TELEX
RADIO DISPATCH PRODUCTS

Application Guide

Kenwood NX-5x00

DMR/NXDN/P25

Interface for IP-224

VOIProven

TELEX
Radio Dispatch

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OpenSSL Project

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes cryptographic software written by Tim Hudson (tjh@cryptsoft.com).

Table of Contents

1.0 Introduction

The Kenwood NX-5x00 DMR/NXDN/P25 radio interface is designed as an add-on option in the Telex Radio Dispatch system. This application guide describes the Telex Radio Dispatch Kenwood NX-5x00 DMR/NXDN/P25 feature set and how to configure the interface for the IP-224 and C-Soft.

NOTE: For more information, see the IP-224 Technical Manual (P/N F.01U.218.562), the C-Soft Software Console Administrator's Guide (P/N F.01U.218.561), and the radio manufacturer's technical documentation.

2.0 Hardware Requirements

- IP-224 Ethernet Adapter Panel (P/N F.01U.306.547)
- IP-224 Cable – Kenwood TK-X150/X180, 5X10, and NXDN radios (P/N F.01U.165.540)
- Kenwood NX-5x00 DMR/NXDN/P25 radio

NOTE: See IP-224 Firmware Release Notes for the radio firmware revision tested.

3.0 Software Requirements

- C-Soft version 6.500 or later
- IP-224 version 2.300 or later
- IP-224 Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key
- Telex System Manager (TSM) 2.300 or later
- Windows 7 (32-bit or 64-bit)
- Windows 8.1
- Windows 10
- Kenwood KPG-D1N Field Programming Unit

4.0 Supported Features

Kenwood NX-5x00 DMR/NXDN/P25 Supported Features									
Feature	**Analog**	**DMR**	**NXDN**	**P25**	**Feature**	**Analog**	**DMR**	**NXDN**	**P25**
Channel/ Talkgroup Change	*	Yes	Yes	Yes	Emergency Acknowledgement	No	Yes	Yes	No
Zone Change	No	No	No	No	Encryption On/Off	Yes	Yes	Yes	Yes
					GPS Read	No	No	No	No
Group Call	Yes	Yes	Yes	Yes	GPS Trigger On/ Off	No	No	No	No
Private Call	Yes	Yes	Yes	Yes	Monitor On/Off	Yes	Yes	Yes	Yes
					Radio Call Alert	No	No	No	No
ANI Decode	Yes	*	Yes	Yes	Radio Check	No	No	No	No
Call Alert Decode	No	No	No	No	Radio Enable/ Disable	Yes	Yes	Yes	No
Emergency Decode	Yes	Yes	Yes	Yes	Radio Select Call	Yes	Yes	Yes	Yes
Status Message Decode	Yes	Yes	Yes	No	Radio Remote Monitor	Yes	Yes	Yes	*
Text Message Decode	No	No	No	No	Radio Send Text Message	No	No	No	No
					Radio Status (Send Status Message)	Yes	Yes	Yes	No
Query Encryption	Yes	Yes	Yes	Yes	Radio Status Request	Yes	Yes	Yes	*
Query Monitor	Yes	Yes	Yes	Yes	Scan Add/Delete	Yes	Yes	Yes	Yes
Query Scan	Yes	Yes	Yes	Yes	Scan On/Off	Yes	Yes	Yes	Yes
Query Talk Around	Yes	Yes	Yes	Yes	Talk Around On/ Off	Yes	Yes	Yes	Yes

** Not fully supported, see the Known Limitations section.*

NOTE: The above list of features are supported when using the latest version of C-Soft. Hardware IP Consoles only support the following:

- Channel/Talkgroup Change
- ANI Decode
- Emergency Decode
- Status Message Decode
- Encryption On/Off
- Monitor On/Off
- Scan On/Off
- Talk Around On/Off

5.0 Known Limitations

5.1 ANI Decode

For DMR systems, ANI Decode is currently supported in the Kenwood NX-5x00 radio firmware version 2.20.00 or greater.

5.2 Channel/Talkgroup Change

Analog Conventional System Types should not be used because there is not a serial command to query the radio's channel type. The radio's channel type is important in determining what serial command the IP-224 needs to send to the Kenwood NX-5x00 radio. If analog channels are necessary they should be created in a DMR, NXDN or P25 System Type.

5.3 Radio Remote Monitor

For P25 systems this feature is only available on P25 Trunking channels.

5.4 Radio Status Request

For P25 systems this feature is only available on P25 Trunking channels.

6.0 Cable Diagram

The IP-224 Cable – Kenwood TK-X150/X180, 5X10, and NXDN radios allows the IP-224 to serially control a Kenwood NX-5x00 DMR/NXDN/P25 radio.

