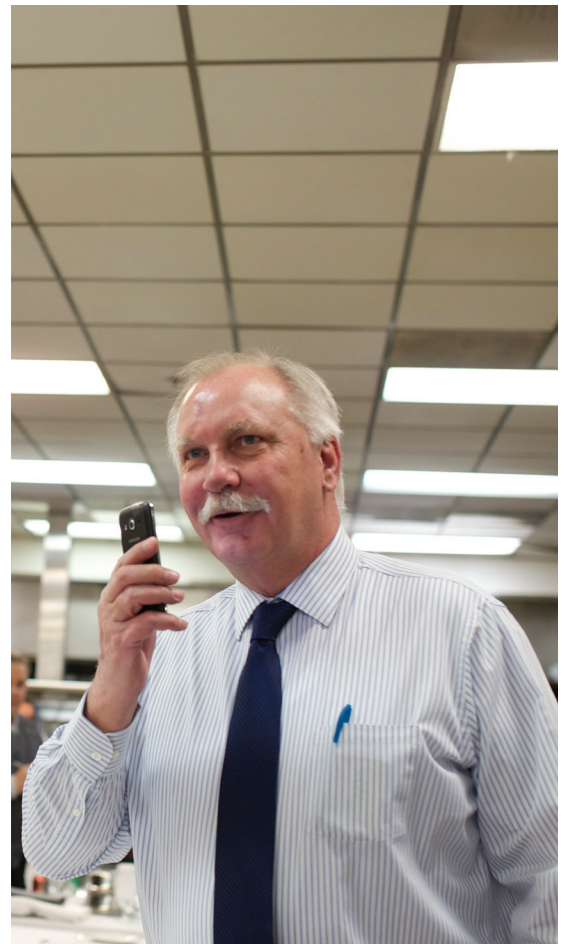**MOTOROLA** *SOLUTIONS*

BROADBAND PUSH-TO-TALK: CONSIDERATIONS FOR LMR INTEGRATION

VOICE: THE CRITICAL SERVICE

Businesses, public safety agencies and defense organizations are being challenged to keep personnel connected despite a rapidly changing communications environment. To effectively communicate in today's mobile world, many teams require the ability to communicate across various geographic boundaries, networks and devices.

AS THE VARIETY OF USERS AND USER DEVICES IN THE WORKPLACE CONTINUES TO MULTIPLY, MANY LEADERS ARE ASKING THEMSELVES:

- How do I give my workers flexibility in the devices they use to communicate?
- How can I bridge disparate networks so they feel like a single service?
- How do we communicate with key work partners outside our organization?

For many, the answer to these questions is a unified Push-To-Talk (PTT) platform. Broadband PTT solutions allow organizations to connect disparate networks such as radio, cellular, Wi-Fi, telephony and more so users can communicate between them. Of particular interest to Land Mobile Radio (LMR) customers is using broadband PTT to drive additional value from their existing LMR networks.

If you too are looking at how to make your LMR systems interoperable with broadband networks, this paper provides advice on the enabling technologies to help guide your decision.

BRIDGING ACROSS YOUR NETWORKS

There are two main options to interconnect your LMR systems with broadband networks: a wireless interface via a donor radio or a wireline interface using an IP connection.
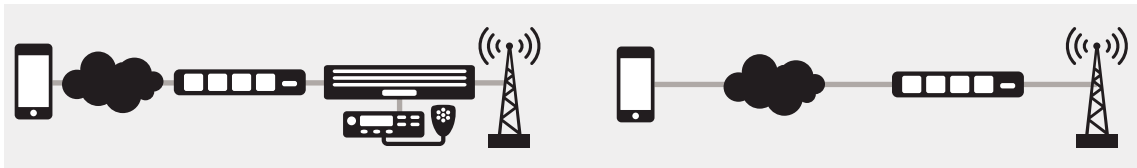
WIRELESS INTERFACE VIA DONOR RADIO:

A donor radio solution involves using a generic 4-Wire interface to provide a link between the core LMR system, using a donor radio, and the radio gateway.

With this set up, each broadband-to-LMR talkgroup must have its own donor radio assigned to it. When a call is initiated within a talkgroup, the donor radio sends the analog signal to the radio gateway. The gateway converts the analog radio signal into IP packets which are then sent on to the broadband PTT server. The broadband PTT server sends the signal via IP to users who are subscribed to that channel.

A similar process happens in reverse for calls outside of the LMR network. A broadband user presses a PTT button to initiate a call to the system. Their audio is sent through the server and into the radio gateway which then connects the stream with the donor radio. The donor radio keys up over the air using its base station site to connect the audio stream into the core LMR network. Anyone on the appropriate talkgroup, either on the LMR or broadband network, can listen to the stream.

With a wireless interface via donor radio solution, only talkgroup audio from the LMR system is available to pass to the broadband PTT server. No additional data such as Unit ID, GPS coordinates, etc. is possible.

WIRELINE VIA AN IP CONNECTION:

With a wireline interface to the radio system, a wired Ethernet connection is used to connect the LMR core to the broadband PTT server.

A key difference between this approach and using a donor radio is the method of adding interoperable talkgroups. Whereas wireless integration requires a new donor radio for each talkgroup, adding talkgroups through wireline integration is simply a configuration process. Talkgroups can be quickly added and removed using software on the server, which translates to less hardware and maintenance costs.

