

WORKFORCE CONNECT

Zebra PTT Pro



ZEBRA

LMR Gateway Configuration Guide

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Revision History

Changes to the original guide are listed below:

Change	Date	Description
-01 Rev A	06/2018	Initial release.

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About This Guide

Introduction

This guide explains the required elements for the LMR Gateway to enable interworking between Zebra PTT Pro and LMR Radios.



NOTE: Screens and windows pictured in this guide are samples and can differ from actual screens.

Chapter Descriptions

Topics covered in this guide are as follows:

- [Getting Started](#), provides an LMR Gateway introduction, requirements, and architecture.
- [RTP Gateway Configuration](#), explains how to create an RTP Gateway user and configure the RTP Gateway.
- [IP Gateway Configuration](#), explains how to configure Remote IP Gateways, such as AudioMate AM360r, JPS NXU-2A, and JPS ACU-2000.
- [LMR Radio Configuration](#), explains how to configure LMR Radios, such as Motorola MotoTRBO XPR series and Motorola CM200/CM200d/CM300 series.

Terms

Table 1 Terms

Term	Description
IP Gateway (IPGW)	A component of the LMR Gateway System which interfaces and converts the IP audio between the Zebra PTT Pro server and the serial audio of the LMR Donor Radio.
LMR	Land Mobile Radio (for example mobile 2-way radio)

Table 1 Terms (Continued)

Term	Description
LMR Donor Radio	A component of the LMR Gateway System which interfaces between the IP Gateway and the 2-way radio channel.
LMR Gateway System	The collection of components that enables communication between Zebra PTT Pro and LMR.
Zebra PTT Pro RTP Gateway	A component of the LMR Gateway System; this is a virtual element of the Zebra PTT Pro system which interfaces to the IP Gateway, and can be assigned to Zebra PTT Pro Talk Groups.
Portable Radio	The radio industry's term for the hand-held radio carried by the user.
Mobile Radio	The radio industry's term for the fixed station, Donor Radio.
Enterprise Group	In this type of Group, there are Open and Closed Groups. An Open Group provides the capability for anyone to join and be a member of the Group. A Closed Group prohibits the capability for a non-member to join the Group. An LMR Radio can be a member of only one Enterprise Group initiating PTT Calls.
Dispatch Group	In a Dispatch Group, a member can be either an Initiator, a Receiver, or Both. This type of group definition is helpful for the Users of the Portable Radios to hear or monitor audio from multiple groups.

Notational Conventions

The following conventions are used in this document:

- **Bold** text is used to highlight the following:
 - Dialog box, window and screen names
 - Drop-down list and list box names
 - Check box and radio button names
 - Icons on a screen
 - Key names on a keypad
 - Button names on a screen.
- Bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

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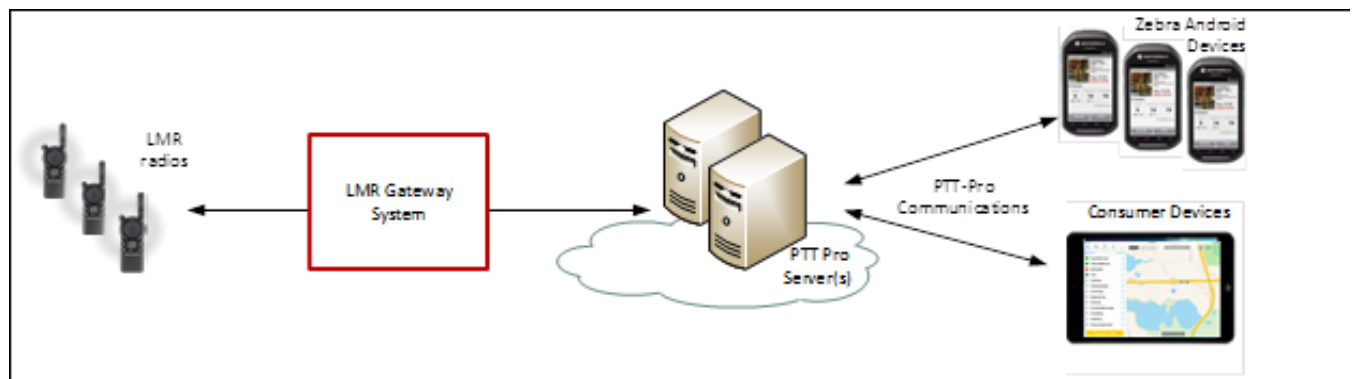
If you have comments, questions, or suggestions about this guide, send an email to EVM-Techdocs@zebra.com.

Getting Started

Introduction

The Zebra PTT Pro LMR Gateway System enables communication between 2-way radio and Android and iOS devices running Zebra PTT Pro, allowing an audio path to be established between a Zebra PTT Pro Talk Group and an LMR Talk Group (for example, an LMR channel).

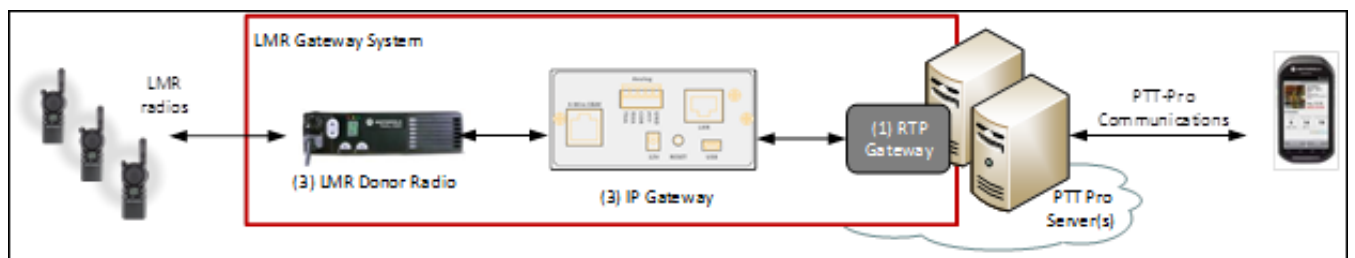
Figure 1 Zebra PTT Pro LMR Gateway System



The Zebra PTT Pro LMR Gateway System is composed of the following elements:

- **Zebra PTT Pro RTP Gateway** - A virtual element of the Zebra PTT Pro system, which interfaces to the IP Gateway and can be assigned to Zebra PTT Pro Talk Groups.
- **IP Gateway** - Interfaces and converts audio between the Zebra PTT Pro server and the LMR Donor Radio.
- **LMR Donor Radio** - Interfaces between the IP Gateway and the 2-way radio channel.

