



END USER GUIDE

Trimble® TDLCONF Software



Contact Information

Trimble Navigation Limited
Engineering & Construction group
5475 Kellenburger Road
Dayton, Ohio 45424-1099
U.S.A

Tel: 800-538-7800 (U.S.A toll free)
+1-937-245-5600 Phone
+1-937-233-9004 Fax
www.trimble.com/global-services/

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Introduction

TDLCONF is a suite of software utilities for configuring and troubleshooting the Trimble® TDL line of digital communication radios and modems. It ships with all radio modems in the TDL family and is available for free download from the Trimble website (www.trimble.com). Running the TDLCONF software on a computer attached using a serial cable to TDL radio enables you to check the status of the radio, enter channel tables, and set radio parameters such as channel bandwidth and output power.

Technical Support

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer or go to the Support area of the Trimble website (http://www.trimble.com/Support/Technical_Support.aspx). Product updates, documentation, and any support issues are available for download.

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. Email your comments to readerfeedback@trimble.com.

Installing the Software

1. Download the latest version of TDLCONF software from www.trimble.com/support, and save it to a folder on your compute.
2. Extract the contents of the zip file.
3. Some firewalls prevent the download of executable files, so the software installer is named TDLCONF_setup.xxx. Right-click the file, select the Rename option and then change the “xxx” to “exe”.
4. Double-click the installer file to install the TDLCONF software.

NOTE: Some versions of the Windows operating system require administrator rights to fully install software. If you do not have administrator rights, right click the installer file and select: Run as Administrator.

Running the Software

Do one of the following:

- Double-click the TDLCONF icon on the computer desktop.
- Click Start / All Programs / Trimble / TDLCONF / TDLCONF.
- Click Start / Run, enter **C:\Program Filesx86\Trimble\TDLCONF\TDLCONF.exe** and then click **OK**.

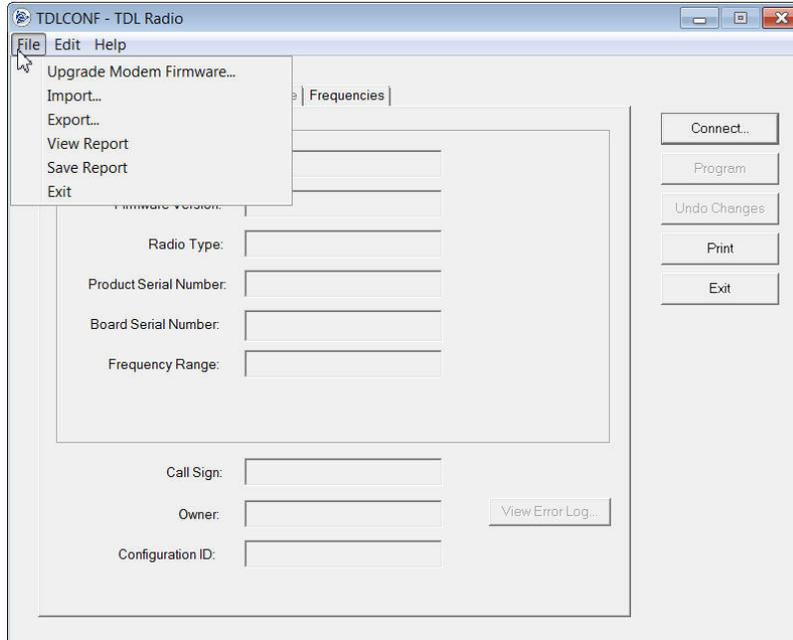
If you have problems running the TDLCONF software on Windows® 7 or a 64-bit computer with the Windows Vista® operating system, do the following:

1. Close the software.
2. Double-click **My Computer** or start Windows® Explorer.
3. Navigate to C:/Program Files/Trimble/TDLCONF/ and then right-click TDLCONF.exe.
4. Click **Properties**.
5. In the Compatibility tab, click **Run this program in compatibility mode for**.
6. Select Windows XP, Vista 32, or Windows 7 and then click **OK**.
7. Restart the TDLCONF software.

TDLCONF Menus

The main TDLCONF dialog contains three main menus: *File*, *Edit*, and *Help*.

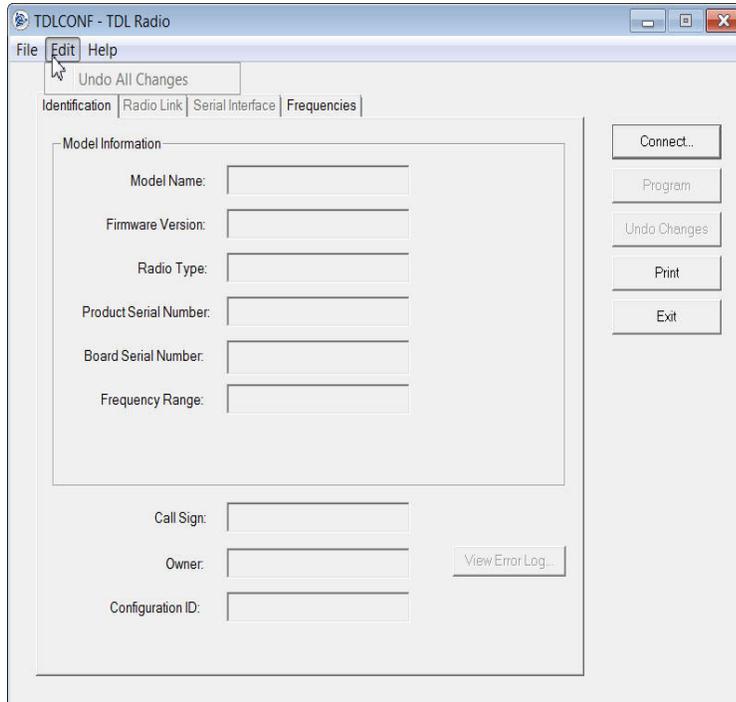
File Menu



Select...	to...
Upgrade Modem Firmware	<p>select a firmware file (*.bin format) to upload into the attached TDL radio modem. Trimble recommends that you save the radio's current configuration to your computer before upgrading firmware. Use the Export option described below to save the configuration. Before upgrading the firmware, the software prompts you to connect or reconnect to the radio. See Connecting to the Radio, page 8.</p> <p>Note: if you wish to upgrade the firmware of TDL radio module embedded within another product, that product may restrict you to using only one baud rate. If so, you must select a special version of firmware made especially for your product. Please check with your dealer, your product's manufacturer or the Trimble web site to obtain this special firmware.</p>
Import	<p>import radio configuration files (*.dat) from your computer to the TDLCONF software. These files contain the radio parameters displayed and edited on the Radio Link and Serial Interface screens. These files contain the radio parameters displayed and edited on the Radio Link and Serial Interface screens. Click Program to upload the configuration to the attached radio.</p>
Export	<p>save the radio configuration (*.dat) to your computer. This enables you to create one configuration and copy it to multiple radios.</p> <p>Note – When you export a configuration you only create a *.dat file. To configure a radio, you must view a configuration in the software (either by creating it or by importing an existing configuration) and then click Program.</p>
View Report	<p>view on a web browser all the configuration parameters of the attached radio. In addition, this HTML-formatted report shows firmware settings that may help Trimble support technicians to diagnose problems if the radio requires service.</p>
Save Report	<p>save a *.txt copy of the configuration report to any location accessible to your computer.</p>

