Next generation Push-to-Talk
Reshaping PTT for the modern day workforce
Introduction

Push-to-Talk (PTT) over radio systems has been around since the mid-1930s. The first PTT over commercial cellular system was developed in 1987. Since then, PTT over cellular has evolved to become a next-generation broadband PTT service. A key characteristic of PTT is instant communication with an individual or a group with the push of a button on a handset. The quick and efficient nature of PTT calls has made the technology a core communication tool for the public safety sector and dozens of industry verticals that have a highly mobile work force.

PTT over commercial cellular networks is now being re-defined, thanks to evolution of cellular networks, emergence of smartphones, new PTT-enabling technology, etc. Next-generation PTT from AT&T sets a new benchmark for performance, features, network coverage, handset choices, and cost savings to end customers.

Why PTT?

In numerous industries that have been using PTT, it is a technology that has become irreplaceable. PTT customers value the convenience and productivity of being able to initiate a 1:1 call or a group call with the push of a button and instantly communicate a message over the speaker of the recipient’s handset (vs. taking the time to dial, answer, go through greetings, etc., all before getting down to business). For example, a dispatcher can communicate location and delivery instructions over PTT faster than it would take most drivers to answer a ringing phone. For a construction worker, hearing messages burst out of a speaker on their handset is more convenient than putting down tools and removing gloves to answer a standard phone call. Since PTT calls are half-duplex, they are typically more informal, sporadic, and business-focused than a standard phone call.

Characteristics of a PTT service

Frequent users of PTT indicate that some of the key characteristics of the service are as follows:

Speed
Sub-one-second call set-up (the time it takes for the first volley) and sub-second latency (the time it takes for users to volley back and forth)

Simplicity
Easy to understand, access and use, as simple as pushing a button to initiate a call

Call bursts
Less than a minute in talk time on average, allowing users to ‘get things done’ quickly without taking the time that is common for typical phone calls

Group calls
Ability to pull multiple people together into a voice call instantly and simultaneously, without the inefficiencies of scheduling calls, reserving conference bridges, and waiting for participants to join

Handsets & accessories
Rugged PTT handsets built with military-grade specifications to ensure durability, coupled with special accessories for ease of operation (e.g., a wireless speaker microphone)
Since PTT became a proven communications tool to industries, it has been delivered primarily through three types of networks:

- Land mobile radio (LMR), also called private mobile radio (PMR)
- The iDEN network (e.g., the commercial PTT network built out by Nextel in the 1990s and de-commissioned by Sprint in 2013)
- Commercial cellular networks with PTT added as a new service (PTT over Cellular, or PoC)

Below are examples of industries and business types that have been using commercial PTT and LMR-based services:

### Industrial & Utilities
- Manufacturing plants
- Warehousing facilities
- Electric, gas, wind, solar energy utilities
- Natural resource exploration companies

### Transportation & Logistics
- Shipping, delivery, and freight
- Transportation services
- Airport passenger facilities, security and tarmac operations
- Marine terminals and port operations

### Field Services
- HVAC servicing
- Automobile towing and heavy equipment recovery companies
- On-site facilities maintenance services

### Public Services
- Government and public safety
- Water and sewage treatment plants
- Trash, refuse, & recycling services
- Schools/universities
- Convention centers and hospitality
- Coliseums, sports arenas & stadiums

### Medical
- Hospitals
- Nursing facilities
- Ambulance and emergency medical providers

### Construction
- Engineers & technical surveyors
- Contractors
- Electricians, roofers, plumbing and safety coordinators
- Landscapers

**Industry developments making PTT more relevant today and tomorrow**

Over the past few years, several key industry developments have changed the dynamics of PTT and made the service even more useful. Such developments include the emergence of 4G LTE network, the development and adoption of industry standards for PTT over cellular, the abundance and versatility of smartphones, rapid market adoption of mobile broadband data, and efficiency of integrated business applications.

**4G LTE network**

Mobile networks have been going through a rapid evolution. Within about ten years, commercial mobile network technology advanced from 2G to 4G LTE (Long-Term Evolution). AT&T has invested billions of dollars every year to upgrade its mobile network and make mobile broadband a reality. Today, AT&T provides the nation’s most reliable 4G LTE network that covers over 300 million people.