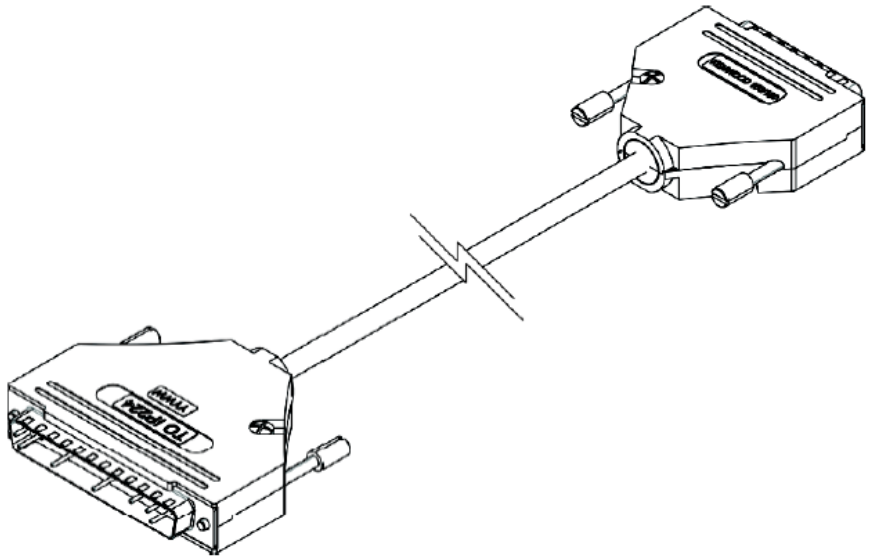


FIGURE 1. Kenwood Interface Cable

Cable Diagram for Kenwood NX-5x00 Radio and IP-224 Interface			
Function	**Kenwood NX-5x00**	**IP-224**	**Function**
RXD2	PIN 2	PIN 17	RS-232/TTL TXD
TXD2	PIN 3	PIN 36	RS-232/TTL RXD
GND	PIN 7	PIN 29	GROUND
GND	PIN 7	PIN 5	PTT RELAY COM CONTACT
Ext. MIC Input	PIN 6	PIN 1	TX+ AUDIO
RX Output	PIN 17	PIN 20	RX+ AUDIO
AUX Input	PIN 12	PIN 24	PTT RELAY N.O.CONTACT
AUX Output	PIN 20	PIN 15	COR INPUT

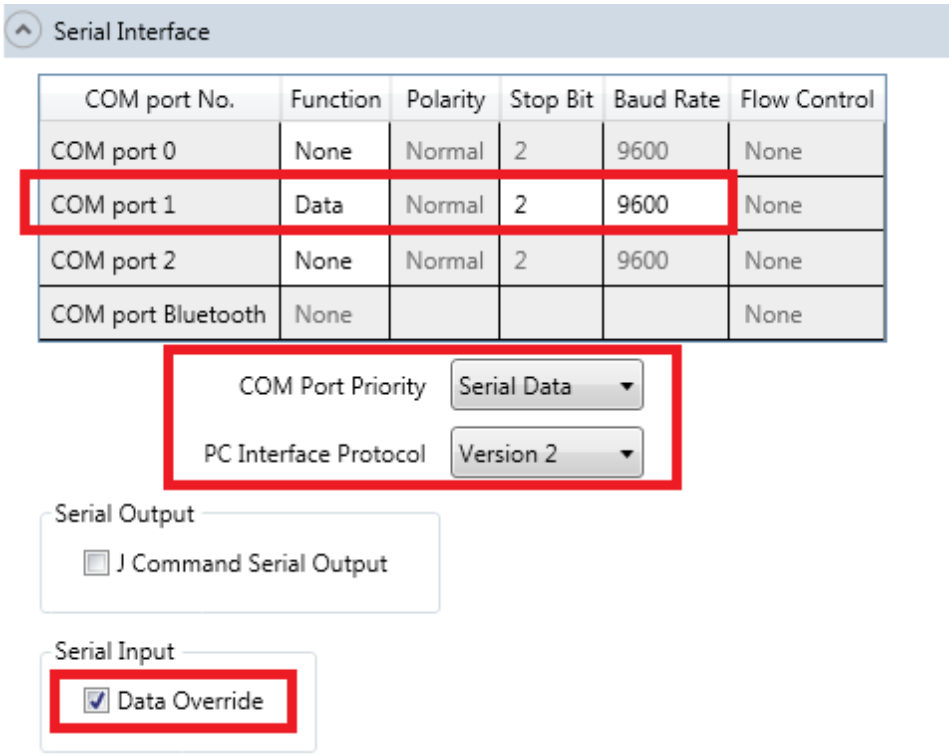
7.0 Radio Programming Application Setup

The Kenwood KPG-D1N Field Programming Unit is used to configure the Kenwood NX-5x00 DMR/NXDN/P25 radio to interface properly with the IP224.

