



GenWatch3®
GW_RSP25 Module
Software Version 2.17.4
Module Book

GenWatch₃

600-2.17.4-EE.1
2/11/2021

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Refer to the *Troubleshooting & Support* section of the GenWatch3 Manual Shell (Book 600-2.17.4-AA.1) for complete support and contact information.

Document History

Revision	Description	Author
2.0.2	Created Document	KIH
2.0.3	Release Revisions	KIH
2.0.3	Topaz Revisions	KIH
2.0.4	Release Revisions	KIH
2.0.4	Bug Fix: 3491	KIH
2.0.5	Added Millennium setup options	JAW
2.0.5	Release revisions	JAW
2.0.6	Updated screenshots	REB
2.0.6	Update Connection types	KIH
2.0.6.6	Release revisions	TDW
2.2	Document reviewed	WRK
2.3	Release Revisions	REB
2.4	Revision Before Release	CWF
2.5	Revisions Before Release	CWF
2.6	Revisions Before Release	CWF
2.7	Revisions Before Release	JAW
2.8	Revisions Before Release	CWF
2.9	Revisions Before Release	CWF
2.10	Revisions Before Release	ATG
2.11	Conversion to docx	BCY
2.12	Revisions Before Release	ATG
2.13	Revisions Before Release	ATG
2.14	Revisions Before Release	JAW
2.15	Revisions Before Release	REB
2.16	Revisions Before Release	JPS

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Goals

This manual provides instructions on creating and managing GW_RSP25 connections.

Who Should Read This Manual?

This manual is intended for an audience of Project 25 (P25) compliant system administrators and persons tasked with maintaining GenWatch3 on a P25 system.

How This Manual Is Organized

This manual is organized as follows:

- **Overview:** Describes the GW_RSP25 module and its role in the GenWatch3 solution.
- **Managing P25 Connections:** Describes how to create and manage GW_RSP25 connections.
- **Filtering P25 Data:** Describes how to create a packet filter for a GW_RSP25 connection.
- **Hardware Compatibility:** Defines the hardware compatible with the GW_RSP25 module.

This manual contains the following images, used to indicate that a segment of text requires special attention:



Additional Information: Additional information is used to indicate shortcuts or tips.



Warning: Warnings are used to indicate possible problem areas, such as a risk of data loss or incorrect/unexpected functionality.

This chapter defines the GW_RSP25 module and its role in the GenWatch3 product.

This chapter contains the following sections:

- **What is the GW_RSP25 Module?:** Defines the GW_RSP25 module and its role in the GenWatch3 solution.
- **EF Johnson Digital Transceiver:** Describes the EF Johnson radio hardware and proper installation practices.
- **Motorola XTL Series Digital Transceiver:** Describes the Motorola XTL series radio hardware and proper installation practices.

What is the GW_RSP25 Module?

The GW_RSP25 module enables GenWatch3 to monitor Common Air Interface (CAI) compliant system control channels. CAI packets are received via serial, TCP/IP or PPP connection to a digital transceiver or from a remote GW_RSP25 that is setup to rebroadcast CAI packets.

Each CAI packet source is maintained by a GW_RSP25 connection. The GW_RSP25 graphical user interface (GUI) allows you to manage each GW_RSP25 connection. The number of connections allowed within the GW_RSP25 GUI is restricted by your GenWatch3 license.

EF Johnson Digital Transceiver

Radio

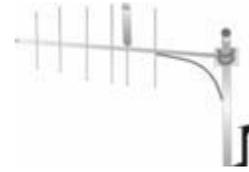
The radio needs to be an EF Johnson digital transceiver capable of outputting P25 control channel data. System monitoring requires a Topaz-enabled digital transceiver. The EF Johnson RS-5300 and 53SL mobile radios are digital transceivers.

Power

A standard EF Johnson power supply can be used to power the transceiver. To ensure reliability, an uninterruptible power supply (UPS) should be considered.

Antenna

The radio must be installed within range of the trunk system's control channel. A high gain, Yagi-style directional antenna is recommended for all installations. Good coax design is required between the antenna and the radio. In order to minimize phasing interference in a Simulcast trunking system, the use of a Yagi directional antenna is of utmost importance.



Placement

The radio should be placed where RF interference that may interrupt its RF reception is minimized. Since there is rarely any need to touch the radio, there is no need for the radio to be easily accessible.

Connection to the PC

The transceiver is connected to the computer using one of two methods.

- If the transceiver has the Topaz Interface enabled, a TCP/IP connection will be used to receive data from the radio. Standard networking equipment and cables can be used to connect to the PC.
- If the transceiver is connected via serial port, the EFJ Remote Programming Interface (RPI) can provide a PC connection through the PTT port on the front of the transceiver. At least one RPI is required to program the transceiver.

