



PTT TECHNOLOGY EVOLUTION

A BRIEF LOOK AT THE DEVELOPMENT OF PUSH-TO-TALK TECHNOLOGY THROUGH THE AGES



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.

While PTT systems and 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.

	PTT Call	Regular Phone Call
No Dialing	✓	✗
No Ringing	✓	✗
No Waiting for Recipient to Answer a Call	✓	✗
Hands-free Receipt of Barge Call	✓	✗
Group Call	✓	✗



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 incoming 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

An 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 typical PTT call lasts less than a minute, much shorter than a regular voice call, because it eliminates the typical greetings and ending protocol used in regular phone conversations. PTT calling allows users to say no more than necessary, focus on getting the job done, and improve productivity accordingly.

PTT vs. SMS or Email

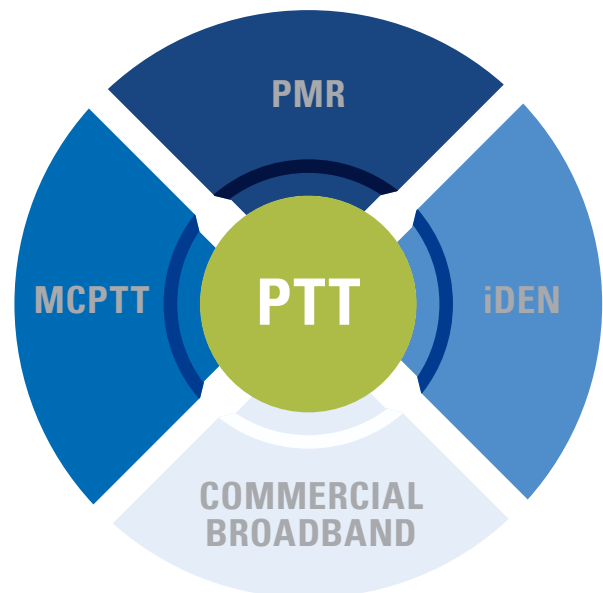
Text messaging and e-mail can also be used for group communications, so why do people still use PTT? First, talking is much faster than typing. Second, even though speech-to-text applications are available, the feedback loop of a voice call is much shorter than text-based communication. Third, there 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:

- Professional Mobile Radio (PMR)
- Integrated Digital Enhanced Network (iDEN)
- Commercial Broadband PTT (PTT over mobile broadband)
- Mission-Critical PTT (MCPTT)



PMR Systems

PMR represents the first technology developed for PTT communication, and it is still widely used today.

A PMR 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 a PMR system. Since then, PMR technology has evolved from conventional to trunked and analog to digital (e.g., P25 and TETRA).

PMR 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 PMR systems for mission-critical voice communications. Business entities in multiple verticals have also used PMR for business-critical communications.

Key advantages of PMR systems include high reliability, high durability, ease of use, and direct mode capability (talkaround without network infrastructure). As a narrowband technology, however, PMR has limitations, such as low bandwidth available for data applications. Interoperability between different PMR technologies 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. Though the Nextel iDEN service was purchased and subsequently shut-down by Sprint in 2013, iDEN is still used in numerous markets globally.

Like PMR, iDEN is a narrowband 2G technology which has limited data capabilities, nor do today's smartphones work on an iDEN network.



Commercial Broadband PTT

Initial PTT-over-cellular (PoC or PTToc) 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 PMR can cost-effectively leverage broadband PTT for PMR 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.

EVOLUTION OF 3GPP MCPTT STANDARD

RELEASE 12 (2015)	RELEASE 13 (2016)	RELEASE 14 & 15 (2017 & 2018)
Device-to-Device Communications (D2D) Proximity Services (ProSe) Group Communications System Enabler (GCSE)	Mission-Critical PTT	Mission-Critical Data Mission-Critical Video Mission-Critical PTT/Data/Video Enhancements and Additions
	ProSe Extensions MBMS Enhancements Isolated E-UTRAN Operation for Public Safety (IOPS)	
Initial MCPTT-Related 3GPP Standards	OMA PCPS (licensed to 3GPP) and contributions from other critical communication industry groups	Additional MCPTT-Related 3GPP Standards

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

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

A broadband PTT industry leader, Motorola Solutions continues to contribute to 3GPP standards related to mission-critical communications and leads the industry in standards implementation and compliance.





PTT FROM MOTOROLA SOLUTIONS

Motorola Solutions recognizes that when it comes to push-to-talk communications one size, or in this case, one technology does not fit all. The right PTT communication platform should fit within your existing workflows, not the other way around. Our breadth of PTT solutions include:

- PMR – with analog and digital solutions compliant with APCO P25, TETRA and DMR standards
- WAVE, broadband PTT which operates over any broadband network
- Kodiak, a white labeled broadband PTT solution integrated into the carriers' broadband networks.

Motorola Solutions is uniquely positioned to provide all aspects of PTT technology. Whether you are a commercial enterprise, local/state government or national government/military we make it possible for you to get a tailored push-to-talk solution that's the right fit for your specific size, industry, and budget.

For additional information about Broadband Push-to-Talk, please visit: www.motorolasolutions.com/broadbandptt



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SUMMARY

Motorola Solutions recognizes that instantaneous communication at the push of a button is key to keeping your teams connected and more productive. We understand that PTT brings the immediacy and spontaneity needed to connect different personnel together seamlessly, regardless of network, location or device used. That's why we continue to invest the resources necessary to remain at the forefront of the PTT technology evolution.