VOCALITY RoIP AND WAVE PTX

Revision 6

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Abstract

This white paper provides a general overview of Vocality interoperability with Motorola Solutions' WAVE PTX™ for the commercial market. Together they enable direct connection between Push-to-Talk (PTT) radios, also known as Land Mobile Radios (LMRs), and smartphones.

Introduction

As broadband technology matures and budgets shrink, demand is greater for more capabilities with lower capital outlay. The ability to establish connectivity between different kinds of voice communication systems and offer more users the ability to communicate with one another is becoming ever more crucial. Achieving connectivity is essential for daily operations and delivering reliable and high-quality communications is of the utmost importance.

The Need for a Converged Voice Solution

Bridging the existing interconnection gap between different voice systems and technologies is a must. The enhancement of communications infrastructure to include smartphones, without the need for special development and/or unique carrier selection, adds new capabilities to existing equipment and reduces capital expenditure. When centralized in an integrated and unique platform solution, these enhanced capabilities and savings are maximized. The key question to answer is how do you enable radios, despite being from different manufacturers and using different technologies and frequencies, to talk to each other as well as to modern smartphone apps? Two primary issues must be addressed.

The first issue is to address radio coverage limitations in traditional RF solutions. Unless you have a city, regional, or nationwide infrastructure in place to provide ubiquitous voice communications, you may need to rely on UHF/VHF radios. In these instances, these radios are limited in transmit power, which in turn limits the RF propagation, reach, and distance. In most cases, Field Crews rely on backup use of personal mobile devices or satellite phones to supplement the radio coverage gaps in remote areas. While certainly an additional investment in infrastructure could be implemented, it may be unrealistic due to the additional CAPEX and OPEX for more towers, repeaters, power, and cooling.

The second issue to address is radio compatibility. When an area is impacted by natural disasters, it can be challenging for different teams to communicate with each other unless you provide any new teams with temporary radios. The existing problem is that different agencies and organizations may use different budgets and infrastructure for two-way communications. Some radios acquired may be from different manufacturers, and some radio technologies being used may also be incompatible.

The Vocality RoIP solution is able to provide mobile crews deployed to the area with a cost-effective, converged interoperability solution quickly.

Underlying Technologies

When looking at enhancing the voice communications network between traditional analog/digital land mobile radios and IP-based services and devices, three key components are required for the end-to-end connectivity of these systems: the Radio over IP Gateway, the IP-based backhaul infrastructure, and the application server.

Enabling Unified Voice Communications

Today, several technologies may independently offer a partial solution to this problem. However, a full solution is achieved only if true interoperability between different kinds of voice communication systems is properly implemented. To fulfill market demands, our solution observes these design principles:

- Use of versatile and standardized equipment that is able to provide interoperability between any PTT radio available.
- Scalability and ease of deployment, allowing gradual expansion based on application needs.
- Cost effectiveness, lending itself to use within standard systems that do not require special customization, and reuse of existing infrastructure.
- Reliable connectivity and voice quality, even over less-reliable interconnections, such as internet and low-bandwidth satellite links.
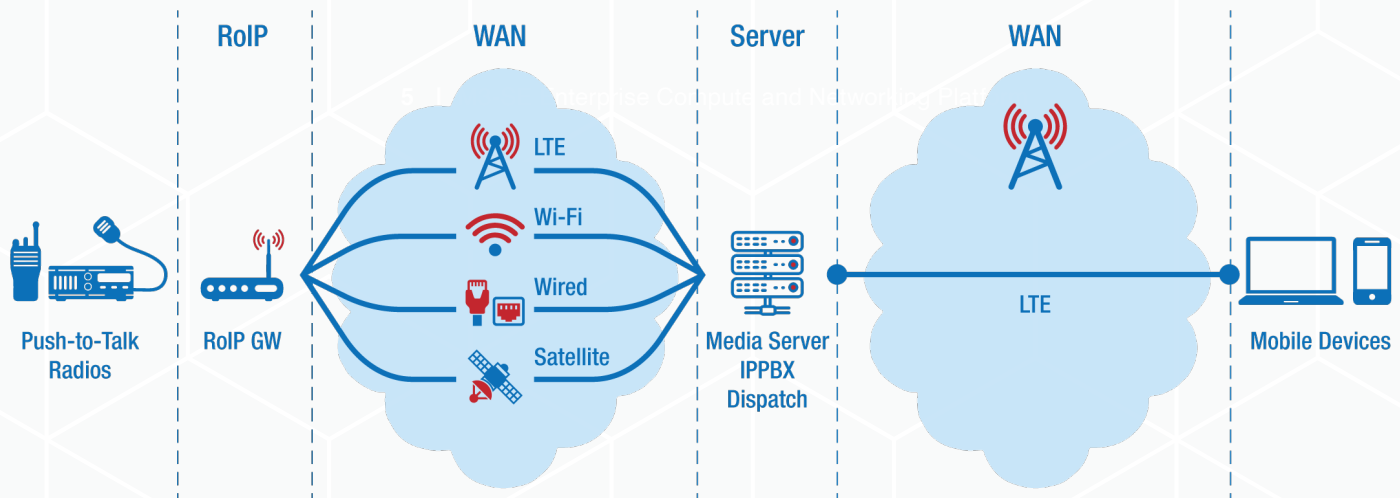
Figure 1: End-to-End Key Components for Unified Voice