A serial connection to the PC is completed by way of a DB9 RS-232 cable. If necessary, this cable may be extended. A cable length over 50 feet (15 meters) is not recommended. Use good data standards to decide if shielded cable is required for a situation and RF environment.

Motorola XTL Series Digital Transceiver

Radio

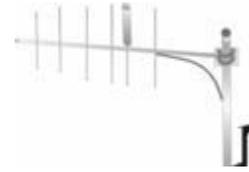
The radio needs to be an RF-modem capable Motorola XTL series radio. System monitoring requires a Millennium-enabled digital transceiver. The Motorola XTL 2500 and Motorola XTL 5000 are examples of these types of radios. The RF-modem feature must be purchased from Motorola.

Power

Genesis offers a power supply for the Motorola XTL series radios. This power supply includes a place to mount the Motorola XTL series radio. To ensure reliability, an uninterruptible power supply (UPS) should be considered.

Antenna

The radio must be installed within range of the trunk system's control channel. A high gain, Yagi-style directional antenna is recommended for all installations. Good coax design is required between the antenna and the radio. In order to minimize phasing interference in a Simulcast trunking system, the use of a Yagi directional antenna is of utmost importance.



Placement

The radio should be placed where RF interference that may interrupt its RF reception is minimized. Since there is rarely any need to touch the radio, there is no need for the radio to be easily accessible.

Connection to the PC

The transceiver is connected to the computer using the USB programming cable provided by Motorola. This cable allows the GW_RSP25 module to communicate to the radio using the Motorola Millennium protocol over a PPP connection. The PPP connection is created and maintained by the GW_RSP25 module.

Connection Management

PPP Communication with a Motorola XTL series radio requires a Windows remote access service (RAS) connection. GW_RSP25 automates the process of creating and dialing this connection when necessary. You can view the RAS entries created by GW_RSP25 by browsing to *Control Panel\Network Connections*.

Programming

The XTL series radio must be programmed with only the following features. Any additional features may prohibit the radio from functioning as an RF Modem.

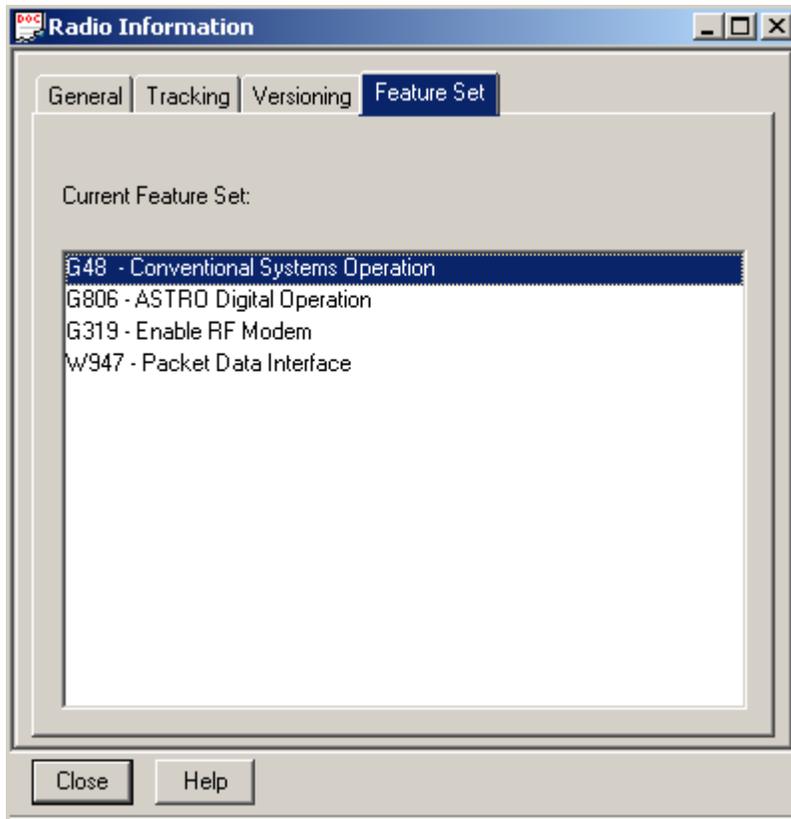


Figure 1.1 – Required XTL Series Radio Programming

This chapter gives instructions on how to manage GW_RSP25 connections.

This chapter contains the following sections:

- **P25 Connections:** Describes GW_RSP25 connections.
- **Connections Properties:** Detailed description of the GW_RSP25 connection properties.

