Project 25 Document Suite

Reference

P25DSR

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Publication Notice

Abstract

This document tracks the current state of Project 25 standards documents. The Telecommunications Industry Association (TIA) TR8 Committee meets quarterly to develop, revise, and approve Project 25 standards documents. This document is updated soon after each TR8 Committee meeting to reflect Project 25 standards document progress.

Disclaimer

This document is sponsored by the National Institute of Standards and Technology/Office of Law Enforcement Standards (NIST/OLES). It is maintained by editors at the Institute for Telecommunication Sciences (ITS) who regularly update the document from comments by users, manufacturers, and participants in the P25 standardization process. This is not an Association of Public-Safety Communications Officials (APCO) Project 25 document.

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Change Log

Date	Changes
October 2005	Initial document.
February 2006	Revised the document's heading hierarchy.
March 2006	Expanded document lists and decision chart graphics.
May 2006	Updated document lists and modified decision chart graphics. Removed the Project 25 Standards Classification Index tables as it was decided they added little value.
June 2006	Updated document lists and modified decision chart graphics.
October 2006	Updated document nomenclature and status.
April 2007	Following Oct 2006 Minneapolis meeting decisions, used the TR8 version of this document to create this agreed upon unified version, which includes estimated dates for unfinished documents. Added suggested "Note" to section 3 (page 7) clarifying that dates for unfinished documents are best-estimate targets. Removed yellow-highlighting from documents approved in April, and changed status to "Approved Apr 2007."

Date	Changes
August 2007	Following Apr 2007 Dallas and Aug 2007 Baltimore TR8 meetings, addressed earlier comments regarding document dates and publications reference organization. Updated document lists and publication dates.
October 2007	Removed version numbering for this document in favor of using only a revision date. Highlighted P25 document requirement levels. Added a new section introducing P25 interfaces. Edited section 1 and 3. Added "Project 25 Communications Resources" section. Added Disclaimer and Contact Information. Revised ISSI scope organization. Incorporated document updates.
December 2007	Corrected estimated dates for ISSI Scope 1 and 2 in Table 7 and 8 respectively. Changed "Performance Measurement Methods" headings to "Measurement Methods" throughout. Changed CSSI TG to CITG, and FSSI TG to FSITG throughout. Added link to P25 Statement of Requirements. Added in-progress ISSI Scope 2 testing standards.
April 2008	Updated document lists and publication dates.
May 2008	Updated document lists and publication dates following San Diego TR8 meetings.
July 2008	Organized the Console Subsystem section into Conventional (Section 4.4.1) and Trunking (Section 4.4.2) subsections, and reflected this change in the Project 25 Console decision chart (Section 7.4).
October 2008	Added TIA-102.CABC-A,TSB-102.BABE, TSB-102.CBBA, TSB-102.CBBC, TSB-102.CBBF, TSB-102.CBBH, TSB-102.CBBJ, TSB-102.CBAB, TSB-102.CAEA, and two more CAP Summary Test Report Guidelines documents in progress (TSB-102.xxxx).
January 2009	Added ANSI/TIA-102.BAAC-B, TIA-102.BAAD-A, TIA-102.AABD-A, TIA-102.AACA-x, TSB-102.BABF, TIA-102.BACx. Added link for TIA Series for Government FTP site.
March 2009	Added ANSI/TIA-102.CAAA-C, ANSI/TIA-102.AABC-B-4, ANSI/TIA-102.AABC-B-5, TIA-102.AAAD-x, TIA-102.AACD-x, TIA-102.BABA-1, TIA-102.BACA-A-1, TIA-102.CABA-A, vocoder overview and performance documents in progress (TIA-102.BAxx)
August 2009	Added or revised ANSI/TIA-102.AAAD-A, ANSI/TIA-102.AABC-C, TIA-102.BABA-1, ANSI/TIA-102.BAAC-B, TIA-102.BACA-A-1, TIA-102.BACA-A-2, TIA-102.BACA-A-3, TIA-102.BAJA, TIA-102.BAJB, TIA-102.BAJC, TIA-102.CABC-A-1, TSB-102.CAEA, TIA-102.CBAB, TSB-102.CBAC, TSB-102.CBAF, TSB-102.CBBJ-A.

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1 Project 25 Document Suite

1.1 Introduction

Project 25 (P25) is a partnership between the public safety communications community and industry manufacturers whose goal is the publication of a suite of standards that enable the offering, procurement, and operation of interoperable digital two-way wireless communications products and systems that meet mission-critical needs of public safety practitioners. (Section 1.6 provides links to more information.)

The formal standards development process is conducted by the Mobile and Personal Private Radio Standards Committee (TIA TR-8) of the Telecommunications Industry Association's (TIA) Standards and Technology Department. TIA is accredited by the American National Standards Institute (ANSI) 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 for which the requirements have been defined by state, local and federal government users.

1.1.1 User Representative Steering Committee

Project 25 is directed by a steering committee composed of user representatives from federal agencies, state governments, and local governments. All activities of the P 25 process must be approved by the steering committee and TIA in accordance with the Memorandum of Understanding (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 standards that can be adopted as part of the P25 standards suite.

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 eventual migration to narrowband channel spacing in the VHF and UHF bands, which call for an eventual four-to-one reduction in spacing from 25 kHz to 6.25 kHz equivalent per voice channel.

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 or equivalency. Phase 2 refers to P25 requirements and standards for a digital CAI time division multiple access (TDMA) using a 6.25 kHz equivalent channel, two slots in a 12.5 kHz channel.

1.1.3 Requirements Driven

P25 standards are driven by a public safety user-defined *Statement of Requirements* and an over-all approach to the development of the standards via a *Project 25 System Description and Organization* document. The organization of the standards divides the suite into documents relating to P25 system interfaces, services, and equipment. Associated with each interface, service, and equipment section is a set of documents that does either of the following:

- Describe and specify the standards appropriate to the section.
- Describe tests to demonstrate compliance of the offered interface, service, and equipment to the 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 describes the operation and functions 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.

- The Conformance Test Procedures documents test for conformance to the protocol specifications. This document would typically be used by the manufacturer to test the system component or service for assurance of conformance to the associated protocol documents.
- 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 requirements
- 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.

1.4 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 TR8.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.

1.5 Compliance Assessment Program

The P25 Compliance Assessment Program (CAP) will formally recognize test laboratories for competence to conduct a predetermined set of tests on P25 products. The tests those laboratories execute will demonstrate product compliance with a select group of requirements within the suite of P25 standards. Subsequently, the Department of Homeland Security (DHS) will post summary reports of the test results and a Supplier's Declaration of Compliance (SDoC) on the Responder Knowledge Base (RKB) web site (https://www.rkb.us/). To help their purchasing decisions, P25 users may search this site for products that have demonstrated compliance. Table 1 lists the current SDoC documents.

Table 1: Project 25 Supplier's Declaration of Compliance Documents

Documents
■ *Project 25 Supplier's Declaration of Compliance (SDoC)*, TSB-102.CBAB (Jun 2009) (P25 CAP Letterhead and Title, Company Information, Product Information, TSB Test Cases, Summary Test Reports, Date, Signature, Page Count, Supplier's Declaration of Compliance Format)

The P25 CAP is a voluntary program that allows P25 equipment suppliers to formally demonstrate their products' compliance with a select group of requirements within the suite of P25 standards. The purpose of the program is to provide emergency response agencies with evidence that the communications equipment they are purchasing meet P25 standards for performance, conformance, and interoperability.

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. P25 equipment suppliers will release summary test reports from recognized labs along with declarations of compliance. This documentation will serve to increase the public's confidence in the performance, conformance, and interoperability of P25 equipment.

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.

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.

1.6 Project 25 Communications Resources

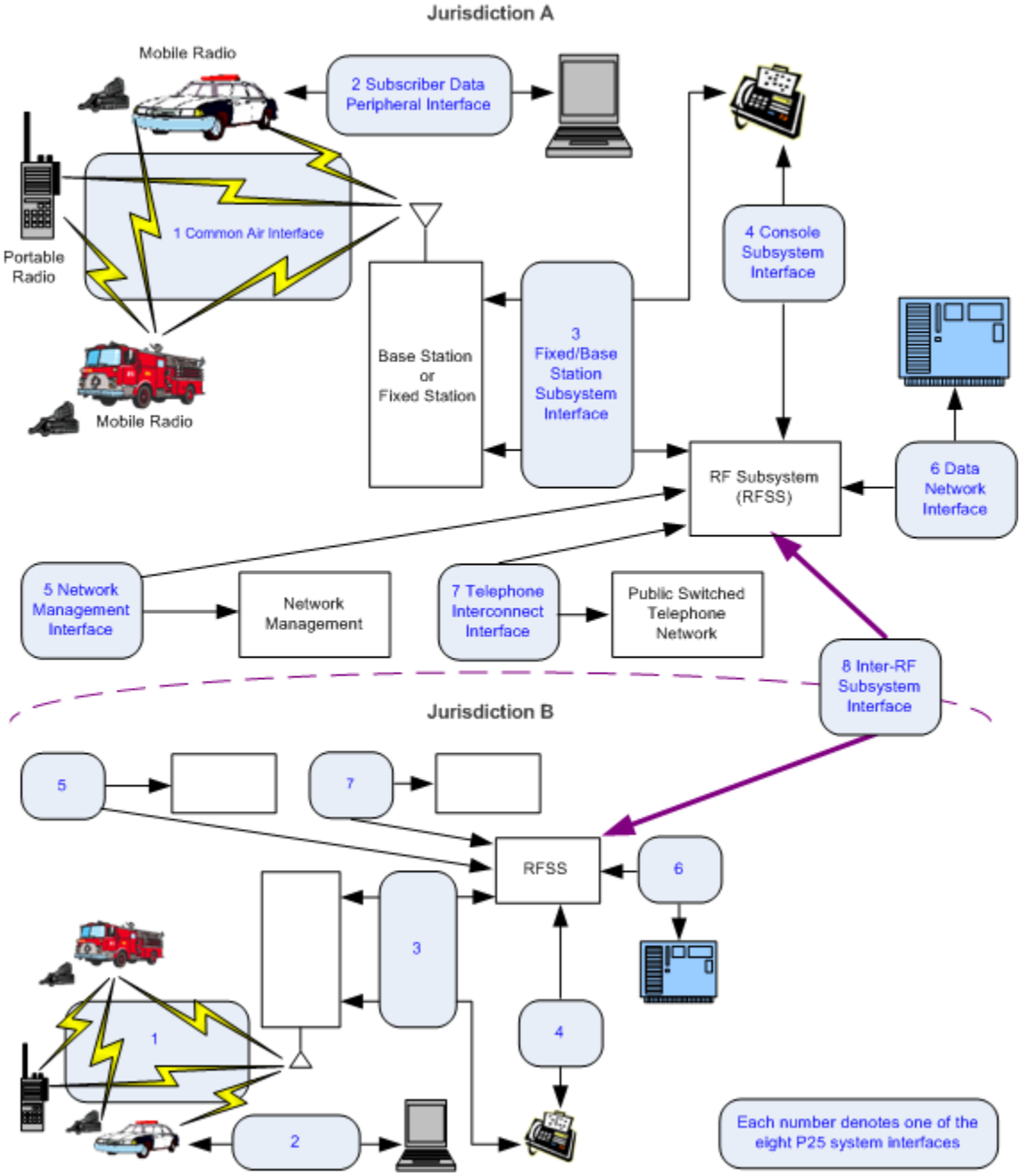
Many resources are available for learning more about Project 25, public safety communications interoperability, and how to procure a P25 system. Following are just a few places to start:

- Project 25
  - http://www.tiaonline.org/standards/technology/project_25/
  - http://www.project25.org/
- Project 25 documents (standards and technical service bulletins, or TSBs)
  - P25 documents are available for purchase from http://global.ihs.com/ by searching for TIA and P25 documents.
  - P25 documents are available to U.S. local, state, and Federal, agencies free of charge at: http://ftp.tiaonline.org/102seriesforgovt/. Please contact Ronda Coulter at TIA (RCoulter@tiaonline.org) to receive a login.
- Public safety communications interoperability
  - http://www.safecomprogram.gov/SAFECOM/interoperability/default.htm
- Procurement
  - http://www.safecomprogram.gov/SAFECOM/library/grant/
  - http://www.safecomprogram.gov/NR/rdonlyres/6AC5602E-7D8B-4416-9416-45F8ED257079/0/GuidelinesforRFPDevelopmentCW62806.pdf

2 Project 25 Interfaces and Legend for Standards

The following figure identifies the eight 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 Interface (CAI)

  Enables 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).

- Subscriber Data Peripheral Interface

  Enables data to be transferred between a P25 radio and an external data device directly connected to the P25 radio.

- 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 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.

2.2 Legend for P25 Standards Document Status

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 6 list the documents related to the P25 interfaces, services, 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 2 for notation information.

Note: Yellow-highlighted documents are unpublished but are under development by the TR8 Committee. For each unpublished document, the TR8 Committee Chairs have supplied best-estimate target dates for release as an approved TR8 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 2: 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 Phase 1 and some Phase 2 standards 905 — P25 Phase 2 902 — P25 wide band services in the 700 MHz band 603 — Analog FM equipment
Where xxxx can be:	Axxx — Services offered by P25 Bxxx — Systems defined by P25 Cxxx — Equipment performance measurement methods for P25
	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
CAI TG	Common Air Interface Task Group
CAPP TG	Compliance Assessment Process and Procedures Task Group
CITG	Console Interface Task Group, where *Console Interface* is the same as *Console Subsystem Interface*
DI TG	Data Interface Task Group
FDMA TG	Frequency Division Multiple Access Task Group
FSITG	Fixed Station Interface Task Group, where *Fixed Station Interface* is the same as *Fixed Station Subsystem Interface*
ISSI TG	Inter-RF Subsystem Interface Task Group
NMI TG	Network Management Interface Task Group
TDMA TG	Time Division Multiple Access Task Group
TII TG	Telephone Interconnect Interface 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 3 lists current P25 SOR documents.

