

National Public Safety Telecommunications Council

Why Can't Public Safety Just Use Cell Phones and Smart Phones for Their Mission Critical Voice Communications?

It's not that simple.
Commercial Cellular Voice is Different

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Why Can't Public Safety Just Use the Planned Nationwide Public Safety Broadband Network for Their Mission Critical Voice Communications?

Again, it's not that simple.

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Why can't public safety just use cell phones and smart phones for their mission critical voice communications?

Unfortunately it's not that simple.

Although public safety regularly use cell phones, smart phones, and other commercial wireless devices and services as a secondary form of communications, these devices and systems are currently not sufficiently suited for public safety mission critical voice communications during critical incidents.

Public safety officials cannot depend upon commercial systems that can be overloaded and unavailable. Experience has shown such systems are often the most unreliable during critical incidents when public demand overwhelms the systems.

Public safety officials have unique and demanding communications requirements. Optimal public safety radio communications require:

- Dedicated channels and priority access that is available at all times to handle unexpected emergencies.
- Mission-critical one-to-many group capability, a feature not available in today's commercial cellular systems.
- Highly reliable, secure, and redundant networks under local control that are engineered and maintained to withstand natural disasters and other emergencies.
- The best possible coverage within a jurisdictional area, with a minimum of dead zones – even in areas where commercial cellular services are not economically viable.
- And, unique, ruggedized equipment designed for quick response in emergency situations. First responders must not be forced to dial, wait for call connections, or get busy signals when seconds mean the difference between life and death!

Why can't public safety just use the planned nationwide public safety broadband network (NPSBN) for their mission critical voice communications?

Again, it's not that simple.

Although the nationwide public safety broadband network (NPSBN) will have voice capabilities that will be valuable to public safety, the network will not be able to initially provide (for many years and maybe never) the mission critical level of voice service and dependability needed by public safety. The NPSBN is intended to provide urgently needed broadband data capabilities for public safety and is not initially being designed to replace current land mobile radio (LMR) mission critical public safety voice systems.

One key element lacking for the NPSBN to replace LMR is that the NPSBN will use LTE commercial technology, a network technology that does not currently provide the "OFF NETWORK" capability that is critical to public safety. This means that when the broadband network is not available or not reachable there will be no communications, a critical requirement for public safety.

Other key elements required for mission critical voice include but are not limited to:

- **Nationwide broadband build out:** It will take 10 years or more to build out the nationwide public safety broadband network to provide mission critical coverage equal to current public safety land mobile networks.
- **Direct Mode or Talk Around:** The capability to communicate unit-to-unit when out of range of a wireless network OR when working in a confined area where direct unit-to-unit communications is required.
- **Push-to-Talk (PTT):** The standard form of public safety voice communications today. The speaker pushes a button on the radio and immediately transmits the voice message to one or many other units. When they are done talking they release the PTT switch and return to the listen mode of operation.
- **Group Call:** This method of voice communications provides communications from one-to-many members of a group and is of vital importance to the public safety community.

There is much debate relative to whether broadband will eventually have the capabilities to replace current mission-critical public safety LMR systems, however the facts are clear that if this capability becomes reality it is not likely to happen in less than 10 years.

Local, tribal, state, and federal public officials are urged to not abandon or stop funding their public safety voice LMR systems until such time as it can be demonstrated that broadband can safely and adequately provide public safety with the mission critical requirements currently provided by LMR.

The National Public Safety Telecommunications Council (NPSTC) is a federation of organizations whose mission is to improve public safety communications and interoperability through collaborative leadership.