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**History of continuously improving network speeds for fast and reliable performance**

<table>
<thead>
<tr>
<th>Wireless Network Evolution</th>
<th>Theoretical Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPRS</td>
<td>48 Kbps</td>
</tr>
<tr>
<td>EDGE</td>
<td>237 Kbps</td>
</tr>
<tr>
<td>UMTS</td>
<td>384 Kbps</td>
</tr>
<tr>
<td>HSDPA</td>
<td>7.2 Mbps</td>
</tr>
<tr>
<td>HSDPA 7.2</td>
<td>13.6 Mbps</td>
</tr>
<tr>
<td>HSPA+</td>
<td>21.6 Mbps (net)</td>
</tr>
<tr>
<td>LTE</td>
<td>72.6 Mbps (net)</td>
</tr>
<tr>
<td>LTE- Advanced</td>
<td>Theoretical Peak 1 Gbps (est)</td>
</tr>
<tr>
<td>Introduce AT&amp;T VoLTE w/HD Voice</td>
<td>Can deliver 4G speeds with enhanced backhaul*</td>
</tr>
</tbody>
</table>

Based on theoretical peak speeds. Actual speed experienced will be less. 4G LTE not avail. everywhere. 4G speeds are delivered by HSPA+ or LTE, where available. Compatible device and data plan required. LTE is a trademark of ETSI. Further information at att.com/network.

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Push to Talk over Cellular (PoC) is a service that allows subscribers using a commercial cellular network to turn their handset into a walkie-talkie but without limitations of private LMR systems. IP-based PoC transmits voice as data packets over the data channel of a mobile network.

With the availability of broadband wireless networks using advanced 4G technology, PoC has become a high-performance and business-grade application. A 4G network delivers much more bandwidth than 2G and also provides superior quality of service for IP-based applications. With the right PTT technology platform, IP-based PoC over high-bandwidth 4G LTE can deliver the following:

- Sub-second call set-up
- Voice quality that is even better than a regular cellular phone call
- Multimedia and other advanced mobile broadband data applications

In an independent test of AT&T’s next-generation PTT (called Enhanced PTT and abbreviated as EPTT), call set-up time was on par with or out-performed competitors, and voice quality is far superior.

It is noteworthy that in addition to having built out the nation’s most reliable 4G LTE network, AT&T also operates more than 30,000 Wi-Fi Hot Spots in the U.S. AT&T EPTT service supports PTT over Wi-Fi.

Development of industry standards

Traditional PTT systems are proprietary. AT&T, however, is the first US carrier to offer a PTT service based on industry standards. The Open Mobile Alliance (OMA) defined PoC as part of the IP Multimedia Subsystem in 2005 and approved the PoC V1.04 standard in 2009. OMA’s PoC V2.0 standard, approved in 2011, expanded on instant voice communication defined in V1.04 and enabled interoperability among network entities, including an interworking functionality that allowed other external PTT networks to interwork with a PoC service infrastructure.

AT&T’s EPTT complies with OMA’s PoC V2.0 standard, ensuring not only interoperability but also a future-proof PTT service. Subscribers do not face the prospect of having to switch to a new system or new handsets when an upgraded PTT system is deployed in the future. AT&T offers the last PTT solution that subscribers will ever need.

Smartphones and tablets

Smartphones not only support regular voice communication and text messaging but also provide advanced computing capabilities (such as e-mail and Web browsing), a portable media player, GPS navigation, a built-in camera, and network connectivity through both cellular and Wi-Fi. Various business applications that once were supported by various separate technologies have rapidly moved to the smartphone. AT&T is the first carrier to deploy the iPhone and offers the most extensive portfolio of smartphones among all carriers in the US. AT&T has a smartphone for every budget.
The positive impact of smartphones on PTT is very significant. Below is a summary of how smartphones make PTT more relevant today and tomorrow.

- **Wider handset choices via a downloadable PTT client:** Now PTT users can use a downloadable PTT client for smartphones. Thus, PTT handset choices include not only feature phones but also smartphones. Today, AT&T provides the widest choices of smartphones for PTT, including ruggedized models.

