



PTT Technology Evolution

MOTOROLA SOLUTIONS and KODIAK are trademarks or registered trademarks of Motorola Trademark Holdings, LLC. This document is not an offer, commitment, representation, or warranty by Kodiak. Actual product may have features different from, or in addition to, what is described in this document and is subject to change.

What is PTT?

Push-to-talk (PTT) is instant one-to-many or one-to-one mobile voice communication without protracted dialing, ringing, and answering steps in a regular phone call. In addition, a PTT system typically allows only one person to speak at a time (via half-duplex communication) and provides call floor control mechanisms.

	PTT Call	Regular Phone Call
No dialing	✓	X
No ringing	✓	X
No waiting for recipient to answer a call	✓	X
Hands-free receipt of barge call	✓	X
Group call	✓	X
One person speaking at a time (half duplex)	✓	X

While PTT systems/services have evolved to provide more capabilities, the key benefit of PTT has remained the same: highest efficiency of mobile voice communication not available from any other communication tools.

Immediate Call Initiation and Voice Delivery

With PTT, the caller can simply select a contact or a group/channel, press the PTT button, speak, and then release the PTT button to get his voice message delivered instantly. There is no need to go through the traditional lengthy voice-call process of dialing, network switching and routing, and waiting for the other party to answer. High-performance PTT solutions can deliver sub-second call set-up and latency to ensure instantaneous communication.

Convenience of Barge Call to the Recipient

A PTT call is a barge call, allowing the recipient to hear in-coming voice right away, through the PTT device's speaker or an accessory in a hands-free, eyes-free manner, without any action. A barge call eliminates the need for the recipient to press the answering button in order to answer a call and hear the caller's voice. To a construction worker, for example, hearing messages burst out of a speaker on their handset is much more convenient than putting down tools and removing gloves to answer a standard phone call. To respond, the recipient can simply push the PTT button and instantly deliver a voice message back.

Group Call Capability

In addition to one-to-one communication, PTT enables an instant meeting through a group call, which is very useful for team collaboration or delivery of an urgent voice message to multiple people simultaneously.

With a PTT group call, there is no need for users to set up and dial into a conference bridge or add additional parties to a phone call one by one manually. Advanced PTT solutions support calls made to a pre-defined group or an ad hoc group that can be created on the fly.

Say No More Than Necessary

A PTT call lasts less than a minute in talk time on average, which is much shorter than a regular voice call. PTT eliminates the typical greetings and ending protocol used in regular phone conversations. Therefore, PTT allows users to say no more than necessary, focus on getting the job done, and improve productivity accordingly.

PTT vs. SMS or Email

Substitutes to PTT include text messaging and e-mail, which support group communications. Why do people still use PTT? First, talking is much faster than typing. Second, even though speech-to-text applications are available, the feedback loop of a voice call is much shorter than text-based communication. Third, there are many situations where eyes and hands are tied up, making text or email communication infeasible.

PTT Technology Evolution

PTT as an application has been delivered primarily through one of the following:

- Land mobile radio (LMR, also called private mobile radio or PMR)
- Integrated Digital Enhanced Network (iDEN)
- Broadband PTT (PTT over mobile broadband)

LMR Systems

LMR represents the first technology developed for PTT communication, and it is still widely used today. An LMR system consists of portable or mobile radios and repeaters/base stations that transmit communication signals received from one party to another. In 1933, the Bayonne, New Jersey police department of the United States became the first entity to operate an LMR system. Since then, LMR has evolved from conventional to trunked and analog to digital (e.g., P25 and TETRA).

LMR has remained a technology specifically designed for PTT, typically deployed for communications over a private network in a specific location. Public safety agencies have relied on LMR systems for mission-critical voice communications. Business entities in multiple verticals have also used LMR for business-critical communications.

Key advantages of LMR systems include high reliability, high durability, ease of use, and direct mode capability (talkaround without network infrastructure). As a narrowband technology, however, LMR has limitations, such as low bandwidth available for data applications. Interoperability between different LMR systems is also a challenge.

iDEN

iDEN is another mobile communications technology that enables PTT communication. It provides the capabilities of a digital cellular telephone, two-way radio, alphanumeric pager, and data/fax modem in a single network.

Originally introduced by Motorola in 1993, iDEN was first launched as a commercial network by Nextel in the United States in 1996. Despite shut-down by Sprint in 2013, iDEN is still used in numerous markets.

Like LMR, iDEN is also a narrowband 2G technology. Thus it has limited data capabilities, and today's smartphones do not work on an iDEN network.

Broadband PTT

Initial PTT-over-cellular (PoC or PTTtoC) systems were introduced to the market in the early 2000's, and they were designed to support 2G/2.5G networks. Since then, cellular networks have rapidly advanced to 4G/LTE that supports bandwidth-intensive mobile data applications. The latest broadband PTT technology leverages commercial broadband cellular networks and supports Wi-Fi as well, capable of delivering high-performance instant one-to-one and group voice communications.

Broadband PTT can be used on a broad range of devices that include standard smartphones, ruggedized smartphones, specialty rugged phones with a dedicated PTT button, and tablets.



