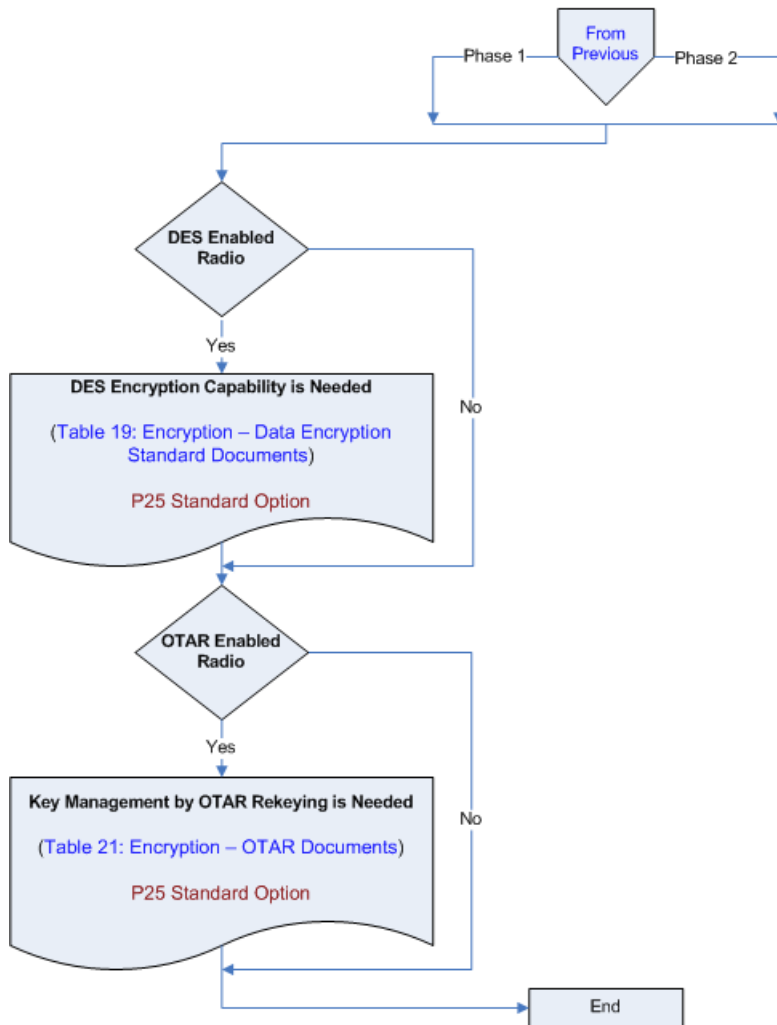
8.4 Project 25 Console



4. Project 25 Console (continued)

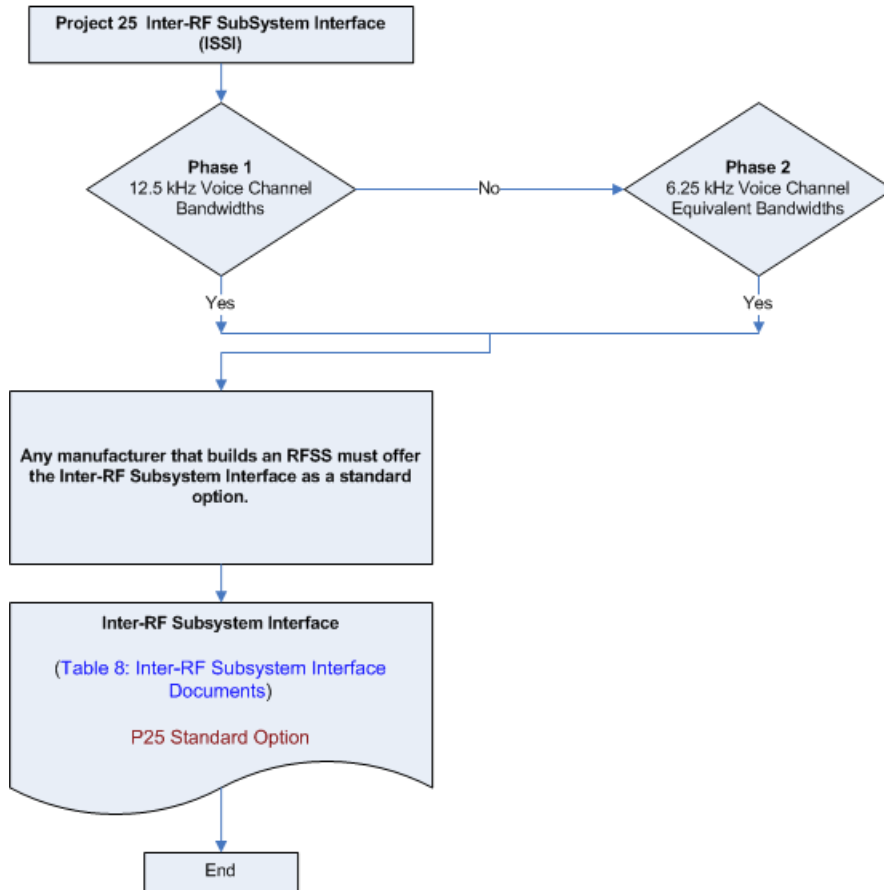


4. Project 25 Console (continued)



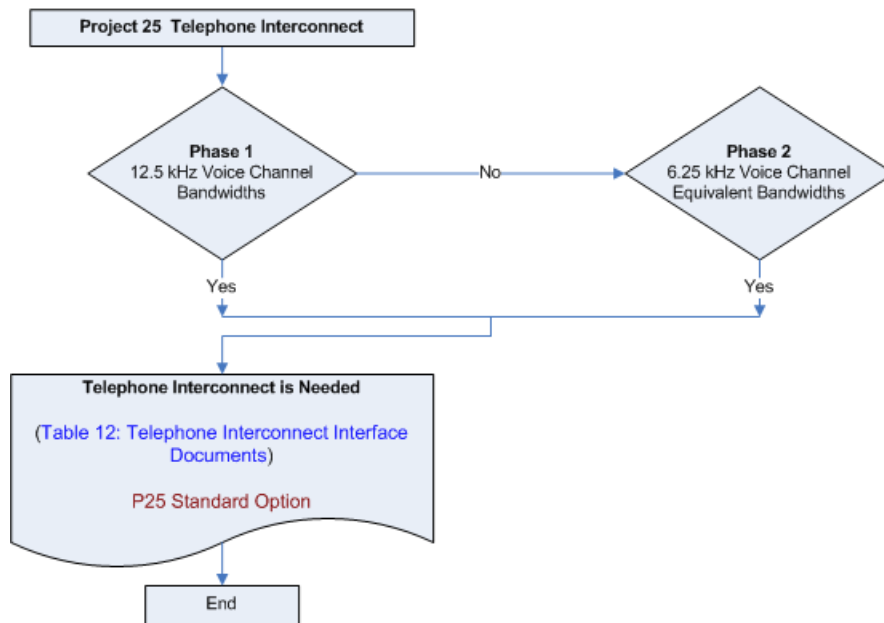
8.5 Project 25 Inter-RF Subsystem Interface