Vocality Radio over IP (RoIP)

Vocality Radio over IP (RoIP) can provide connectivity between radio networks and other voice equipment. This other equipment can be local to Vocality RoIP, such as radio equipment from different manufacturers, using different radio technologies and different frequencies. Distant voice equipment is accessed remotely via digitized voice streams. Vocality RoIP can connect to various Wide Area Networks (WANs) to carry this traffic to the remote equipment. Typical use cases for Vocality RoIP include the following:

Crossbanding (Radio Bridging)

One of the most common use cases for Vocality RoIP is the crossbanding feature, by which it behaves as a radio bridge. When teams must communicate quickly, Vocality RoIP can connect two or more different radio groups to each other. Below we see a representation where Team A could be using one type of radio vendor and Team B could be using a different radio. Connecting a "donor radio" from each radio network to Vocality RoIP allows communication between the two teams. The strategic advantage of this setup is that each team can continue to use the same radio it has in the past.

Additionally, if end users want to migrate away from a radio technology or radio manufacturer, crossbanding enables them to continue to use their existing radios, extending the life of the radio equipment while migrating to a different model or technology.
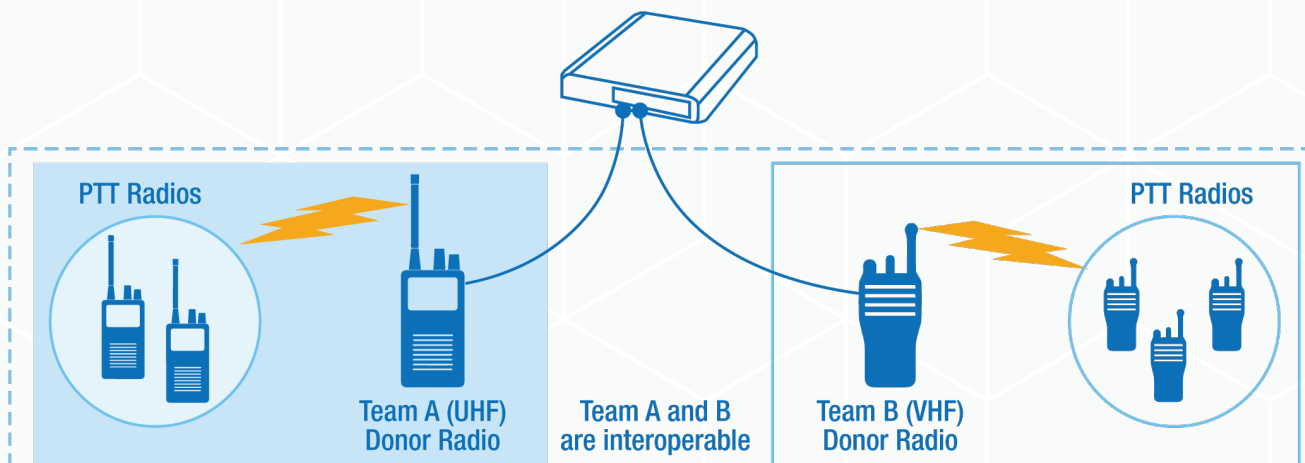

Figure 2: Crossbanding

Radio Over IP

In this use case, Vocality RoIP digitizes the voice from local radio networks and sends it via a WAN connection to a remote location. At the remote location, another Vocality RoIP can be used to convert back to analog voice if a radio network is to be connected at this remote site, otherwise the digitized audio can be passed to a third-party system for connection with other equipment, such as VoIP phones via an IP PBX.