Figure 2 Zebra PTT Pro LMR Gateway System Elements

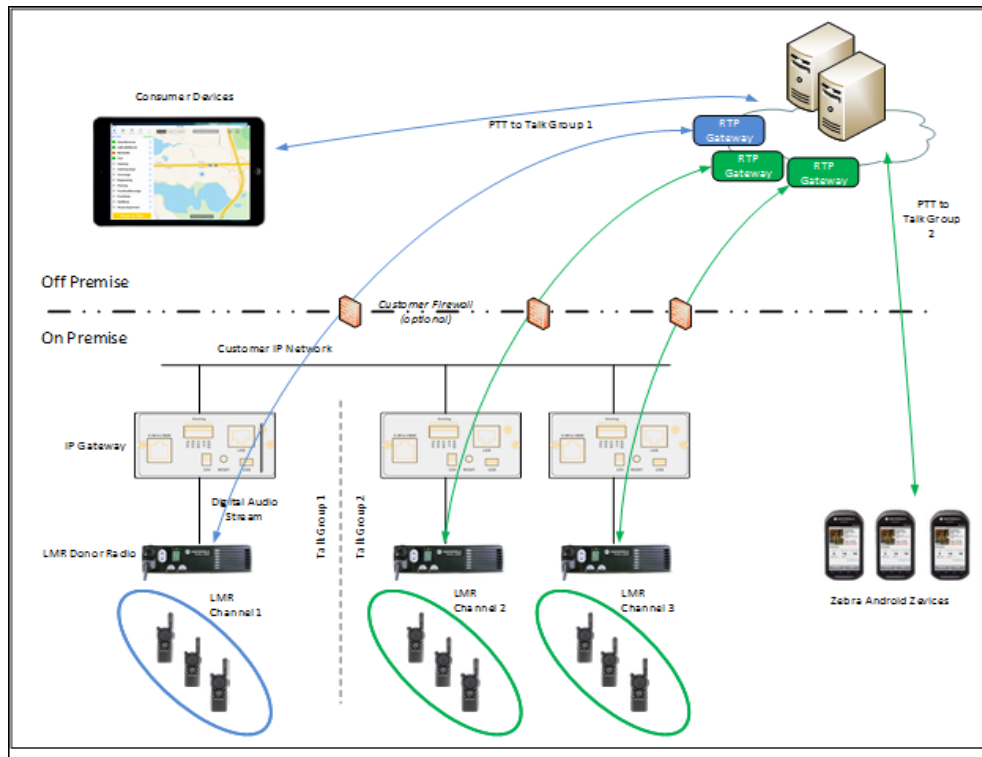


The remainder of this document goes into more detail concerning the elements of this architecture, configuration guidelines, and configuration details for the Zebra PTT Pro RTP Gateway, as well as example IP Gateways and LMR Donor Radios.

System Architecture

The following illustrates two Zebra PTT Pro Talk Groups that have been extended to include LMR through the use of the LMR Gateway System components.

Figure 3 System Architecture



Talk Group 1 (in blue) includes a consumer device (for example, an iPad) and an LMR Talk Group/Channel. Talk Group 2 (in green) includes Zebra Android devices and two LMR Talk Groups/Channels.

One Zebra PTT Pro LMR Gateway System is used per LMR Talk Group/Channel. In the illustration above, Zebra PTT Pro Talk Group 2 includes two LMR Talk Groups/Channels, and therefore two Zebra PTT Pro LMR Gateway Systems are required.

Architectural Principles

The following are configuration principles that should be considered prior to deployment:

- One Zebra PTT Pro RTP Gateway supports one LMR Donor Radio.
- One LMR Donor Radio supports one LMR Talk Group (for example, LMR Channel).

- The Zebra PTT Pro RTP Gateway can be configured to participate in multiple Zebra PTT Pro Talk Groups. However, the following constraints apply:
 - The RTP Gateway can participate as an initiator in only one Talk Group.
 - The RTP Gateway can participate as a receiver in multiple Talk Groups.

Some Zebra PTT Pro group types, such as Dispatch, allow specification of roles of originator and receiver for members. While others, such as Enterprise Closed, do not allow any control of roles. The Zebra PTT Pro administrator must pay careful attention to Talk Group type definitions while assigning the RTP Gateway to Talk Groups.

The ability to specify roles is captured in the following table, for different Zebra PTT Pro Talk Group types.

Table 2 Talk Group Types and Associated Roles

Talk Group Type	Originate/Receive Control
Enterprise Open	Every member can receive calls. Ability to originate calls controlled by settings.
Enterprise Closed	Every member can receive and originate calls. This is not controllable.
Dispatch	Ability to both receive and originate calls are controlled by settings.
Unicast	Every member can receive and originate calls. This is not controllable.
Surveillance	Every member can receive and originate calls. This is not controllable.

The following table takes the Zebra PTT Pro Group definitions and constraints into account and presents three example combinations of Talk Group Types that would be valid for Group Membership for the RTP Gateway.

