



### Applies to the following FreeWave Products

- LRS455-C-U
- LRS455-CE-U
- LRS455-T-U
- LRS455-TE-U

### Summary

This document describes how to quickly get your LRS455-C transceivers set up and connected in a Point-to-Point or Point-to-MultiPoint network. The information provided here, along with detailed information about each parameter setting available in the LRS455-C transceivers, and settings specific to Repeaters is available in the *LRS455 Wireless Data Transceiver User Guide*.

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**Warning!** Do *not* connect the LRS455 series radios to DC power without terminating the antenna port to a suitable load, such as a 50 ohm antenna, or an attenuator with a power rating greater than or equal to 2 W. Powering up without a load attached will damage your radio and void your warranty.

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### Installing Tool Suite

Tool Suite is the newest configuration software and is the recommended method for programming your transceivers. It provides a group of tools for configuring the devices in your network and for monitoring your network's performance. Using the Configuration application within Tool Suite, you can program changes to your transceiver settings. The Tool Suite installation is available on the *User Manual and System Tools CD* and is also available for download from [www.freewave.com](http://www.freewave.com).

For more information about the general use of Tool Suite, see the *Tool Suite User Manual* available on the *User Manual and System Tools CD* or by selecting **File > Help** in the Tool Suite software.

**Note:** You can also program FreeWave radios using HyperTerminal, which offers the same configuration options that are available in the Configuration application in Tool Suite. If you run versions of the Windows operating system prior to Windows 7, HyperTerminal is included in the operating system installation. However, if you are running Windows 7 or newer, HyperTerminal is no longer available. If you prefer the HyperTerminal interface, the Setup Terminal application within Tool Suite provides the same interface that is available using HyperTerminal.


## Point-to-MultiPoint Network Quick Start

The following is a quick start guide for setting up two transceivers in Point-to-MultiPoint mode. This mode allows for a Master to communicate with several Slaves simultaneously. Refer to the *LRS455 Wireless Data Transceiver User and Reference Manual* if you plan to use Repeaters in your network.

### Point-to-MultiPoint Network Quick Start (Tool Suite):

1. Connect the transceiver to the serial port of a computer either through a serial cable or using the diagnostics cable. Make sure to connect the radio to a power source (+6.0 to +27.0 VDC).

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2. Open a Tool Suite session, select the **Configuration** application, and ensure the correct port is selected in the **Com Port** field in the upper left of the Configuration ribbon.
3. From the Networks section of the Configuration ribbon, select the network in which the radio resides or click **Add Network** to create a new network in Tool Suite.
4. Click **Read Radio** in the Configuration ribbon to read the radio's current settings.

- If you are using a diagnostic cable to connect to the radio, the radio automatically goes into Setup mode.
- If you are using a data cable to connect to the radio, you are prompted to press the radio's Setup button to put the radio in Setup mode. If you are using a board-level radio, use the interrupt line to short pins 2 and 4.
- When in Setup mode, all three LEDs on the radio display solid green.

5. Select the Operation Mode tab.

In the **Modem Mode** field, select **2** to set the radio as a Point-to-MultiPoint Master or select **3** to set the radio as a Point-to-MultiPoint Slave.

**Note:** A network can have only one Master.

6. Select the Baud Rate tab.

Change the **Baud Rate**, **Data Parity**, and **Modbus RTU** to match the device that the radio is to be attached to.

7. Select the Transmission Characteristics tab.

Set the following parameters so they are the same on all radios in the network:

- **Tx Frequency**
- **Rx Frequency**
- **Max Packet Size**
- **Min Packet Size**
- **RF Data Rate** (Only **RF Data Rate 4** and **5** are approved by the FCC for use in the United States.)

Changing these settings from the factory defaults may help to eliminate interference from other FreeWave networks.


8. Select the MultiPoint Parameters tab.

In the **Network ID** field, set the value to any value between **1** and **4095**, except **255**. FreeWave recommends setting the **Network ID** to the last three or four digits of the radio's serial number, as this is a number you can look up if necessary

### Point-to-MultiPoint Network Quick Start (HyperTerminal):

1. Connect the transceiver to the serial port of a computer either through a serial cable or via the diagnostics cable. Make sure to connect the radio to a power source (+6.0 to +27.0 VDC).

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 **Warning!** Do *not* connect the LRS-455 series radios to DC power without terminating the antenna port to a suitable load, such as a 50 ohm antenna, or an attenuator with a power rating greater than or equal to 2 W. Powering up without a load attached will damage your radio and void your warranty.

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2. Open a HyperTerminal session and use the following settings when connecting the radio. You can also use Setup Terminal within Tool Suite if HyperTerminal is unavailable.