Table 3: Project 25 Statement of Requirements Documents

Documents
■ *Project 25 Statement of Requirements (SOR)*, (Aug 2007) (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 (sometimes referred to as "shell" 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 4 lists the current documents.

Table 4: Project 25 System Description and Organization Documents

Documents
■ *Project 25 System Description and Organization*, TSB-102A (Nov 1995) (Project 25 Overview, General System Model, Standards Organization, and Technical Requirements)

4 Suite of Standards for Project 25 Interfaces and Systems

This section discusses the suite of standards documents for the (currently) eight 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) uses frequency division multiple access (FDMA) methods with two modulations.The first defines the digital modulation used in the 12.5 kHz voice channel bandwidth and is mandatory for all P25 Phase 1 systems. The second defines the analog FM modulation used in 25 kHz and 12.5 kHz bandwidths and is mandatory in all P25 Phase 1 subscriber equipment (portable and mobile transceivers). Operation in a conventional mode is mandatory for P25 and operation using trunking is optional. The P25 structure defines trunking as a service. Section 5.2 lists trunking related documents.

4.1.1 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 5: FDMA Conventional Digital Documents—Phase 1

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 FDMA Common Air Interface Operational Description for Conventional Channels*, TIA-102.BAAD (Dec 2003) (Unit Addressing, Repeater Addressing, Voice Transmit and Receive Operation, Packet Data Transmit and Receive Operation)
	■ *Project 25 Common Air Interface Description for Conventional Channels Addendum 1 – Packet Data Registration/OTAR Messages and Procedures*, TIA-102.BAAD-1 (Mar 2008)
	■ *Project 25 FDMA Common Air Interface Operational Description for Conventional Channels*, TIA-102.BAAD-A (Projected TR8 approval date to publish, Aug 2009) (Unit Addressing, Repeater Addressing, Voice Transmit and Receive Operation, Packet Data Transmit and Receive Operation)
	■ *Project 25 Location Services Overview*, TIA-102.BAJA (Feb 2009)

Table 5: FDMA Conventional Digital Documents—Phase 1 (Continued)

Document Type	Documents
Protocol (Normative):	■ *Project 25 FDMA Common Air Interface*, ANSI/TIA-102.BAAA-A (Sep 2003) (Voice Coder, Voice Formats, Data Packets, Data Error Correction, Channel Access, Modulation, Transmit Bit Order) ■ *Project 25 Tier 1 Location Services*, TIA-102.BAJB (Feb 2009) ■ *Project 25 Tier 2 Location Services*, TIA-102.BAJC (Aug 2009) ■ *Project 25 Identity Extensions to Link Control Word Formats*, TIA-102.AABF-B (Jul 2009) (Part of voice message, Conventional and Trunked: Link Control Messages, Field Definitions, and Word Usages) ■ *Project 25 Conventional Control Messages*, TSB-102.AABG (Jul 1996) (Trunked system 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) ■ *Project 25 Conventional Control Messages, Addendum 1— Individual Telephone Calls,* TSB-102.AABG-1 (May 2006) (Control Messages Specifications, Annex A Message Sequence (informative)) ■ *Project 25 Link Layer Authentication*, ANSI/TIA-102.AACE (Dec 2005) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
Conformance Test Procedures:	**Testing Documents** ■ *Project 25 Common Air Interface Conformance Test*, ANSI/TIA-102.BAAB-B (Mar 2005) (Transmit Voice Format Tests, Transmit Data Format Tests, Receiver Tests) ■ *Project 25 Conformance Profile – Level One – Basic Conventional Operation*, TIA-102.xxxx (draft, Aug 2008) (Group and Individual Calls via Repeater Operation, Group and Individual Calls via Direct Operation, and Telephone and PSTN Operations) ■ *Project 25 Conformance Profile – Level Two – Advanced Conventional Operation*, TIA-102.xxxx (draft, Jan 2009)
Measurement Methods:	■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)

Table 5: FDMA Conventional Digital Documents—Phase 1 (Continued)

Document Type	Documents
Performance Recommendations:	■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	■ *Project 25 Interoperability Test Procedures Conventional Voice Equipment*, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Conventional Systems*, TIA-102.CABA-A (Projected TR8 approval date to publish, tbd) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	Compliance Assessment Documents
	■ *Project 25 Conformance Profiles Level 1 Basic Conventional Operation*, TSB-102.CAEA (Apr 2009) (Tests to demonstrate compliance)
	■ *Project 25 Conformance Profiles Level 2 Advanced Conventional Operation*, TSB-102.CAEB (Projected TR8 approval to publish, Aug 2009) (Tests to demonstrate compliance)

4.1.2 FDMA Conventional Analog—Phase 1

Mandatory FDMA conventional analog capabilities are mandatory for P25 Phase 1 subscriber equipment to provide backward compatibility with non-P25 systems. Section 6.1 lists the documents associated with this P25 equipment feature.

4.1.3 FDMA Trunked Digital—Phase 1

Optional Support for FDMA trunked digital capabilities is optional (mandatory if supporting FDMA Trunked Digital features) for Phase 1 P25 systems. Section 5.2.1 lists the documents associated with this P25 services feature.

4.1.4 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 5.2.2 lists the documents associated with this P25 services feature.

4.1.5 Vocoder

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

Table 6: Vocoder Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	*Project 25 Vocoder Overview*, TIA-102.BAxx (Projected TR8 approval date to publish, Oct 2009)
Protocol (Normative):	■ *Project 25 Vocoder Description*, 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) ■ *Project 25 TDMA Half-Rate Vocoder Addendum 1*, TIA-102.BABA-1 (Jul 2009)
	Testing Documents
Conformance Test Procedures:	■ 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) ■ *Project 25 Vocoder Mean Opinion Score Conformance Test*, ANSI/TIA-102.BABB (May 1999) (Speech Data Bases, Production of Digital Vocoder Recorded Tapes, Subjective Evaluation of Speech Quality, MOS Result Analysis) ■ *Project 25 Vocoder Reference Test*, ANSI/TIA-102.BABC (Apr 1999) (A25VCTS Operation Manual, Test Computer Hardware and I/O Circuitry, Test Computer Software, Objective Performance Requirements) ■ *Project 25 Vocoder Selection Process*, TSB-102.BABD (May 1996) (Evaluation procedures for assessing various digital voice coding technology proposals for Project 25)
Measurement Methods:	■ *Project 25 Experiment 3 MOS Test Plan for Vocoder Technology for Project 25, Phase 2*, 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.)

Table 6: Vocoder Documents (Continued)

Document Type	Documents
Performance Recommendations:	■ *Project 25 Vocoder Performance*, TIA-102.BAxx (Projected TR8 approval date to publish, Oct 2009)
Interoperability Test Procedures:	(No documents are currently under development)
	Compliance Assessment Documents
	(No documents are currently under development)

4.1.6 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):	■ *Project 25 Common Air Interface Reserved Values*, ANSI/TIA-102.BAAC-B (May 2009) (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)
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)

4.2 Inter-RF Subsystem Interface

Table 8 and Table 9 list current Scope 1 and Scope 2 P25 Inter-RF Subsystem Interface (ISSI) description, specification, and assessment documents.

4.2.1 Scope 1 – Voice Services

Optional

The following documents provide guidance necessary to meet the optional (mandatory if supporting RFSS) Scope 1 P25 protocol standards defining ISSI support of P25 trunked voice service among multi-jurisdictional systems. This includes support for roaming subscriber equipment, with the following objectives:

- Mobility management
- Call control
- Push-to-talk management

Table 8: Inter-RF Subsystem Interface Documents, Scope 1 – Voice Services

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Inter-RF Subsystem Interface Overview*, TSB-102.BACC-A (Dec 2003) (ISSI Requirements and Standards Considerations)
Protocol (Normative):	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice Services*, TIA-102.BACA-A (Jan 2009) (Architecture and Protocol Suite Overview; Sip Messages and Parameters Definition, RTP Message Vocabulary, Mobility Management, Mobility Management, Push-To-Talk Management, Annex A (Normative) – Table of Timers and Constants; Annex B (Informative) – SU-to-SU Call Flows; Annex C (Informative) – Group Call Flows; Annex D (Informative) – Future Considerations; Annex E (Informative) – Console Functionality)
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-1 (Projected TR8 approval date to publish, Aug 2009)
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-2(Projected TR8 approval date to publish, Oct 2009)
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-3 (Projected TR8 approval date to publish, Oct 2009)
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Inter-RF Subsystem Interface Conformance Test Procedures*, TIA-102.CACC (Jan 2009)

Table 8: Inter-RF Subsystem Interface Documents, Scope 1 – Voice Services (Continued)

Document Type	Documents
Measurement Methods:	■ *Project 25 Inter-RF Subsystem Interface (ISSI) Measurement Methods for Voice Services*, TIA-102.CACA (Apr 2007) (ISSI Voice Services Performance Models, Performance Parameters, and Measurement Procedures)
Performance Recommendations:	■ *Project 25 Inter-RF Subsystem Interface Measurement Recommendations for Voice Services — Addendum 1 — Trunked Console*, TIA-102.CACB-1 (Projected TR8 approval date to publish, Oct 2008)
Interoperability Test Procedures:	■ *Project 25 Inter-RF Subsystem Interface Interoperability Test Procedures for Voice Services*, TIA-102.xxxx (ISSI TG approval, tbd; CAPP TG approval, tbd)
	Compliance Assessment Documents
	(No documents are currently under development)

4.2.2 Scope 2 – Additional Project 25 Services

Optional

The following documents provide guidance necessary to meet the optional (mandatory if supporting RFSS) Scope 2 P25 protocol standards defining ISSI support of four additional P25 services among multi-jurisdictional systems:

- 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 9: Inter-RF Subsystem Interface Documents, Scope 2 – Additional P25 Services

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents are currently under development)
Protocol (Normative):	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice Services*, TIA-102.BACA-A (Jan 2009) (Architecture and Protocol Suite Overview; Sip Messages and Parameters Definition, RTP Message Vocabulary, Mobility Management, Mobility Management, Push-To-Talk Management, Annex A (Normative) – Table of Timers and Constants; Annex B (Informative) – SU-to-SU Call Flows; Annex C (Informative) – Group Call Flows; Annex D (Informative) – Future Considerations; Annex E (Informative) – Console Functionality)

Table 9: Inter-RF Subsystem Interface Documents, Scope 2 – Additional P25 Services (Continued)

Document Type	Documents
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-1 (Projected TR8 approval date to publish, Aug 2009)
	■ *Project 25 Inter-RF Subsystem Interface (ISSI) Messages and Procedures for Supplementary Data Services*, TIA-102.BACD-A (Mar 2008) (Overview of Architecture and Protocol Suite, SIP Messages and Parameters Definition, Mobility Management, Supplementary Data Procedures, Message Sequence Charts (Informative))
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Supplementary Data Services*, TIA-102.BACD-B (Projected TR8 approval date to publish, tbd) (Overview of Architecture and Protocol Suite, SIP Messages and Parameters Definition, Mobility Management, Supplementary Data Procedures, Message Sequence Charts (Informative))
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Conventional Operation*, TIA-102.BACE (Aug 2008) (Overview of Architecture and Protocol Suite, Application Protocols – Complexity 1, Call and Transmission Control, Timer Values and Constants, Transmission Control Call Flows)
	■ *Project 25 Packet Data OTAR ISSI Messages and Procedures*, TIA-102.BACx (Projected TR8 approval date to publish, Aug 2009)
Conformance Test Procedures:	**Testing Documents**
	■ *Project 25 Inter-RF Subsystem Interface Conformance Test Procedures for Trunked Console*, TIA-102.BAxx (ISSI TG approval, tbd; TR8.19 approval, tbd)
	■ *Project 25 Inter-RF Subsystem Interface Conformance Test Procedures for Packet Data*, TIA-102.BAxx (ISSI TG approval, tdb; TR8.19 approval, tbd)
	■ *Project 25 Inter-RF Subsystem Interface Conformance Test Procedures for Conventional*, TIA-102.BAxx (ISSI TG approval, tdb; TR8.19 approval, tbd)
Measurement Methods:	■ *Project 25 Inter-RF Subsystem Interface Measurement Methods for Voice Services — Addendum 1 — Trunked Console*, TIA-102.CACA-1 (Dec 2008)
	■ *Project 25 Inter-RF Subsystem Interface Measurement Methods for Packet Data*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd)
	■ *Project 25 Inter-RF Subsystem Interface Measurement Methods for Conventional*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd)

Table 9: Inter-RF Subsystem Interface Documents, Scope 2 – Additional P25 Services (Continued)