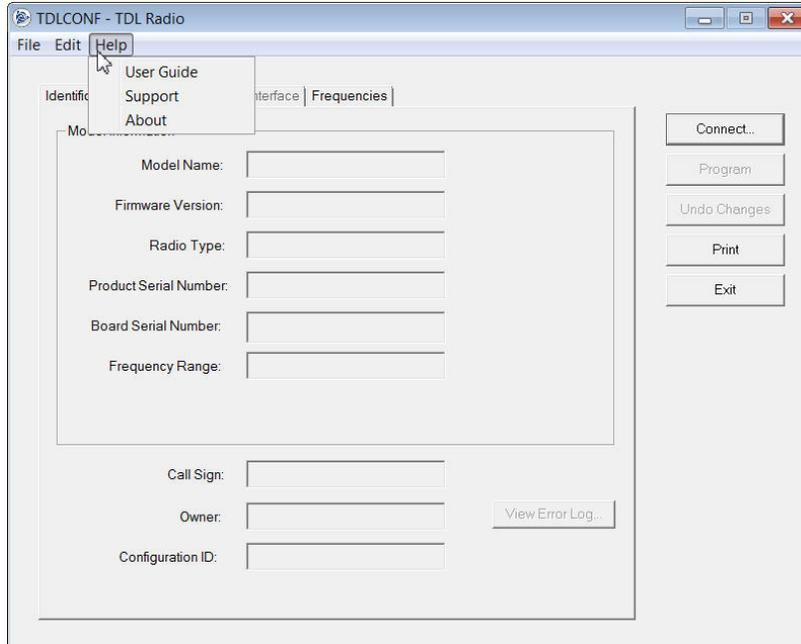
Select...	to...
Exit	exit the software.

Edit Menu



Select...	to...
Undo All Changes	<p>Selecting Undo All Changes will discard all the configuration changes you made during this session.</p> <p>Settings on all the TDLCONF screens are reset to what was in effect when you started this session. Selecting Undo All Changes does not affect any settings in the radio or any configuration file on your computer. To change the radio configuration, you must make changes in the software and then click Program.</p>

Help Menu



Select...	to...
User Guide	view a copy of the TDLCONF User Guide (this document).
Support	access links to Trimble Technical Support and the Trimble website .
About	view which version of the software is installed on your computer.

Connecting to the Radio

To connect the software to TDL radio:

1. Start the software.
2. Use the provided programming cable to connect the radio to the computer serial port.

If your computer does not have a serial port, connect the programming cable to a serial-to-USB adaptor cable such as an IOGEAR® Model GUC232A or an FTDI Model UC232R.

The TDL software program communicates only with Trimble TDL radios. You must use TDLCONF software to communicate with TDL radios, the PDLCONF program to communicate with PDL radios and RFMCONF software to communication with RFM radios. All of these programs are available for free download from www.trimble.com.

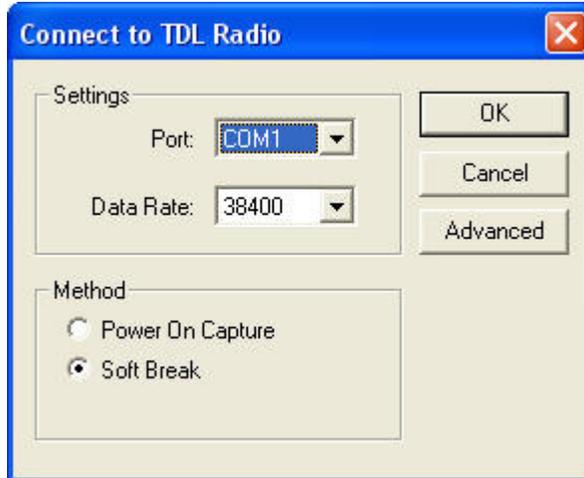
The radio turns on when it is connected to power.

3. Click the **Connect** button on the right of the screen.

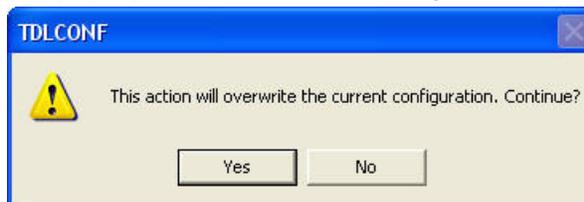
Note – When the TDLCONF software connects to a radio, it copies the radio

settings to the computer's memory and overwrites any other settings that may be currently displayed. If you had made any edits to the copy of the file in the computer memory and then click **Connect**, the TDLCNF software does not ask you if you want to save the settings from the memory to a file on your hard drive.

The following dialog appears:



4. To connect to a TDL radio that is connected to the PC via a serial cable, select Serial in the Mode box. Then, select Serial in the Mode box. Then, select the COM port that the radio is connected to (from the Port list) and then select a baud rate (from the Data Rate list).
5. To connect to a TDL radio that is connected to the PC via the Internet, select TCP in the Mode box and type in the IP address of the radio.
6. To connect to a TDL radio embedded in an Ashtech GNSS receiver, check the DSY box and select the number of pipes.
7. When done, click OK on the Connect to TDL Radio window and click **Yes** on the pop-up to overwrite the configuration currently displayed by TDLCNF:



8. To establish a connection, select one of the following;
 - Power On Capture. Turn off the radio. Select the *Power On Capture* option and then click **OK**. **Within 10 seconds**, turn on the radio.
The radio accepts a packet switch command (at the selected baud rate) that puts the radio into command mode.
 - Soft Break (the default method). Ensure that the radio has been turned on for at least four seconds and then click **OK**.

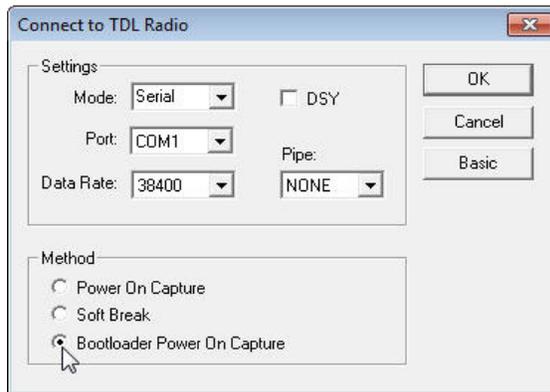
This sends a soft break, (ASCII string “+++”) to the radio at the selected baud rate, which puts the radio into a mode to accept commands from the TDLCONF software (“command mode”).

Note – If the TDL radio was previously connected to any external device (for example, a computer, a GNSS receiver, or a measurement device) while using a data rate other than that shown, the software detects non-communication at the displayed rate and cycles through the other rates to establish a connection. Some versions of the Windows operating system, and some serial communications drivers, can prevent this connection; if communication fails, do the following:

- a. Turn off the radio.
- b. Disconnect it from the computer.
- c. Reconnect the radio but do not turn it back on.
- d. Use the Power On Capture method for connection (see above).