- Connect to COMx (where 'x' is the number of the Com port being connected).
- Set the following:
  - **Data Rate** - 19,200
  - **Data Bits** - 8
  - **Parity**- none
  - **Stop Bits** – 1
  - **Flow control** – none

3. If you are using the data cable, press the **Setup** button on the radio or use the interrupt line to short pins 2 and 4. If using the diagnostics cable, press **Shift-U** (capital U).

- The three LEDs on the radio should all turn green, indicating Setup mode.
- The Main menu displays on the screen.

4. Press **0** to access the Operation Mode menu.

- Press **2** to set the radio as a Point-to-MultiPoint Master or press **3** to set the radio as a Point-to-MultiPoint Slave.
- Press **Esc** to return to the Main menu.

**Note:** A network can have only one Master.

5. Press **1** in the Main menu.

- Change the **Baud Rate**, **Data Parity**, and **Modbus RTU** to match the device that the radio is to be attached to.
- Press **Esc** to return to the Main menu.































6. Press **3** in the Main menu.
  - Set the following parameters so they are the same on all radios in the network:
    - **FreqKey** (Tx Frequency and Rx Frequency)
    - **Max Packet Size**
    - **Min Packet Size**
    - **RF Data Rate** (Only **RF Data Rate 4** and **5** are approved by the FCC for use in the United States.)



The **Tx Frequency** and **Rx Frequency** options, or Frequency Key, are located in the F submenu after you press **0** to access the Frequency Key menu in Main menu **3**.

Changing these values from the factory defaults may help to eliminate interference from other networks.

- Press **Esc** to return to the Main menu.
7. Press **Esc** to return to the Main menu.
  8. Press **5** in the Main menu.
    - Set the **Network ID** value to any value between **1** and **4095**, except **255**. FreeWave recommends setting the **Network ID** to the last three or four digits of the radio's serial number, as this is a number you can look up if necessary.
    - Ensure this value is the same on every radio in the network.
  9. Press **Esc** to exit the Setup menu and resume normal radio operation.

### Point-to-MultiPoint Operation LEDs

Condition	Master			Slave		
	Carrier Detect (CD)	Transmit (TX)	Clear to Send (CTS)	Carrier Detect (CD)	Transmit (TX)	Clear to Send (CTS)
Powered, not linked	Solid red bright 	Solid red dim 	Off 	Solid red bright 	Off 	Blinking red
Slave linked to Master, no data	Solid red bright 	Solid red dim 	Off 	Solid green 	Off 	* Solid red bright 
Slave linked to Master, Master sending data to Slave	Solid red bright 	Solid red dim 	Off 	Solid green 	Off 	* Solid red bright 
Slave linked to Master, Slave sending data to Master	Solid green  RCV data or Solid red bright 	Solid red dim 	Intermittent flash red 	Solid green 	Intermittent flash red 	* Solid red bright 
Master with diagnostics program running	Solid red bright 	Solid red dim 	Intermittent flash red 	Solid green 	Intermittent flash red 	* Solid red bright 

\* Clear to Send LED is solid red  with a solid link, as the link weakens the Clear to Send LED light on the Slave begins to flash .


## Point-to-Point Network Quick Start

To establish communications between a pair of transceivers just received from the factory, complete the steps described below for each transceiver. Refer to the *LRS455 Wireless Data Transceiver User and Reference Manual* if you plan to use Repeaters in your network.

### Point-to-Point Network Quick Start (Tool Suite):

1. Connect antennas to the transceivers.
2. Connect the transceiver to the serial port of a computer either through a serial cable or using the diagnostics cable. Make sure to connect the radio to a power source (+6.0 to +27.0 VDC).

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 **Warning!** Do *not* connect the LRS-455 series radios to DC power without terminating the antenna port to a suitable load, such as a 50 ohm antenna, or an attenuator with a power rating greater than or equal to 2 W. Powering up without a load attached will damage your radio and void your warranty.

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3. Open a Tool Suite session, select the **Configuration** application, and ensure the correct port is selected in the **Com Port** field in the Configuration ribbon.
4. From the Networks section of the Configuration ribbon, select the network in which the radio resides or click **Add Network** to create a new network in Tool Suite.
5. Click **Read Radio** in the Configuration ribbon to read the radio's current settings.
  - If you are using a diagnostics cable to connect to the radio, the radio automatically goes into Setup mode.
  - If you are using a data cable to connect to the radio, you are prompted to press the radio's Setup button to put the radio in Setup mode. If you are using a board-level radio, use the interrupt line to short pins 2 and 4.
  - When in Setup mode, all three LEDs on the radio display solid green.

