

# PROJECT 25 TDMA TRUNKING SUITE OF TIA-102 STANDARDS

# PROJECT 25 TDMA TRUNKING

The Project 25 (P25) standard is supported by the TIA-102 suite of standards. The P25 suite of standards enables interoperability of a diverse set of interfaces and services to cover different communication needs and configurations. P25/TIA-102 standards are used to design and manufacture interoperable communications equipment for mission critical operations. P25/TIA-102 standard has gained worldwide acceptance for public safety and service and many other industries including utilities, transit, petrochemical and mining.

The Common-Air Interface (CAI) is the most widely deployed P25 interface and enables interoperable communications between P25 subscribers and between P25 subscribers and P25 infrastructure. The P25 TDMA trunking suite of standards adds TDMA voice service to the existing P25 FDMA trunking services.

P25 systems use the P25 FDMA control channel for both FDMA and TDMA call requests. This enables systems to support FDMA calls as well as TDMA calls.

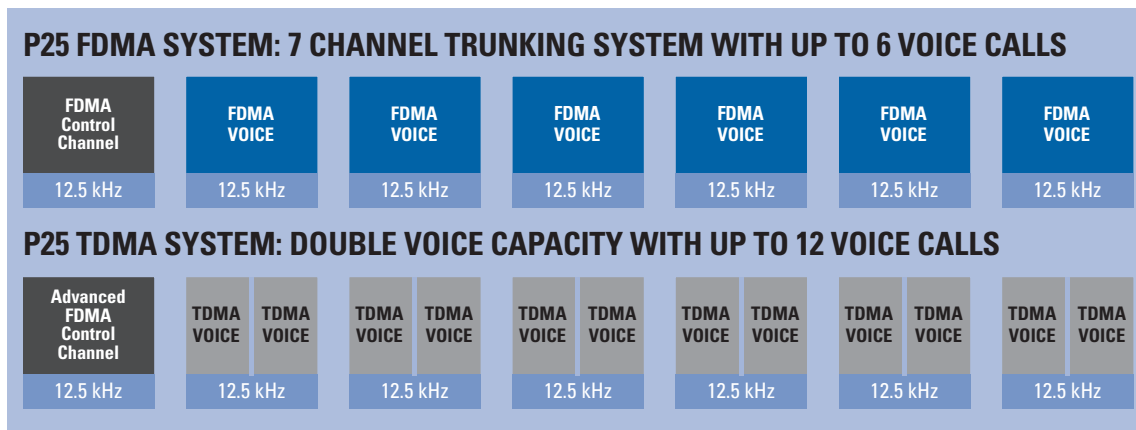
P25 systems use FDMA data services to support P25 OTAR and Location services, thus showing the importance of P25 systems continuing to support P25 FDMA features and operation.

P25 TDMA trunking operation meets the FCC 6.25 kHz equivalent narrowband requirement.

P25 TDMA provides the flexibility to leverage current frequency allocations. A system implementing P25 TDMA services could increase its voice capacity or keep the voice capacity the same and free up channels for data operations.

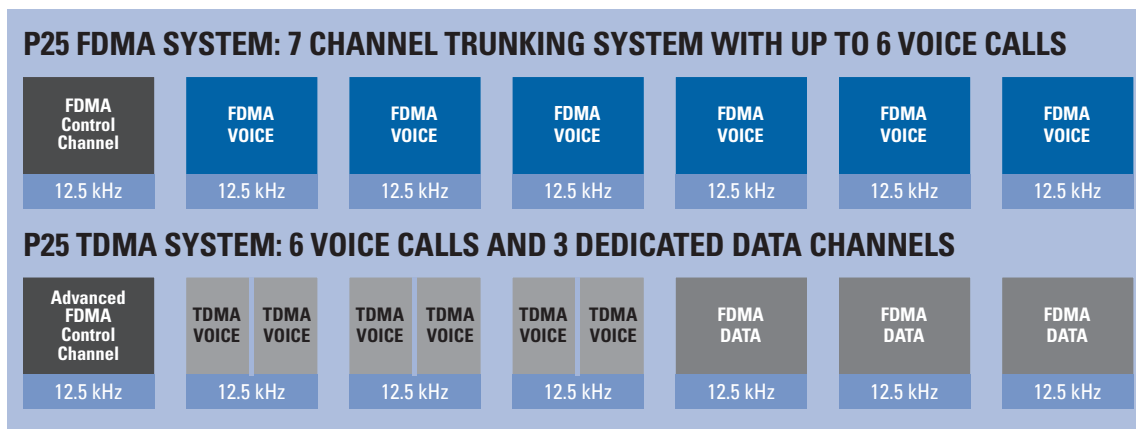
The P25 TDMA standards enhance the functionality of P25 standards and do not replace existing standards.

## USE CASE: INCREASED VOICE CAPACITY WITH TDMA



P25 trunking systems with TDMA operation increase their voice capacity with the same number of channels.

## USE CASE: SAME VOICE CAPACITY PLUS ADDITIONAL DATA CAPACITY WITH TDMA



Channels can be available for Data functionality such as OTAR and location services.

