
Tzero 7110 RevA1 Mini-PCI Card Windows Evaluation Kits

User Guide

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For Software Releases 1.2.2 (Windows) And Above

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U.S. Operation:

This device is under certification for compliance with FCC Code of Federal Regulations (CFR) 47, Part 15 Subpart F: Ultra-Wideband Operation. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Please consult with Tzero if you have any questions, prior to use.

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- Tzero shall not be liable to any person for any special or indirect damages, including, but not limited to, lost profits from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, repair, maintenance or use of the 7110 Mini-PCI Card Module.
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Getting Started

Package Content

Your Windows Evaluation Kit consists of two host systems, each comprised of the following modules:

1) A laptop running Windows XP Pro and configured with Tzero software.

2) One Mini-PCI card with Tzero chip set.

One antenna and its mounting system: Tripod with mounting SMA bulkhead

3) One cable.

4) One Reverse Polarity (RP) SMA -> SMA adaptor

In addition, the following documents are included in the package:

1) Windows Evaluation Kits User Guide.

2) Chip datasheets for Tz7110 and Tz7210.

3) Driver CD if required.

Assembly

1) Mount mini-PCI card in mini-PCI card slot on laptop when laptop is OFF.

2) Mount antenna on tripod bulkhead connector using SMA connector, and then unfurl tripod and align antenna to be vertical.

3) Connect antenna to provided cable, and then cable to RP SMA -> SMA adaptor using the standard SMA side of the adaptor.

4) Connect RP SMA -> SMA adaptor to RP SMA pigtail on Tzero mini-PCI card using the RP side of the adaptor.

Installing the Driver and Tzero Software

To install the driver and Tzero software:

- Turn the computer off and install the Tzero wireless card into any available PCI slot.
- Turn the computer on and log into the Windows operating system. Insert the Tzero software CD in the CD drive of this PC
- A dialog will come up indicating that the OS has found new hardware and will ask you for a driver for the newly discovered hardware. In that dialog, say that you want to install it yourself and it should not check the net for this driver. Then in the following dialogs point it to the “hostdriver” directory that’s part of the release on this CD
- Click on the appropriate “OK” and “Install Anyway” buttons in the dialogs that follow in this procedure.
- Now, double-click on the tzero software installer icon named tzero_setup.exe in the installation software directory to install the rest of the software and utilities.

User Names and Passwords

[Windows Only] Upon powering up, you are asked to log in into the system. A user is predefined, as shown in the following table:

User Name	Password	Description
Swlab	swlab	For the normal user

Server and Client

The PC’s in the evaluation kits have different roles in a typical evaluation scenario. One will be referred to as the “Server”, and the other as the “Client”, throughout this document.

The Server PC is the source for wireless media transmission.

The Client receives wireless transmission, decodes incoming media data, and displays it onto the screen.

System Boot (and Reboot)

[Windows Only] Standard re-boot: Start Menu->Shut Down->Select Restart

Directories and Paths

[Windows Only] Path to all application executables are preset. The following information is for reference only.

Tzero software and utilities are located at **C:/tzero**.

Basic Connection Setup

Set Up Connection through GUI

This Evaluation Kit comes with an extensive, Web-based, GUI interface for UWB connection management and device configuration.

To access this interface, you start the browser and go to <http://localhost>.