Table 3 Talk Group Type Examples

Talk Group Type	Combination 1	Combination 2	Combination 3
Enterprise Open	Multiple as receiver 1 as originator	Multiple as receiver 0 as originator	Multiple as receiver 0 as originator
Dispatch	Multiple as receiver 0 as originator	Multiple as receiver 0 as originator	Multiple as receiver 1 as originator
Enterprise Closed, Unicast, Surveillance	0	1	0

Network Requirements for IP Gateway Installation

Before installing an IP Gateway, the planned deployment site should meet the following requirements:

- The Ethernet network supporting the IP Gateway must have access to the Internet.
 - The IP Gateway must be able to reach the Zebra PTT Pro server. The IP definition in the IP Gateway is static and is not dynamic.
 - For each IP Gateway, the Zebra PTT Pro server defines the publicly exposed IP address of the customer's network. This is not a dynamic setting and is set once in the server.
 - For each IP Gateway, the Zebra PTT Pro server defines a UDP port used to communicate the RTP data to the IP Gateway. This is not a dynamic setting and is set once in the server.
 - The Zebra PTT Pro server determines the next available UDP port to use, starting at 50000, when the IP Gateway is created. The ports are assigned in even number increments; for example, 50002, 50004, 50006, and so on.
- A static IP address must be assigned to each IP Gateway.
 - The Zebra PTT Pro server's configuration identifies the IP Gateway with a static IP address.
- The IP Gateway may be configured with a private IP address, however it is expected the firewall will:
 - Provide Network Address Translation to/from the public IP address.
 - Provide Stateful Firewall connection services.
- The data network connectivity between the site and the Internet should support 90 kbps of traffic per IP Gateway channel.

Zebra PTT Pro RTP Gateway Specifications

The Zebra PTT Pro RTP Gateway supports the following specifications:

- RTP (Real-time Transport Protocol) or RoIP (Radio over Internet Protocol) over UDP (User Datagram Protocol).
- G.711 u-law codec @64 kbps.
- Receipt of 20 ms frames at any bundling ratio per UDP packet.
- Transmit of 20 ms frames at any bundling ratio per UDP packet.

Configuration Process Overview

To prepare an RTP Gateway for communication, two configuration steps are required:

- Create an LMR in the Zebra PTT Pro Portal.
- Configure Settings in the IP Gateway.

Creating a Zebra PTT Pro RTP Gateway Entity in the Zebra PTT Pro Portal

To create a Zebra PTT Pro RTP Gateway entity in the Zebra PTT Pro Portal:

1. Add a user to the desired department.
 - Specify **Client Type** as a Radio (RTP) Gateway.
2. Edit the RTP Gateway:
 - **Remote IP Address** - Public facing IP address of the Customer's network.
 - **Remote UDP Port** - The Zebra PTT Pro server assigns the next available UDP Port.

- Protocol Mode:
 - Specify **JPS RoIP Protocol** for JPS IP Gateways, such as the NXU, ACU, and RSP-Z2.
 - Specify **RTP Protocol** for other IP Gateways, such as the AudioMate AM360r.
- 3. Note the Zebra PTT Pro Portal's assigned server IP address and Remote UDP Port.

NOTE: License configuration may not enable addition of the RTP Gateway. Check with the System Administrator to validate enablement.

Configuring the IP Gateway

To configure the IP Gateway:

1. Establish agreeable local network IP configuration.
 - Static IP Address required (or DHCP reservation).
 - Network can support public network access.
2. Configure the remote IP Address of the Zebra PTT Pro Server RTP Gateway.
3. Configure the local and remote UDP port.

Configuring the Firewall Port Forwarding Rules

Using JPS and RoIP

The JPS IP Gateways support RoIP and provides an active link initiated by the IP Gateway. Connectivity is initiated and maintained to the Zebra PTT Pro server from the IP Gateway with a Keepalive heartbeat. This session is established between the IP Gateway and the Zebra PTT Pro server through a stateful firewall, and no Port Forwarding rules are required.

Using Other IP Gateways and RTP

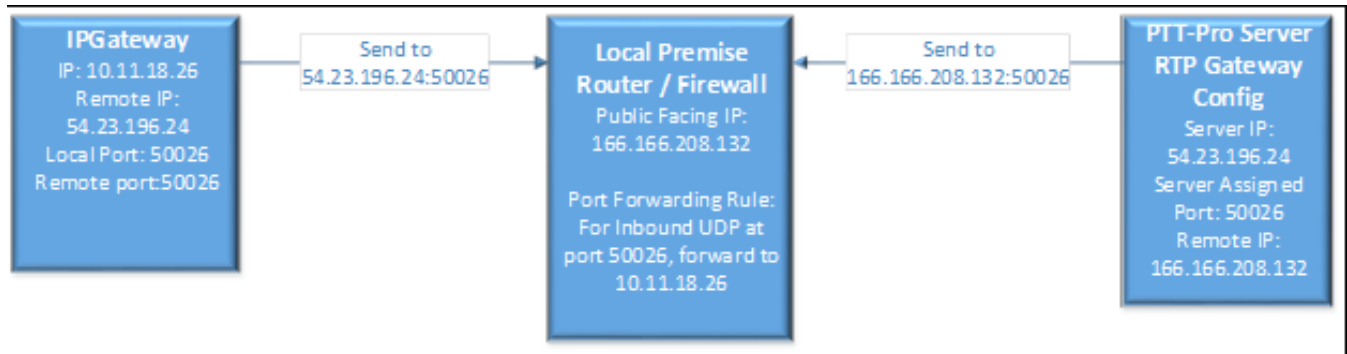
While the Zebra PTT Pro system supports two protocols (RTP and RoIP), the AM360r IP Gateway supports only RTP. The AM360r is a passive device and is not actively maintaining a communications link with the Zebra PTT Pro server, therefore Port Forwarding rules are required. As such, the following Firewall rules must be established.