P25 Connections

Each connection shown in the *Connections* list, in the left of the GW_RSP25 GUI, represents a connection to a packet source. Connections receive CAI packets via serial, TCP/IP or PPP. The status of each connection is represented by a radio icon that appears in the Windows system tray (the bottom right of your desktop). The icon has the following statuses:

-  : Connection status unknown (white).
-  : Connection has received packets within the last 5 seconds (green) for connections that are not Topaz Conventional. Topaz Conventional connections will turn green as soon as a connection is established and will stay green if the socket the connection is using remains open.
-  : Connection has not received packets within the last 5 seconds (blinks between red and white background) for all connections that are not Topaz Conventional.

The **Connection Type** of **Serial + TCP/IP** forwards packets received from the serial connection to a specified TCP port. If a client connects to this port, the following connection icons will indicate connection state:

-  : Connection status unknown (white) and the TCP/IP client is connected.
-  : Connection has received packets within the last 5 seconds (green), and the TCP/IP client is connected.
-  : Connection has not received packets within the last 5 seconds (blinks between red and white background) and the TCP/IP client is connected.

Adding a Connection

To receive packets from a packet source, you must add a GW_RSP25 connection.

To add a GW_RSP25 connection, take the following steps:

1. Click the **Add** button: The GW_RSP25 GUI will show the default settings for a new connection and a **Connection Alias** value of something like “New Connection 1.”
2. Change the connection properties (described below) to the desired values.
3. Click the **Update** button.

Updating a Connection

In most cases, after you configure a GW_RSP25 connection, you will not need to update it. However, you can update the GW_RSP25 connection properties if you make a data entry error or if the settings change for some reason. To update an existing connection, take the following steps:

1. In the *Connections* list, select (click on) the connection that you wish to update. This will show the properties of this connection.
2. Update the properties that you wish to change.
3. Click the **Update** button.



You can cancel a pending add or update and discard changes by clicking the **Cancel** button.

Deleting a connection

In most cases, after you add a GW_RSP25 connection, you will not need to delete it. However, you can delete a GW_RSP25 connection if you no longer want to monitor the connection's packet source. To delete an existing connection, take the following steps:

1. In the *Connections* list, select (click on) the connection that you wish to delete. This will show the properties of this connection.
2. Click the **Delete** button. This will result in a confirmation prompt.
3. Click **Yes**.

Connection Properties

Each GW_RSP25 connection contains many properties. The properties are defined in detail below.

Connection Settings

- **Connection Alias:** This name will be used to reference the connection.
- **Connection Type:** Used to set the input mode used by this connection.
 - **Serial:** When selected, the connection will use the **Port Number** (COM Port) specified to connect to a data source.
 - **Topaz:** When selected, the connection will use the **Host Name / IP** value to connect to a Topaz-enabled digital transceiver. The **Port** option is not displayed and is automatically set to 9130.
 - **TCP/IP:** When selected, the connection will use the **Host Name / IP** and **Port** values to connect to a TCP/IP socket.
 - **Serial + TCP/IP:** When selected, the connection will use the **Port Number** (COM Port) specified to connect to a data source. Each packet received is then echoed via TCP/IP on the specified **Port**.
 - **Millennium:** When selected, the connection will automatically use the next available XTL Series Digital Transceiver connected to the machine via USB.

- **Millennium + TCP/IP:** When selected, the connection will automatically use the next available XTL Series Digital Transceiver connected to the machine via USB. Each packet received is then echoed via TCP/IP on the specified **Port**.
- **Port Number*:** When using Serial or Serial + TCP/IP input, defines which COM port to use for this connection.
- **Host Name / IP*:** For TCP/IP connections, the network computer name or IP address of the computer set up as a GW_RSP25 TCP/IP server. For **Topaz** connections, the network computer name or IP address of the Topaz-enabled radio.
- **Port*:** For Topaz connections, this is the port used to connect to the Topaz-enabled radio. For TCP/IP connections, this is the port of the CAI data source. For TCP/IP + Serial and Millennium + Serial, this is the forwarding TCP/IP port on the local machine for all data received.
- **Redundancy Position:** For Millennium connections, this allows the configuration of multiple connections per site for redundancy. The values can be assigned arbitrarily but must be unique per site.



The port range available for selection is the default dynamic range, therefore the ports at the start of the range might be in use by other applications.

- **Start Connection:** If checked, then the GW_RSP25 module will start this connection when the connection is updated. If you want to retain the settings for a connection but do not want to receive packets from the connection, uncheck this option. In most cases, this option should be checked.
- **APX Modem:** For Millennium and Millennium + Serial connection types, this indicates that this connection will use a Motorola APX series radio.