Note that it is possible to bridge local networks and stream audio to remote locations at the same time, as well as have the option of connecting to IP PBXs for connection to telephony devices. It is possible to connect a radio network to multiple different services.
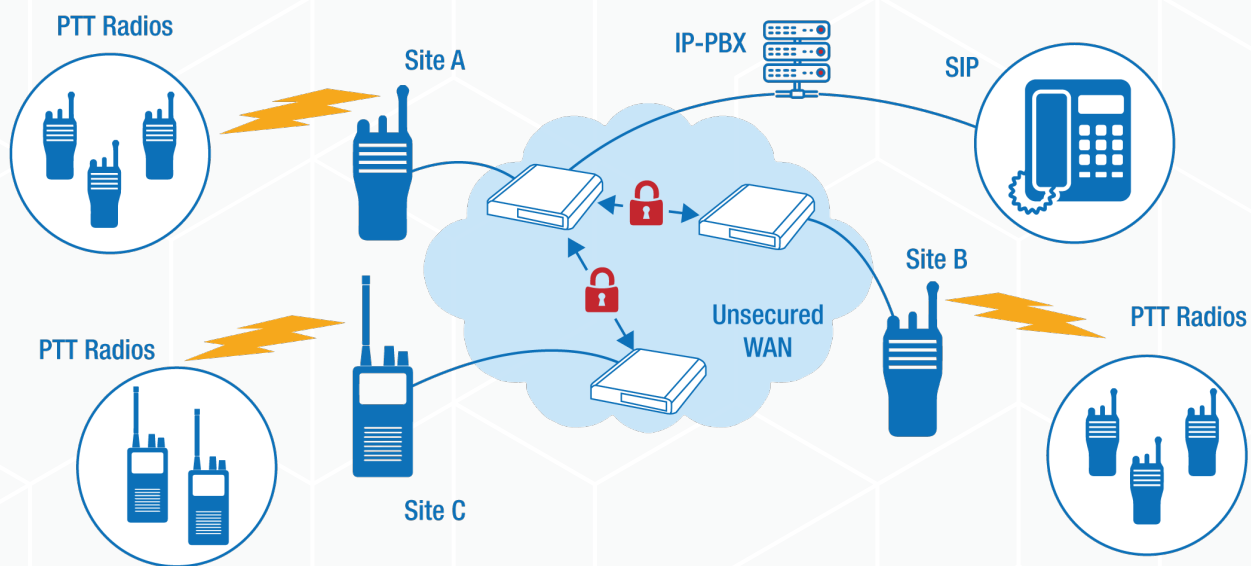

Figure 3: Radio over IP

Evolution of Push-to-Talk Over Cellular (PTToC)

As seen so far, both technologies have very powerful functions, but what happens when existing legacy radio users need interoperability with over-the-top PTT applications emulating a traditional radio on a mobile device or modern LTE radios? An integration between both technologies is the answer that benefits from the advantages each technology offers and will overcome existing limitations when they are used separately. Via an encrypted audio stream across any WAN connection, Vocality RoIP can send audio from one radio network to Motorola Solutions' WAVE PTX.

Thus, all PTT users, both LMR and WAVE PTX, can communicate as if they are on the same network. This incredibly powerful solution means that remote managers of off-site/off-duty end users can have robust communications with teams on the ground, whenever they want, wherever they are in the world. It allows the teams to add users quickly using existing mobile cellular devices or Bring Your Own Device (BYOD) if radio hardware is scarce.

The Wide Area Network (WAN)

The WAN could be anything from a public IP/MPLS or LTE service from the carrier, private microwave or fiber-based wide area network. WANs can also include satellite links and terrestrial networks accessed via Wi-Fi.

Motorola Solutions' WAVE PTX

Motorola Solutions' WAVE PTX is a carrier-independent broadband PTT subscription service that instantly connects teams across different devices, networks, and locations to let everyone be part of the discussion.