If neither of these methods establishes a connection:

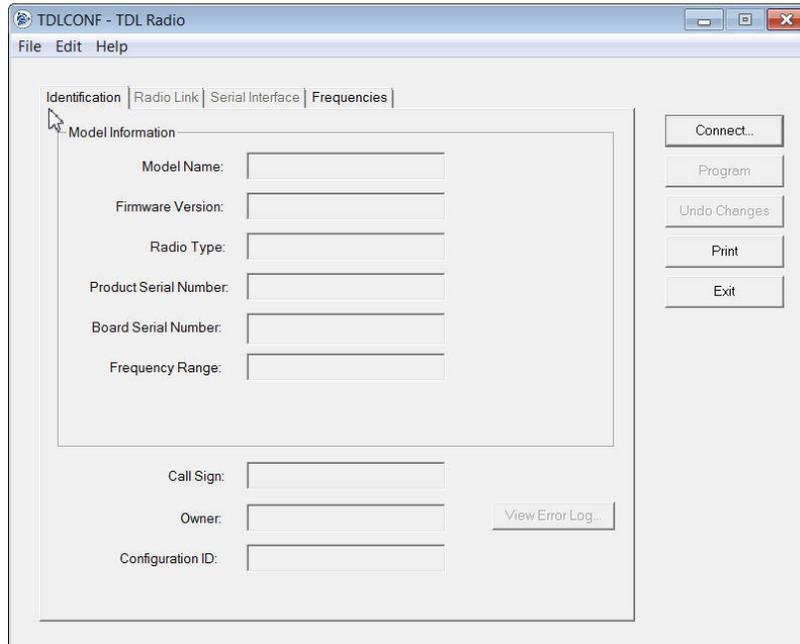
1. Turn off the radio and then click **Advanced**:
2. Select the *Bootloader Power On Capture* option and then click **OK**:



3. *Within 10 seconds*, turn on the radio. The bootloader firmware puts the radio into monitor mode that will accept commands.

Identification Tab

Connecting to the radio displays the TDLCONF Identification screen:



This screen shows the current configuration of the attached radio:

- Model Name
- Firmware Version
- Radio Type (“Transceiver” or “Receiver Only”)
- Product Serial Number
- Board Serial Number (serial number of the modem board inside a radio - used primarily by manufacturing and service technicians)
- Frequency Range

You cannot edit these fields.

The *Identification* screen also enables you to enter a call sign, owner name, and configuration ID.

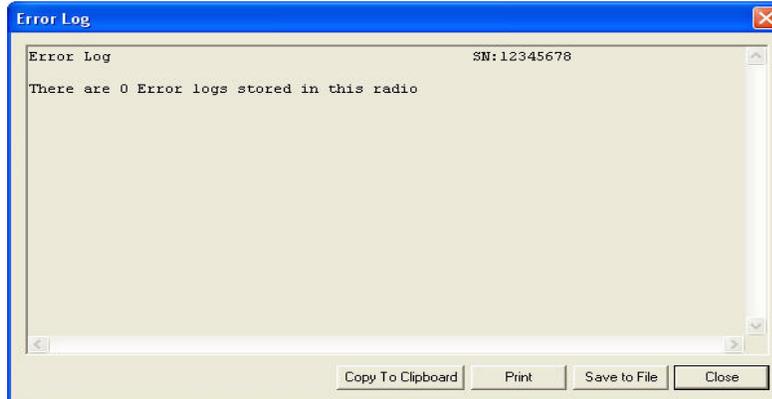
For operating in the USA, the FCC requires that radio transmitters periodically broadcast a station identifier every 15 minutes. The station identifier is the call sign assigned to USA operators on their station license. The call sign is transmitted in Morse code. It is not included in any data packet and so is ignored by the receiving radio. However, data transmission is interrupted for a few seconds while the call sign is being transmitted. If you leave the call sign field blank, a radio programmed with this configuration file will not transmit any call sign. If you are operating outside the USA, ask your local authority if you need to transmit a call sign.

The *Configuration ID* field is a user-friendly way to identify which configuration has been loaded into the radio. It can be different from the *.dat filename used when exporting (saving) the configuration using the *File / Export* function.

When configuring TDL 450H radio, you can select the language that will be used on the radio's front panel. The options are English, Chinese, and Cyrillic. When configuring TDL 450L radio, only English is supported.

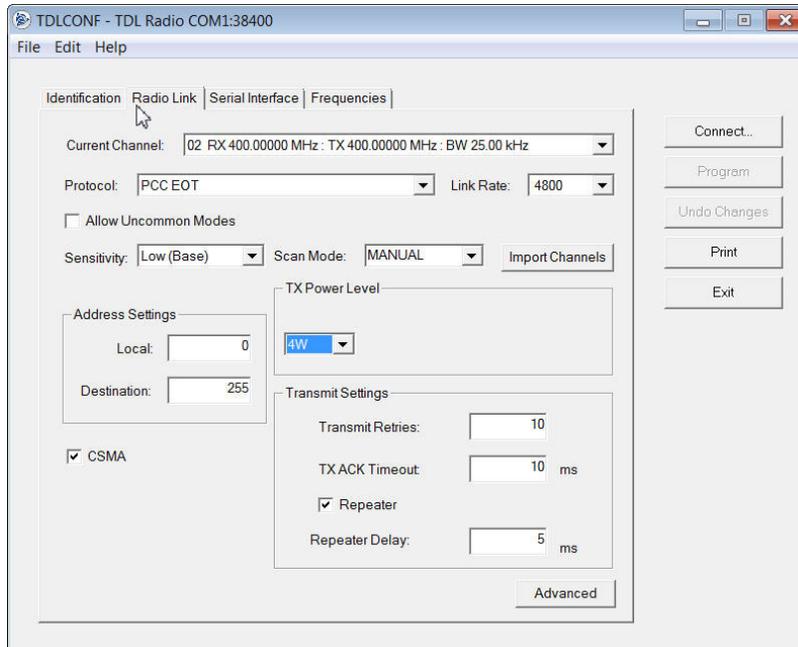
To save the call sign, owner name, and configuration ID to the radio, click **Program**. To save any configuration changes to a file on your computer, select *File / Export*.

TDL radio modems record error logs in the field if the modem experiences a problem. To view this log, click **View Error Log**:



Radio Link Tab

This settings available vary according to the radio protocol selected. The following example shows the settings available when the PCC EOT protocol is selected. Selecting other protocols displays variations of what is shown below:



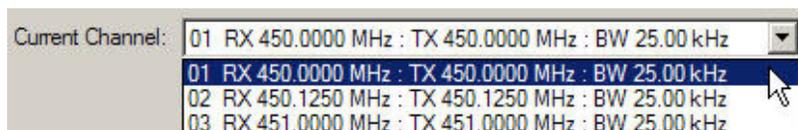
Current Channel

Channel tables are lists of radio settings comprising:

- Channel numbers (from 1 through 32)
- Frequencies at which the radio receives data on each channel
- Frequencies at which the radio transmits data on each channel (this may be different from the receive frequencies)
- One channel bandwidth (25 kHz or 12.5 kHz) for all channels in the table
- An optional list of radio serial numbers that can read the channel table

Your dealer should have created a channel table based on your radio license and loaded it into your TDL radio(s) before delivery. If you did not receive a channel table with your TDL radio, contact your dealer or Trimble Support.

The radio channel table can contain more than one channel, but the radio can be set to only one channel at a time. The *Current Channel* field indicates the current setting. The list to the right of the field shows all the channels in your channel table. To select another channel, click it:



Note – The radio is not set to this new channel until you click **Program**. While all TDL radios can be reconfigured using the TDLCONF software, some models have user interfaces that enable you to select other channels on the front of the radio, and others must be reconfigured using the TDLCONF software.