Voting Members

1. AASHTOAmerican Association of State Highway and Transportation Officials
2. ARRLAmerican Radio Relay League
3. AFWAAssociation of Fish and Wildlife Agencies
4. APCOAssociation of Public-Safety Communications Officials – International
5. FCCAForestry Conservation Communications Association
6. IACPInternational Association of Chiefs of Police
7. IAEMInternational Association of Emergency Managers
8. IAFCInternational Association of Fire Chiefs
9. IMSAInternational Municipal Signal Association
10. NASCIONational Association of State Chief Information Officers
11. NASEMSONational Association of State Emergency Medical Services Officials
12. NASFNational Association of State Foresters
13. NASTDNational Association of State Technology Directors
14. NENANational Emergency Number Association
15. NSANational Sheriffs' Association

Associate Members (Non-Voting)

1. ATISAlliance for Telecommunications Industry Solutions
2. CITIGCanadian Interoperability Technology Interest Group
3. NCSWICNational Council of Statewide Interoperability Coordinators
4. TIATelecommunications Industry Association
5. UTCUtilities Telecom Council

Liaison Organizations (Non-Voting)

1. FCCFederal Communications Commission
2. FEMAFederal Emergency Management Agency
3. FPICFederal Partnership for Interoperable Communications
4. NTIANational Telecommunications and Information Association
5. OECOffice of Emergency Communications
6. OICOffice for Interoperability and Compatibility
7. PSCEPublic Safety Communication Europe
8. US DOIUS Department of the Interior
9. US DOJUS Department of Justice

Resources:

NPSTC Mission Critical Voice Definition

http://www.pscr.gov/projects/broadband/reqs_stds/Functional_Description_MCV_v5.pdf

Voice over Broadband Articles:

Voice and Public Safety Broadband <http://andrewseybold.com/3038-voice-over-public-safety-broadband>

Mission-Critical Voice over LTE: What, When and How?

<http://andrewseybold.com/2772-mission-critical-voice-over-lte-what-when-and-how>

Mission-Critical Voice and LTE: Be Careful

<http://andrewseybold.com/2772-mission-critical-voice-over-lte-what-when-and-how>

Public Safety Two-Way Radio Technologies and Trends

Keith Kemmerline - Solutions Architect, Motorola Solutions, 2013

Introduction

Two-way radio is focused for the public safety and government type of users who need very good control and coordination of their people for a variety of reasons. In particular, they require two-way radio in their day-to-day operations. This article will focus on two-way wireless technologies available today.

What is two-way radio and its benefits?

Two-way radio is a wireless one-to-many type of calling system (compared with cellular's one-to-one), similar to a conference call on a telephone system where many people communicate together at the same time so that the message is not repeated several times and there are no delays. Two-way radio allows many users to listen on the same conversation all at the same time, and with only one person speaking at any given time. This method of communication has some very useful advantages that cellular or paging technologies do not have. For example, two-way radio functional implementation in commercial, government and industrial operations result in:

- **Better response or reaction time** - Unlike cellular, where you must wait for a person to dial a 7 or 10 digit number, two-way radio users have a channel dedicated to them for immediate use with a simple Push-to-Talk (PTT), which results in faster communication of urgent messages or information that is vital to an organization's reaction or response. Telephone or cellular calls can take an average of 10 seconds to setup and connect a call to *one* person, while two-way trunked radios can take an average of 0.3 seconds to setup and connect a call to *multiple* users.
- **Better control and coordination of personnel or resources** - Because two-way radio is a point-to-multipoint configuration, it is very easy and useful for management to use two-way radio as a tool to manage and coordinate the workforce. Orders can be given out over-the-air without repetition or time delays for the workforce to execute quickly. Because everyone hears the message once, there are no misinterpretations from relaying of messages.
- **Better productivity of your operations** - It is a very well-known fact in management practice that improved communications will improve the productivity of your workers. Using two-way radio has helped many large multi-national companies to keep their costs down substantially, to minimize downtime or idle time, and to improve their revenue & profits.