- **Integration of GPS-based location tracking in PTT handsets:** With GPS built into smartphones, dispatchers can track where mobile workers are and thus can allocate resources much more efficiently. Fleet management systems, which traditionally require a variety of special devices, can now leverage smartphones. AT&T’s EPTT offering includes an available dispatch console that integrates GPS tracking functionality.

- **Application consolidation into one PTT-enabled device:** Mobile workers now do not have to carry a PTT phone for instant voice and a smartphone for mobile data applications. Now they can use a single device for both purposes, which reduces handset cost and increases productivity.

In addition to smartphones, tablets have also been widely used by business entities and government agencies as well as consumers. AT&T EPTT supports PTT over tablets (e.g., iPAD and Android-based tablets), providing subscribers with the convenience of using PTT on a highly mobile and portable data terminal.

### LMR augmentation

LMR is a term that denotes two-way radio systems used by commercial entities, government agencies, and other organizations to fill a wide range of communication requirements, including logistical coordination, quick communication, emergency response, and security.

While a proven technology for PTT communication, LMR has its limitations, including coverage constraints, very limited data capability (if any), and lack of resource-efficient support for 1:1 private calls. LMR users thus have a strong need to use cellular networks as LMR supplement/augmentation. According to a recent survey of US LMR users (conducted by Kodiak, which powers AT&T’s EPTT service), 75% of non-managerial LMR end users and 97% of decision makers who carry a LMR radio while at work already use commercial cellular networks to supplement LMR. The key use cases of such supplementation include:

- Voice calls outside LMR coverage area
- 1:1 private calls
- Text messaging
- Internet access
- Office email
- Photos/video

With AT&T EPTT, LMR users can add PTT to an existing cellular plan (for a very low monthly fee) and use a cellular handset for PTT communications, with interoperability with LMR systems. LMR augmentation using AT&T EPTT provides organizations with the following benefits:

- Extend the reach of the existing LMR system
- Reserve the capacity of the existing LMR system to those who need it most
- Allow more employees to use PTT cost-effectively
- Eliminate the need for some employees to carry two devices: a LMR radio for PTT and a smartphone for mobile broadband data
Evolving field force management and next generation of PTT

A key component of field force management is communication. While mobile technologies have continuously evolved, so has field force management. Today, organizations that have a mobile workforce face the following challenges:

- Demand for real-time intelligence or information, such as field workers’ status and location
- Fragmentation of communication technologies in silos (e.g., LMR, 2G/3G/4G cellular, Wi-Fi, wireline, etc.)
- Proliferation of new mobile devices and applications (two-way radio, smartphones, tablets, etc.)
- Pressure to reduce communication costs and increase efficiencies
- Diverse needs of different functions of the workforce
- Changing organizational structure due to streamlined operations, increasingly matrixed environment, closer cooperation with partners, etc.

AT&T’s EPTT retains the traditional strengths of PTT and offers numerous new capabilities (to be illustrated in the next section). The table below summarizes how AT&T’s EPTT can help organizations optimize field force management.

<table>
<thead>
<tr>
<th>Challenges of field force management</th>
<th>How AT&amp;T’s EPTT can help meet the challenges</th>
</tr>
</thead>
</table>
| Demand for real-time intelligence or information | - Real-time presence  
- PTT-enabled smartphones with built-in GPS  
- Integration of voice and data on mobile devices |
| Fragmentation of communication technologies in silos | - Integration of communication applications  
- Interoperability with LMR  
- PTT over both cellular and Wi-Fi  
- PTT on a desktop PC |
| Proliferation of new mobile devices and applications | - Consolidation of mobile devices into a single smartphone or tablet that can support both PTT and other applications |
| Pressure to reduce communication costs and increase communication efficiencies | - Instant voice and group communication  
- Future-proof PTT service  
- Leverage of existing commercial cellular network |
| Diverse needs of different functions of the mobile workforce | - Versatility of 4G networks and PTT-enabled smartphones |
| Changing organizational structure | - Centralized management of internal/external contacts and real-time synchronization with mobile workers’ PTT handsets  
- Increase of contacts/groups on the PTT handset |