Document Type	Documents
	■ *Project 25 Inter-RF Subsystem Interface Measurement Methods for Supplementary Data*, TIA-102.BAxx (ISSI TG approval, tdb; TR8.19 approval, tbd)
Performance Recommendations:	■ *Project 25 Inter-RF Subsystem Interface Performance Recommendations for Packet Data*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd) ■ *Project 25 Inter-RF Subsystem Interface Performance Recommendations for Conventional*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd) ■ *Project 25 Inter-RF Subsystem Interface Performance Recommendations for Supplementary Data*, TIA-102.BAxx (ISSI TG approval, tdb; TR8.19 approval, tbd)
Interoperability Test Procedures:	■ *Project 25 Inter-RF Subsystem Interface Interoperability Test Procedures for Trunked Console*, TIA-102.xxxx (ISSI TG approval, tbd; TR8.19 approval, tbd) ■ *Project 25 Inter-RF Subsystem Interface Interoperability Tests for Packet Data*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd) ■ *Project 25 Inter-RF Subsystem Interface Interoperability Tests for Conventional*, TIA-102.CACx (ISSI TG approval, tdb; TR8.19 approval, tbd) ■ *Project 25 Inter-RF Subsystem Interface Interoperability Test Procedures for Trunked Systems Involving the ISSI,* TIA-102.CACD (Projected TR8 approval date to publish, Jun 2009) ■ *Project 25 Inter-RF Subsystem Interface Interoperability Tests for Supplementary Data*, TIA-102.BAxx (ISSI TG approval, tdb; TR8.19 approval, tbd)
	Compliance Assessment Documents
	■ *Project 25 Recommended Compliance Assessment Tests – Trunking ISSI Interoperabnility*, TSB-102.CBBK (Projected TR8 approval to publish, Jul 2009)

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 10: Fixed Station Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Fixed Station Subsystem Interface Overview*, TIA-102.xxxx (FSITG approval, tbd; TR8.19 approval, tbd)
Protocol (Normative):	■ *Project 25 Fixed Station Interface, Messages and Procedures*, 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)
	■ *Project 25 Fixed Station Interface, Messages and Procedures*, TIA-102.BAHA-A (Projected TR8 approval date to publish, tbd)
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Fixed Station Interface Conformance Test Procedure*, TIA-102.CADA (Apr 2007) (Conventional Systems, Voice Services only)
Measurement Methods:	■ *Project 25 Fixed Station Interface Measurement Methods*, TIA-102.xxxx (draft from FSITG tbd; TR8.19 approval, tbd)
Performance Recommendations:	■ *Project 25 Fixed Station Interface Performance Specifications*, TIA-102.xxxx (draft from FSITG tbd; TR8.19 approval, tbd)
Interoperability Test Procedures:	■ *Project 25 Fixed Station Interface Interoperability Testing Procedures*, TIA-102.xxxx (draft from FSITG tbd; CAPP TG approval, tbd)
	Compliance Assessment Documents
	■ *Project 25 Recommended Compliance Tests Conventional Fixed Station*, TSB-102.CBBC (Jan 2009)

4.4 Console Subsystem Interface

Table 11 and Table 12 list current Conventional and Trunked P25 Console Subsystem Interface (CSSI) description, specification, and assessment documents.

4.4.1 Conventional

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 11: Conventional Console Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Console Subsystem Interface Overview*, 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):	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Conventional Operation*, TIA-102.BACE (Aug 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:	■ *Project 25 Console Subsystem Interface Conformance*, TIA-102.xxxx (CITG approval, tbd; TR8.19 approval, tbd)
Measurement Methods:	(No documents are currently under development)
Performance Recommendations:	(No documents are currently under development)
Interoperability Test Procedures:	■ *Project 25 Console Subsystem Interface Interoperability Testing Procedures*, TIA-102.xxxx (CITG approval, tbd; CAPP TG approval, tbd)
	Compliance Assessment Documents
	(No documents are currently under development)

4.4.2 Trunked

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 12: Trunked Console Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Console Subsystem Interface Overview*, 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):	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice Services*, TIA-102.BACA-A (Jan 2009) (Architecture and Protocol Suite Overview; Sip Messages and Parameters Definition, RTP Message Vocabulary, Mobility Management, Mobility Management, Push-To-Talk Management, Annex A (Normative) – Table of Timers and Constants; Annex B (Informative) – SU-to-SU Call Flows; Annex C (Informative) – Group Call Flows; Annex D (Informative) – Future Considerations; Annex E (Informative) – Console Functionality)
	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-1 (Projected TR8 approval date to publish, Aug 2009) ■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-2(Projected TR8 approval date to publish, Oct 2009) ■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Packet Data/OTAR,* TIA-102.BACA-A-3 (Projected TR8 approval date to publish, Oct 2009)
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Console Subsystem Interface Conformance*, TIA-102.xxxx (CITG approval, tbd; TR8.19 approval, tbd)
Measurement Methods:	■ *Project 25 Inter-RF Subsystem Interface Measurement Methods for Voice Services — Addendum 1 — Trunked Console*, TIA-102.CACA-1 (Dec 2008)

Table 12: Trunked Console Subsystem Interface Documents (Continued)

Document Type	Documents
Performance Recommendations:	■ *Project 25 Inter-RF Subsystem Interface Measurement Recommendations for Voice Services — Addendum 1 — Trunked Console*, TIA-102.CACB-1 (Projected TR8 approval date to publish, Oct 2008)
Interoperability Test Procedures:	■ *Project 25 Console Subsystem Interface Interoperability Testing Procedures*, TIA-102.xxxx (CITG approval, tbd; CAPP TG approval, tbd)
	Compliance Assessment Documents
	(No documents are currently under development)

4.5 Subscriber Data Peripheral Interface and Data Interface

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

Table 13: Subscriber Data Peripheral Interface and Data Network Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Data Overview*, ANSI/TIA-102.BAEA-A (Jun 2004) (Overview, Categories, Data Services, and Data Configurations)
Protocol (Normative):	■ *Project 25 Packet Data Specification*, ANSI/TIA-102.BAEB-A (Mar 2005) (Overview of Packet Switched Services, MDP/MRC "A" Interface Packet Data, Air Interface "U_M" Packet Data, RFG/ES Interface "E_D" Packet Data, SNDCP Field Definitions and PDU Mappings) ■ *Project 25 Circuit Data Specification*, TIA-102.BAEC (Last update was Jun 2000; this document will be rescinded in five years or less) (Overview of Circuit Switched Services, MDP/MRC "A" Interface Circuit Switched Data, MRC/RFG Protocol "U_M" Circuit Data, Host Interface "E" Circuit Data, Procedures) ■ *Project 25 Radio Management Protocol,* (also known as Radio Control Protocol — RCP), ANSI/TIA-102.BAEE-A (Sep 2004) (RPC: Protocol Characteristics, Request, Response, and Report Class Service Data Units, Simple Network Management Protocol (SNMP): Overview, P25 SNMP Node and RMP MIB Definitions)

Table 13: Subscriber Data Peripheral Interface and Data Network Interface Documents (Continued)

Document Type	Documents
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Data Interface Conformance*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Measurement Methods:	■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	■ *Project 25 Interoperability Test Procedures Conventional Voice Equipment*, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Conventional Systems*, TIA-102.CABA-A (Projected TR8 approval date to publish, tbd) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, ANSI/TIA-102.CABC-A (Mar 2008) (trunked systems, voice only) (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)
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, TIA-102.CABC-A-1 (Aug 2009) (trunked systems, voice only) (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
	(No documents are currently under development)

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 14: Network Management Interface Documents

Document Type	Documents
Overview (Informative):	**Description and Specification Documents**
	■ *Project 25 Network Management Interface Overview*, 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)
Conformance Test Procedures:	**Testing Documents**
	■ *Project 25 Network Management Interface Conformance*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Measurement Methods:	■ *Project 25 Network Management Interface Measurement Methods*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Performance Recommendations:	■ *Project 25 Network Management Interface Performance Specifications*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Interoperability Test Procedures:	■ *Project 25 Network Management Interface Interoperability Testing Procedures*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; CAPP TG approval, tbd)
	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 15: Telephone Interconnect Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Telephone Interconnect Requirements and Definitions (Voice Services)*, 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) ■ *Project 25 Telephone Interconnect Requirements and Definitions (Voice Services), Addendum 1 — Conventional Individual Calls*, 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))
Protocol (Normative):	(No documents are necessary or applicable)
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Interoperability Profile – Level One Basic Conventional Operation*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd) (Group and Individual Calls via Repeater Operation, Group and Individual Calls via Direct Operation, and Telephone and PSTN Operations)
Measurement Methods:	■ *Project 25 Telephone Interconnect Interface Measurement Methods*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Performance Recommendations:	■ *Project 25 Telephone Interconnect Interface Performance Specifications*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; TR8.n approval, tbd)
Interoperability Test Procedures:	■ *Project 25 Telephone Interconnect Interface Interoperability Testing Procedures*, TIA-102.xxxx (xxxx TG or TR8.n approval, tbd; CAPP TG approval, tbd)
	Compliance Assessment Documents
	(No documents are currently under development)

5 Suite of Standards for Project 25 Services

This section discusses the suite of standards documents for the (currently) two services of a P25 system. For each of the services, 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 RFPs of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

Project 25 currently has two broad categories of services. The first deals with encryption for security of voice and data as well as security of radio control channels, etc. The second deals with trunking of radio channels to promote spectrum efficiency.

5.1 Encryption Services

Several encryption algorithms are available for use with P25 systems. The oldest algorithm, for which there are P25 standards documents, is Data Encryption Standard (DES). This particular algorithm is no longer endorsed (after May 2005) by the Federal Government for secure communications. The most recently endorsed algorithm is Advanced Encryption Standard (AES) and must be used by all Federal agency communications systems beyond May 2007. The recommendation has been that State and local agencies also transition to AES to ensure interoperability.

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.

5.1.1 Advanced Encryption Standard

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

Table 16: Encryption – Advanced Encryption Standard Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Security Services Overview*, ANSI/TIA-102.AAAB-A (Jan 2005) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management)
Protocol (Normative):	■ *Project 25 Block Encryption Protocol*, ANSI/TIA-102.AAAD (Jul 2002) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm – DES, Triple Data Encryption Algorithm (TDEA), and AES)

Table 16: Encryption – Advanced Encryption Standard Documents (Continued)

Document Type	Documents
	■ *Project 25 Block Encryption Protocol BEP Updates*, ANSI/TIA-102.AAAD-A (Projected TR8 approval date to publish, Aug 2009) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm — DES Triple Data Encryption Algorithm (TDEA), and AES)
	■ *Project 25 Link Layer Authentication*, ANSI/TIA-102.AACE (Dec 2005) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
Conformance Test Procedures:	**Testing Documents**
	(No documents are currenty under development)
Measurement Methods:	No specific documents planned for AES, but the following document also applies: ■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	No specific documents planned for AES, but the following document also applies: ■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	No specific documents planned for AES, but the following documents also apply: ■ *Project 25 Interoperability Test Procedures Conventional Voice Equipment*, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Conventional Systems*, TIA-102.CABA-A (Projected TR8 approval date to publish, tbd) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)

Table 16: Encryption – Advanced Encryption Standard Documents (Continued)

Document Type	Documents
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, ANSI/TIA-102.CABC-A (Mar 2008) (trunked systems, voice only) (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)
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, TIA-102.CABC-A-1 (Aug 2009) (trunked systems, voice only) (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
	(No documents are currently under development)

5.1.2 Data Encryption Standard

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

Table 17: Encryption – Data Encryption Standard Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Security Services Overview*, ANSI/TIA-102.AAAB-A (Jan 2005) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management)
Protocol (Normative):	■ *Project 25 Block Encryption Protocol*, ANSI/TIA-102.AAAD (Jul 2002) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm – DES, Triple Data Encryption Algorithm (TDEA), and AES)
	■ *Project 25 Block Encryption Protocol BEP Updates*, ANSI/TIA-102.AAAD-A (Projected TR8 approval date to publish, Aug 2009) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm — DES Triple Data Encryption Algorithm (TDEA), and AES)

Table 17: Encryption – Data Encryption Standard Documents (Continued)

Document Type	Documents
	■ *Project 25 Link Layer Authentication*, ANSI/TIA-102.AACE (Dec 2005) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
Conformance Test Procedures:	**Testing Documents**
	■ *Conformance Test for Project 25 DES Encryption Protocol*, ANSI/TIA-102.AAAC (Apr 2007) (Test Parameters, Transmitter Tests, and Receiver Tests)
Measurement Methods:	No specific documents planned for DES, but the following document also applies: ■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	No specific documents planned for DES, but the following document also applies: ■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	No specific documents planned for DES, but the following documents also apply: ■ *Project 25 Interoperability Test Procedures Conventional Voice Equipment*, TSB-102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Conventional Systems*, TIA-102.CABA-A (Projected TR8 approval date to publish, tbd) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, ANSI/TIA-102.CABC-A (Mar 2008) (trunked systems, voice only) (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)

Table 17: Encryption – Data Encryption Standard Documents (Continued)

Document Type	Documents
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, TIA-102.CABC-A-1 (Aug 2009) (trunked systems, voice only) (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
	(No documents are currently under development)

5.1.3 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 18: Encryption – Key Fill Device Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	■ *Project 25 Key Fill Device (KFD) Interface Protocol*, TIA-102.AACD (Feb 2005) (Manual Rekeying Overview, Interface Protocol Definition)
	■ *Project 25 Key Fill Device (KFD) Interface Protocol*, TIA-102.AACD-x (Projected TR8 approval date to publish, tbd) (Manual Rekeying Overview, Interface Protocol Definition)
	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)

5.1.4 Over-the-Air Rekeying

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

Table 19: Encryption – Over-the-Air Rekeying Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Over-the-Air Rekeying (OTAR) Operational Description*, TIA-102.AACB (Nov 2002) (Key Management Overview, OTAR Concepts, Key Management Definitions and Using OTAR)
Protocol (Normative):	■ *Project 25 Over-the-Air Rekeying (OTAR) Protocol*, 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) ■ *Project 25 Over-the-Air-Rekeying (OTAR) Protocol Addendum 1 – Key Management Security Requirements for Type 3 Block Encryption Algorithms,* TIA-102.AACA-1 (Nov 2002) (Encryption Modes, Annex A and B (Normative)) ■ *Project 25 Over-the-Air Rekeying (OTAR) Protocol Addendum 2 – Data Link Independent OTAR*, 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)) ■ *Project 25 Over-the-Air Rekeying (OTAR) Protocol*, TIA-102.AACA-A (Projected TR8 approval date to publish, Jan 2010) (Overview of Key Management Techniques, Overview of Protocol – Mandatory and Optional Key Management Procedures, Definition and Use of Response Kinds)
	Testing Documents
Conformance Test Procedures:	■ *Conformance Tests for Project 25 Over-the-Air Rekeying (OTAR) Protocol*, 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)

Table 19: Encryption – Over-the-Air Rekeying Documents (Continued)

Document Type	Documents
Measurement Methods:	No specific documents planned for OTAR rekeying, but the following document also applies: ■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	No specific documents planned for OTAR rekeying, but the following document also applies: ■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	■ *Project 25 Interoperability Test Procedures – Over-the-Air Rekeying (OTAR)*, ANSI/TIA-102.CABB (Aug 2003)
	Compliance Assessment Documents
	(No documents are currently under development)

5.2 Trunked Services

Project 25 allows an optionto 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 two schemes are defined below.