*See Table 2.1 for more information on these settings and how they relate to **Connection Type**.

Setting	Connection Types					
	Serial	Topaz	TCP/IP	Serial + TCP/IP	Millennium	Millennium + TCP/IP
Port Number	Serial (COM) port	N/A	N/A	Serial (COM) port	N/A	N/A
Host Name / IP	N/A	Computer name or IP address of the Topaz-enabled radio connected via TPC/IP	Computer name or IP address of the CAI data source. This is usually another RSP25 connection set up as a Serial + TCP/IP.	N/A	IP address of the APX modem connected via USB.	IP address of the APX modem connected via USB.
Port	N/A	TCP/IP port used to connect to the Topaz-enabled radio. This is restricted to 9130.	TCP/IP port of the CAI data source. This is usually another RSP25 connection set up as a Serial + TCP/IP.	Forwarding TCP/IP port on the local machine for all data received from the serial port.	N/A	Forwarding TCP/IP port on the local machine for all data received from the serial port.

Table 2.1 – Setting Definition Based on Connection Type

System Information

- **WACN ID:** 5-digit hexadecimal WACN ID. WACN IDs are retrieved from your license.
- **System ID:** 4-digit hexadecimal system ID. System IDs are retrieved from your license.
- **RFSS ID:** Decimal RFSS ID. The CAI RFSS is equivalent to the Zone ID in a SmartZone system. Valid range is 1-255.
- **Site ID:** Decimal site ID. This number identifies the site that provides the control channel data. Valid range is 1-255.
- **Channel ID:** Decimal channel ID. Only valid with the Topaz connection type. This number identifies the conventional channel monitored by this connection.
- **Conventional:** Check if connecting to a Conventional P25 System. Uncheck if connecting to a Trunking P25 System.

Non-Millennium Channel Settings

The channels within a P25 trunking system are grouped using up to 16 unique identifiers. Each identifier represents a base frequency/channel-spacing pair and is used in conjunction with a channel number. In order to translate this information into a frequency, the GW_RSP25 module requires the following information about each identifier used by your system:

- **Base Frequency:** Base frequency for this identifier.
- **Channel Spacing:** Spacing between each frequency for this identifier.



If needed, this information can be provided by your system manufacturer.

When to use Non-Millennium Channel Settings

In most cases, the channel settings will be decoded from the control channel. Entering the channel settings manually is necessary only for channels that cannot be decoded from the control channel. To see if channels are being decoded, launch the GW_Activity GUI and verify that frequencies are displayed in the frequency column. If channel settings are not being decoded, frequencies will not be displayed and packets that should contain a frequency will be listed as corrupt. In this case, you must manually enter the channel settings.

Millennium Channel Settings

Millennium RF-modems require programming in order to tune into the current control channel on a system. Many of the values are repeated in the form of TX (transmit) and RX (receive) to allow for UHF/VHF programming. Transmit and receive are from the perspective of the RF-modem. The following channel settings are available only when the **Connection Type** of **Millennium** is selected.

- **Increment Step Size RX:** Spacing between radio receive channels. Values include:
 - **5.0 KHz**
 - **6.25 KHz**
 - **2.5 KHz**
 - **3.125 KHz**
- **Increment Step Size TX:** Spacing between radio transmit channels. Values are the same as Increment Step Size RX.
- **Range Frequency RX:** Radio receive channel range. The lower end of this range is used as the base channel. Values include:
 - **20-55.0025 MHz**
 - **63-93 MHz**
 - **103-230 MHz**
 - **375-525 MHz**
 - **801-963.835 MHz**
 - **740-870 MHz**
- **Range Frequency TX:** Radio transmit channel range. Values are the same as **Range Frequency RX**.

- **System Deviation RX:** Defaults are **2.5 KHz** for P25, **4.0 KHz** for NPSPC and **5.0 KHz** for interleave analog. Values include:
 - **0 KHz:** Not known to be used.
 - **2.5 KHz:** Used on P25 systems.
 - **4.0 KHz:** Used by NPSPC systems.
 - **5.0 KHz:** Used by analog interleave systems.
- **System Deviation TX:** Defaults are **2.5 KHz** for P25, **4.0 KHz** for NPSPC and **5.0 KHz** for interleave analog.
- **Channel Band Width RX:** Values include:
 - **12,500 Hz:** Generally used by all digital systems.
 - **20,000 Hz**
 - **25,000 Hz**
 - **30,000 Hz**
- **Channel Band Width TX:** Values are the same as **Channel Bandwidth RX**.
- **Modulation:** Frequency modulation. Values include:
 - **12.5 KHz / C4FM:** Rebanded or digital systems
 - **CQPSK:** Not known to be used.
 - **Wide Pulse:** Not known to be used.
- **IF Filter:** Intermediate Frequency filter. Values include:
 - **5.76 KHz:** Used for P25.
 - **7.8 KHz:** Used for analog.