7.1 Serial Communications Setup

To **configure Serial Communications**, do the following:

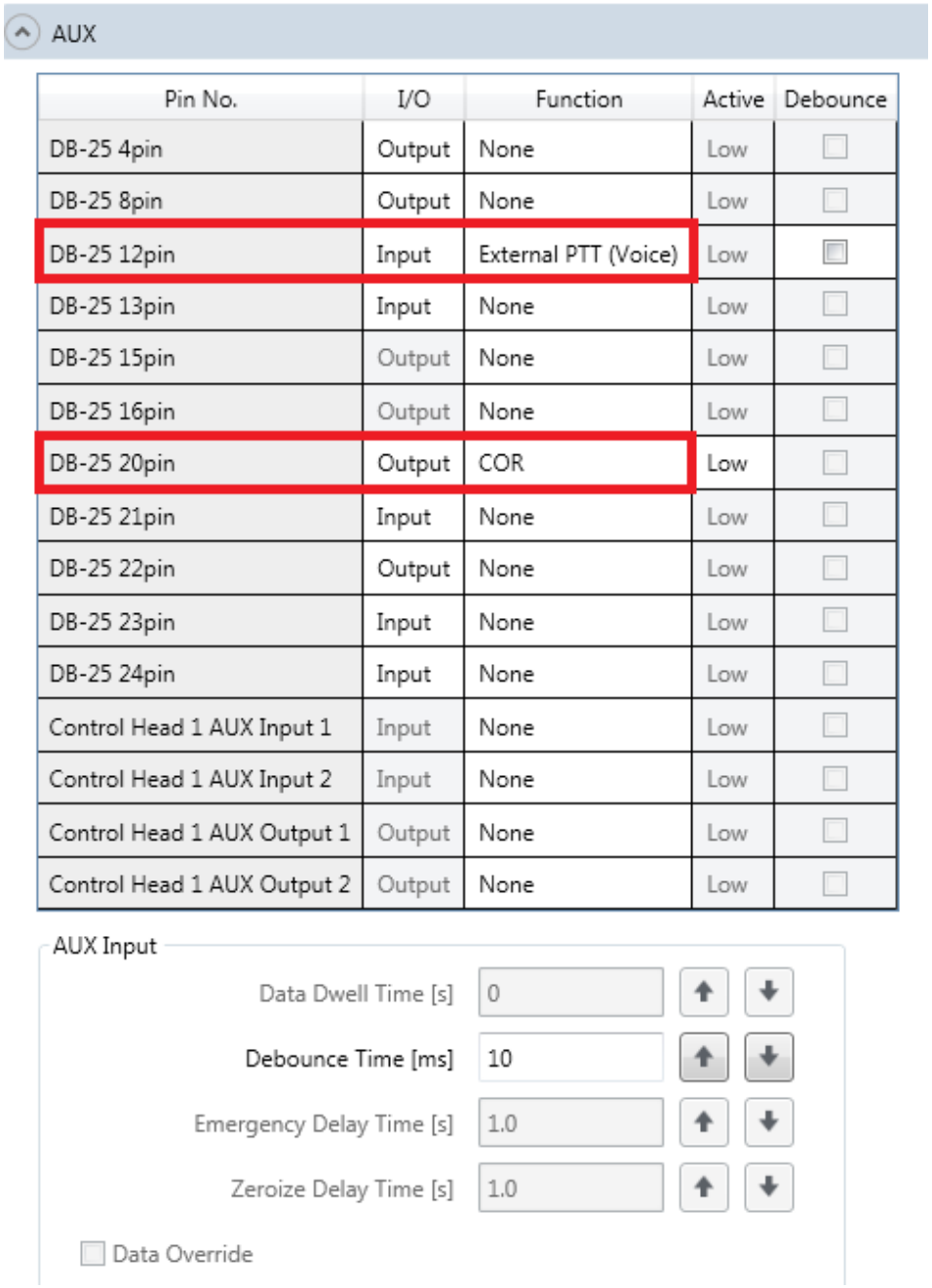
1. From the left navigation panel of Transceiver Settings, select **Optional Features | Optional Features 1 | Serial Interface**.
2. In the Function field for COM port 1, select **Data**.
3. In the Polarity field for COM port 1, select **Normal**.
4. In the Stop Bit field for COM port 1, select **2**.
5. In the Baud Rate field for COM port 1, select **9600**.
6. From the COM Port Priority drop down menu, select **Serial Data**.
7. From the PC Interface Protocol drop down menu, select **Version 2**.
8. From the Serial Input Group Box, select the **Data Override check box**.