Establish an ingress rule defined as:

- Forward traffic to the IP Gateway Address
- UDP data type
- UDP Port created in the Zebra PTT Pro server.

Because of the Firewall and Port Forwarding rules, the IP traffic and target destinations required in the configuration can be confusing. The following is an example of a configuration in the Zebra PTT Pro server, the Firewall, and the IP Gateway.

Figure 4 Component Traffic Flow



Hardware Options

This document describes the integration of multiple IP Gateways and Donor Radios provided by third party vendors.

Examples of IP Gateways which can be used are:

- VoiceInterop AM360r
- JPS IP Gateways, including the NXU-2A, ACU-2000, and RSP-Z2.

Configuring the IP Gateway's for the products referenced above, is performed through the interface exposed in the browser.

The Donor Radios described in this document are:

- Motorola MotoTRBO XPR series
- Motorola CM200/CM300 series.

The Donor Radio configuration needs to be programmed for Auxiliary output. To accomplish this requires specialized software and a programming cable. The software is purchased from the Donor Radio manufacturer. The programming cables can be purchased from various suppliers on the Internet. The Auxiliary port programming is discussed later in this document.

RTP Gateway Configuration

Introduction

Using the Zebra PTT Pro Management Portal, perform the following steps:

- Create an RTP Gateway user
- Configure an RTP Gateway.

It is assumed that the process of adding a Customer Rep and Customer Administrator have already been completed and users are able to be added to the Customer's selected Department.

Creating the RTP Gateway Entity in the Zebra PTT Pro Administrator Portal

The RTP Gateway is added the same way as a standard departmental User. The first step in this process is to add the RTP Gateway as a User. The next step is to access department settings to view the UDP Port settings the server assigned to the Gateway.

To create an RTP Gateway user:

1. Sign in as a Customer Admin/Customer Rep.
2. Add an RTP Gateway user to the department established by the Zebra Customer Manager.
 - a. In the **PTT Pro Operational Functions** section, select the **Customers** tab.

Note that a Customer Contact may not necessarily see the **Operational Functions** section, unless the Customer Contact has other privileges.

- b. From the list of customers, select the appropriate **Customer**.
- c. In the **PTT Pro Subscriber Functions** section, select the **Departments** tab.
- d. From the list of departments, select the appropriate **Department**.
- e. In the **Department** section, select the **Users** tab.

A list of users display.

- f. Click the **Add** button at the top of the list.

The **Add User** window displays.

- g. Enter the following details in the **Add User** window, using the standard conventions for an RTP Gateway user and click **Submit**:

User Login - Name of the RTP Gateway. Enter LMR.Gateway.x where x = the number of radios in the system.

- Any meaningful, unique User Login can be used
 - The name will appear in the Contact list with the other Zebra PTT Pro users.
 - Contact list names shown can be either Login, or First/Last Name
 - **First Name/Last Name** - Required. Enter any first name and last name that you find useful, such as the customer administrator's name, or identifying information for this particular Gateway.
 - **Phone Number and Email** - Not required fields.
 - **Trusted** - On.
 - **Activation Method** - Automatic.
 - **Client Type** - Radio Gateway.
 - **Maximal Contacts** - Determine if Maximal Contacts is appropriate. If selected, this device will appear in the Contact list for every Department User.
3. After entering all required fields, click **Submit**.
- The user created displays in the list of users in the Zebra PTT Pro server.

Figure 5 Add User

Configuring the RTP Gateway

To configure the RTP Gateway:

1. Select the new RTP Gateway user that was added in the previous section and select the **Settings** tab. Note that if you proceeded directly from the previous section you may already be on the **Settings** tab.
2. Select **Edit RTP Gateway**.

The **Configure RTP Gateway** window displays. The **Assigned Server IP Address** is blank. The **Assigned Server UDP Port** displays the value of the next available port number calculated by the Zebra PTT Pro server.

Figure 6 Configure RTP Gateway Window - Default

As shown in the example above, 50000 is the next available UDP port. There is a drop-down available, allowing the capability of selecting a specific port value if required. Any previously assigned ports are not shown and it is not possible to duplicate a port assignment.

1. Enter the following details in the **Configure RTP Gateway** window:

- **Remote IP Address** - Remote static IP address of the WAN circuit for the RTP Gateway being added. Enter in IPv6 format; for example, '::ffff:166.166.108.201'. The Remote IP Address is the public facing ingress IP Address for the customer's protected network.
- **Remote UDP Port** - Default value is 50000. The **Assigned Server UDP Port** value will be used in this field.

When the User/RTP Gateway user is created, a UDP port must be specified. At this point the UDP Port is unknown because the server automatically assigns a unique port for each RTP Gateway defined. This field is modified in a later step; do not modify at this time. The Server Assigned Port shows a drop-down list of available ports to enter. Whichever value is selected, the Server Assigned port and the Remote UDP Port values must match.

- **Voice DSCP** - Use the default Expedited Forward for QoS tagging.
- **Protocol Mode - RTP or JPS RoIP**
 - RTP is available for many common IP Gateways, for example AM360r
 - JPS RoIP is available for specific JPS IP Gateways
- **Keep Alive Duration** - Default value is 0. The amount of time the floor is held to the IP Gateway from the PTT Pro server for each PTT message. This helps prevent "Ping Ponging" communication events. If set too high, and the users response from the portable radio is too fast, the user may experience clipping from the first few moments of the audio response.



NOTE: If using the JPS IP Gateway, the Keep Alive interval should be set to 3000 (3 seconds) in order for the IP Gateway to come on-line. The AM360r does not require this setting and should be left at 0.