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 20: FDMA Trunked Digital Documents—Phase 1

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Trunking Overview*, ANSI/TIA-102.AABA-A (Jun 2004) (Trunking Overview, Voice and Data Services)

Table 20: FDMA Trunked Digital Documents—Phase 1 (Continued)

Document Type	Documents
	■ *Project 25 Trunking Procedures*, 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)
Protocol (Normative):	■ *Project 25 Trunking Control Channel Formats*, ANSI/TIA-102.AABB-A (Jul 2005) (Control Channel Designation and Modes, Inbound Control Channel Access, Packet and Information Block Structures) ■ *Project 25 Trunking Control Channel Messages*, ANSI/TIA-102.AABC-B (Jan 2005) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Inbound and Outbound Signaling Packets) ■ *Project 25 Project 25 Trunking Control Channel Messages Addendum for Link Layer Authentication Service,* ANSI/TIA-102.AABC-B-1 (Nov 2006) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Inbound and Outbound Signaling Packets) ■ *Project 25 Trunking Control Channel Messages Addendum – ISSI,* ANSI/TIA-102.AABC-B-2 (Aug 2007) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes) ■ *Project 25 Trunking Control Channel Messages Addendum for ISSI Supplementary Data,* TIA-102.AABC-B-3 (Feb 2008) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes) ■ *Project 25 Trunking Control Channel Messages Addendum for ISSI Supplementary Data,* TIA-102.AABC-B-4 (Sep 2008) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes) ■ *Project 25 Trunking Control Channel Messages Addendum for ISSI Supplementary Data,* TIA-102.AABC-B-5 (Dec 2008) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes)

Table 20: FDMA Trunked Digital Documents—Phase 1 (Continued)

Document Type	Documents
	■ *Project 25 Trunking Control Channel Messages Addendum for ISSI Supplementary Data,* ANSI/TIA-102.AABC-C (Projected TR8 approval to publish, Aug 2009) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes)
	■ *Project 25 Identity Extensions to Link Control Word Formats*, TIA-102.AABF-B (Jul 2009) (Part of voice message, Conventional and Trunked: Link Control Messages, Field Definitions, and Word Usages)
	■ *Project 25 Conventional Control Messages*, TSB-102.AABG (Jul 1996) (Trunked system 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)
	■ *Project 25 Conventional Control Messages, Addendum 1— Individual Telephone Calls,* TSB-102.AABG-1 (May 2006) (Control Messages Specifications, Annex A Message Sequence (informative))
	■ *Project 25 Link Layer Authentication*, ANSI/TIA-102.AACE (Dec 2005) (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:	■ *Project 25 Conformance Profile – Level Three Basic Trunked Operation*, TIA-102.Cxxx (Projected TR8 approval to publish, tbd) (Procedure Signaling Parameter and Values, Procedure Signaling (including Control Channel Signaling and Voice Traffic Channel Signaling), and the following Procedures: Network Status Broadcast, RFSS Status Broadcast, Channel Identifier Update, System Services Broadcast, Adjacent Site Broadcast, Full Unit Registration Request, Full Unit Registration Command, Location Update (New LRA), Location Update (Same RA), Single Group Affiliation, Unit to Group Call Setup, Unit to Group Voice Transmission, Unit to Announcement Group Call Setup, Unit to System Group Call Setup, Unit to Unit Call Setup, Group Call Termination, Unit to Unit Call Termination, Emergency Call, Emergency Alarm)
	■ *Project 25 Conformance Profile – Level Four Advanced Trunked Operation*, TIA-102.Cxxx (Projected TR8 approval to publish, tbd)

Table 20: FDMA Trunked Digital Documents—Phase 1 (Continued)

Document Type	Documents
Measurement Methods:	No specific documents planned for FDMA Trunked Digital, but the following document also applies: ■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	No specific documents planned for FDMA Trunked Digital, but the following document also applies: ■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, ANSI/TIA-102.CABC-A (Mar 2008) (trunked systems, voice only) (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)
	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, TIA-102.CABC-A-1 (Aug 2009) (trunked systems, voice only) (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
	■ *Project 25 Recommended Compliance Tests Trunked Mode Fixed Station*, TSB-102.CBBH (Jan 2009) (Tests to demonstrate compliance)
	■ *Project 25 Recommended Compliance Tests Trunking Interoperability*, TSB-102.CBBJ (Feb 2009) (Tests to demonstrate compliance)
	■ *Project 25 Recommended Compliance Tests Trunking Interoperability*, TSB-102.CBBJ-A (Projected TR8 approval to publish, Aug 2009) (Tests to demonstrate compliance)
	■ *Project 25 Compliance Assessment Program Trunking Interoperability Summary Test Report Guidelines*, TSB-102.CBAF (Apr 2009) (Tests to demonstrate compliance)

5.2.2 Two-Slot TDMA Trunked Digital—Phase 2

Optional The following documents provide guidance necessary to meet the optional (mandatory if supporting Two-Slot TDMA Trunked Digital features) Phase 2 P25 Two-Slot TDMA Trunked Digital standard. (Section 1.1.2 describes Phase 2.)

Table 21: Two-Slot TDMA Trunked Digital Documents—Phase 2

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Two-Slot TDMA Overview*, TIA-102.BBAA (Projected TR8 approval to publish, Apr 2009) (TDMA Trunking Overview, Voice and Data Services)
Protocol (Normative):	■ *Project 25 Trunking Control Channel Messages Addendum for ISSI Supplementary Data*, ANSI/TIA-102.AABC-B4 (Sep 2008) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services, Reason Codes)
	■ *Project 25 Vocoder Description*, 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) ■ *Project 25 TDMA Half-Rate Vocoder Addendum 1*, TIA-102.BABA-1 (Jul 2009) ■ *Project 25 Two-Slot TDMA Common Air Interface – Physical Layer Specification*, 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) ■ *Project 25 Two-Slot TDMA Common Air Interface – MAC Layer: Procedures and Messages*, TIA-102.BBAC (Projected TR8 approval to publish, Oct 2009) (Logical Channels Structure, MAC Protocol Description, MAC Protocol Data Units (PDUs), Physical Layer Services Required by the MAC Layer) ■ *Project 25 Two-Slot TDMA Common Air Interface – LLC Layer: Procedures and Messages*, TIA-905.BAAD (Projected TR8 approval to publish, Aug 2009) (Protocol Stack Architecture, Routing of Data Flow on the Logical Channels, LLC Frame Structure, Link Layer – Elements and Procedures, and Services Definition)

Table 21: Two-Slot TDMA Trunked Digital Documents—Phase 2 (Continued)

Document Type	Documents
	Testing Documents
Conformance Test Procedures:	■ *Project 25 Two-Slot TDMA Common Air Interface Conformance Tests*, TIA-102.CBBA (Projected TR8 approval date to publish, Apr 2010) ■ *Project 25 Two-Slot TDMA Protocol Messages and Procedures Conformance Tests*, TIA-102.CBBB (Projected TR8 approval date to publish, Apr 2010)
Measurement Methods:	■ *Project 25 Two-Slot TDMA Transceiver Measurement Methods*, TIA-102.CBAA (Projected TR8 approval date to publish, Jan 2010) (Methods of Measurements for Receivers, Transmitters, Unit Characteristics)
Performance Recommendations:	■ *Project 25 Two-Slot TDMA Transceiver Performance Recommendations*, TIA-102.CBAB (Projected TR8 approval date to publish, Jan 2010) (Standards for All Equipment: Receiver Section, Transmitter Section, Unit Characteristics)
Interoperability Test Procedures:	■ *Project 25 Two-Slot TDMA Common Air Interface Interoperability*, TIA-102.CBBC (Projected TR8 approval date to publish, Apr 2010)
	Compliance Assessment Documents
	■ *Project 25 Definition of Compliance Assessment TDMA*, TSB-102-xxxx (Projected TR8 approval date to publish, tbd) (Tests to demonstrate compliance)
	■ *Project 25 Compliance Assessment Program Trunking Interoperability Summary Test Report Guidelines*, TSB-102.CBAF (Apr 2009) (Tests to demonstrate compliance)

6 Suite of Standards for Project 25 Equipment

This section discusses the suite of standards documents for the (currently) five 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 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.

6.1 Analog FM Transceivers—Phase 1

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. (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:	■ *Project 25 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*, ANSI/TIA-603-C (Dec 2004) (Methods of Measurement and Performance Standards for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)
Performance Recommendations:	■ *Project 25 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*, ANSI/TIA-603-C (Dec 2004) (Methods of Measurement and Performance Standards for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)
Interoperability Test Procedures:	(No documents are necessary or applicable)

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

Document Type	Documents
	Compliance Assessment Documents
	■ *Project 25 Transceiver Performance Summary Test Report*, TSB-102.CBAC (Apr 2009)

6.2 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:	■ *Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods*, ANSI/TIA-102.CAAA-C (Sep 2008) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, ANSI/TIA-102.CAAB-B (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	(No documents are necessary or applicable)
	Compliance Assessment Documents
	■ *Project 25 Recommended Compliance Tests Conventional Mode Subscriber*, TSB-102.CBBA (Feb 2009) (Tests to demonstrate compliance) ■ *Project 25 Transceiver Performance Summary Test Report*, TSB-102.CBAC (Apr 2009)

6.3 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:	■ *Project 25 Two-Slot TDMA Transceiver Measurement Methods*, TIA-102.CBAA (Projected TR8 approval date to publish, Jan 2010) (Methods of Measurements for Receivers, Transmitters, Unit Characteristics)
Performance Recommendations:	■ *Project 25 Two-Slot TDMA Transceiver Performance Recommendations*, TIA-102.CBAB (Projected TR8 approval date to publish, Jan 2010) (Standards for All Equipment: Receiver Section, Transmitter Section, Unit Characteristics)
Interoperability Test Procedures:	(No documents are necessary or applicable)
	Compliance Assessment Documents
	■ *Project 25 Recommended Compliance Tests Trunked Mode Subscriber*, TSB-102.CBBF (Feb 2009) (Tests to demonstrate compliance) ■ *Project 25 Transceiver Performance Summary Test Report*, TSB-102.CBAC (Apr 2009)

6.4 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 25: Mobile Radio Push-to-Talk and Audio Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	■ *Project 25 Mobile Radio Push-to-Talk and Audio Interface – Definitions and Methods of Measurement*, TSB-102.CAAC (Sep 2002) (Physical and Electrical Interfaces, Standard Test Conditions, and Methods of Measurement)
	Testing Documents
Conformance Test Procedures:	(No documents are necessary or applicable)
Measurement Methods:	No specific documents planned for Mobile Radio Push-to-Talk and Audio Interface, but the following documents also applies: ■ *Project 25 Mobile Radio Push-to-Talk and Audio Interface – Definitions and Methods of Measurement*, 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)

6.5 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 26: Audio Tone Signaling Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents are necessary or applicable)
Protocol (Normative):	■ *Project 25 Mobile Audio Tone Signaling Definition and Requirements*, TIA-102.CAAD (TR8.1 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)
	Compliance Assessment Documents
	(No documents are currently under development)