Protocol

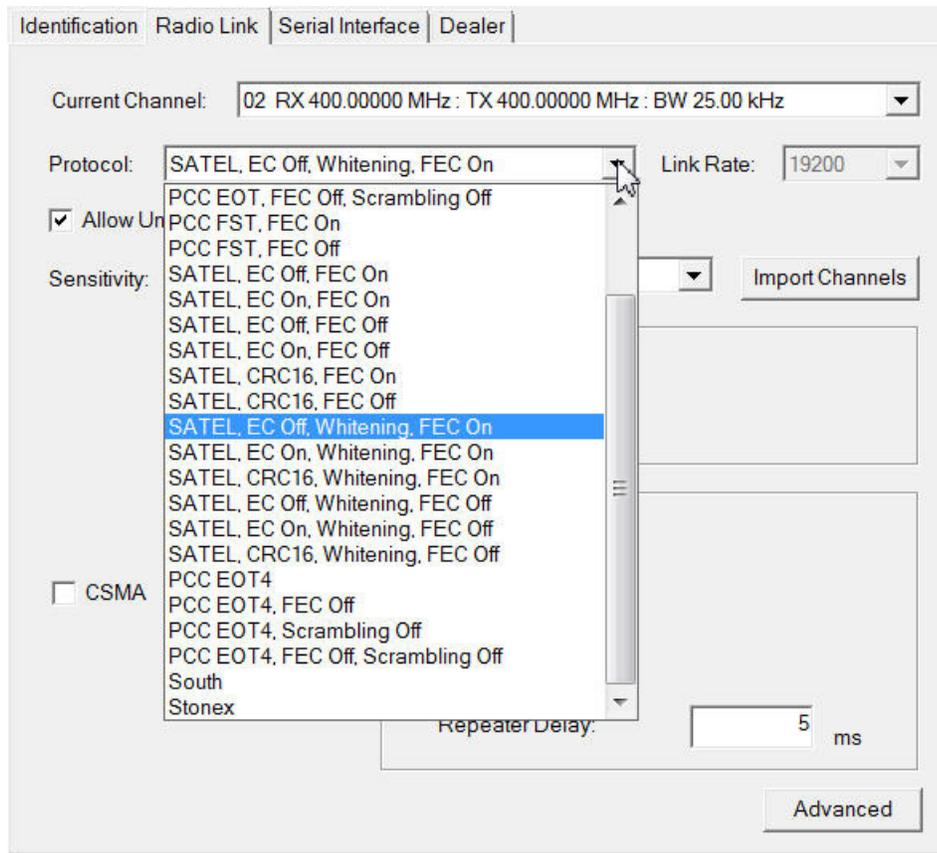
Click the down-arrow to the right of the **Protocol** field to display a short list of the most commonly used wireless modes. A wireless mode is defined as a combination of radio parameters: typically a wireless protocol (analogous to the language the radio “speaks”) and other parameters such as Forward Error Correction and Whitening. The most commonly used protocols are shown below:

The screenshot shows the TDLCONF software interface. At the top, the 'Current Channel' is set to '02 RX 400.00000 MHz : TX 400.00000 MHz : BW 25.00 kHz'. Below this, the 'Protocol' dropdown menu is open, showing a list of options: TRIMTALK v1 (highlighted), PCC EOT, PCC EOT, FEC Off, PCC FST, FEC On, SATEL, EC Off, FEC On, and SATEL, EC Off, Whitening, FEC On. To the right of the protocol dropdown is a 'Link Rate' dropdown set to '4800'. Below the protocol dropdown is a 'Sensitivity' dropdown and an 'Import Channels' button. Further down, there is a '2W' dropdown and a 'Transmit Settings' section. In the 'Transmit Settings' section, the 'CSMA' checkbox is unchecked, the 'Repeater' checkbox is checked, and the 'Repeater Mode' dropdown is set to 'BASE with One Repeater'. An 'Advanced' button is located at the bottom right of the interface.

TRIMTALK v1 is an improved version of all of the older Trimble protocols, such as TRIMTALK 450S, TRIMTALK II/Ile, TRIMMARK 3, etc. It is backward compatible with all of these older versions.

PCC EOT and PCC FST respectively correspond to the Pacific Crest “Transparent EOT” and “Transparent FST” protocols that were supported by older versions of Trimble TDL firmware.

If you wish to configure the radio in a less commonly used protocol or wireless mode, check the **Allow Uncommon Modes** box and click the **Protocol** field’s down-arrow.



Link Rate

This is the rate at which data bits will be transmitted or received by the radio modem. All radios in the network must both receive and transmit at the same rate. When you have selected a protocol, the supported link rate or rates are displayed. In some cases you have a choice of link rates, but if the rate is grayed out this means only that rate is supported by the protocol you selected.

Sensitivity

To optimize your radio for operation in different signal or noise environments, select a sensitivity level from the list (the PDL radios used the term Digisquelch):



In general, set the Sensitivity level of the radio low enough to reject noise, but high enough to accept signal. Signal is defined here as the radio energy you want to receive; noise is defined as everything else. Suitable sensitivity levels to select depending on both the noise level and the signal level are:

		Signal	
		Strong	Weak
Noise	Loud	Low	Medium
	Quiet	Medium	High

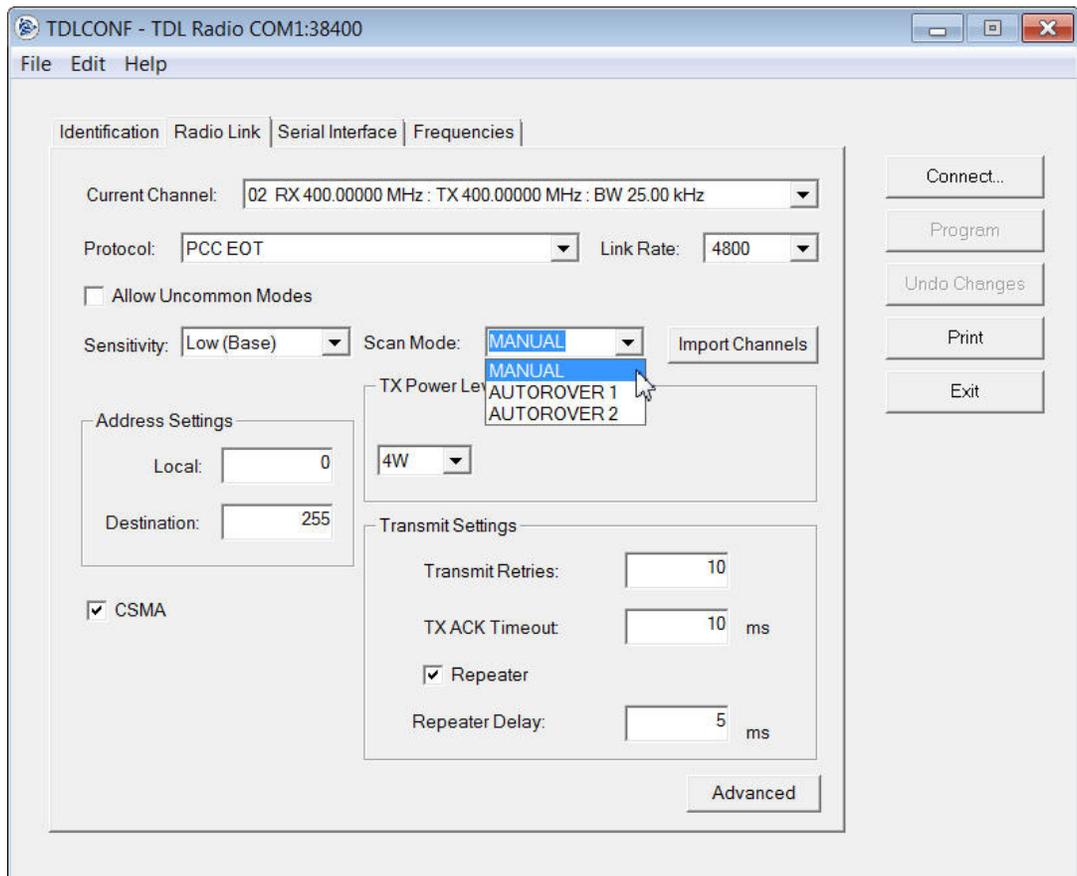
Signal levels decrease with distance between the transmitter and the receiver. To extend the range, set Sensitivity to Medium or High, although this can increase the amount of noise passed through the radio. At times, it may not be easy to determine the noise level without using a scanner or other RF energy monitor. If you are not sure about the noise level in your work environment, you can use the following guidelines to set Sensitivity:

GNSS Surveying and similar applications	Set Sensitivity to
GNSS base station radio	Low
GNSS rover radio	High
Environmental Monitoring and Similar Applications	
Remote sensor radio	Low
Local office radio	High

Environmental noise levels may change throughout a work day and you may need to adjust the Sensitivity setting. Most TDL radios include a user interface that enables you to adjust the Sensitivity in the field without running the TDLCONF software.