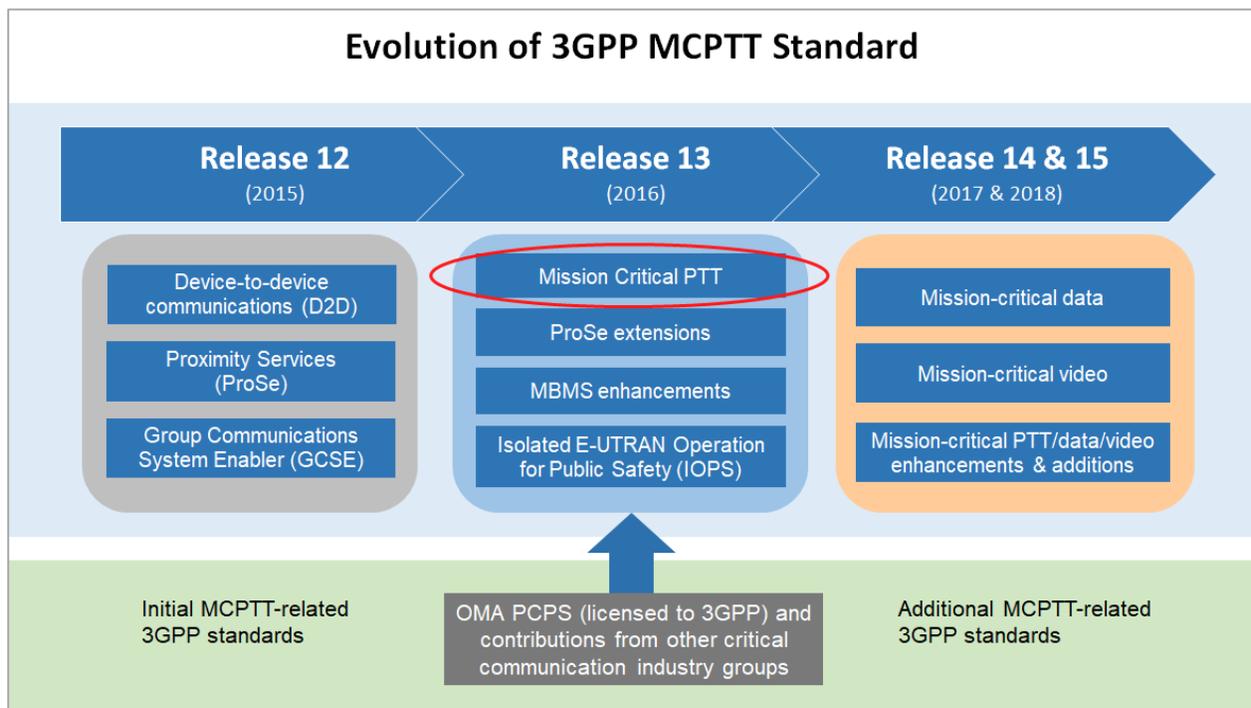
Users of broadband PTT benefit from sub-second call set-up, high voice quality, numerous advanced features, multimedia applications integrated on the same device, and nationwide network coverage. Organizations that have been using LMR can cost-effectively leverage broadband PTT for LMR augmentation.

From Commercial Broadband PTT to MCPTT over LTE

While broadband PTT has been originally driven by the needs of commercial business users, the evolving mission-critical push-to-talk (MCPTT) standard from 3GPP is aimed at allowing public safety agencies to leverage broadband PTT over LTE for mission-critical communications.

In 2015, the Open Mobile Alliance (OMA) released its Push to Communicate for Public Safety standard (PCPS v1.0), which is based on OMA PoC specifications. OMA licensed PCPS to 3GPP so that 3GPP could use PCPS as the foundation of MCPTT without having to “re-invent the wheel”. While 3GPP MCPTT efforts officially started with Release 12, which includes initial specifications related to Group Communication Service Enablers (GCSE) and direct mode communication (ProSe), the MCPTT standard was formally established in 3GPP Release 13 in March 2016.

Release 13 provides a systematic set of technical specifications of mission-critical voice communication over LTE, including mission-critical push-to-talk, Proximity Services (ProSe) enhancements, Multimedia Broadcast Multicast Services (MBMS) enhancements, and Isolated E-UTRAN Operation for Public Safety (IOPS). Release 14 and 15 carry the MCPTT standards efforts forward by addressing mission-critical video and data as well as enhancements of MCPTT voice communication.



Kodiak, a Motorola Solutions Company, is at the center of convergence of commercial and public safety broadband PTT. In fact, Kodiak was the architect of the OMA PoC v2 standard. It also made significant contributions to the OMA PCPS standard, including the following:

- PoC Control Plane technical specification
- XDM technical specification
- Entire set of XML schemas

As the broadband PTT industry leader, Kodiak continues to contribute to 3GPP standards related to mission-critical communications and keeps leading the industry in standards implementation and compliance.

Kodiak Solution

Like the MCPTT standards development efforts, an MCPTT solution can be delivered in phases. Since the OMA PCPS standard provides the commercial-ready baseline for MCPTT, an existing broadband PTT platform compliant with OMA PCPS provides an operational MCPTT baseline solution today, and that is exactly what is available from Kodiak. Key features of Kodiak Broadband PTT include the following:

- Sub-second call set-up
- 1:1 private call
- Pre-arranged group call
- Ad hoc group call
- Real-time presence
- Call alert (call-me alert and missed-call alert)
- AES 256-based media and signaling encryption
- Centralized, Web-based contact and group management
- Supervisory override
- Talk group scanning with priority
- Broadcast calling
- Multimedia messaging (text, picture, video, location, recorded voice message, etc.)
- Location mapping and geo-fencing on device
- Broad device choices
- Interoperability with LMR systems
- High scalability
- High reliability

Summary

PTT as application is available from three major types of technology platforms: LMR, iDEN, and broadband PTT. Since 2012, Kodiak has been working with numerous leading mobile network operators to commercially deploy hardened broadband PTT service. Tightly integrated into carriers' networks and optimized for the radio access network (RAN), Kodiak Broadband PTT has been delivering reliable and high-performance PTT service to end customers in multiple countries. For more information about Kodiak and its solutions, visit kodiakptt.com.