- **Internal Data Payload Format** - The drop-down box reveals **Opus 4G**, **Opus 3G**, **Opus 2G**, and **G.711.mu-Law**. Most installations will find the best performance by selecting G.711.mu-Law. This selection minimizes transcoding. Use the other selections only when directed by Technical Support.
- **Receive Gain and Transmit Gain** - Provides the ability to increase or decrease the perceived volume of the voice response to the radios. If there is gain distortion, this provides the ability to minimize the distortion.

Note that the **Assigned Server IP Address** is not yet populated. This will be populated once the configuration is submitted. This address is entered in the Remote IP Gateway as the target destination.

RTP Gateway Configuration

Figure 7 Configure RTP Gateway Window - Results

The 'Configure RTP Gateway' window displays the following configuration details:

- Assigned Activation Code: CDNQQTNHHTH
- Assigned Server IP Address: [Empty]
- Assigned Server UDP Port: 50094
- Remote IP Address: ::ffff:166.166.108.201
- Remote UDP Port: 50094
- Protocol Mode: JPS RoIP
- Voice DSCP: Expedited Forwarding
- Keep Alive Duration: 0
- Internal Data Payload Format: G.711, mu-Law
- Receive Gain: 0dB
- Transmit Gain: 0dB

Buttons: Submit, Cancel

Once submitted, the console will return to the newly created LMR device.

2. Click **Submit** to return to the user **Settings** tab.
3. Select the **RTP Gateways** tab for the Department.

The RTP Gateway user displays in the list.

4. If the new RTP Gateway user does not display in the list, click **Refresh**.

Figure 8 RTP Gateways Tab

The screenshot shows the 'RTP Gateways' tab with the following table:

Select	RTP Gateway Server	Assigned Activation Code	Status	Assigned Server IP Address	Assigned Server UDP Port	Remote IP Address	Remote UDP Port
<input type="checkbox"/>	rtpgwd-1	0BORCNUCBC	Online	::	50004	::ffff:192.168.10.12	50004
<input type="checkbox"/>	rtpgwd-1	0DQWWKFNMB	Online	::	50006	::ffff:166.157.153.38	50006
<input type="checkbox"/>	rtpgwd-1	0VKFSDIIXL	Online	::	50008	::ffff:192.168.10.16	50008
<input type="checkbox"/>	rtpgwd-1	0ILRVQBLFL	Online	::	50010	::ffff:192.168.10.16	50000

Showing 1 to 4 of 4 entries

5. Click the **Edit RTP Gateway** tab to review all the settings.

Note that the Server IP Address is now populated.

Figure 9 Configure RTP Gateway Window - Populated

The 'Configure RTP Gateway' window now shows the following configuration details:

- Assigned Activation Code: CDNQQTNHHTH
- Assigned Server IP Address: ::ffff:54.153.34.98
- Assigned Server UDP Port: 50094
- Remote IP Address: ::ffff:166.166.108.201
- Remote UDP Port: 50094
- Protocol Mode: JPS RoIP
- Voice DSCP: Expedited Forwarding
- Keep Alive Duration: 0
- Internal Data Payload Format: G.711, mu-Law
- Receive Gain: 0dB
- Transmit Gain: 0dB

Buttons: Restart, Submit, Cancel

6. Ensure all other settings are as expected, and click **Submit** to accept changes.

IP Gateway Configuration

Introduction

There are a variety of potential IP Gateways that could be deployed, such as the following:

- AudioMate AM360r (single port; supports RTP Protocol)
- JPS IP Gateways, including the NXU-2A, ACU2000, and RSP-Z2 (supports JPS RoIP Protocol).

This chapter describes configuring these gateways.

Configuring IP Gateways Using RTP

This section describes the process of configuring IP Gateways that use RTP, such as the AudioMate AM360r IP Gateway. The following settings must be configured:

1. **RTP Remote IP** - Zebra PTT Pro server address and identified when the RTP Gateway is configured in the Zebra PTT Pro server.
2. **RTP Remote Port** - Identified when the RTP Gateway is configured in the Zebra PTT Pro server. These should be set to the same value.
3. **RTP Local Port** - Identified when the RTP Gateway is configured in the Zebra PTT Pro server. These should be set to the same value.

Figure 10 Configure RTP Gateway Screen - RTP

Configure RTP Gateway

Assigned Activation Code: CDNQQTNHTH

1 Assigned Server IP Address: ::ffff:54.153.34.98

2 Assigned Server UDP Port: 50094

Remote IP Address: ::ffff:166.166.108.201

Remote UDP Port: 50094

Protocol Mode: RTP

Voice DSCP: Expedited Forwarding

Keep Alive Duration: 0

Internal Data Payload Format: G.711, mu-Law

Receive Gain: 0dB

Transmit Gain: 0dB

Restart Submit Cancel

Default settings are generally appropriate for most other fields in the IP Gateway. Radio Receiver settings and/or Radio Transmitter settings may need to be modified to adjust the volume of the LMR radios or the Zebra PTT Pro devices. Refer to the IP Gateway manual for the settings available for your product.

Configuring JPS IP Gateways

This section describes the process of configuring JPS IP Gateways, such as the NXU-2A, ACU2000, and RSP-Z2. Some JPS Gateways house multiple IP Gateway ports which can be used as part of an LMR Gateway. The intent of this description is for specific configuration elements required to make a single JPS IP Gateway port operational.

Configuring Zebra PTT Pro Server RTP Gateway

The Zebra PTT Pro RTP Gateway definition in the Zebra PTT Pro server is the same for JPS IP Gateways as for the IP Gateways using RTP with one notable exception – the Protocol used for the JPS IP Gateways is RoIP. When creating a Zebra PTT Pro RTP Gateway user for the JPS IP Gateway, ensure the correct protocol is selected.