7 Project 25 Decision Charts

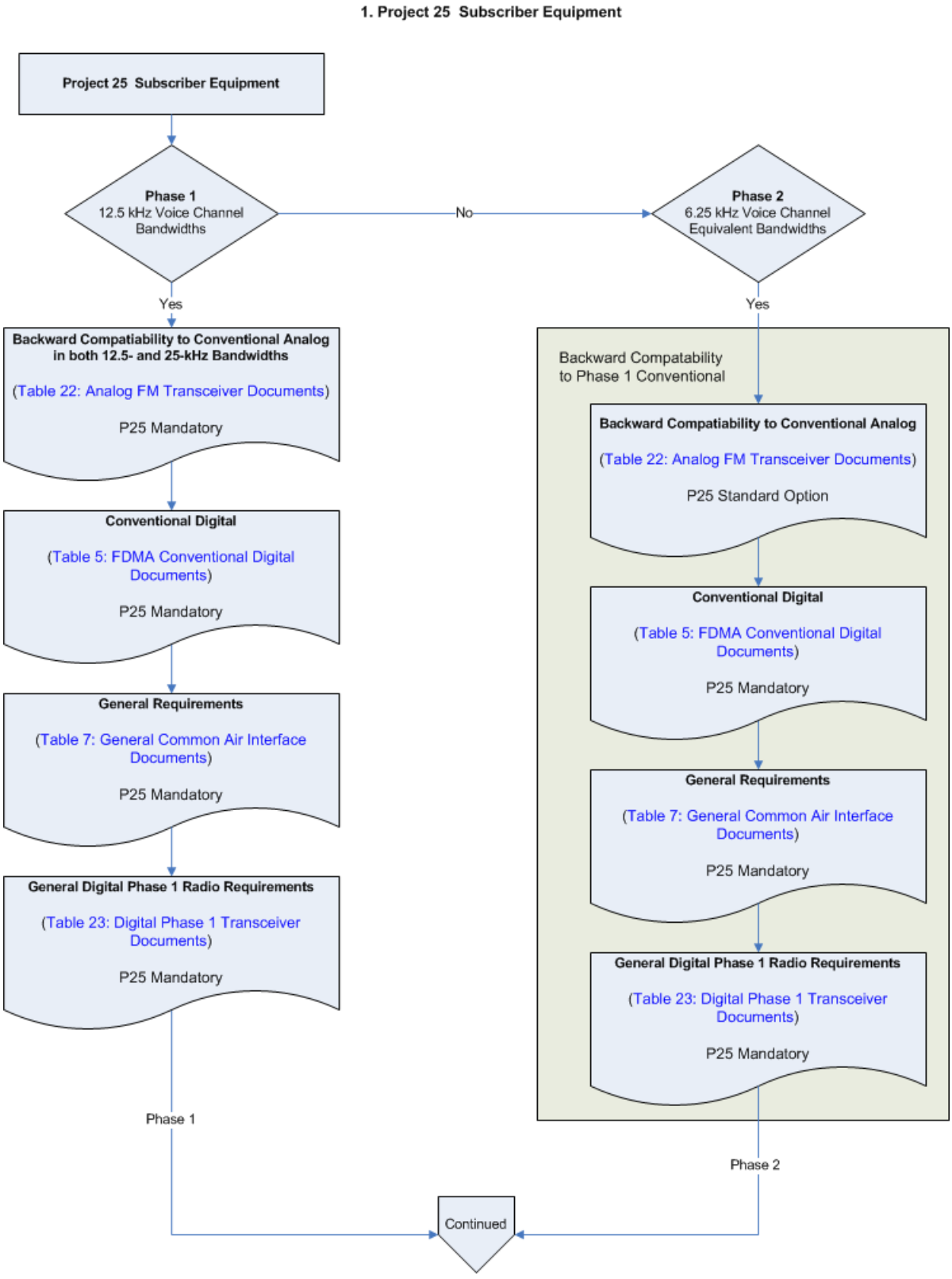
Use the decision charts in this section to find the P25 standards relevant to a given public safety communications component.

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.

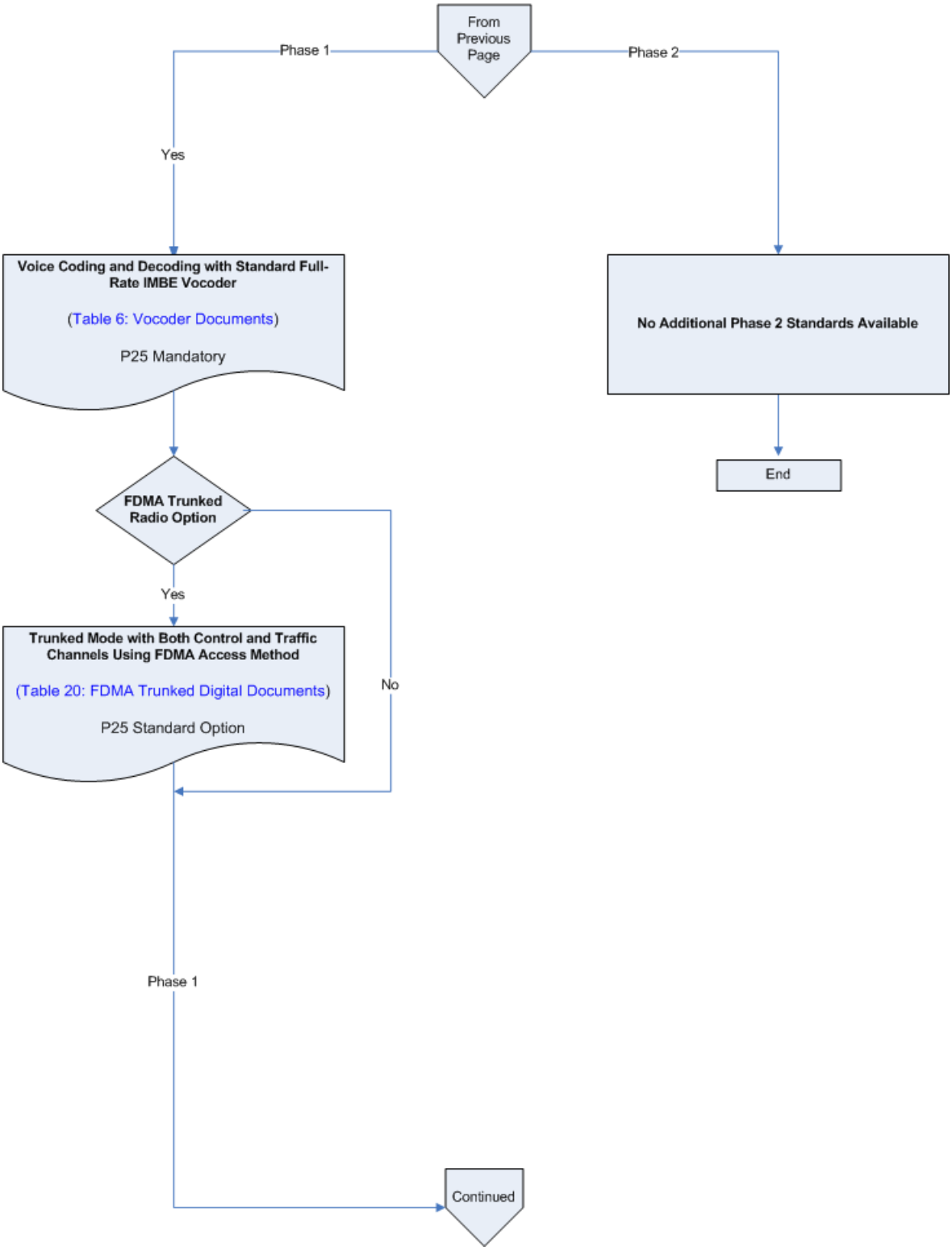
Note: In the decision charts, click a table's title to jump to that table in this document.

See Section 2.2, "Legend for P25 Standards Document Status," on page 7 for information about the identifier convention used for document names.

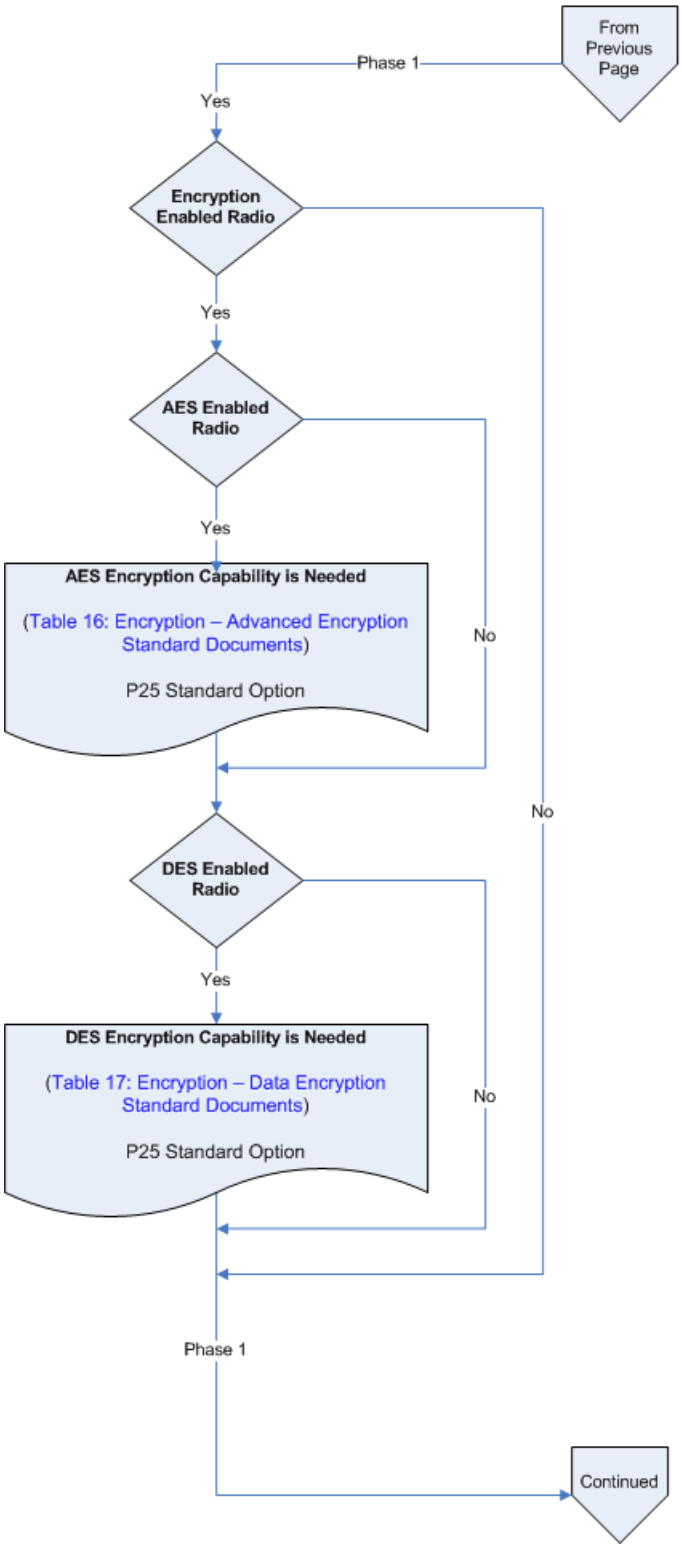
7.1 Project 25 Subscriber Equipment



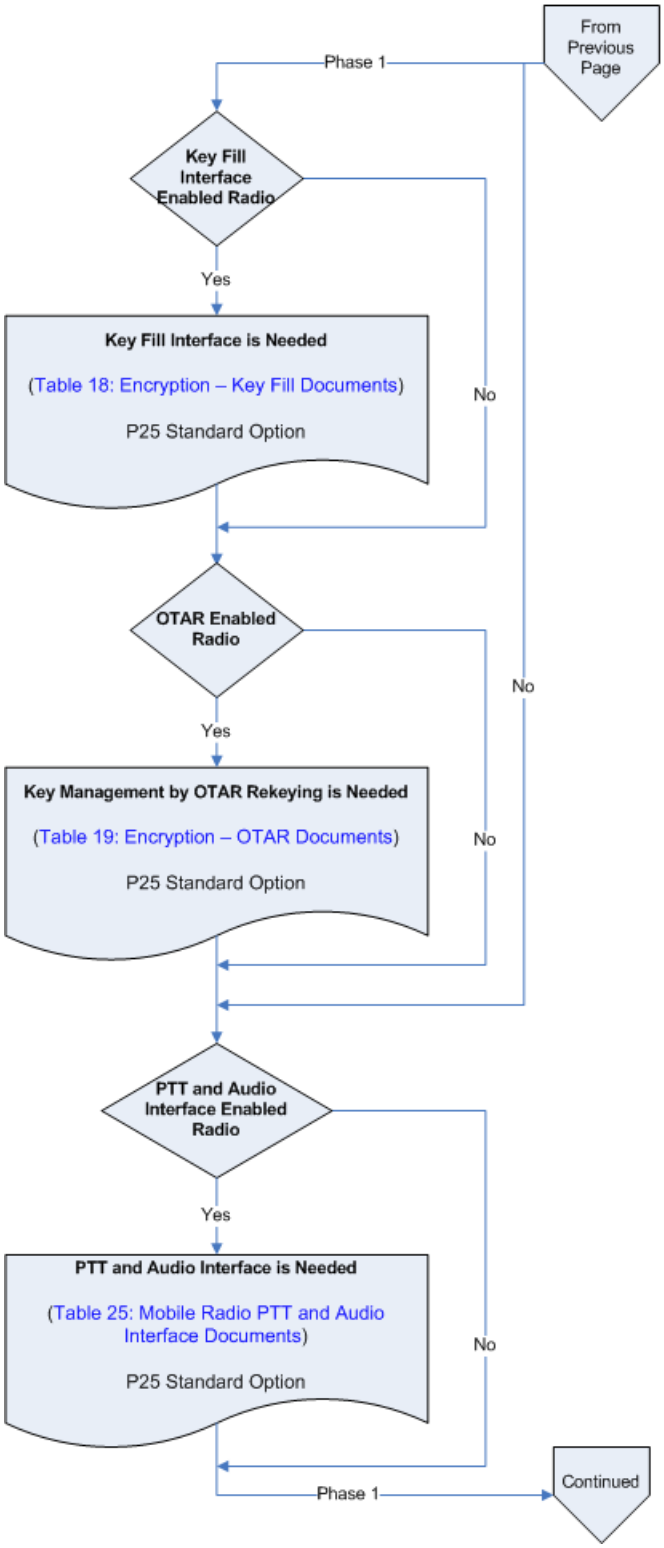
1. Project 25 Subscriber Equipment (continued)