Motorola Solutions' WAVE PTX is made up of the following components:

- **WAVE PTX Dispatch**: From any internet-enabled location, the WAVE PTX dispatch application makes it possible to effectively manage operations in the field with easy access to key features, such as talkgroup scanning, multimedia communication, and location mapping and tracking.
- **WAVE PTX Mobile APP**: The WAVE PTX mobile application turns smartphones or tablets into a PTT handset, combining the power of push-to-talk with the ability to share location, images, videos, and data files with individuals or groups at the touch of a button.
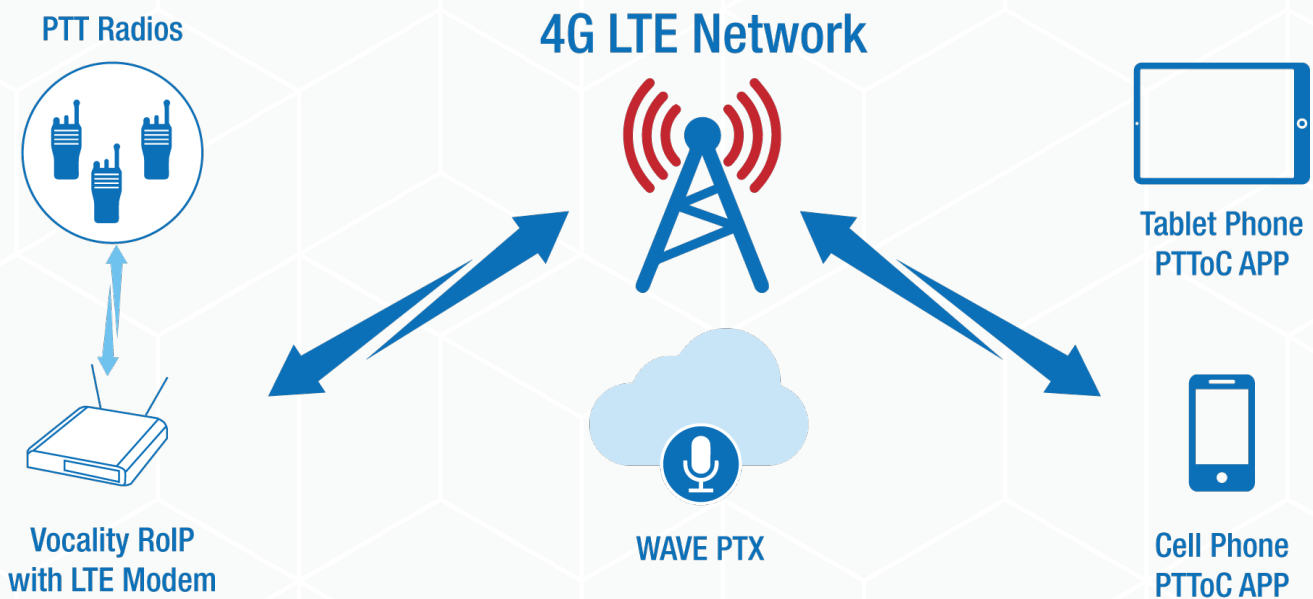

Figure 4: WAVE PTX over Cellular

Deployment Scenarios

Push-to-Talk over Cellular has a wide range of use cases that encompass a variety of end users across all vertical market segments. Today, some of the Vocality and WAVE PTX deployments include customers in the following public safety and enterprise customer base:

- Broadcasters
- Aid Agencies
- Oil and Gas

- Mining
- Construction
- Marine

- Security
- Road and Rail
- Education/Campus

Samples of Vocality-Supported Radios

- Motorola Solutions
- Kenwood
- Icom
- Hytera

- Tait
- Thales
- Sepura
- Harris

- Codan
- Barrett
- Military Radios
- Ritron

Conclusion

The Vocality RoIP and Motorola Solutions' WAVE PTX broadband PTT service makes it possible for any end user in any vertical to explore new OPEX-based models for voice communications. The subscriber-based models allow for lower cost interworking between legacy and modern mobile-based devices, flexibility in adopting new broadband-based voice communications resulting in improved risk mitigation of a full CAPEX investment, and a path for those end users looking to upgrade entire radio systems. By combining the advantages that the different technologies provide independently, a new unified solution with stronger capabilities, easier scalability and faster deployment is introduced. Implementation of a solution like this represents operational efficiency improvements that result in cost savings and maximized profits.

Additional Information

For Vocality products:
www.vocality.com

For WAVE PTX:
http://www.motorolasolutions.com/WAVEPTX

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