Scan Mode

When connected to a TDL 450L radio, the Radio Link screen will display the Scan Mode option. Select the MANUAL option when you wish to select the channel manually. Select the AUTOROVER 1 option when you want the radio to automatically scan the entire channel table and select the one with the strongest decodable signal. The AUTOROVER 1 option will perform one scan when the radio is turned on and will then reset the radio to MANUAL mode. The AUTOROVER 2 option will perform a scan for the strongest decodable signal when the radio is turned on and will perform a subsequent scan if the percentage of received data packets drops under 90%. Select the MANUAL option when you wish to select the channel manually. Select the AUTOROVER option when you want the radio to scan the entire channel table and select the one with the strongest signal.



Import Channels

Click **Import Channels** to select any other channel table created for your radio by an authorized Trimble dealer. Channel tables are files with the *.frq file extension. Other channel table files, such as *.upg files created by the PDLCONF software for PDL-generation radios, are not compatible with TDL radios.

Note – Government regulations may require you to possess a valid license to transmit data on certain radio frequencies. This version of the TDLCONF software does not let you create channel tables. You must check with your dealer about obtaining frequency channel tables, which meet your licensed authorized frequencies or other government regulations.

Address Settings

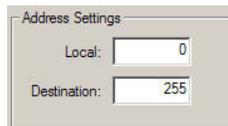
Use these fields to set Local and Destination addresses for any two Trimble TDL transceivers that are configured for the PCC EOT protocol to communicate exclusively with each other.

The main advantage of addressing is the ability to restrict the usage of transmitted data to a specified receiver. Any receiving rover radio with a Local address different from the transmitting base radio's Destination address will delete the data without repeating it over the air to other radios or sending it serially to an external device such as a GNSS receiver. Addressing allows multiple transceiver pairs to operate on the same channel without "seeing" each other's data. To do this, the addressed radios need Tx/Rx capability.

The addressing feature only works between two radios. In addition, both radios must be configured for the PCC EOT protocol (in the Protocol field above). The Local address of one radio must be the same as the Destination address of the other radio, and vice versa. For example, a radio with Local=X and Destination=Y can only communicate with another radio with Local=Y and Destination=X.

Note – There is no standard in the radio community that defines addressing. Each manufacturer does things slightly differently. Therefore, when using radios of different brands in a communication system, addressing should be turned off on all of them.

To select a Local or Destination address, click the appropriate field and enter a number between 0 and 254. You can enter only one Local and only one Destination address into any one radio:



The image shows a screenshot of a software interface titled "Address Settings". It contains two input fields. The first field is labeled "Local:" and has the number "0" entered. The second field is labeled "Destination:" and has the number "255" entered.

Selecting 255 for the Destination address is a special case designated as **broadcast mode**. If you enter **255** as a radio's Destination address, all Trimble radios sharing the channel—regardless of their Local address—can receive the data transmissions and either repeat them over the air to other radios or send them serially to an external device.

The default Local address number is 0 and the default Destination address number is 255. If you are not using Transparent EOT, Transparent EOC, or Packet Switched protocol, do not change these defaults.

To insert the local, i.e., source address into each data packet, click the Radio Link screen's Advanced button and check the Insert Source Address check box.

Note – The *Local=0/Destination=255* combination is the only selection that works with receive-only radios.

CSMA

TDL radios are configured in the factory to have the CSMA feature (Carrier Sense Multiple Access) set to ON. It is illegal to transmit in the United States while CSMA is turned off. When CSMA is activated, the radio will “listen” on the selected transmission frequency for any broadcasts. (The selected transmission frequency is indicated in the *Radio Link* screen’s *Current Channel* field.) If no broadcasts are detected, the radio will transmit any data received on its serial interface. If a radio signal is detected on the selected frequency, the radio will not transmit but waits 3.3 milliseconds before checking again if it is clear to transmit. It continues checking until the frequency is clear.

TX Power Level

If you purchased your TDL radio as a transceiver, you can configure it for various output power levels. To adjust the transmit power, select it from the list:

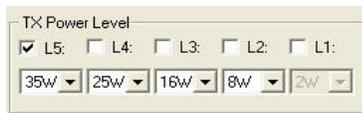


If the radio is a receiver-only, this field is grayed out.

The *Radio Type* field on the *Identification* screen (see above) indicates if the radio is a transceiver or receiver only.

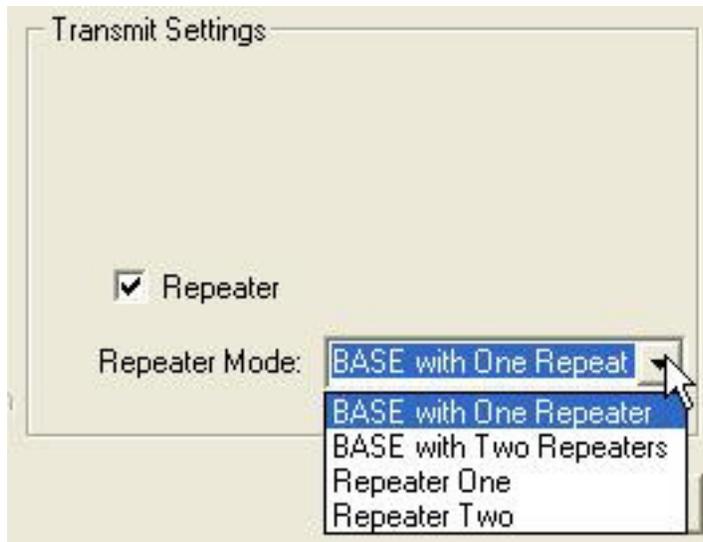
If you are configuring a TDL 450H or TDL 450Hx radio, this option lets you select four power levels in addition to a low power setting of 2 Watts. You cannot edit the 2 Watt setting. The other four settings can be in any order, but not higher than the Max TX Power set by your dealer.

Select the box above the power level at which the TDL 450H or TDL 450Hx radio will initially transmit:



Transmit Settings

If you selected the TRIMTALK v1 protocol in the **Protocol** field, the Transmit Settings section of the Radio Link screen lets you to configure the radio to be used as a repeater, i.e., to automatically retransmit each data packet it receives. When you select the Repeater check box, the following repeater modes become available:

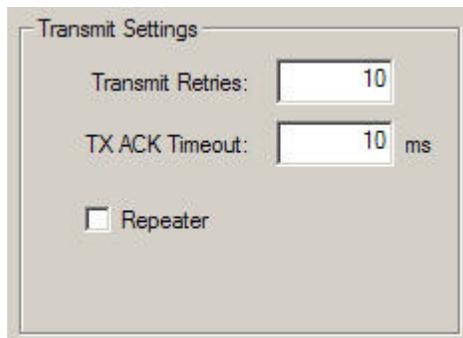


- Select the BASE with One Repeater option to configure the attached radio as a base station transmitting GNSS corrections to one repeater radio
- Select the BASE with Two Repeaters option to configure the attached radio as a base station transmitting GNSS corrections to two repeater radios
- Select the Repeater One option to configure the attached radio as a single repeater or the first of two repeaters
- Select the Repeater Two option to configure the attached radio as the second of two repeaters

When configuring the radio with the PCC EOT protocol, the Transmit Settings section of the Radio Link screen enables you to configure three aspects of the radio's transmitter:

- Transmitter Retries
- TX ACK Timeout
- Repeater

When configuring the radio for any other protocol only the Repeater option is visible.