- **Control Channels # RX/TX:** Control channels used on this system. Control channel values must be entered in hertz. Most control channels are shown in megahertz, so you may need to multiply the number by 1 million to determine the hertz value. All eight control channels must be provided.

Please note:

- If your system uses only one control channel, repeat that control channel value for each channel; enter it in all four positions of the same type (RX or TX).
- If your system uses only two control channels, then repeat the second control channel value in the third and fourth positions.
- If your system uses only three control channels, then repeat the third control channel value in the fourth position.



Control Channel RX is for the frequency that is receiving control channel activity. Control Channel TX is for the frequency transmitting (sending) control channel activity.



Changing the RX values will set their respective TX value to the values' expected RX values. This feature speeds setup for non-UHF/VHF connections.

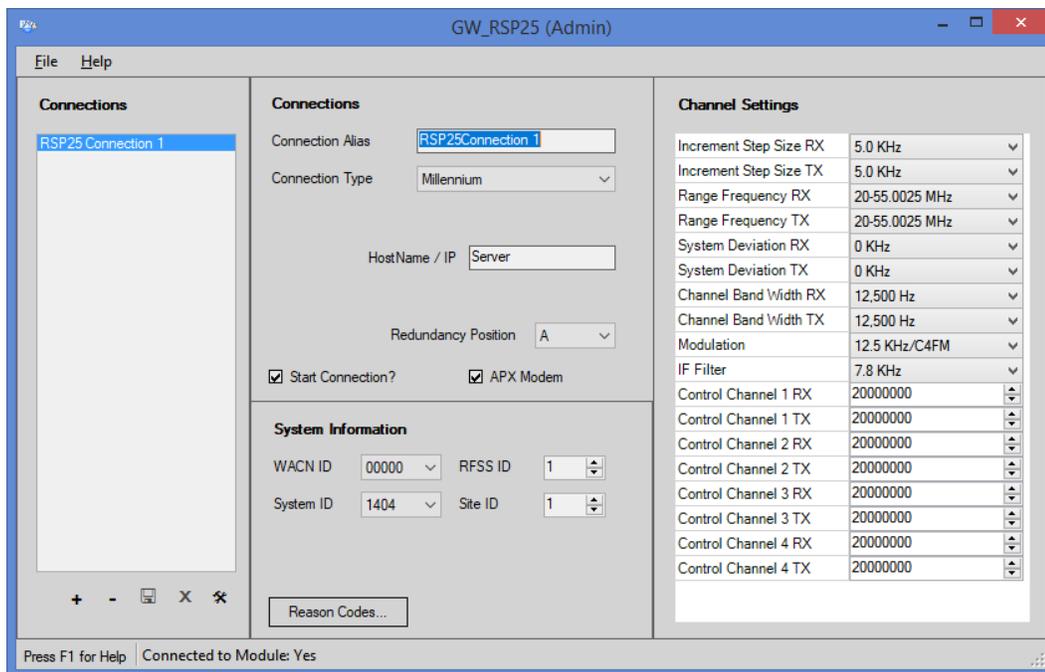


Figure 2.1 – Settings for Millennium Connection



Non-APX Millennium connections require the Remote Access Connection Manager service. If this service is disabled, it will not be possible to connect to a Millennium device.

Reason Codes

The CAI used by P25 systems defines two types of reason codes. Within each type, certain values are defined by the CAI and others are defined by manufacturers and users.

- **Deny Reasons:** Unit requests service/call that is denied by the system. User or system defined values: 91-239 & 244-254 (hexadecimal 61-EF & F4-FE).
- **Queue Reasons:** Unit must wait for service/call to be available again. User or system defined values: 128-255 (hexadecimal 80-FF).

The GW_RSP25 GUI allows users to define the same codes for use in GenWatch3. Start by clicking the **Reason Codes...** button on the GW_RSP25 GUI.



Figure 2.2 – Reason Codes button

The *Reason Codes* window will appear. Each list of user-defined reason codes is displayed and can be edited on this window. Modifications to the lists can be saved by clicking the **Save** button or ignored by clicking the **Cancel** button.