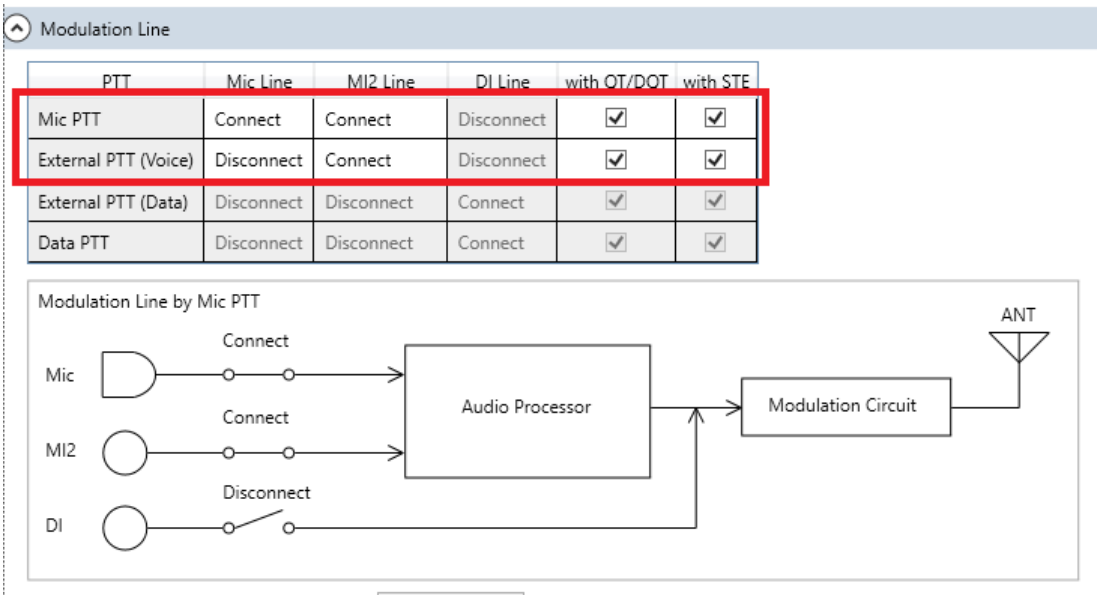
7.2 COR and External PTT Setup

To **configure the COR and External PTT**, do the following:

1. From the left navigation panel of Transceiver Settings, select **Extended Function | AUX**.
2. From the I/O column drop down menu for DB-25 12pin, select **Input**.
3. From the Function column drop down menu for DB-25 12pin, select **External PTT (Voice)**.
4. From the I/O column drop down menu for DB-25 20pin, select **Output**.
5. From the Function column drop down menu for DB-25 20pin, select **COR**.



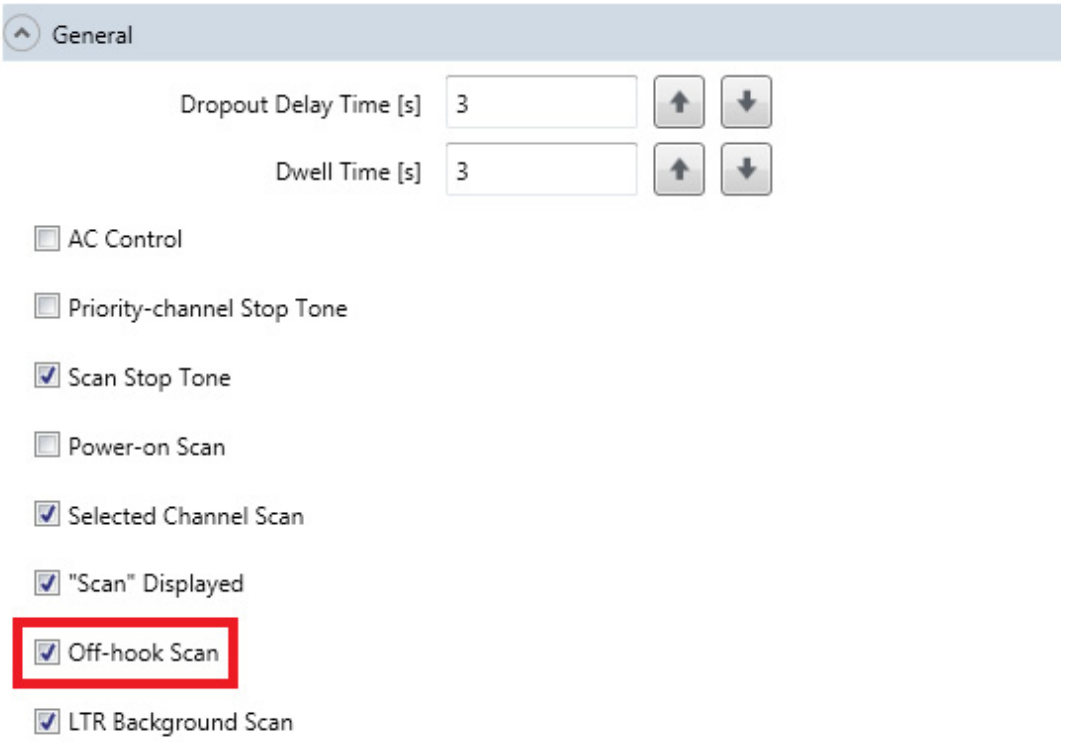
6. From the left navigation panel of Transceiver Settings, select **Extended Function | Modulation Line**.
7. From the Mic Line column drop down menu for Mic PTT, select **Connect**.
8. From the MI2 Line column drop down menu for Mic PTT, select **Connect**.
9. From the Mic Line column drop down menu for External PTT (Voice), select **Disconnect**.
10. From the MI2 Line column drop down menu for External PTT (Voice), select **Connect**.



7.3 Scan Setup

To **configure Scan**, do the following:

1. From the left navigation panel of Transceiver Settings, select **Scan | Scan Information | General**.
2. Select the **Off-hook Scan checkbox**.