# P25 TDMA AIR INTERFACE STANDARDS COMPLETE

P25 standard documents have the information necessary for manufacturers to build and verify that their equipment is designed to and interoperable with other manufacturers P25 TDMA trunking equipment.

P25 Standard documents can be segmented into two categories:

**Core Definition Documents** enable the development of interoperable P25 trunking equipment.

<b>P25 TDMA CORE DEFINITION DOCS ENABLE DEVELOPMENT</b>	<b>Publication Date</b>	<b>TIA Document Number</b>	<b>Document Description</b>
TDMA Overview	March 2010	TBS-102.BBAA	Describes P25 TDMA Standard and includes FDMA to TDMA migration and interoperability
TDMA Physical Layer	July 2009	TIA-102.BBAB	Modulation and data rate for P25 TDMA operation
TDMA CAI MAC Layer	December 2010 February 2013	TIA-102.BBA C and BBAC-1	Protocol, messages, and procedures for the P25 TDMA
Control Channel Updates	April 2011	TIA-102.AABC-C-1 TIA-102.AABD-A-1	Control channel messages and procedures to enable P25 TDMA radio registration and call assignment
Encryption Updates	August 2009	TIA-102.AAAD-A	Voice/data encryption synchronization on a P25 TDMA channel
Half-Rate Vocoder Annex	July 2009	TIA-102.BABA-1	Lower bit-rate vocoder for the higher spectral efficiency of TDMA
ISSI Messages and Procedures	November 2012	TIA-102.BACA-B	Details messages and procedures required between P25 FDMA and TDMA systems

**Testing Documents** verify the implementation meets the P25 Definition Documents.

<b>P25 TDMA TESTING DOCS VERIFY IMPLEMENTATION</b>	<b>Publication Date</b>	<b>TIA Document Number</b>	<b>Document Description</b>
TDMA CAI Conformance Tests	September 2011	TIA-102.BCAD	MAC protocol tests
TDMA Messages and Procedures Conformance Tests	July 2011	TIA-102.BCAE	MAC messages and procedures tests
TDMA Transceiver Measurement Methods	August 2011	TIA-102.CCAA	Test methods for measuring transmitter and receiver performance
TDMA Transceiver Performance Recommendations	October 2011	TIA-102.CCAB	Performance specification for the TX and RX measurement methods
TDMA Interoperability Tests	July 2011	TIA-102.CABC-B-1	Tests for interoperability between radios and infrastructure
Trunked TDMA Voice Channel Conformance Profiles	August 2012	TIA-102.BCAF	Tests to verify the messages, message sequences and message content for interoperability
TDMA RCAT	June 2012	TSB-102.CBBL	Identifies tests appropriate for P25 TDMA
Enhanced Vocoder Methods of Measurement for Perf	March 2010	TIA-102.BABG	Defines the methods of measurement to test performance of the P25 enhanced vocoder

# MOTOROLA IMPLEMENTS THE STANDARDS

## P25 TDMA TRUNKING IS AVAILABLE ON ASTRO® 25 SYSTEMS SINCE DECEMBER 2011 (RELEASE 7.11 AND LATER)

Project 25 TDMA trunking is an optional feature available now on ASTRO 25 systems. In support of the standard, Motorola has implemented enhancements specified in the P25 TDMA TIA-102 core documents such as the dual rate vocoder in the APX™ subscriber portfolio and the MCC 7500 and 7100 consoles. Key systems components in ASTRO 25, like G-series products (stations, controllers, comparators, receivers) and the MCC 7500 and 7100 consoles, are software upgradeable to TDMA.

Communication between P25 TDMA and P25 FDMA resources is a key priority of Project 25. In addition to the basic communication between P25 TDMA and P25 FDMA resources outlined by Project 25, Motorola offers Dynamic Dual Mode, which enables improved ease of use and system operation. With Dynamic Dual Mode, calls in an ASTRO 25 system are dynamically assigned as FDMA or TDMA depending on the resources that participate in a call. When all the resources (stations, subscribers) in a call are TDMA capable the call is processed as a TDMA call. If any of the resources is only capable of FDMA then the call

is processed as a FDMA call. The call assignment through Dynamic Dual Mode is part of the core call processing application and is transparent to users and requires no intervention from users or network operators.



## ADDITIONAL INFORMATION

### Glossary of Terms

- P25 – Project 25
- TIA – Telecommunication Industry Association
- TIA-102 – TIA Standards Document issued by TIA
- TDMA – Time Division Multiple Access
- FDMA – Frequency Division Multiple Access
- CAI – Common Air Interface
- MAC – Media Access Control Layer
- FCC – Federal Communications Commission
- OTAR – Over The Air Rekeying

### Project 25 Information Sources

- Project 25 Technology Interest Group (PTIG) [www.project25.org](http://www.project25.org)
- TIA (Telecommunication Industry Association) [www.tiaonline.org/standards/](http://www.tiaonline.org/standards/)
- Motorola Project 25 Website [www.motorolasolutions.com/project25](http://www.motorolasolutions.com/project25)