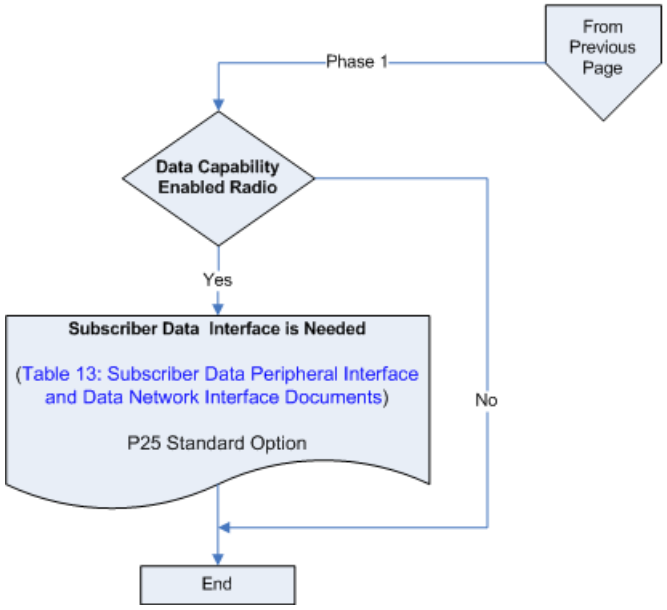
1. Project 25 Subscriber Equipment (continued)



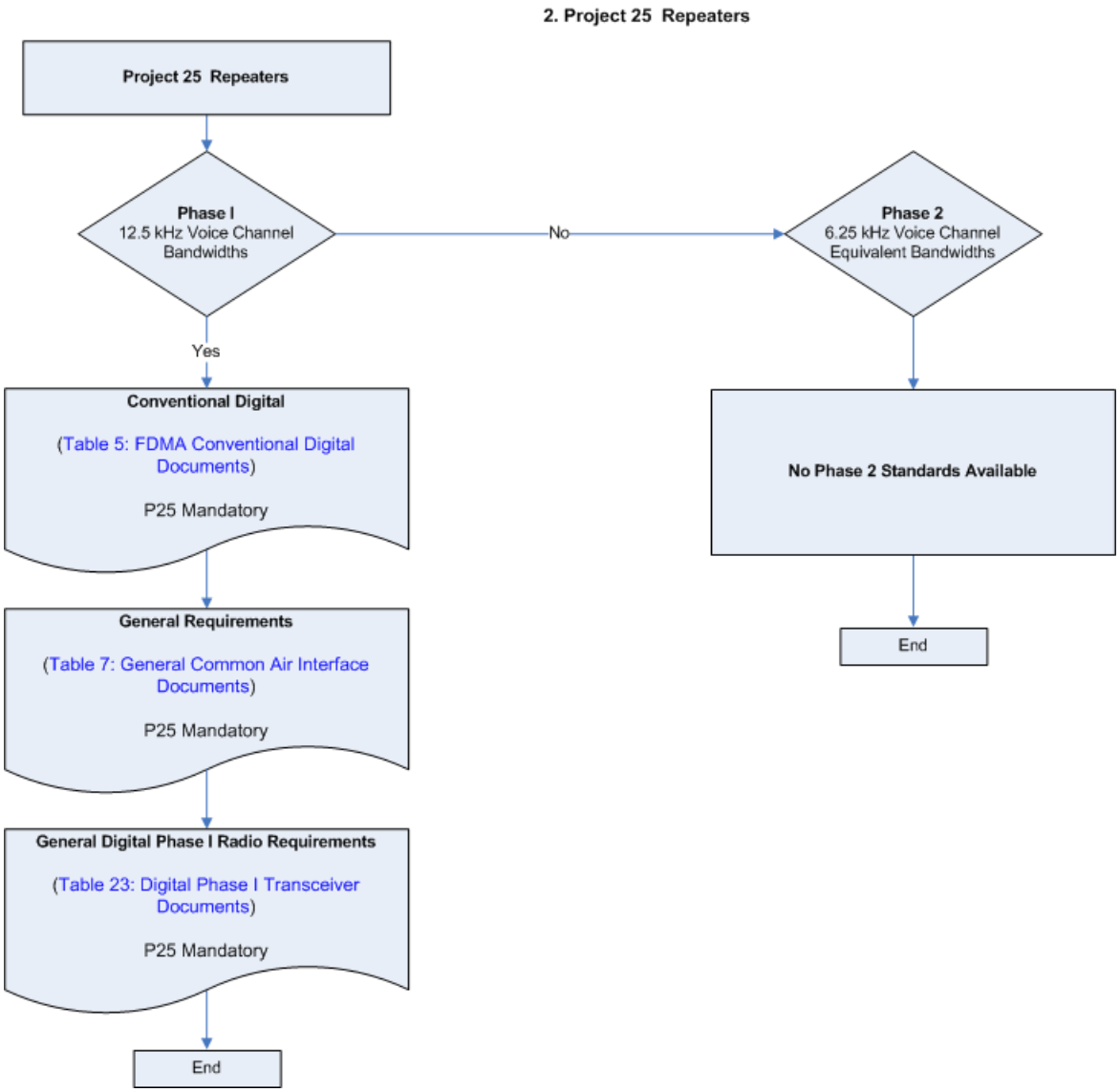
1. Project 25 Subscriber Equipment (continued)



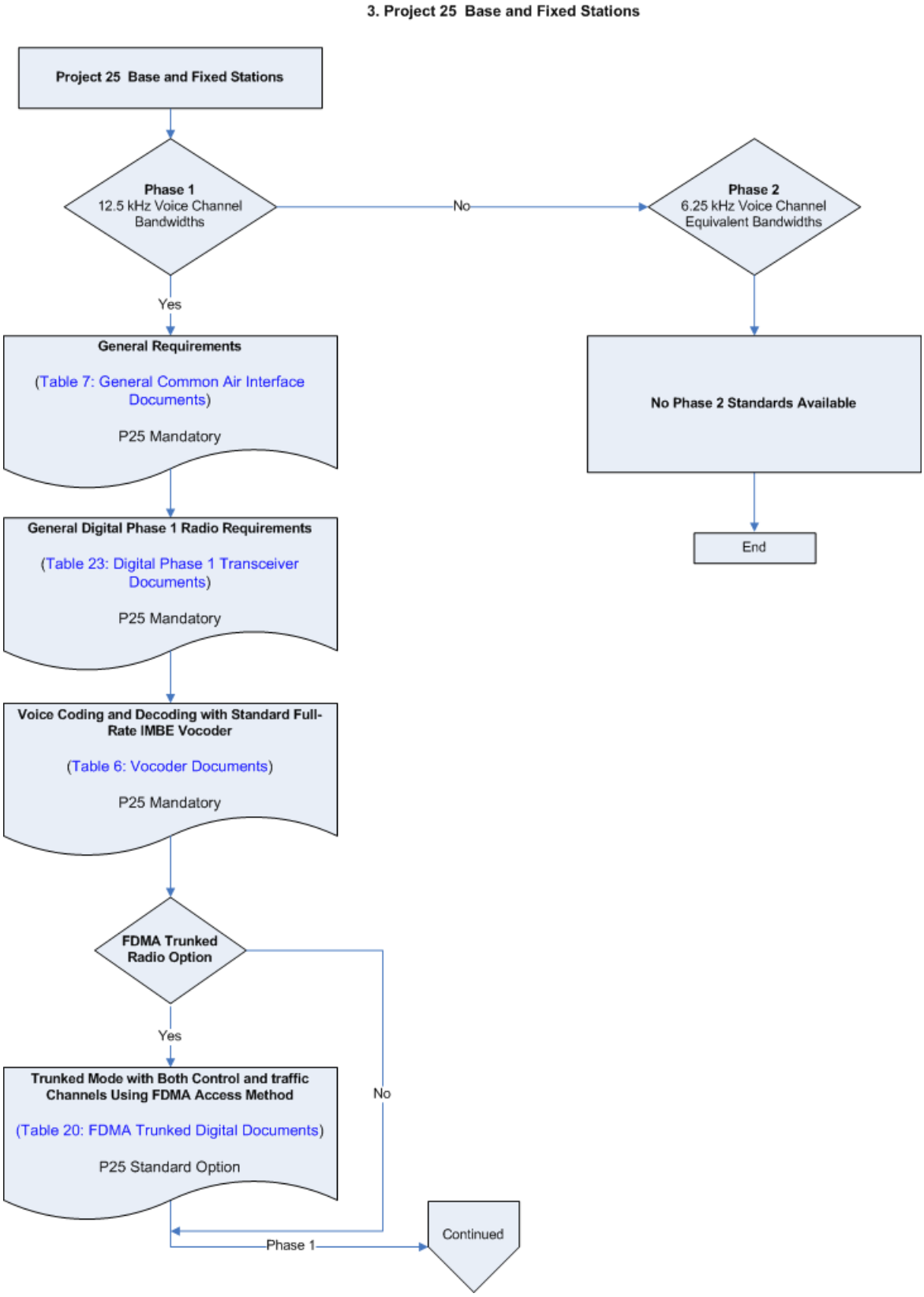
1. Project 25 Subscriber Equipment (continued)