When users on the LMR network request a call – Police Channel A, for example – the LMR core communicates directly with the broadband PTT server to include the broadband users interested in that particular LMR talkgroup in the call.

In reverse, any broadband network user can initiate a call across this interoperable talkgroup by selecting Police Channel A on their device's application simply by pressing the PTT button. The broadband PTT server will use the Ethernet connection to notify the LMR core to include all radio subscribers tuned into the particular LMR talkgroup that the broadband user chose to speak on.

In addition to talkgroup audio being passed between the LMR and broadband networks, the wireline interface opens up the possibility for a wider range of features, including private calls, sending and receiving UnitID information and more.

FINDING THE RIGHT LMR INTEGRATION SOLUTION

The best approach for you depends on your organization's PTT requirements. The following five questions will help guide your decision between using wireline or wireless radio integration.

1. CAN YOUR LMR NETWORK INTERFACE VIA AN IP WIRELINE CONNECTION?
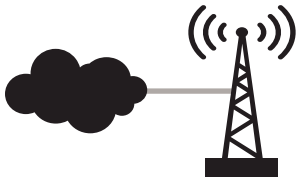
It's important to carry out an inventory of your radio systems and what networks you want to interface with. If you have an older radio network, e.g., an analog or conventional system, a wireline solution may not be available. In this instance you can still link your LMR core to broadband PTT networks but this will need to be done using a wireless interface via a donor radio. If you have a newer trunking system, typically released from 2013 onwards, then wireline IP interfaces are likely to be available that will connect to your LMR network.

2. DO YOU NEED RICHER VOICE SERVICES?

If simple PTT is the main requirement for your users, then a donor radio solution is worth considering. But in operational situations, it can be valuable to have richer services available; services offered via a wireline IP connection.

WIRELINE SOLUTIONS ENABLE:

- Unified aliases and naming of users and talkgroups over LMR and broadband PTT networks
- Private calls to other broadband or radio users
- Call control messaging that communicates directly with the LMR network, receiving grant and deny tones to ensure the LMR network's resources and sites are ready to take the call

Donor solutions work differently. They provide a "best effort" in sending audio to the LMR network. If there is a lot of system traffic and resources are pushed, calls may be lost or users may experience partial messages.

3. HOW FLEXIBLE DO YOU NEED TO BE?

This question relates to your operations. Specifically, how many talkgroups do you require? And do you need them to be set up quickly? For instance, if you anticipate a need to respond to dynamic incidents, creating new talkgroups on the fly, wireline integration will better suit your needs. Using a programmable interface on your broadband PTT server, you are able to quickly and easily configure and turn on talkgroups.

With wireless interfaces, the process of setting up donor radios for each talkgroup can be time consuming: you will need to find a new radio, reconfigure it and connect it to the core and radio gateway unit. This said, with smaller networks, or, networks where talkgroup requirements are predictable, and you just need simple PTT services, donor radios remain a strong solution.

4. HOW SCALABLE DO YOU NEED TO BE?

With wireless interfaces via a donor radio, each additional talkgroup brings an associated increase in infrastructure. You will need a fixed antenna on the premises and you'll potentially need a large number of donor radios in racks, as well as monitoring and alarm equipment to oversee them. As each radio will also need its own channel, you may have to carefully manage RF spectrum. It's also important to bear in mind that each donor radio will physically need to be close to the LMR users, so you might have donor radios spread around a number of sites.

In smaller scale networks, or networks where users are not dispersed across wide areas, these considerations do not present a challenge to using donor radio integration. Even in larger networks, such challenges can be overcome with an experienced deployment team. However, if your network is more fluid and you need to add more talkgroups or connect people on LMR systems in many different areas with broadband networks, equipment costs escalate.

With wireline integration, the connection to the radio system is already made via Ethernet, so it's easy to add new talkgroups between the two systems and is much more cost and time effective. In addition, there are broadband PTT servers available that can scale to support thousands of users.

5. WILL YOUR REQUIREMENTS CHANGE?

As your organization evolves, so will your service requirements. IP-based solutions provide a more versatile platform to support your changing needs. Services that include location and cross-network text messaging and notification are now being offered by some solutions. These capabilities allow you to enhance operational support and safety features while driving more value from your systems. If you have plans to invest in unified messaging or GPS tracking capabilities across LMR and broadband in the future, wireline integration is a better fit for you.

SUMMARY

In summary, donor radios are a proven and cost-efficient option if you are looking to support a smaller numbers of talkgroups or your talkgroups are stable and not subject to change. If you are running legacy LMR infrastructure, they are also your only option to bridge with broadband networks. But if you have a large numbers of talkgroups or want additional interoperable services besides audio, IP wireline interfaces are more suitable.

WHY MOTOROLA SOLUTIONS?

We have deep experience in, and history of innovation across, both public safety and critical communications networks. And with expertise in both wireless via donor radio and wireline via IP connectivity we can help advise you on the right solution for your interoperable PTT needs. Our services team is on hand to provide you with the expertise we've gained through thousands of network deployments to help you plan, deploy, optimize and maintain your donor radio or wireline interface.

To find out more about our broadband PTT and interoperability solutions please visit http://www.motorolasolutions.com/WAVE.

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