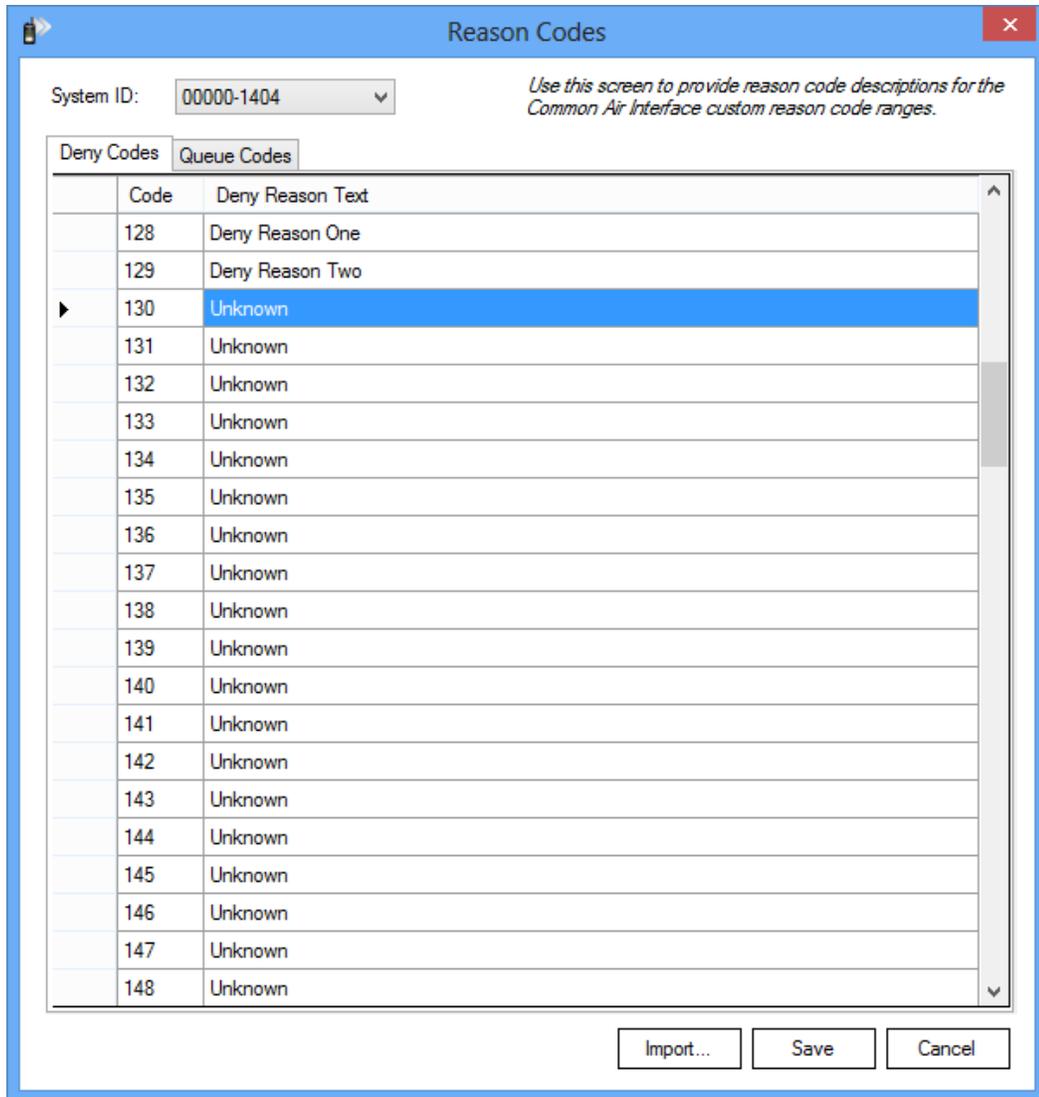


Figure 2.3 – Reason Code Window

Reason codes can also be imported from a .CSV file. To import a file, click the **Import...** button above the desired list and the *Import Codes* window appears. The title will denote which set of codes you are importing. In Figure 2.4 the *Import Deny Reasons* window has been opened for Deny codes.

This chapter gives instructions on how to manage GW_RSP25 connection filters.

This chapter contains the following sections:

- **What are Connection Filters?:** Describes the GW_RSP25 connection filter.
- **Why Would I Create Connection Filters?:** Explains how connection filters can be used to offload monitoring and reporting to agencies.
- **Loading the Connection Filter window:** Instructions on how to load the GW_RSP25 *Connection Filter* window.
- **Connection Filter Options:** Instructions on managing the GW_RSP25 Connection Filter.

What are Connection Filters?

Each GW_RSP25 connection allows filtering based on groups assigned to a GenWatch3 user. Information that is filtered out on this level is not passed to the rest of the GenWatch3 modules. If a filter is set up, only packets that reference groups selected in the user's groups or radio IDs that reference this group as their default group are included.