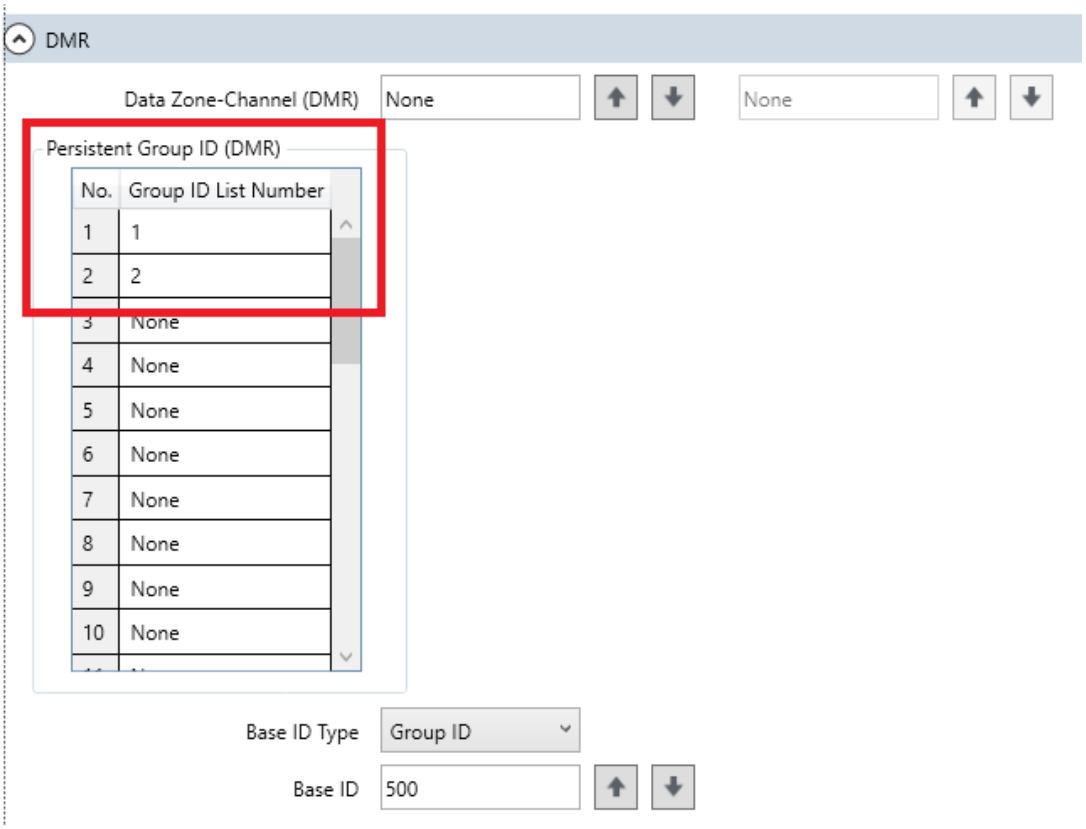


7.4 Persistent Group ID (DMR) Setup:

NOTE: This option is necessary because the mobile radio only receives DMR group calls from Group IDs in the Persistent Group ID list.

To **configure Persistent Group IDs (DMR)**, do the following:

1. From the left navigation panel of Transceiver Settings, select **Personal | DMR Zone | Personal Features | DMR**.
   The DMR window appears.