The Transmit Retries feature only works when the addressing feature is enabled. When addressing is enabled, the receiving radio will send an

acknowledgment message back to the transmitter. Transmit Retries is the number of times the transmitter will attempt to retransmit the packet if the remote radio does not acknowledge the receipt of the packet. If Addressing is not used (that is, if Local=0 and Destination=255), the Transmit Retries feature is not used.

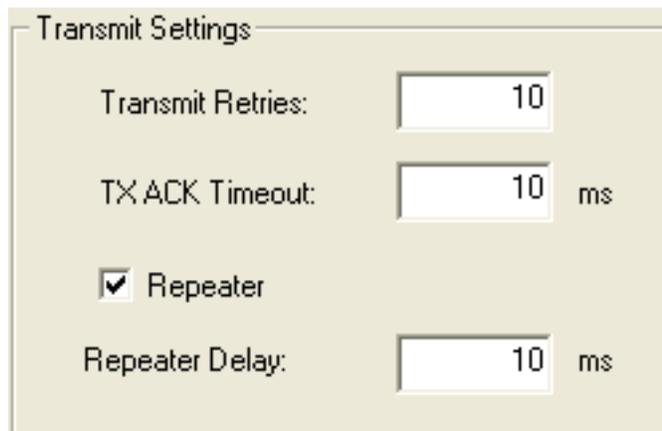
As a general rule, the number of Transmit Retries should be less than the correction update rate (in seconds) times the link rate (in bits per second) divided by the packet size (in bits):

$$(TX \text{ Retries}) < (\text{Update rate}) \times (\text{Link Rate}) \div (\text{Packet Size})$$

For example, if you transmit 3300-bit corrections every second at a 9600 bps radio link rate, set the Transmit Retries to less than three because it would take more than one second to transmit 3300 bits three times at 9600 bps, and after one second there will be newer, more accurate corrections to transmit.

TX ACK Timeout is the amount of time the transmitting modem will wait for an acknowledgment before rebroadcasting or failing the packet transmission. You may enter any value between 0 and 255 ms.

Check the Repeater check box to configure the radio as a repeater. Checking this option displays different fields depending on the selected protocol. If you selected a non-Trimble protocol and then check the Repeater check box, the Repeater Delay field appears



The image shows a screenshot of a software interface titled "Transmit Settings". It contains four rows of controls:

- "Transmit Retries:" followed by a text input field containing the number "10".
- "TX ACK Timeout:" followed by a text input field containing "10" and the unit "ms" to its right.
- A checked checkbox followed by the text "Repeater".
- "Repeater Delay:" followed by a text input field containing "10" and the unit "ms" to its right.

Note – Only the PCC EOT protocol supports transmit retries. So when you select any other protocol in the **Protocol** selection field (see above), the **Transmit Settings** section of the **Radio Link** screen does not display the **Transmit Retries** or **TX ACK Timeout** check boxes.

Advanced Settings

Click **Advanced** to access the following controls:

Advanced

Current Mode:

Automatically turn off power when voltage drops below Volts

Low voltage warning offset Volts

RX LED flashes when ...

Signal received

Data packets received

Insert Source Address

Autoscan Period: ms

Data Security

Enable

Data Code:

Current Mode

This is the number of the mode the radio is currently set up for. It is helpful to know the mode in some technical support situations.

Automatic Turn Off

TDL radios turn off automatically if the input voltage drops to a user-specified level.

The default is 10 volts with a low voltage warning offset of 1 volt. This offset value is the number of volts above the automatic turn off level at which the radio interface, if it has one, warns you that the radio battery charge is low. With a radio shut off value of 10 V and a low voltage warning offset of 1 V, the radio warns you when the battery reaches 11 V and the radio turns off if the charge drops to 10 V.

If you are configuring a TDL 450H or TDL 450Hx radio, you should not lower these values because the batteries used by these radios can be damaged if discharged below 10 volts.

RX LED Flashing

You can use TDLCONF to select what you want the radio's RX LED to signify when flashing. The two choices are:

- Signal received (RF energy above squelch level is detected) – the default

-
- Data packets received

If the Signal Received option is selected and the RX LED Flashes, this means:

- A radio within range is transmitting at the selected frequency
- The signal may or may not be decipherable data, which means you do not know from the RX LED flashing if the transmitter and receiver are configured in the same way

If the Signal Received option is selected and the RX LED doesn't flash, this means:

- No radio within range is transmitting at the selected frequency

If the Data Packet Received option is selected and the RX LED flashes, this means:

- A radio within range is transmitting at the selected frequency
- Data packets are deciphered, which means the transmitter and receiver are configured in the same way

If the Data Packet Received option is selected and the RX LED doesn't flash:

- Either no radio within range is transmitting at the selected frequency and/or
- No data packets are deciphered

How to use the RX LED Meaning feature:

1. Set the RX LED Meaning feature to Data Packets Received
2. If the RX LED flashes, you have a good connection between the transmitter and receiver
3. If the RX LED doesn't flash, check that the receiver sensitivity is set to High (Rover)
4. Switch the RX LED meaning on the receiver to Signal Received
5. If the RX LED now flashes, you know that a radio within range is transmitting at the same frequency but that it is not configured the same way as the receiver. It is possible that it is being operated by someone else, but it is more likely that it is your transmitter but it was not configured in the same way as the receiver. To reconfigure the receiver, do the following:
6. Set the RX LED Meaning feature back to Data Packets Received
7. Check that the receiver is set to use the protocol you typically use and then change the link rate
8. If the RX LED still doesn't flash with any link rate, check that Scrambling is on
9. If the RX LED still doesn't flash, you will need to compare the receiver's and transmitter's configurations

Insert Source Address

If you check this box, and program the radio with a local address and a

destination address, both addresses will be added to each transmitted data packet.

Autoscan Period

If you are attached to an ADL Vantage radio and have selected an automatic scan mode on the Radio Link screen, you can adjust the scan period, the amount of time between automatic scans of energy levels on the programmed channels to see if signal on any of them is “louder” than on the currently set channel. The default is 1000 ms.

Data Security

PCC EOT protocol supports a data security feature. To send encrypted messages, enter any combination of 8 alpha-numeric characters into the Data Code field, select the Enable check box and then program the radio. Only Trimble TDL radios programmed with this code can interpret data sent by any of the radios—and only when configured to use PCC EOT protocol.