The evolution of mobility

- **Opportunistic Mobility**  
  - Point solutions  
  - Addresses specific employee classes  
  - Limited extendibility

- **Strategic Mobility**  
  - Addresses large subset of mobile workers  
  - Common architecture for mobility  
  - “Policy-driven” approach  
  - Sophisticated administration

- **Holistic Mobility**  
  - Integrated into most business and IT processes  
  - Influences work behaviors  
  - Ubiquitous connectivity  
  - Internal and customer-facing activities  
  - Communications enablement

Source: The Yankee Group
Enhanced PTT Offering from AT&T

AT&T’s EPTT has set the utmost standard for PTT and provides numerous features and benefits not available from alternative services.

Key Features of AT&T EPTT

AT&T EPTT leverages the latest advances of mobile communication technologies and delivers an unprecedented user experience of push to talk. AT&T has re-defined PTT in the following key areas:

- Supports PTT over 4G LTE/3G networks and Wi-Fi as well, ensuring ubiquitous coverage, fastest speed, best voice quality, and mobile application integration.
- Supports the widest portfolio of PTT devices and accessories in the industry, including the iPhone, Android-based-smartphones, and specialty feature phones, giving organizations utmost handset flexibility that meets their specific communication needs and budget requirements.
- Compliant with industry standards, which ensures future-proof PTT service and eliminates lock-in to old technology and the cost of being forced to switch to new handsets and service plans in the future.
- Enables simplified, efficient, cost-effective, and feature-rich communications service for the mobile workforce, through a single device for both PTT and mobile broadband data.
- Offers best-of-breed PTT performance and product features, including sub-second call set-up, AES 256 encryption, FIPS 140-2, and Web-based contact/group management.
- Interoperability with LMR through a gateway or an existing dispatch console.

The following two tables provide a summary of the key differentiators, features, and benefits of AT&T’s EPTT.

<table>
<thead>
<tr>
<th>Feature</th>
<th>AT&amp;T EPTT</th>
<th>LMR</th>
<th>Legacy Carrier PTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support for 4G LTE/3G cellular and Wi-Fi</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Ubiquitous coverage</td>
<td>Yes</td>
<td>No</td>
<td>Depends on carrier</td>
</tr>
<tr>
<td>Device choices</td>
<td>Smartphones, feature phones, &amp; tablets</td>
<td>LMR radio only</td>
<td>Limited device choices</td>
</tr>
<tr>
<td>Single device for both PTT &amp; mobile broadband data</td>
<td>Yes</td>
<td>No</td>
<td>Data over limited device choices</td>
</tr>
<tr>
<td>Standards-based</td>
<td>Yes</td>
<td>Partially</td>
<td>No</td>
</tr>
<tr>
<td>Future-proof</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
AT&T EPTT sets a new standard for PTT features and performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td># of contacts</td>
<td>Up to 1,000 Larger than any other existing PoC platform</td>
</tr>
<tr>
<td># of groups (pre-defined)</td>
<td>Up to 100 Larger than any other existing PoC platform</td>
</tr>
<tr>
<td>Members per group</td>
<td>Up to 250 Larger than any other existing PoC platform</td>
</tr>
<tr>
<td>Ad hoc group calls</td>
<td>Yes Convenient for calling a non-pre-defined group (up to 10 members per ad hoc group)</td>
</tr>
<tr>
<td>Centralized contact &amp; group management</td>
<td>Feature-rich Web-based tool Contact/group management by a corporate administrator and real-time synchronization with corporate PTT subscribers' handsets wirelessly, eliminating the need for PTT users to manually enter and manage PTT contacts and groups</td>
</tr>
<tr>
<td>Call set-up</td>
<td>Sub-second Comparable to or better than other PTT solutions</td>
</tr>
<tr>
<td>Voice quality</td>
<td>High MOS score: ~3.6 Better than a regular cellular call (GSM MOS score: ~2.33)</td>
</tr>
<tr>
<td>Presence</td>
<td>Real-time presence Most robust in the industry. Presence status includes Availability, Do Not Disturb (DND), and Offline</td>
</tr>
<tr>
<td>Broadcast calling</td>
<td>Yes Allows a dispatcher or EPTT subscriber to initiate a pre-emptive one-way call to a large number of people at the same time</td>
</tr>
<tr>
<td>Prioritized talk group scanning</td>
<td>Yes Allows an EPTT subscriber to create a scan list of talk groups for monitoring, with up to three groups that can be set up as priority groups</td>
</tr>
<tr>
<td>Encrypted voice/signaling and FIPS 140-2 security</td>
<td>Yes Peace of mind when it comes to communication security</td>
</tr>
<tr>
<td>Late join/Re-join</td>
<td>Yes Allows a participant to conveniently join or rejoin a group call after it has already started</td>
</tr>
<tr>
<td>Supervisory override</td>
<td>Yes Allows a supervisor to take over the floor any time during a group call, even when someone else is speaking. Supervisors are assigned by a corporate administrator through a centralized contact management tool</td>
</tr>
<tr>
<td>PTT/cellular call interaction</td>
<td>Yes Allows a PTT subscriber to put a PTT call on hold to answer an in-coming cellular call</td>
</tr>
<tr>
<td>Speaker identification</td>
<td>Yes Useful for identifying who has the floor</td>
</tr>
<tr>
<td>Instant personal alert</td>
<td>Yes Convenient feature for requesting a call-back</td>
</tr>
<tr>
<td>Roaming</td>
<td>Yes Allows a subscriber to use PTT while traveling internationally</td>
</tr>
<tr>
<td>Dispatch console</td>
<td>Yes Supports dispatcher PoC calling &amp; GPS mapping of PTT subscribers (see Dispatch Console section below)</td>
</tr>
<tr>
<td>API for 3rd-party applications</td>
<td>Yes Enables integration of EPTT into 3rd-party applications</td>
</tr>
<tr>
<td>Cellular/LMR interoperability</td>
<td>Yes Allows EPTT subscribers to communicate to LMR users by using an interoperability gateway or an existing dispatch console that supports CSSI</td>
</tr>
</tbody>
</table>
Integrated Dispatch Console