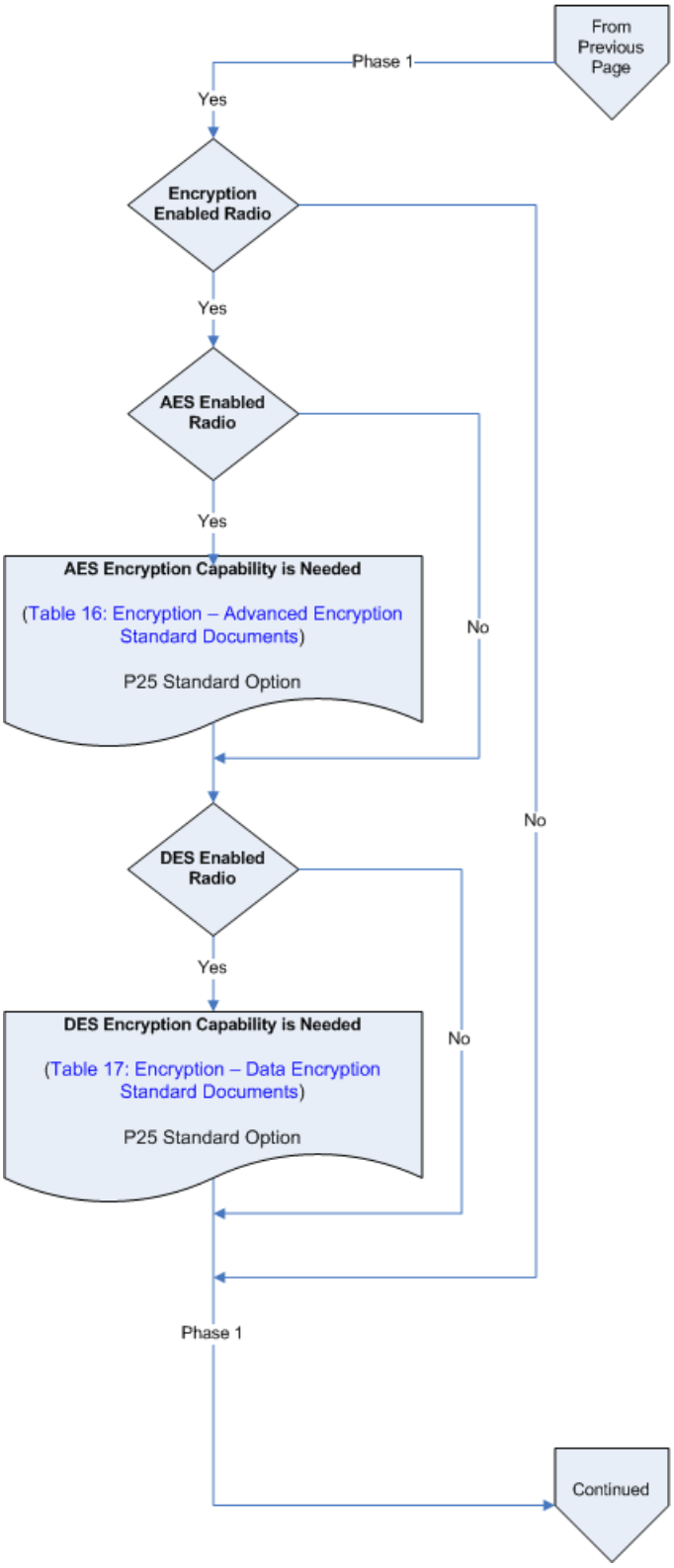
7.2 Project 25 Repeaters

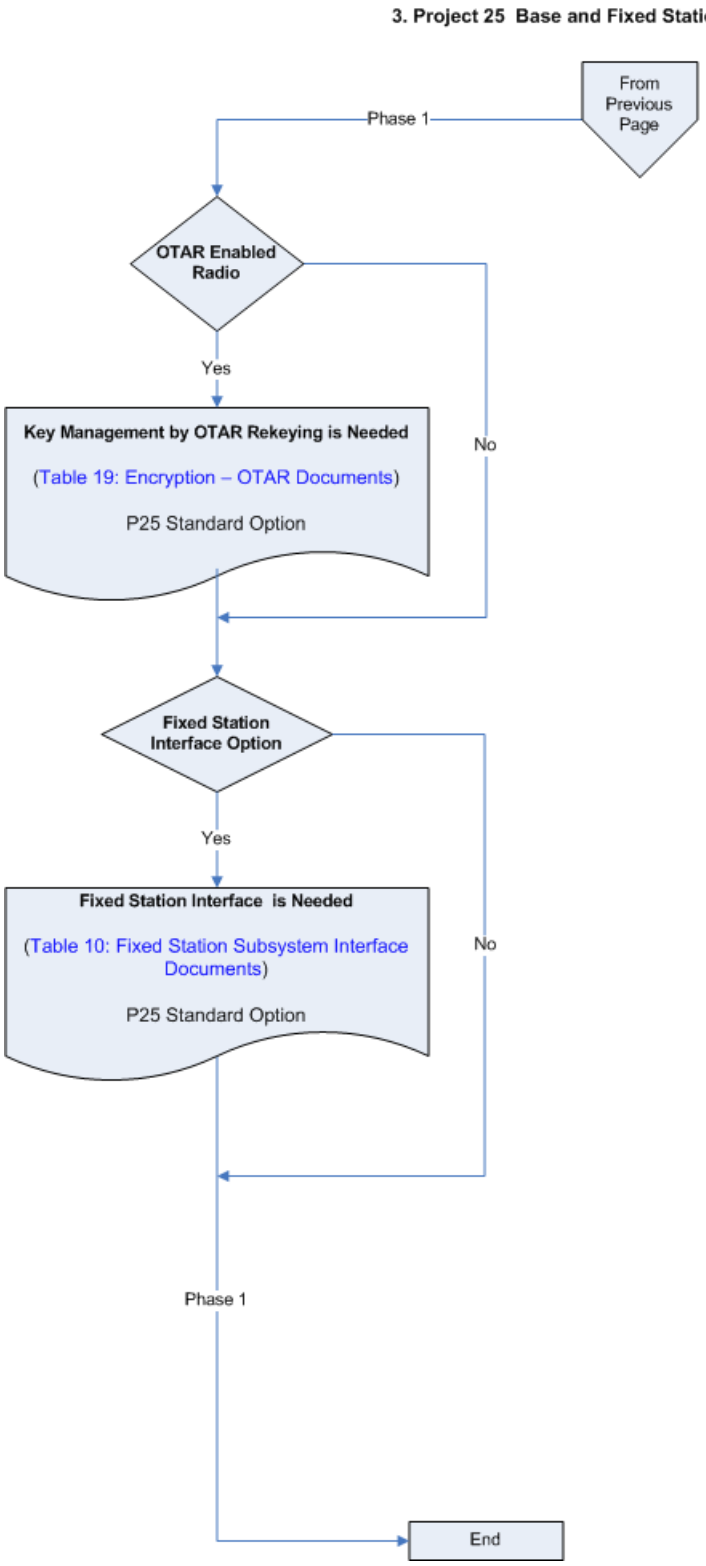


7.3 Project 25 Base and Fixed Stations

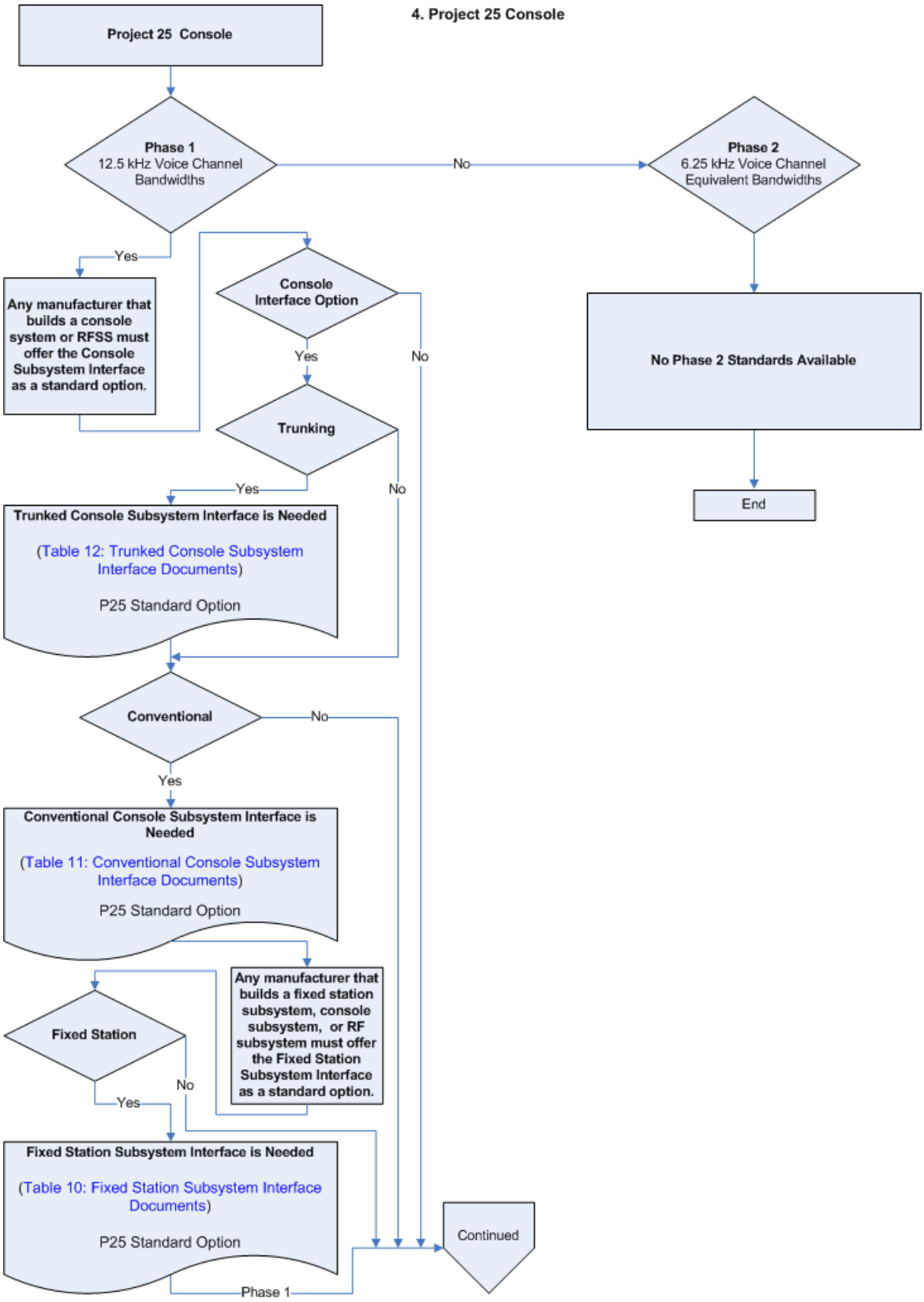


3. Project 25 Base and Fixed Stations (continued)

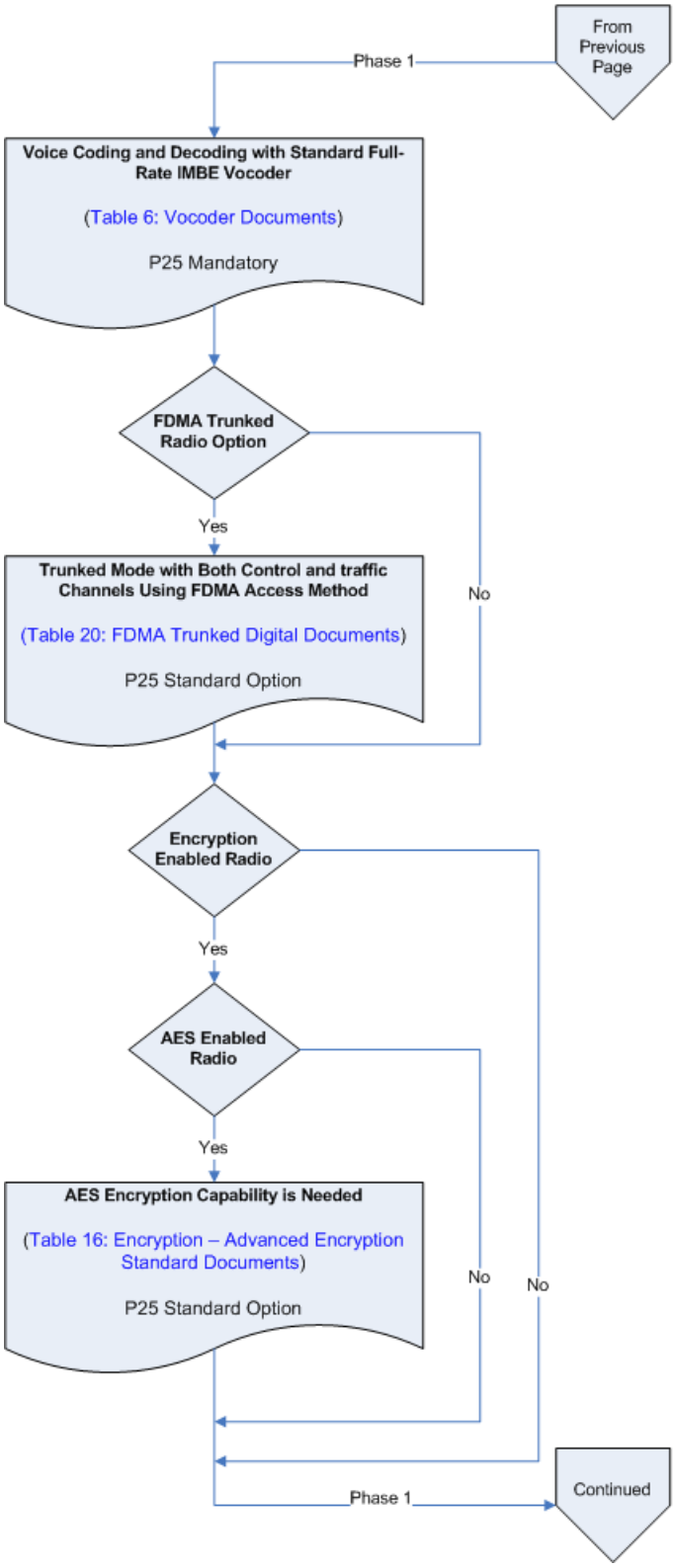



3. Project 25 Base and Fixed Stations (continued)
From Previous Page
Phase 1
OTAR Enabled Radio
Yes
No
Key Management by OTAR Rekeying is Needed
(Table 19: Encryption – OTAR Documents)
P25 Standard Option
Fixed Station Interface Option
Yes
No
Fixed Station Interface is Needed
(Table 10: Fixed Station Subsystem Interface Documents)
P25 Standard Option
Phase 1
End