In addition, the Keep Alive Duration timer must be set to 3000. Failure to set the Keep Alive Duration timer will result in the IP Gateway not establishing a link with the Zebra PTT Pro Server.

Figure 11 Configure JPS NXU-2A/ACU2000 IP Gateway

Configure RTP Gateway

Assigned Activation Code: DMQSHJFUVF
Assigned Server IP Address: ::ffff:54.153.34.98
Assigned Server UDP Port: 50006

Remote IP Address: ::ffff:166.166.108.201 Remote UDP Port: 50006 Protocol Mode: JPS RoIP
Voice DSCP: Expedited Forwarding Keep Alive Duration: 3000 Internal Data Payload Format: G.711, mu-Law
Receive Gain: 0dB Transmit Gain: 0dB

Restart Submit Cancel

Configuring JPS NXU-2A/ACU2000 IP Gateway

The approach for configuring JPS IP Gateways is similar to that of IP Gateways using RTP. The following settings must be configured:

1. **RTP Remote IP** - Zebra PTT Pro server address and identified when the RTP Gateway is configured in the Zebra PTT Pro server.
2. **RTP Remote Port** - Identified when the RTP Gateway is configured in the Zebra PTT Pro server. These should be set to the same value.
3. **RTP Local Port** - Identified when the RTP Gateway is configured in the Zebra PTT Pro server. These should be set to the same value.

Figure 12 Configure RTP Gateway Screen - JPS RoIP

Configure RTP Gateway

Assigned Activation Code: CDNQQTNHHTH
 1 Assigned Server IP Address: ::ffff:54.153.34.98
 2 Assigned Server UDP Port: 50094

Remote IP Address: ::ffff:166.166.108.201 Remote UDP Port: 50094
 Voice DSCP: Expedited Forwarding Keep Alive Duration: 0
 Receive Gain: 0dB Transmit Gain: 0dB
 Protocol Mode: JPS RoIP
 Internal Data Payload Format: G.711, mu-Law

Restart Submit Cancel

Firewall Port Forwarding Rules

Port Forwarding rules may or may not be required depending on the IP Gateway used.

- Port Forwarding rules are required if IP Gateways using RTP, such as the AM360r IP Gateway are used.
- Port Forwarding rules are not required if the JPS IP Gateway is used with the JPS RoIP Protocol.

The IP Gateway and Donor radios typically reside in the Customer's private network behind a Firewall. For cloud-based Zebra PTT Pro Server environments, Firewall rules should be added to forward the inbound UDP traffic from the Zebra PTT Pro server to the IP Gateway.

Figure 13 Firewall Port Forwarding Rules Example

Name: Zebra UAL #2 - XPR 5550e IP Address: 10.9.5.11
 Unit is a: Server Subnet Mask: 255.255.255.0
 Communications mode: Connectionless Gateway IP: 10.9.5.1
 VOIP Port: 50070 Remote IP: 54.219.138.108
 Command Port: 23 Remote Port: 50070
 Serial port baud rate: 115200 Voice Compression: 5 PCM 64Kbps

The IP Gateway's IP Address on the internal network is 10.5.97.95, and the defined UDP port for inbound (and outbound) traffic is Port 52132. This traffic is coming from the Zebra PTT Pro server at IP Address 54.219.138.108.

Therefore, the Firewall rule would be established to forward UDP on port 52132 traffic from 54.219.138.108 and forward to the IP Gateway at 10.5.97.95.

LMR Radio Configuration

Introduction

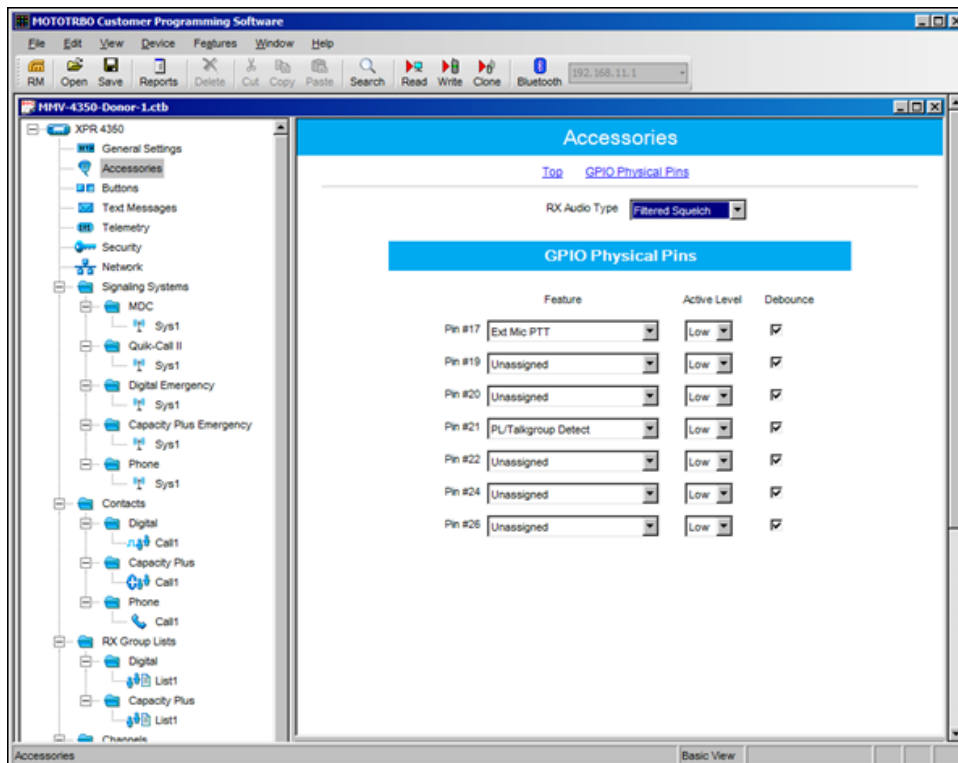
The following information provides a guide for the settings that can be potentially used to configure the LMR Donor Radio. The critical element in setting the configuration is defining the characteristics of the Auxillary output at the rear of the Donor Radio. This document includes the following radios:

- Motorola MotoTRBO XPR series
- Motorola CM200/CM200d/CM300 series

Configure Motorola MotoTRBO XPR

The Motorola MotoTRBO Accessories settings for the Auxiliary port are displayed in the following illustration.