NOTE: Default groups are assigned to radio IDs in the GW_Alias GUI.

Why Would I Create Connection Filters?

Connection filters are designed to allow system owners to offload the GenWatch3 monitoring and reporting capabilities onto agencies. In these installations, system owners would install and set up GenWatch3. During the setup an “Agency A” GenWatch3 user is defined, containing only the groups available to that agency. This GenWatch3 user is used for the connection filter.

In the end, only the system owners know the logins that would allow changes to the GenWatch3 users. The system owners also create various GenWatch3 users to be used by Agency A. Agency A is now allowed to monitor and report on only the groups and radio IDs used by their agency.

Loading the Advanced Options Screen

To load the *Advanced Options* window, take the following steps:

1. Load the GW_RSP25 GUI.
2. Click on a connection in the *Connections* list: This will show the connection's properties and enable the **Options** button (bottom left of the screen). To see the **Options** button, you must be logged in as a user whose role contains the *SetupFilters* privilege for the GW_RSP25 module.
3. Click the **Options** button: The *Advanced Options* window will appear.

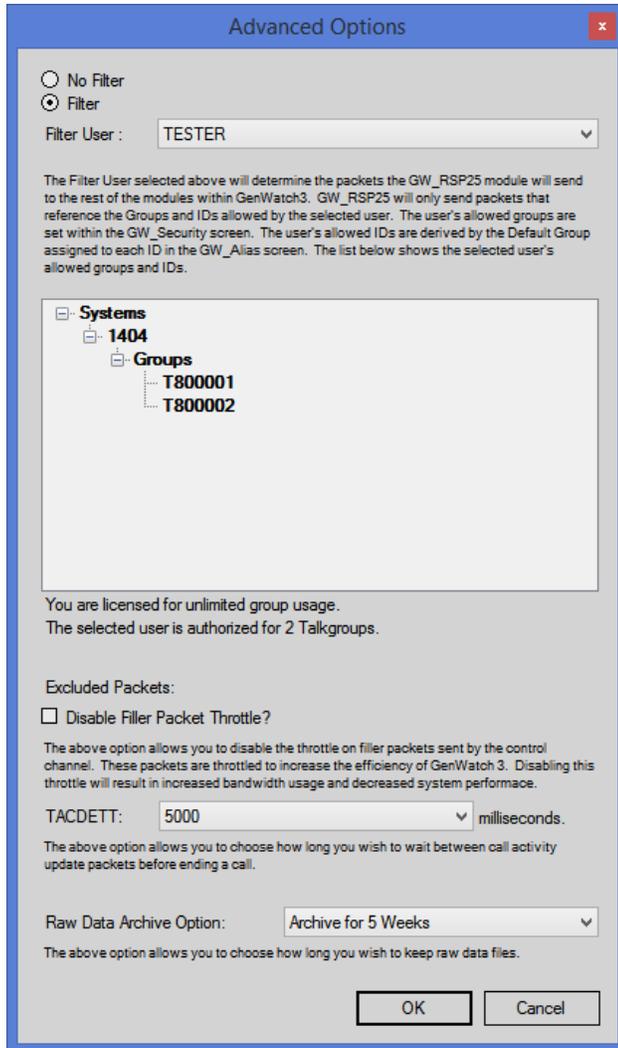


Figure 3.1 – Advanced Options Window

Connection Advanced Options

Each GW_RSP25 connection has advanced options. The list below describes the advanced options:

- **No Filter:** If selected, all packets will be passed to the GenWatch3 modules, regardless of radio ID or talkgroup. This option is only available if you are not licensed for a set number of talkgroups.
- **Filter:** If selected, GenWatch3 will only process packets with a talkgroup or radio ID matching ones defined in the **Filter User's** groups.
- **Filter User:** User whose **Group Filter** settings will be used to filter CAI packets. When you select a **Filter User**, the tree below the **Filter User** shows the talkgroups and radio IDs that are allowed by the selected user.
- **License Threshold:** Two labels at the bottom of the *Advanced Options* window indicate how many talkgroups you are licensed for and how many groups the selected user includes. You cannot select a **Filter User** whose **Group Filter** settings include more groups than are included in your license. This applies only if you are licensed for a set number of talkgroups.
- **Disable Filler Packet Throttle:** P25 systems must constantly broadcast “overhead messages” containing system information for radios. By default, GenWatch3 throttles these packets down to one per 5 seconds. The **Disable Filler Packet Throttle** option disables the throttling of these filler packets. For diagnostic purposes, you may want to disable this throttle. *This option should normally be unchecked.*
- **TACDETT:** Call time out in milliseconds. If this time period elapses between call activity packets, GenWatch3 will issue an End of Call packet for the call. In most cases, the default of 2000 milliseconds is ideal. However, on some busier systems, this period may need to be extended. This is because call activity packets, by default, have a very low priority on the control channel. If there is other activity to report, such as affiliations, deaffiliations, statuses, messages, etc., then you will receive fewer call activity packets during a push-to-talk.
- **Raw Data Archive Option:** This option allows you to choose how long the GenWatch3 raw data files remain on your GenWatch3 computer.
 - **Do Not Archive:** GenWatch3 should not archive raw data files.
 - **Archive for 1 Week:** GenWatch3 should archive one week's worth of raw data files.
 - **Archive for 2 Weeks:** GenWatch3 should archive two weeks' worth of raw data files.
 - **Archive for 5 Weeks:** GenWatch3 should archive five weeks' worth of raw data files (default).