6. Select the Operation Mode tab.

In the **Modem Mode** field, select to set the transceiver in Point-to-Point mode. For example, set one transceiver as a Point-to-Point Master (Mode 0) and the other as a Point-to-Point Slave (Mode 1).

**Note:** A network can have only one Master.

7. Select the Baud Rate tab.

Change the **Baud Rate**, **Data Parity**, and **Modbus RTU** to match the device that the radio is to be attached to.

8. Select the Transmission Characteristics tab.
  - Set the following parameters so they are identical on both radios in the network:
    - **Tx Frequency**
    - **Rx Frequency**
    - **Max Packet Size**

- **Min Packet Size**
- **RF Data Rate** (Only **RF Data Rate 4** and **5** are approved by the FCC for use in the United States.)

Changing these values from the factory defaults may help to eliminate interference from other networks.

9. Select the Call Book tab.


- Enter the Slave serial number in the Master's Call Book. Enter the Master's Serial number in the Slave's Call Book, or disable Slave Security (in the Slave).

Shortly after both transceivers are plugged in, they should establish a communications link with each other and the connection is complete. Using the table below, verify that the radios are operating as expected.

### Point-to-Point Network Quick Start (HyperTerminal):

1. Connect antennas to the transceivers.
2. Connect the transceiver to the serial port of a computer either through a serial cable or using the diagnostics cable. Make sure to connect the radio to a power source (+6.0 to +27.0 VDC).

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3. Open a HyperTerminal session and use the following settings when connecting the radio. You can also use Setup Terminal within Tool Suite if HyperTerminal is unavailable.
  - Connect to COMx (where 'x' is the number of the port being connected).
  - Set the following:
    - **Data Rate** - 19,200
    - **Data Bits** - 8
    - **Parity** - none
    - **Stop bits** – 1
    - **Flow control** – none.
4. If you are using the data cable, press the **Setup** button on the radio or use the interrupt line to short pins 2 and 4. If using the diagnostics cable, press **Shift-U** (capital U).
  - The three LEDs on the radio should all turn green, indicating Setup mode.
  - The Main menu displays on the screen.
5. Press **0** to access the Operation Mode menu.
  - Press **0** to set the radio as a Point-to-Point Master or press **1** to set the radio as Point-to-Point slave.
  - Press **Esc** to return to the Main menu.
6. Press **1** in the Main menu.
  - Change the **Baud Rate**, **Data Parity**, and **Modbus RTU** to match the device that the radio is to be attached to.

When setting the transceiver's baud rate, its RS232 data rate is set. The baud rate does not have to be the same setting for the two transceivers in the Point-to-Point network.

- Press **Esc** to return to the Main menu.
7. Press **2** in the Main menu to update the Call Book.
- Enter the Slave serial number in the Master's Call Book. Enter the Master's Serial number in the Slave's Call Book, or disable Slave Security (in the Slave).
8. Press **3** in the Main menu.
- Set the following parameters so they are identical on both radios in the network:
    - **Tx Frequency**
    - **Rx Frequency**
    - **Max Packet Size**
    - **Min Packet Size**
    - **RF Data Rate** (Only **RF Data Rate 4** and **5** are approved by the FCC for use in the United States.)

The **Tx Frequency** and **Rx Frequency** options, or Frequency Key, are located in the **F** submenu after you press **0** to access the Frequency Key menu in menu 3.






























Changing these values from the factory defaults may help to eliminate interference from other networks.

- Press **Esc** to return to the Main menu.

Shortly after both transceivers are plugged in, they should establish a communications link with each other and the connection is complete. Using the table below, verify that the radios are operating as expected.

9. Press **Esc** to exit the Setup menu and resume normal radio operation.

### Point-to-Point Operation LEDs

Condition	Master			Slave		
	Carrier Detect (CD)	Transmit (TX)	Clear to Send (CTS)	Carrier Detect (CD)	Transmit (TX)	Clear to Send (CTS)
Powered, no link	Solid red bright 	Solid red bright 	Solid red bright 	Solid red bright 	Off 	Blinking red 
Linked, sending sparse data	Solid green 	Intermittent flash red 	Intermittent flash red 	Solid green 	Intermittent flash red 	Intermittent flash red 
Master calling Slave	Solid red bright 	Solid red dim 	Solid red bright 	Solid red bright 	Off 	Blinking red 
Mode 6 - waiting for ATD command	Solid red bright 	Off 	Blinking red 	Solid red bright 	Off 	Blinking red 
Setup Mode	Solid green 	Solid green 	Solid green 	Solid green 	Solid green 	Solid green 