Different technologies in two-way radio

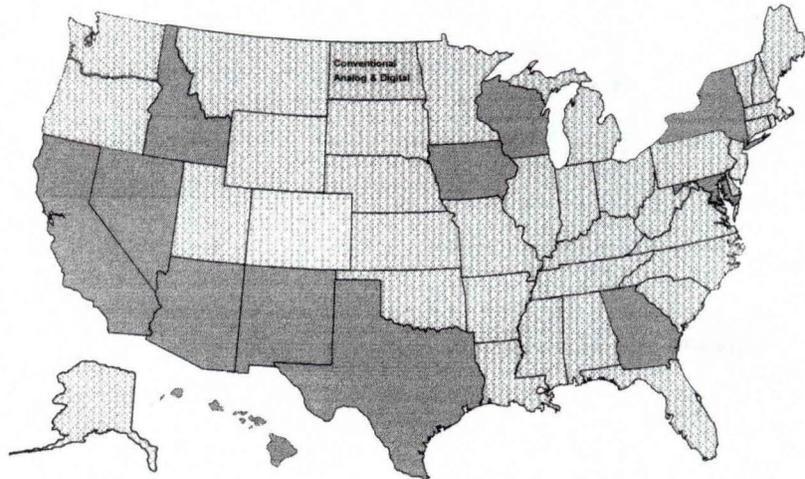
Two-way radio has been around since the 1930's. The original radio designs are called "conventional" radio designs. Motorola later pioneered "trunking" technology for radio system design in the early 1970's and has been a world leader in this technology for about 40 years. Both types of systems started as analog-based technologies, but now have almost totally migrated to digital-based technologies.

Conventional vs. Trunking Technologies

In conventional systems, your group is assigned a channel and this channel is generally shared with multiple groups or users. Users need to make sure they do not interfere with another user and cannot talk until they "listen" on the channel to make sure it is clear. Once the channel is deemed "clear", a user will press their PTT button on the radio to access the channel and start speaking to send your voice message. If someone else is using the channel, the person must wait, monitor again, then when it is clear, can begin talking.

In a trunking system, there are multiple channels available and the system assigns an unused channel to the user wishing to make a call. All radios in that person's group automatically move to the designated channel and the initiating user can begin talking by simply pressing their PTT button. This process is automated and takes less than ½ second.

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Statewide Trunking Systems

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Project 25 (P25) – Public Safety Communication Standards

Project 25 is a standard for Public Safety communications. P25 is the product of the Association of Public Safety Communication Officers International (APCO International), an international organization based in the U.S. that represents most of the public safety communications officers worldwide. It applies to both trunking and conventional systems and is applicable to most Public Safety frequencies that are utilized today. This standard, when implemented, allows for several benefits to the operating agencies:

1. Users can communicate with other P25 users (on different systems) who comply with the standard thus enhancing interoperability.
2. Competitive procurements can be let over time as there are many manufacturers who can provide P25 compliant equipment.
3. The standard has moved with technology, so it is a current standard and not outdated so users who implement P25 will not be using older, outdated technology.
4. Most manufacturers are putting a majority of their R&D monies into P25 technology which will provide future enhancement for those agencies.

LTE – Broadband Data

LTE (Long Term Evolution)... or 4G... is a broadband data technology currently being implemented by commercial carriers (i.e. Verizon) for data connectivity to most people's smart phones. This technology is also going to be deployed for a nationwide Public Safety broadband data network. This will someday allow first responders to have fast data access without having to use a commercial carrier's system.

Why not use a Commercial Carrier network?

Commercial carrier networks cater to the paying public, which is why coverage is so good in urban areas and generally weak in more rural areas. So when there is an emergency incident, everyone gets on their phones, makes calls, send text messages, pictures and video, thus rendering that site useless, which is exactly when a Public Safety user needs to have access. If first responders used a commercial network, they would not be able to access the information needed... when they need it.

What is FirstNet?

FirstNet is a Federal organization created to oversee the design and implementation of a Nationwide Public Safety broadband data network. They are currently in the due diligence phase asking public safety agencies what their data requirements are and where they would need coverage. The current thought is that FirstNet will begin the development of this network within the next several years if adequate funding can be found. Only \$2B has been identified of a possible \$30B that may be required to implement this nationwide network.