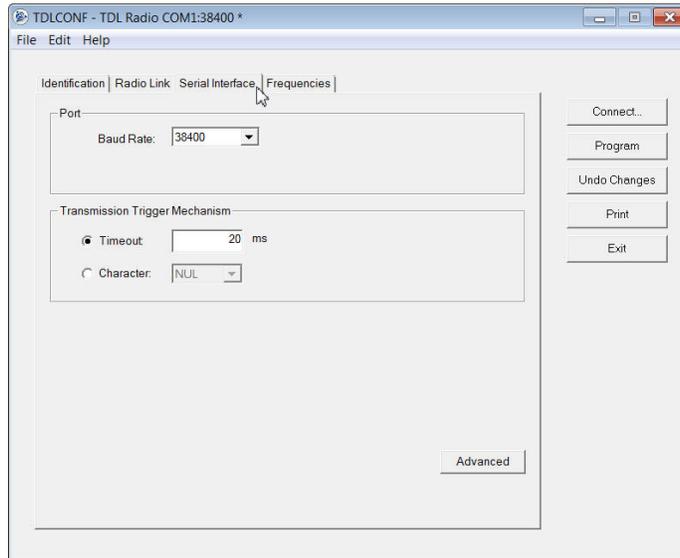
Note – *If you program a radio to use the Data Security feature, it cannot communicate with any radio that does not use the same code. When you enable this feature for one radio, it is a good idea to enable it for all the radios you will use in the same communication network. Trimble TDL radios with button/LCD interfaces can turn the Data Security feature on or off in the field, but internal Trimble radio modules must have the Data Security feature disabled using the appropriate configuration software.*

Nonstandard S Whitening

This check box is functional only when you have selected a protocol that supports it. It allows the radio to be compatible with certain legacy radios and radios from other manufacturers that support data whitening.

Serial Interface Tab

This screen has the following controls:



The Serial Interface screen lets you set the baud rate at which your radio will communicate with external devices such as computers, GNSS receivers or monitoring equipment. In general, the higher the baud rate the better, but whatever value you chose, you must configure the external device with the same rate.

Serial communications require a serial port consisting of a software driver running in conjunction with the operating system and a physical port—usually a DB9 connector. If your computer, GNSS receiver, or other external device does not have a serial port, you can use a serial-to-USB adaptor cable to connect the radio serial cable to the external device.

Transmission Trigger Mechanism

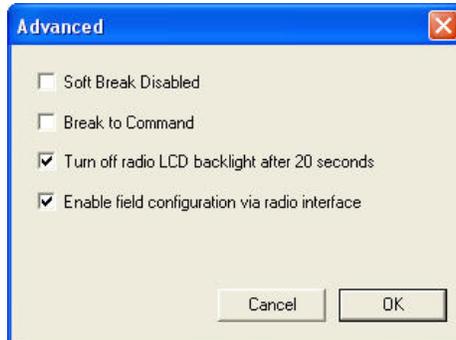
The radio protocols supported by most data radios include a transmission trigger mechanism: a signal to the radio that the data coming in the radio's serial port is complete and ready for transmission over the air. Typically this is a timeout mechanism, i.e., a length of time during which no data is received that indicates the packet is complete. Fifty ms of no data is ample in most situations. You may speed up the time to transmit each packet by selecting a smaller number but less than 20 ms is not advised.

PCC EOT protocols also support triggering transmission of a packet as soon as a special ASCII character is detected by the radio. An older version of this

protocol was called “Transparent EOC.”

Advanced Settings

Click **Advanced** to access the following functions:



Soft Break Disabled

The TDLCNF software normally connects to a radio using a technique called Soft Break whereby you attach a radio, turn it on and then click **Connect**. Selecting this check box enables you to reconnect to the radio without using the Soft Break technique. This is normally done under the guidance of a service technician to troubleshoot connection problems.

Break to Command

The Break to Command function configures the radio to accept a hard break signal that puts the radio into command mode. Clear this check box for the radio to ignore any hard breaks.

Turn off radio LCD backlight after 20 seconds

If the attached radio is equipped with an LCD, this check box configures the LCD backlight to turn off 20 seconds after the last button on the radio interface is clicked. Clear this check box for the radio to leave its LCD backlight on as long as the radio is turned on.

Enable/Disable Radio Configuration via Radio Interface

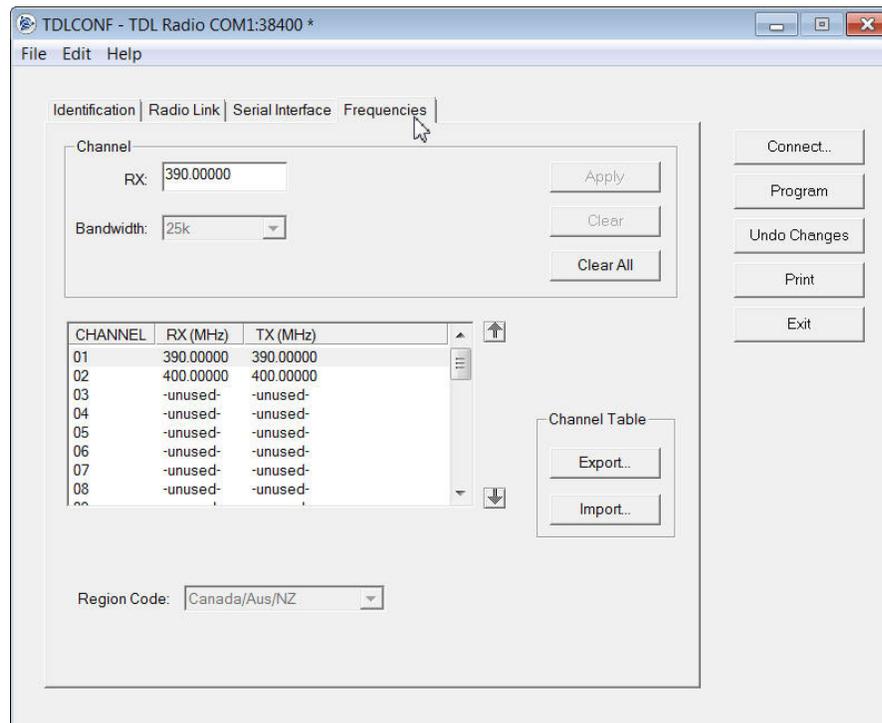
Some radio models include a keypad for configuring the radio in the field. To prevent field configuration, clear this check box and then click **OK** to return to the main screen. Click **Program**. To re-enable a radio, clear this check box and then program the radio.

Radios with an LCD display include an *Edit Config* screen that indicates if configuring the radio with the keypad is Enabled or Disabled. The current selection is displayed with an asterisk on the second row of the *Edit Config* screen. To switch the selection, press the down arrow to display the other option and click **Enter**. You are now prompted to enter a passcode, which is

369369 for all TDL radios. To enter this code, press the right arrow to display a 3 on the second row. Then press the down arrow to display a 6 and the left arrow to display a 9. Press the right, down, and left buttons a second time in sequence. When you see 369369 displayed on the second row of the LCD, press **Enter** and the keypad's ability to configure the radio is changed.

Frequencies Tab

This screen has the following controls:



The Frequencies screen displays the channel table created for you by your dealer. This channel table consists of one or more channels with RX and TX frequencies, a channel bandwidth used for all channels and a region code.

To add a receive-only channel, click on an “unused” channel, select the RX field, enter the frequency on which you wish to receive data and then click **Apply**.

To clear a receive-only channel, select it and then click **Clear**.

To clear all receive-only channels, click **Clear All**.

To move a channel up or down in the channel table, click on the channel you want to move and then either click the up or down arrow next the channel

table, or “drag and drop” the channel into its new position.

This configures the channel table that is displayed in the TDLCONF software. To program the attached radio to receive on this frequency, you must click **Program** (see below). In addition, select *File / Export* to save any new radio configurations to your computer.

Importing a Channel Table

To display a channel table created by the TDLCONF software, click **Import** and then select the required FRQ file.