2. In the Persistent Group ID (DMR) list, enter the necessary **Group IDs** to the Group ID List Number column.

8.0 IP-224 Access Key Installation

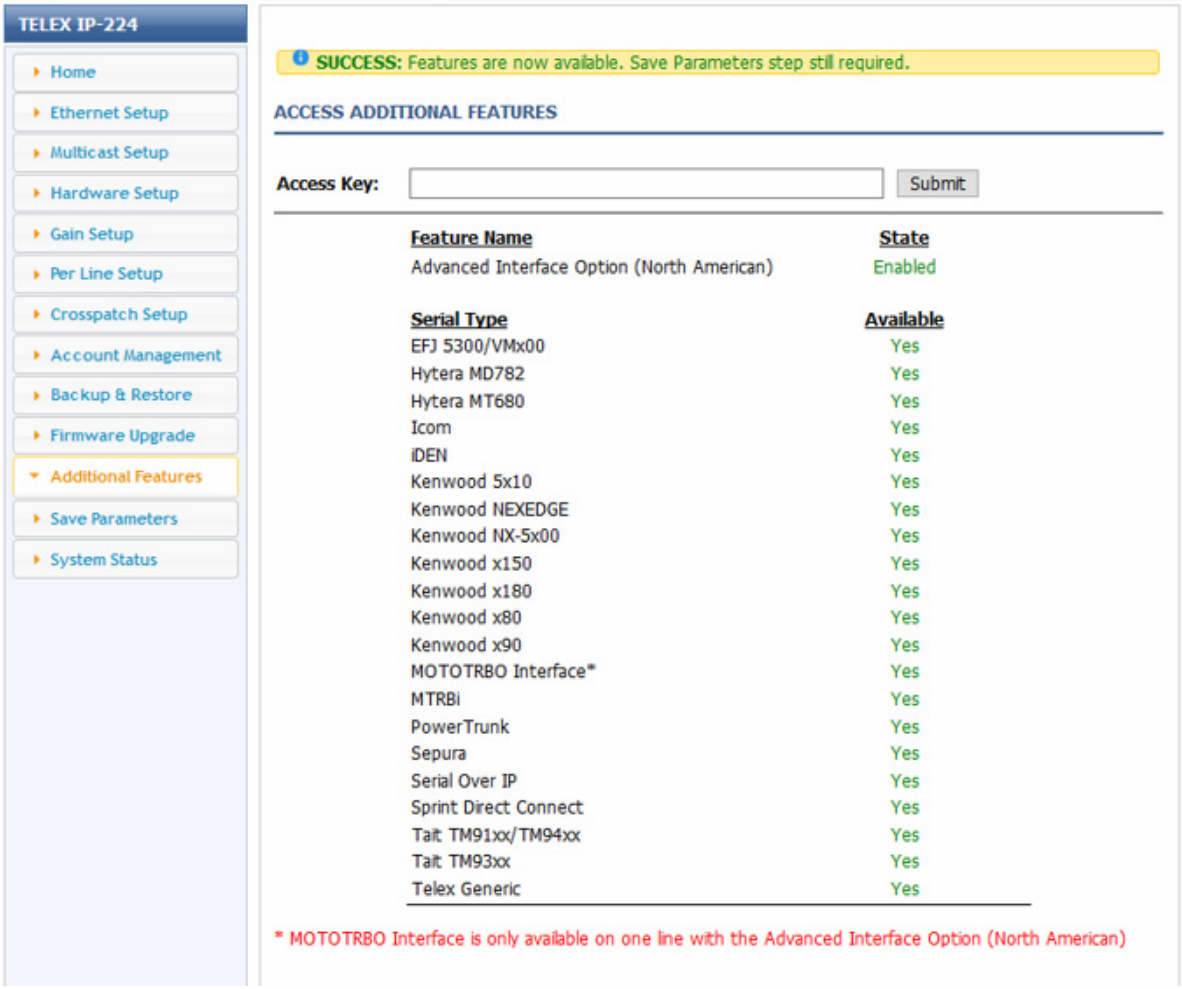
The Kenwood NX-5x00 DMR/NXDN/P25 radio interface requires an additional Advanced Interface Option (Export) or Advanced Interface Option (North American) on the IP-224.

NOTE:

- The Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key must be purchased before you can select the Kenwood NX-5x00 Serial Type. The Advanced Interface Option (Export) or Advanced Interface Option (North American) requires an access key to be generated specifically for each IP-224.
- If the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key was purchased as a factory installation [(F.01U.347.906) IP-224 Radio Gateway Advanced Options Export or (F.01U.347.907) IP-224 Radio Gateway Advanced Options NA (factory installed)], the access key was activated by the factory prior to shipping.
- Activating the Advanced Interface Option (Export) or Advanced Interface Option (North American) via the IP-224 web interface is only required if this is a field installation [(F.01U.343.868) IP-224 Field Code Advanced Options Export or (F.01U.343.869) IP-224 Field Code Advanced Options NA (customer purchased option)].

To **activate the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key**, do the following:

1. Open the **IP-224 webpage**.
2. From the left navigation, select **Additional Features**.
   The Additional Features page appears.