Figure 14 Motorola MotoTRBO Accessories Settings



The Active Levels are set to Low to match the settings in the IP Gateway.

Configure the following two settings:

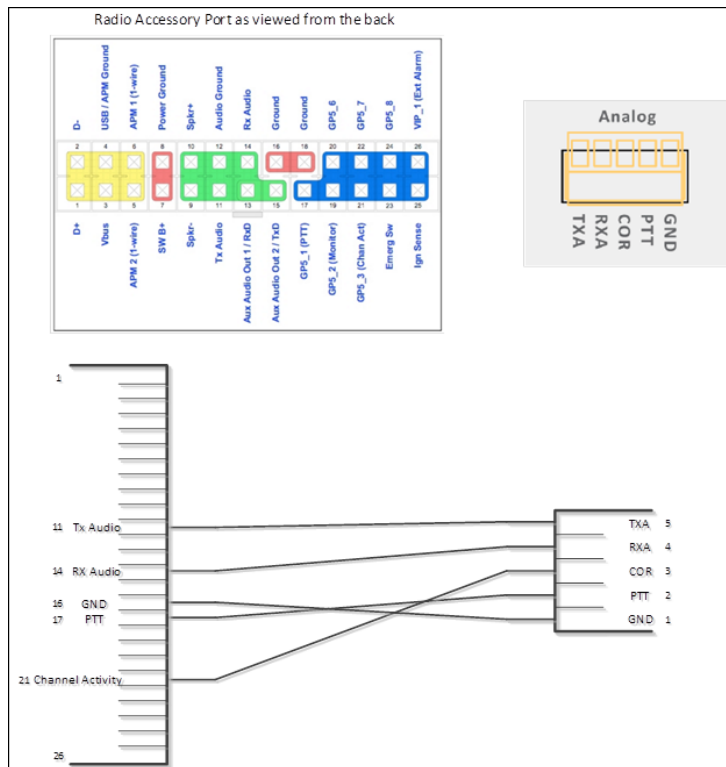
- Pin 17 - set to External Mic PTT, Active Low.
- Pin 21 - set to PL/Talkgroup Detect, Active Low.

Motorola MotoTRBO Interface Cable

There have been several radios established for production and are described below. There may be differences in the models and versions over time, but this provides a reasonable guide for the required modifications.

Note that the cable diagrams are shown for the AudioMate AM360r IP Gateway. If the JPS IP Gateway is used, JPS provides the interface cables for each radio deployed.

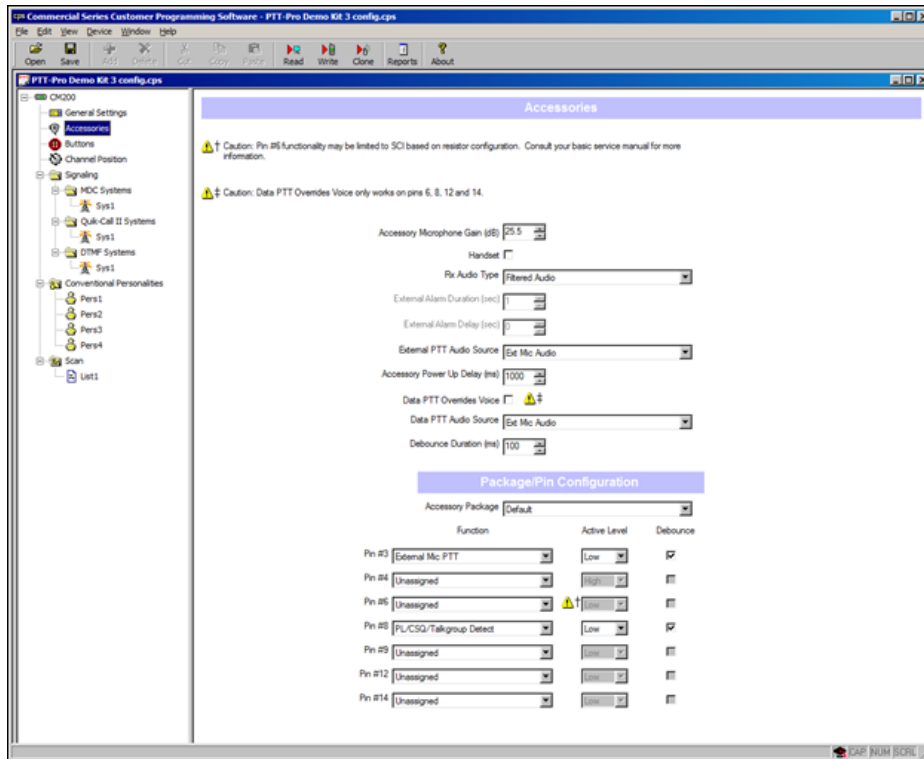
Figure 15 Interface Cable from the Motorola MotoTRBO Donor Radio to the AudioMate AM360r LMR Gateway



Configure Motorola CM200/CM200d/CM300

The Motorola CM200/CM200d/CM300 Accessories settings for the Auxiliary port are displayed in the following illustration.

Figure 16 Motorola CM200/CM200d/CM300 Accessories Settings



The Active Levels are set to Low to match the settings in the LMR Gateway.