Note – *Only a dealer can program a radio with a channel table containing transmit frequencies unless the channel table was tagged with the serial number of the radio. Please check with your dealer for an Rx/Tx channel table created for your radio’s serial number.*

Trimble TDL radio modems use an 18 MHz digitally compensated crystal reference oscillator. The modems are designed to emit a minimum of energy at harmonic frequencies, hence minimizing the effect of harmonic interference to other radio users. However, harmonics of the unit’s reference crystal at 18 MHz can internally interfere with received signals at frequencies that are exact multiples of 18 MHz: 396, 414, 432, 450, and 468 MHz. To minimize the potential of harmonic interference, avoid using frequencies that are multiples of 18 MHz.

Exporting a Channel Table

After you build a receive-only channel table, click **Export** to save it to your computer.

Note – *Only your dealer can add transmit frequencies to your channel table.*

Region Codes

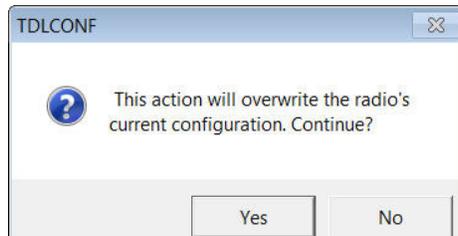
Different countries and regions require radios to be configured in slightly different ways. to configure your TDL radio to meet your country’s or region’s regulations. Only authorized Trimble dealers are able to edit the region code. If you feel the selected code is not appropriate, please contact your dealer.

Programming the Radio

When you start the TDLCONF software, it displays a blank file. Click **Connect** to connect to a radio, and to open a file containing the radio settings. If you edit any settings, an asterisk appears in the title bar. Before you exit the software, click **Program** to save changes to the radio or you will lose them.

To save changes to TDLCONF file to your hard drive, select *File / Export*.

When you click **Program**, you are prompted to confirm you want to overwrite the radio's current configuration:



The following message appears if programming the radio is successful:



After you click **OK** the software will allow you to save the new configuration as a TXT file on your computer. To save the configuration as a DAT file that you can import into other TDL radios, select *File / Export*.

High Heat Configurations

The amount of heat generated by any transmitter is highly dependent on its configuration. Some configurations cause the radio's transmitter to stay on longer, and the longer the radio is actually transmitting, the more heat it generates. Because this is more of an issue with the 35-Watt TDL 450H than with the 4-Watt TDL 450L, if you try to program a TDL 450H radio with a high heat configuration, you will see a warning message with three choices: Cancel, Continue and OK.

If you click the Cancel button you are returned to the ADLCONF software without programming the radio. This will allow you to change the configuration to one that will generate less heat. For example, you can raise the radio link rate or switch to a more efficient protocol such as PCC FST. Both actions halve the time it takes the radio to transmit the data and so halve the amount of heat generated.

If you click Continue, your settings are programmed into the radio.

If you click OK, the ADLCONF program will automatically program the maximum transmit power of the radio to 25 Watts. You will not be able to select a higher transmit power using the radio interface, but you will be able to re-configure the radio for higher power with the TDLCONF program.

There are other ways you can reduce the temperature of your TDL radio besides reducing the transmit power. Using a compressed data format such as CMRx can reduce the data packet size by as much as 60% allowing the radio to generate 60% less heat. On hot days, keeping the radio above the ground and out of direct sunlight can lower the temperature as much as 20°.

US Narrowbanding Regulations

FCC narrowbanding regulations restrict the speed of UHF transmissions within the United States. Data transmission made in 12.5 kHz-wide channels are restricted to radio link rates ≥ 9600 bps; data transmission made in 25 kHz-wide channels are restricted to radio link rates ≥ 19200 bps.

All Trimble radios are programmed by authorized dealers with region codes that ensure the radios adhere to local radio regulations. ADLCONF will not allow you to program a radio with an illegal setting. To adhere to US narrowbanding regulations, ADLCONF will not permit you to program a radio to transmit more slowly than 9600 bps if it is set for 12.5 kHz channels and with the US region code.

What does this mean for radio network compatibility?

In order for two radios to communicate they must be configured for the same protocol, frequency, modulation type, forward error correction and scrambling. In general, you also want both radios to be set to the same channel bandwidth, but a radio set up for 25 kHz channels will receive data from a radio transmitting in 12.5 kHz channels as long as no nearby radio is simultaneously transmitting in an adjacent 12.5 kHz channel. (You can catch all the water from a faucet with a glass, but not with a thimble.) This ensures that TDL radios configured with the US region code will remain compatible with legacy radios.

Undoing Changes to Radio Settings

To undo all configuration changes entered in the current session of the TDLCONF software, click **Undo Changes** or select *Edit / Undo All Changes*.

This action cancels all the configuration changes you have made during the session. All settings on the TDLCONF screens are reset to those that were in effect when you started this session.

Click **Undo Changes** does not affect any settings in the radio or any configuration file on your computer. The only way to change the configuration of the radio is to first make them in the TDLCONF software and then click **Program**.

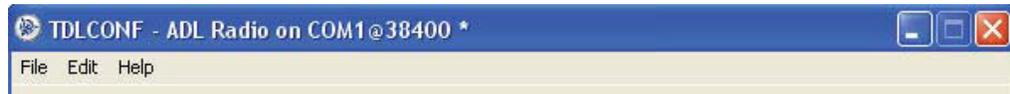
Printing Radio Settings

To create a file describing the current configuration of the attached radio, select File / Save Report. To print the configuration without creating a file, click **Print** on the right of the TDLCNF screen:

On the subsequent Print screen, select the printer you want to use and then click **OK**.

Note – The configuration displayed on the TDLCNF software may not be the same as the configuration in the attached radio. The TDLCNF software displays a radio's configuration as soon as you connect to the radio. However, you can import a configuration file from your computer by selecting File / Import. You can also use the TDLCNF software to edit parts of the displayed configuration. The imported or edited configuration displayed on the TDLCNF software is not written to the radio until you click **Program**. If you click **Print** before clicking **Program**, the configuration that is printed is of the radio, not what appears in the TDLCNF software.

An asterisk in the TDLCNF title bar indicates that the displayed configuration has changed:



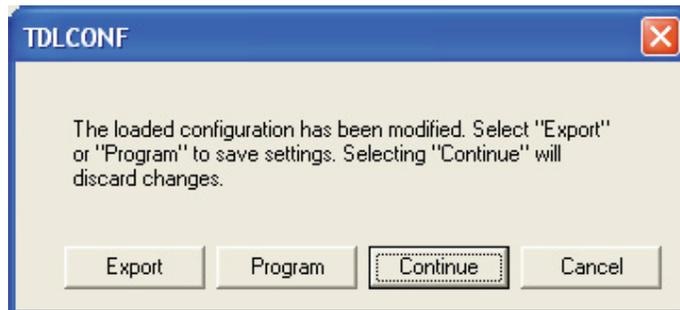
Closing the TDLCNF Program

There are three ways to close the TDLCNF software:

- Click **Exit**
- Click the **X** at the top right corner
- Select *File / Exit*

Closing the TDLCNF software puts an attached radio back into data mode.

When you close the TDLCNF software after changing any setting without programming the change(s) to a radio, the following message appears:



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- Click **Export** to write a configuration file to a selected location on your computer and close the TDLCONF software.
 - Click **Program** to write the new configuration to the attached radio and then close the TDLCONF software.
 - Click **Continue** to discard the changes and close the TDLCONF software.
 - Click **Cancel** to return you to the TDLCONF software without making any changes to the radio.

You must save changes before closing the program or you will lose them:

- You save the changes **to a file on your computer** by closing the TDLCONF software and then selecting the Export option or by selecting *File / Export*.
- You save the changes **to a connected radio** by closing the TDLCONF software and then selecting the *Program* option or by clicking the **Program** button.