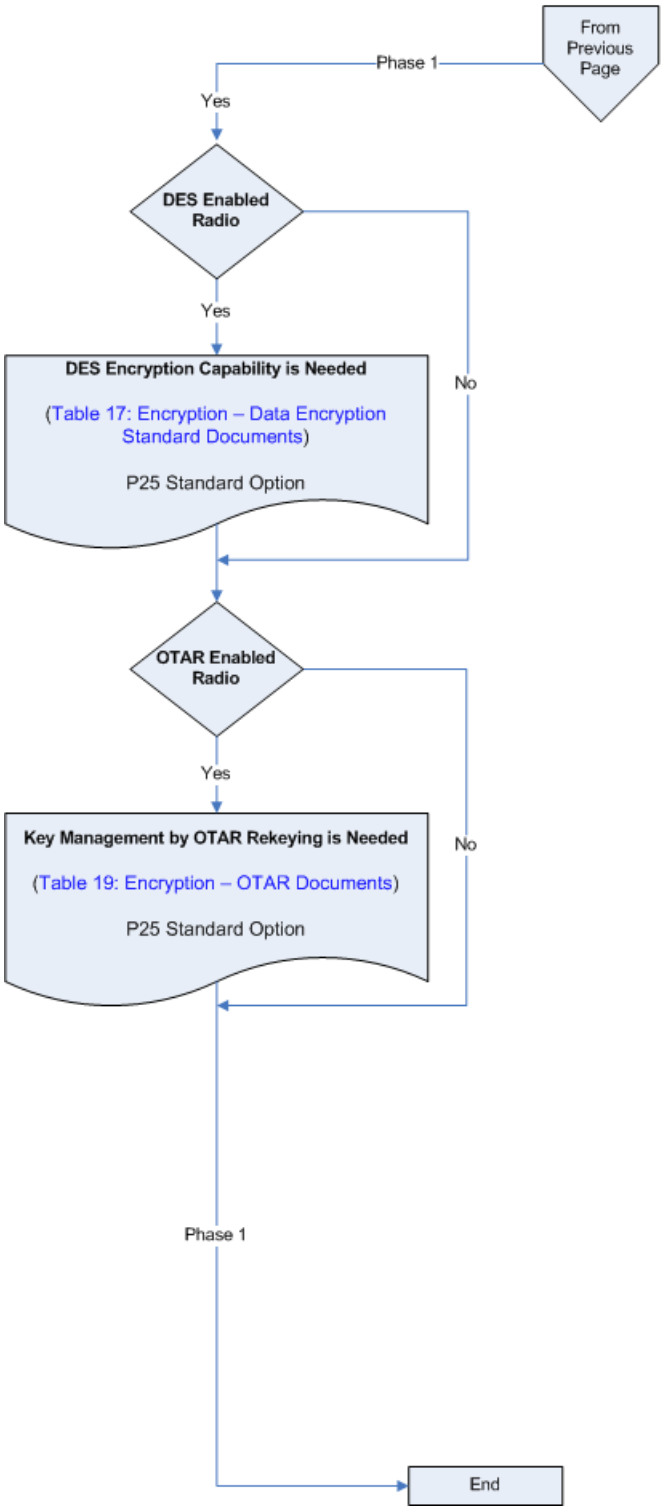
7.4 Project 25 Console



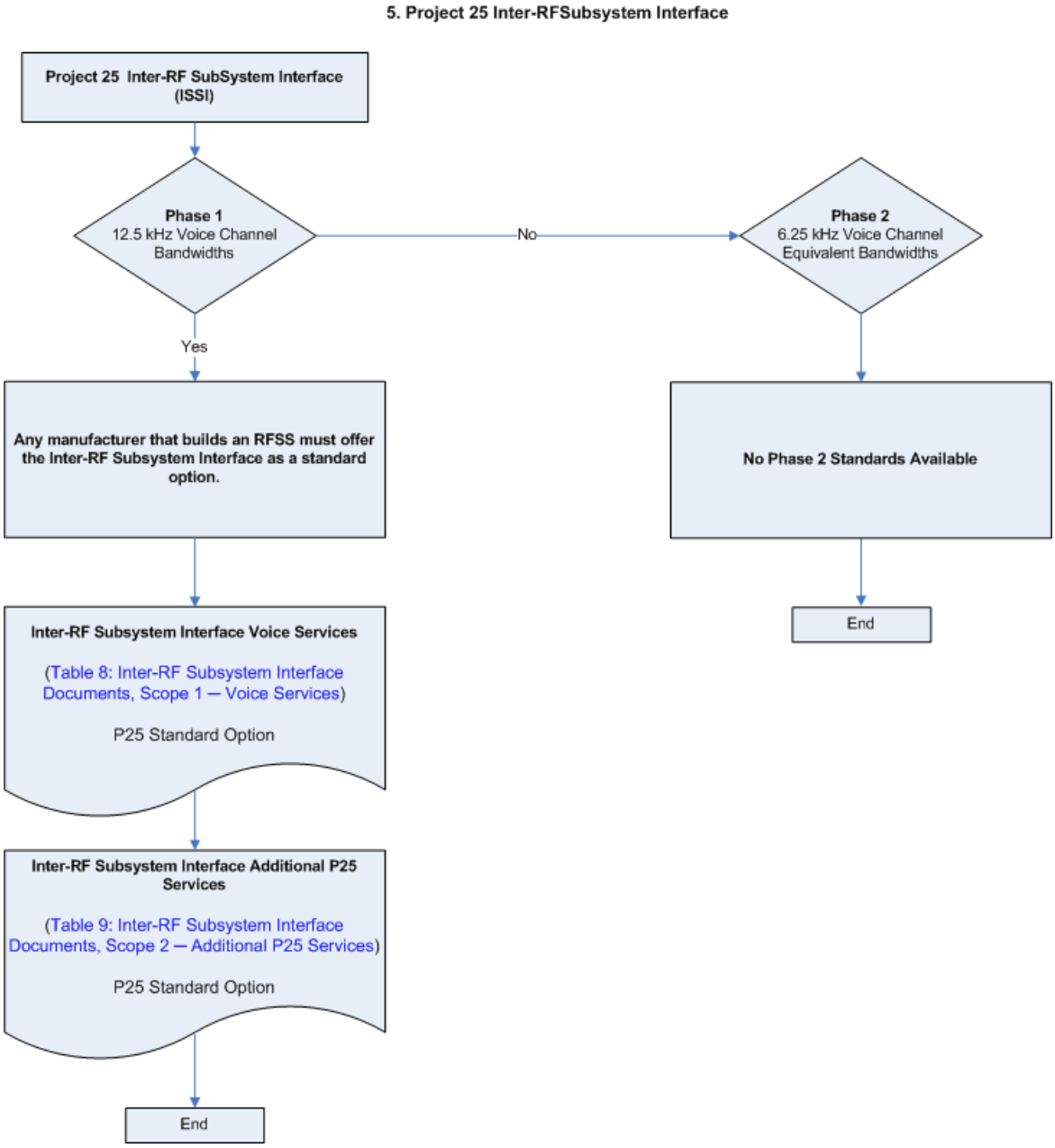
4. Project 25 Console (continued)



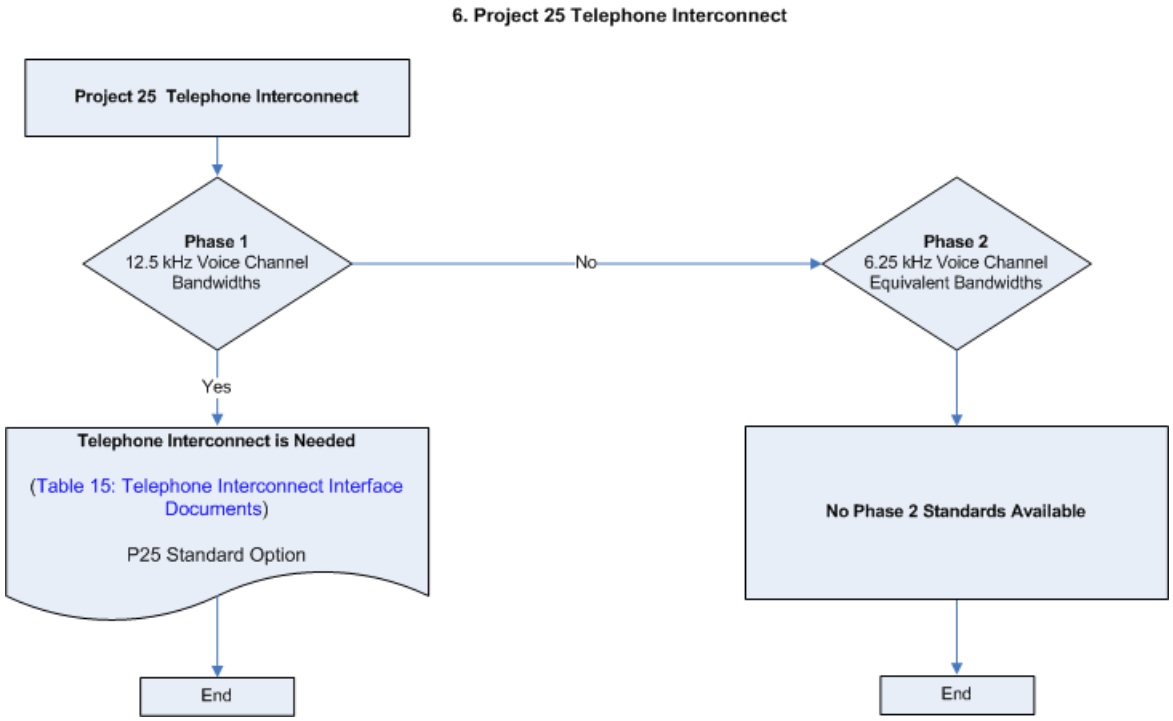
4. Project 25 Console (continued)



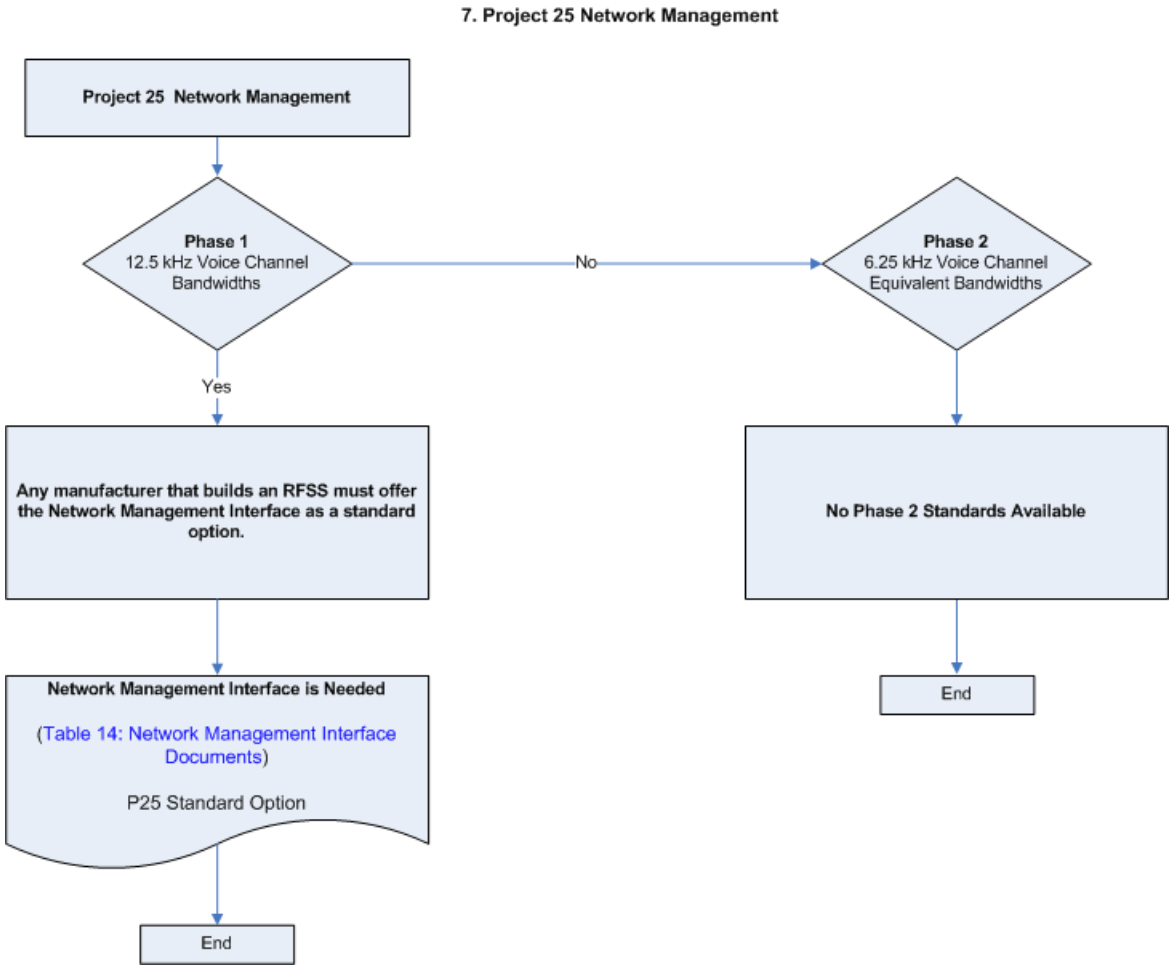
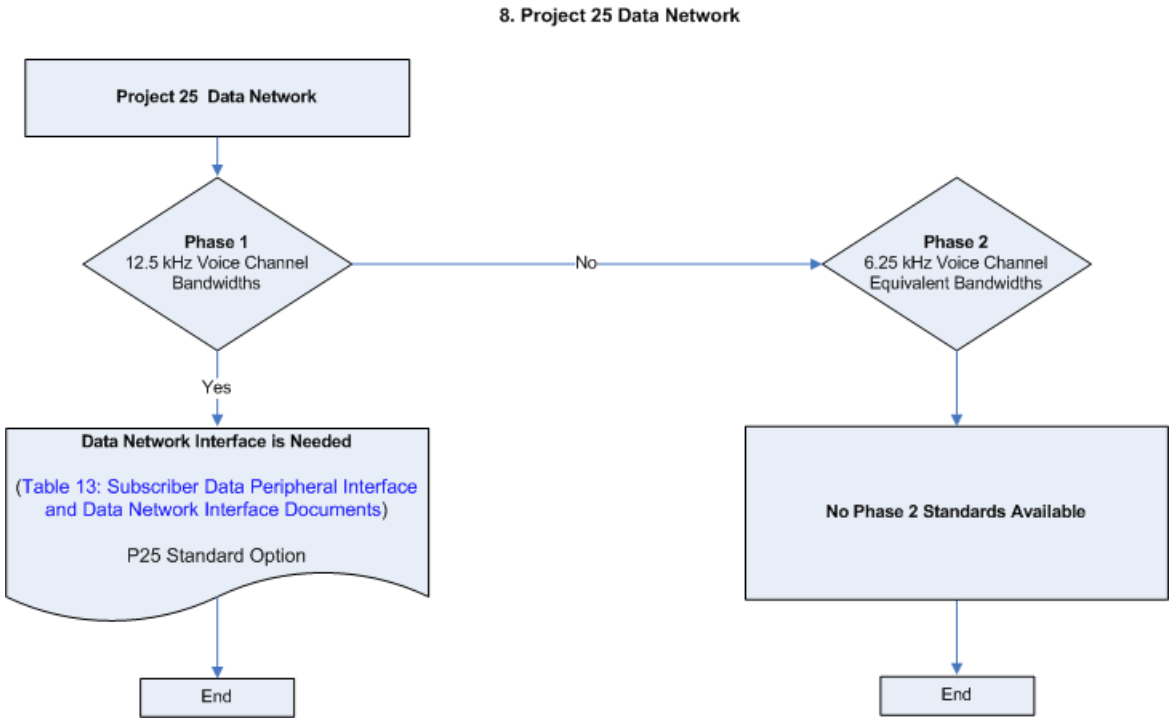
7.5 Project 25 Inter-RF Subsystem Interface



7.6 Project 25 Telephone Interconnect



7.7 Project 25 Network Management



7.8 Project 25 Data Network