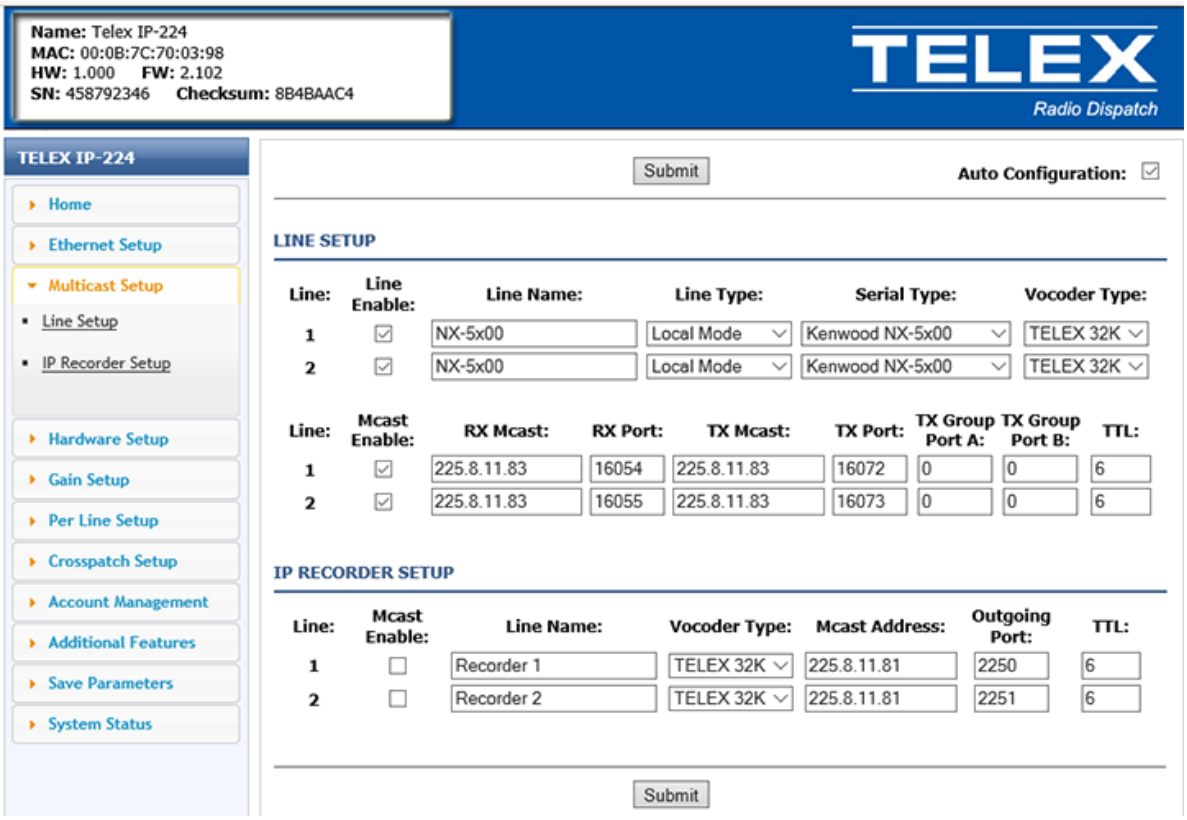


3. In the Access Key field, enter the **32-character access key**.
4. Click the **Submit button**.
   The changes are sent to the IP-224 in temporary storage.
5. From the left navigation, select **Save Parameters**.
   The Save Parameters page appears.
6. Click the **Save Parameters button**.
   Changes are now permanently saved to the IP-224 console.

9.0 IP-224 Setup

To **configure the IP-224**, do the following:

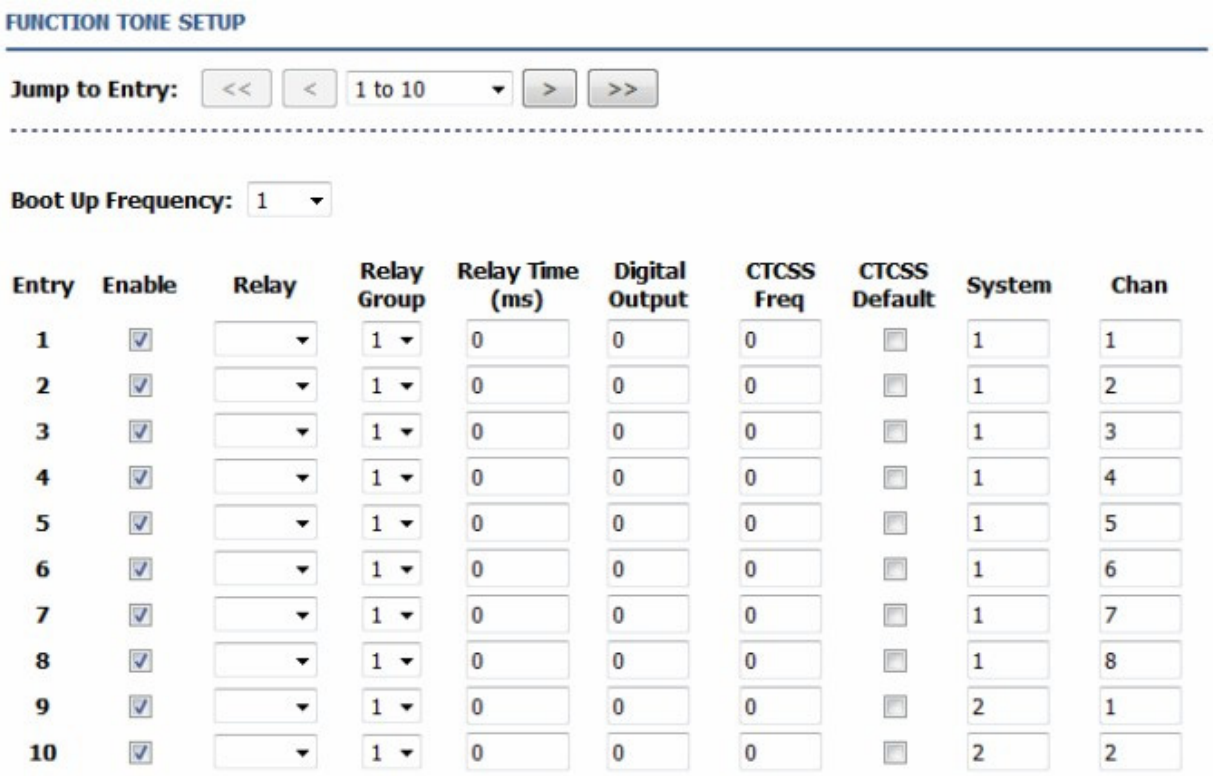
1. Open the **IP-224 web application**.
   The IP-224 web page appears.
2. From the left navigation, select **Multicast Setup.**



3. Select the **Auto Configuration check box**.

Under LINE SETUP

4. From the Serial Type drop down menu, select **Kenwood NX-5x00**.
5. In the RX Mcast field, enter **Receive Multicast IP Address**.
6. In the RX Port field, enter the **Receive Multicast Port number**.
7. In the TX Mcast field, enter the **Transmit Multicast IP Address**.
8. In the TX Port field, enter the **Transmit Multicast Port number**.
9. Click the **Submit button**.
   The changes are sent to the IP-224 in temporary storage.
10. From the left navigation, select **Per Line Setup**.
    The Per Line Setup window appears.