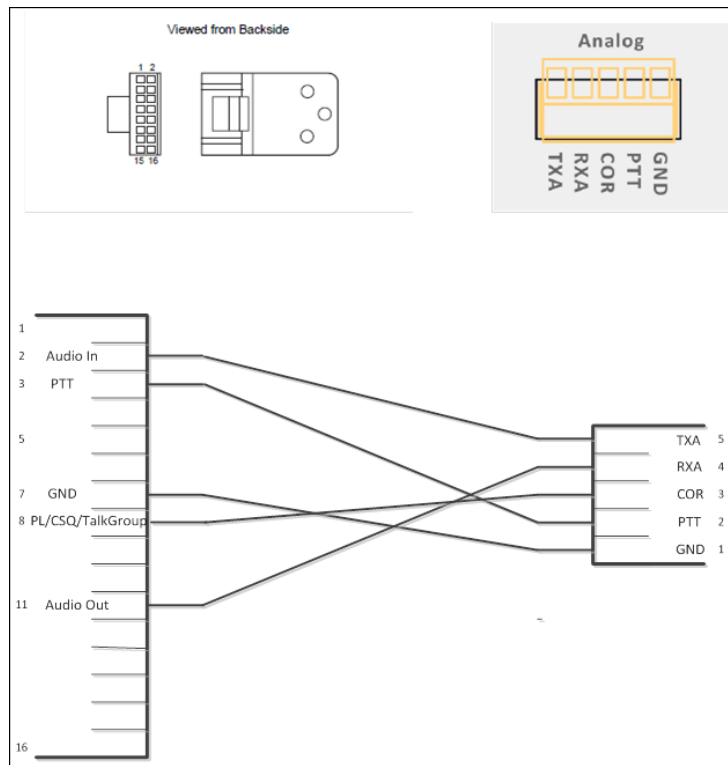
Configure the following two settings:

- Pin 3 - set to External Mic PTT, Active Low.
- Pin 8- set to PL/CSQ/Talkgroup Detect, Active Low.

Motorola CM200 Interface Cable

The interface cable from the CM200, CM200d, and CM300 are interchangeable. The Aux port on the CM200 is a 16-pin connector and the CM200d and CM300 are 20-pin connectors. The 16-pin connector cable can be inserted into the CM200d/CM300 by centering the Aux port, leaving two pins exposed on each side of the connector.

Figure 17 Interface Cable from the Motorola CM200 Donor Radio to the LMR Gateway



Setting Up Talk Groups to Support LMR

The LMR Radio configuration provides the ability for a Portable radio on a specific Radio Channel to communicate with a Zebra PTT Pro mobile device(s).

The following are some configuration principles that should be considered in the deployment:

- One LMR Gateway (or gateway module) supports one LMR Donor Radio.
 - Each IP Gateway has a specific IP Address and a Unique UDP Port that the Zebra PTT Pro server establishes a logical link.
 - Each IP Gateway physically connects to one Donor Radio.
 - Each Donor Radio communicates on a specific Radio Channel.
 - The portable radios operating on the same channel as the Donor Radio will hear communications from other portable radios on that channel.
 - There are LMR Gateways that support multiple Donor Radios. These Gateways have two or more IP Gateway modules housed in one chassis. For example, the JPS ACU-2000 is a chassis that supports up to 12 IP Gateway modules. Each IP Gateway module supports one Donor Radio. The JPS Z2 supports two Donor Radios.
- One LMR Donor Radio can participate in one Talk Group.
 - The Zebra PTT Pro server configuration for the RTP Gateway dictates that a specific RTP Gateway User definition can participate as an initiator in one and only one Enterprise Talk Group.
 - For inbound PTT from the radio the IP Gateway is required to send those messages to one specific target Talk Group. If the IP Gateway was a member of multiple Talk Groups, there is no mechanism to direct a PTT from a Channel based radio to a particular Talk Group.

- The LMR Gateway can participate as an initiator in only one Enterprise Talk Group.
- The LMR Gateway can participate as a receiver in multiple Dispatch Talk Groups.

If the Customer's use case demands that the portable radio participate in multiple Talk Groups, there is a unique configuration available. While the rule One LMR Donor Radio can participate in one Talk Group is absolutely true, the Donor Radio can also participate in one or more Dispatch Group(s) as a Receiver only.

In this environment, there are three ways for a portable radio to participate in a Zebra PTT Pro call:

- **Ad-Hoc Call:** A Zebra PTT Pro client device can select the RTP Gateway User from the contact list and initiate an Ad-Hoc call to the portable radios. Once the call is established, audio is heard by all radios on the Donor Radio channel, as well as any additional contacts selected by the initiator.
- **Talk Group Call:** The Zebra PTT Pro client device or the portable radio can initiate a PTT call to the Enterprise Talk Group where the LMR Radio is a member. Once this call is established, audio is heard by all radios on the Donor Radio channel, as well as all client devices that are a member of the Talk Group
- **Dispatch Group:** The Zebra PTT Pro client device can initiate a PTT call to the Dispatch Talk Group where the LMR radio is a Recipient member only of the Talk Group. In this mode the radio cannot respond to the calling Client device. This mode is used for announcement type communications to the radios.

Physical Plant Requirements

Additionally, the installation site's minimum requirements are as follows:

- Access to 120 VAC 20-amp circuit
 - Power for the IP Gateway and Donor Radio
- Cat 5/6 Ethernet Interface
 - On a VLAN with routed access to the external public network
 - LAN availability from the Port Forwarding Firewall configuration
- Physical equipment mounting
 - Donor Radio antenna to be mounted according to the radio dealer's specifications
 - Physical equipment, cables routed, and labeling according to Customer's standard installation and cable management specifications.

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