5. Project 25 Inter-RF Subsystem Interface



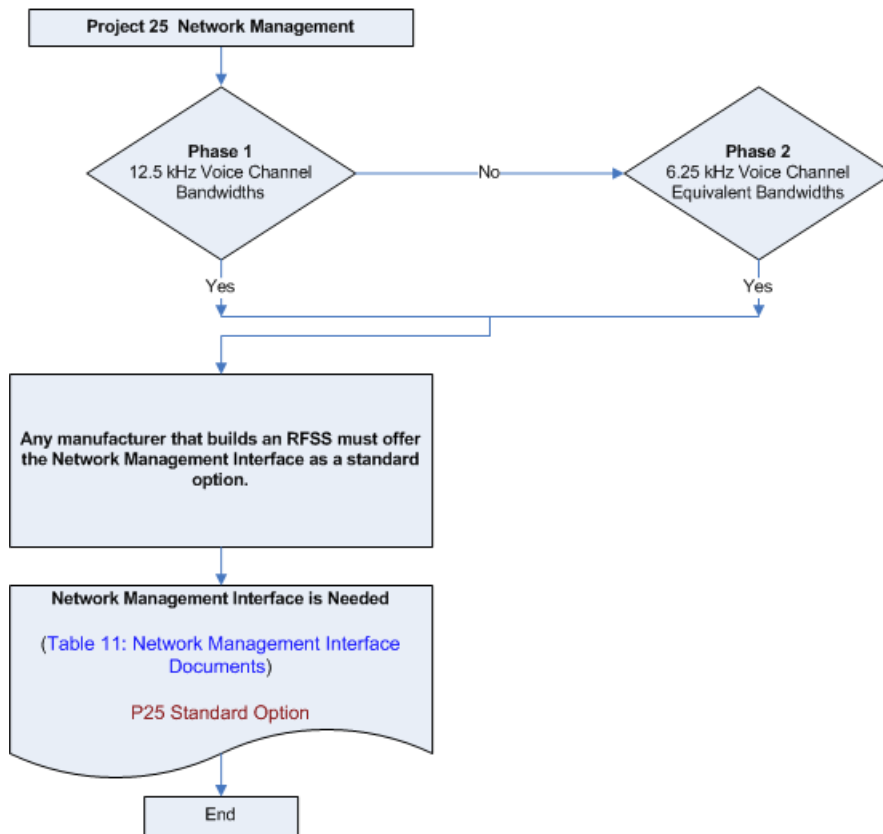
8.6 Project 25 Telephone Interconnect

6. Project 25 Telephone Interconnect



8.7 Project 25 Network Management

7. Project 25 Network Management



8.8 Project 25 Data Network

8. Project 25 Data Host Network