Your GenWatch3 GW_RSP25 module may be licensed to a specific list of talkgroups. You can check this via the **View License** button on GW_LaunchPad. If your GW_RSP25 license information contains WACN, System and Talkgroup information, then you are licensed to a specific list of talkgroups. If you are licensed in this way, creating a **Filter User** will not override this license restriction (i.e., allow you to see more talkgroups than you are licensed for). However, you can use a **Filter User** to allow GenWatch3 to only process a subset of the talkgroups that you are licensed for. This is particularly useful if you, as a system owner, are licensed for twelve talkgroups, and you are setting up an agency-based installation of GenWatch3 and you want this agency to only view activity on four of your twelve talkgroups.

More on Raw Data Files

GenWatch3 stores raw data files on your GenWatch3 computer. Genesis and Motorola support personnel use these files to help diagnose control channel decode issues you may have with GenWatch3.

By default, GenWatch3 will keep five weeks' worth of raw data files (approximately 1.2 GB). You may wish to conserve hard drive space by choosing to keep only one week's worth of raw data files. We suggest you keep the full five weeks, just in case it takes you awhile to notice a control channel decode issue.

These raw data files are stored in the following directory:

<GenWatch3 Data

Directory>\RawData\RSP25\<WACNId>\<SystemId>\<RFSSId>\<SiteId>

In the default GenWatch3 installation directory, if the WACN ID is BEE00, the System ID is 1404, the RFSS ID is 1 and the site ID is 10, the GenWatch3 raw data directory is:

*C:\ProgramData\Genesis\GenWatch3\
RawData\RSP25\BEE00\1404\1\10*

The files in this directory are in the following format:

GW3_<year><month><day>_<hour>.RAW

The raw data file for the 3:00pm hour on 10/12/2020 would be:

GW3_20201012_15.RAW

Changing the Raw Data File Directory

Changing the GenWatch3 raw data directory is usually not recommended. However, if the default location might not have enough disk space to store the raw data, you may wish to move this archive operation to another drive. For instructions on how to change the raw data file directory, see the *GenWatch3 Config Files* section of *Chapter 3 – GenWatch3 Service* in the *GenWatch3 Core Manual*.



Warning: Make sure you only change the *RawDataFilePath* setting. Changing other GenWatch3.config settings can cause your computer to become unstable or even unusable. When in doubt, ask for assistance from your IT department or Genesis support.

This chapter gives a list of hardware that the GW_RSP25 module is compatible with.

Radio

The following digital transceivers are fully compatible with GenWatch3:

- **53SL Mobile**
 - Manufacturer: EF Johnson
 - Model Number: 242-5417-XXX
- **RS-5300 Mobile**
 - Manufacturer: EF Johnson
 - Model Number: 242-5377-XXX

The GW_RSP25 module is compatible with the following transceivers via the Millennium interface:

- **XTL 2500**
 - Manufacturer: Motorola
 - Model Number: Varies based on programming
 - Firmware: R12.00.17 or newer
- **XTL 5000**
 - Manufacturer: Motorola
 - Model Number: Varies based on programming
 - Firmware: R12.00.17 or newer
- **APX 4500 Mobile (dash mount)**
 - Manufacturer: Motorola
 - Firmware: N/A
- **APX 6500 Mobile (dash mount)**
 - Manufacturer: Motorola
 - Firmware: N/A
- **APX 7500 Mobile (dash mount)**
 - Manufacturer: Motorola
 - Firmware: N/A

Radio Interface

If the Topaz interface is used, standard networking equipment can connect the radio(s) to the PC. Connecting the radio to the computer's serial port can be accomplished with the following:

- **Remote Programming Interface**
 - Manufacturer: EF Johnson
 - Part Number: 023-5300-000



NOTE: At least one remote programming interface is required, as it is needed to program the transceivers.