Entry	Enable	Relay	Relay Group	Relay Time (ms)	Digital Output	CTCSS Freq	CTCSS Default	System	Chan
1	☑		1	0	0	0	☐	1	1
2	☑		1	0	0	0	☐	1	2
3	☑		1	0	0	0	☐	1	3
4	☑		1	0	0	0	☐	1	4
5	☑		1	0	0	0	☐	1	5
6	☑		1	0	0	0	☐	1	6
7	☑		1	0	0	0	☐	1	7
8	☑		1	0	0	0	☐	1	8
9	☑		1	0	0	0	☐	2	1
10	☑		1	0	0	0	☐	2	2

Under Function Tone Setup

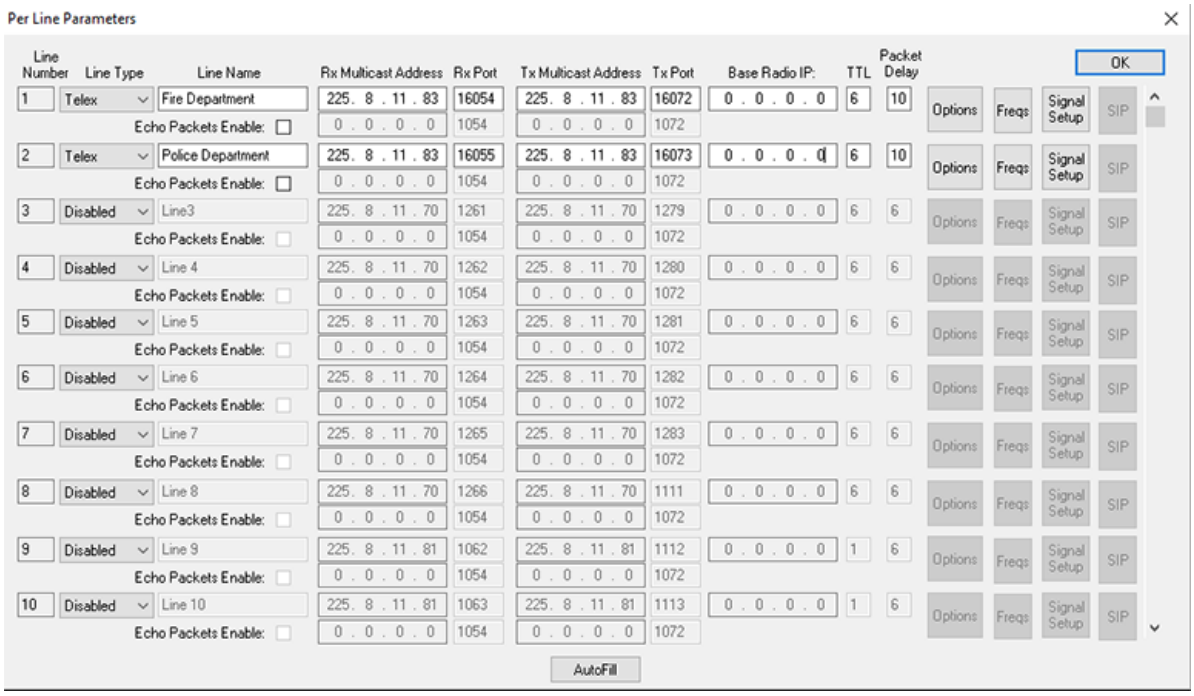
11. In the System Column field, enter the **desired radio system/zone**.
12. In the Chan Column field, enter the **desired radio channel**.
13. Click the **Submit button**.
    The changes are sent to the IP-224 in temporary storage.
14. In the left navigation, select **Save Parameters**.
    The Save Parameters page appears.
15. Click the **Save Parameters button**.
    Changes are now saved permanently to the IP-224 console.

10.0 C-Soft Designer Setup

The **Per Line Parameters** window is used to configure C-Soft to IP-224 communications.

To **configure Per Line Parameters**, do the following:

1. Open **C-Soft Designer**.
2. From the Edit menu, select **Setup Per Line Parameters**.
   The Per Line Parameters window appears.



3. In the Rx Multicast Address field, enter the **Receive Multicast IP Address of the connected IP-224**.
4. In the Rx Port field, enter the **Receive Multicast Port number of the connected IP-224**.
5. In the Tx Multicast Address field, enter the **Transmit Multicast IP Address of the connected IP-224**.
6. In the Tx Port field, enter the **Transmit Multicast Port number of the connected IP-224**.
7. In the Base Radio IP field, enter the **IP address of the connected IP-224**.
8. Click the **Close button**.

NOTE: The Multicast settings of IP-224 and C-Soft must match for the interface to function properly. Verify the RX and TX Multicast Addresses match, as well as RX and TX Ports.

Notes:

Suggestions or comments:
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