AT&T’s integrated dispatch console is Windows-based and provides an intuitive user interface. The console allows a dispatcher to operate from a centralized location to manage, command, and control activities for EPTT subscribers working in the field. This product provides the following key capabilities to the dispatcher:

- Manage the corporation’s EPTT contacts and groups for dispatching purposes
- See presence status of all contacts and get presence updates in real time
- Initiate a PTT call to an individual, a pre-defined group, or an ad hoc group
- Use supervisory override to take over the floor of at any time during a PTT call by pre-empting the talker
- Monitor various talk groups and join or leave active group sessions
- Locate an individual or group members through Google Maps and make calls or send alerts by selecting members from the map
- Record voice calls and view call history

Summary

PTT is a proven and critical communications tool to numerous industry verticals due to its core capability to deliver instant voice and enable group communication with the push of a button. PTT is now becoming even more relevant due to the combination of the following industry developments:

- Availability of high-bandwidth 4G technologies that enable high-performance PoC
- Development of PoC industry standards that can ensure interoperability and future-proof PoC service
- Versatility of smartphones that can consolidate PTT and multiple other applications into a single device
- LMR users’ need to leverage commercial cellular networks for mobile broadband data, leading to fragmentation of communication networks and devices, an issue addressable by next-generation PTT
- Evolving needs of mobile work force management, which call for more effective and efficient mobile communications

AT&T’s EPTT is built upon the latest mobile communication technologies and addresses the needs of end customers in a continuously changing business environment. AT&T EPTT has redefined PTT through the following:

- The first PTT service over a 4G LTE network in the US
- Compliance with PoC industry standards
- Future-proof PTT service
- Delivery of PTT through both cellular networks and Wi-Fi
- Widest mobile client portfolio for PTT, including smartphones as well as low-cost feature phones
- Superior PTT performance and features
- Tools and API’s for streamlined operations and application integration
- Interoperability with LMR

In summary, there is a strong resurgence of PTT due to advances of mobile networks, changes in the business environment, and new capabilities of next generation of PTT. AT&T’s EPTT provides the most compelling value proposition to industry verticals seeking to leverage the power of PTT to improve business operations.