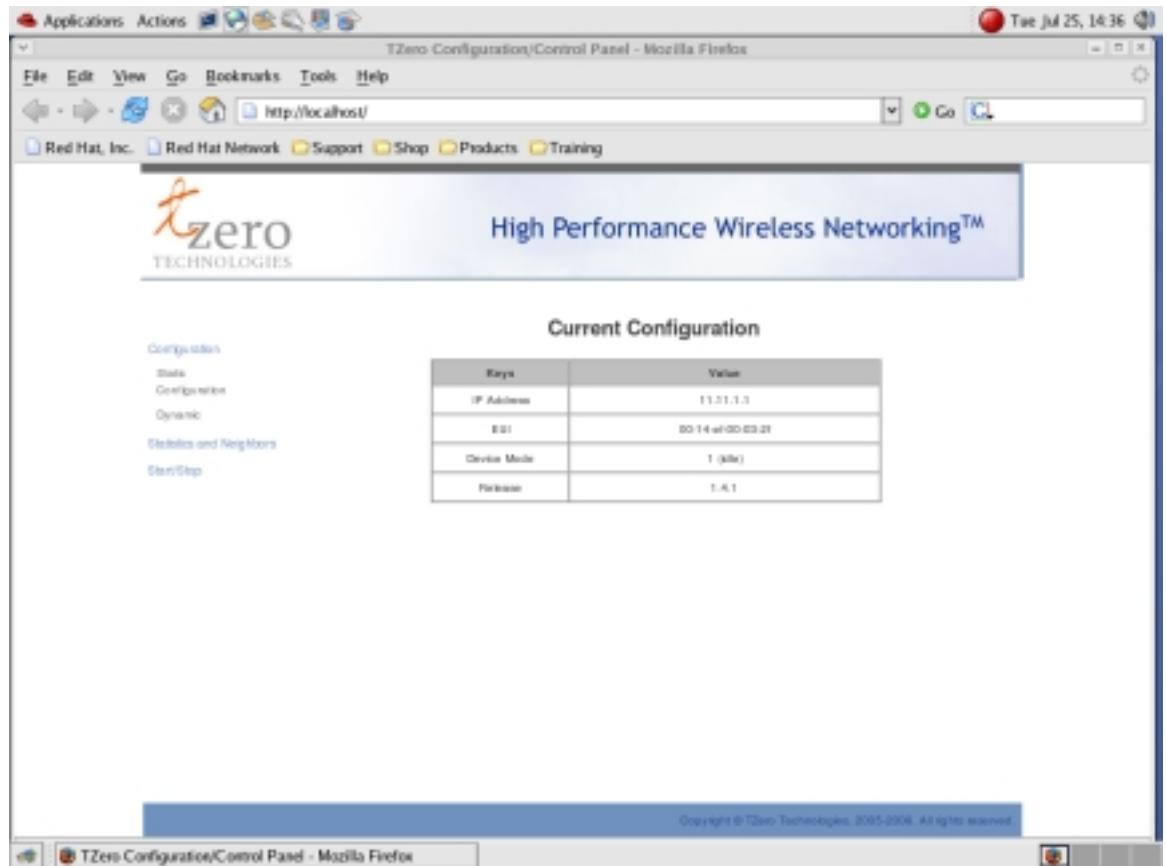


Figure 1. Startup Page

From within this GUI, you configure and setup Server and Client, respectively.

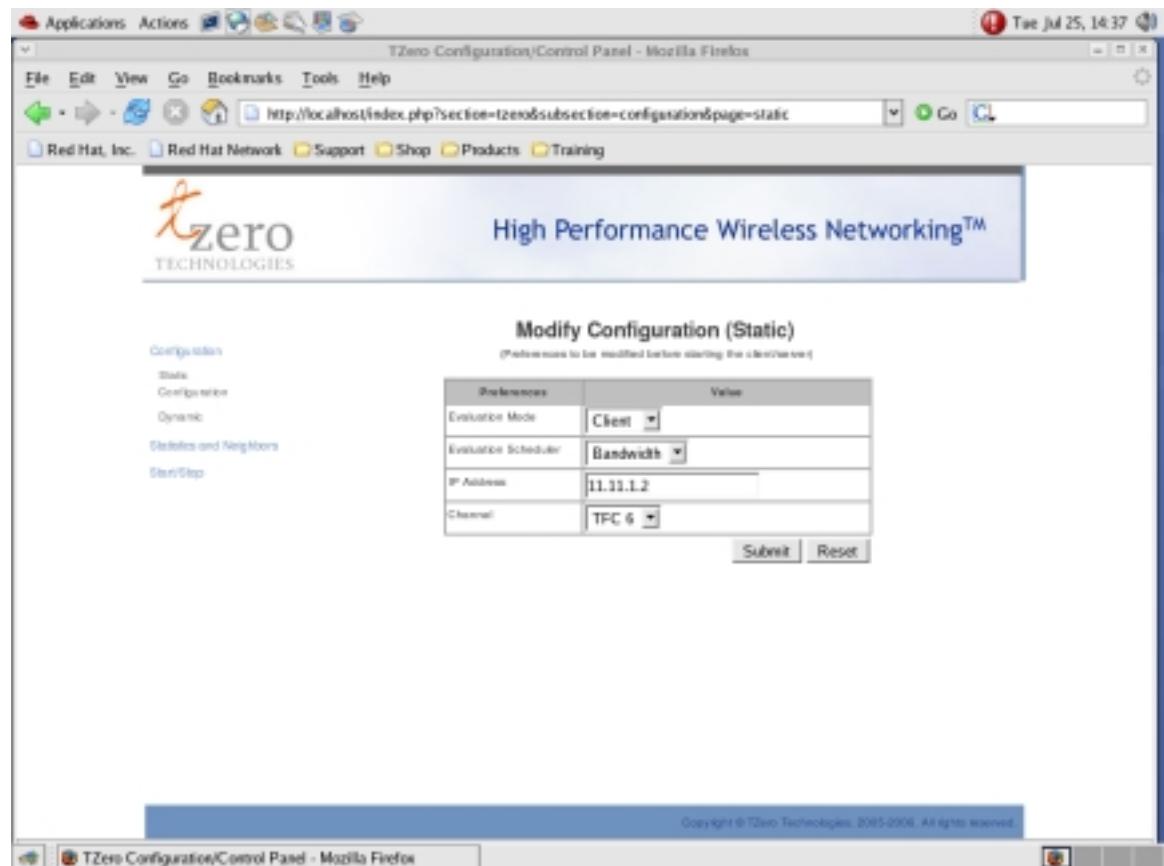


Figure 2. Static Configuration

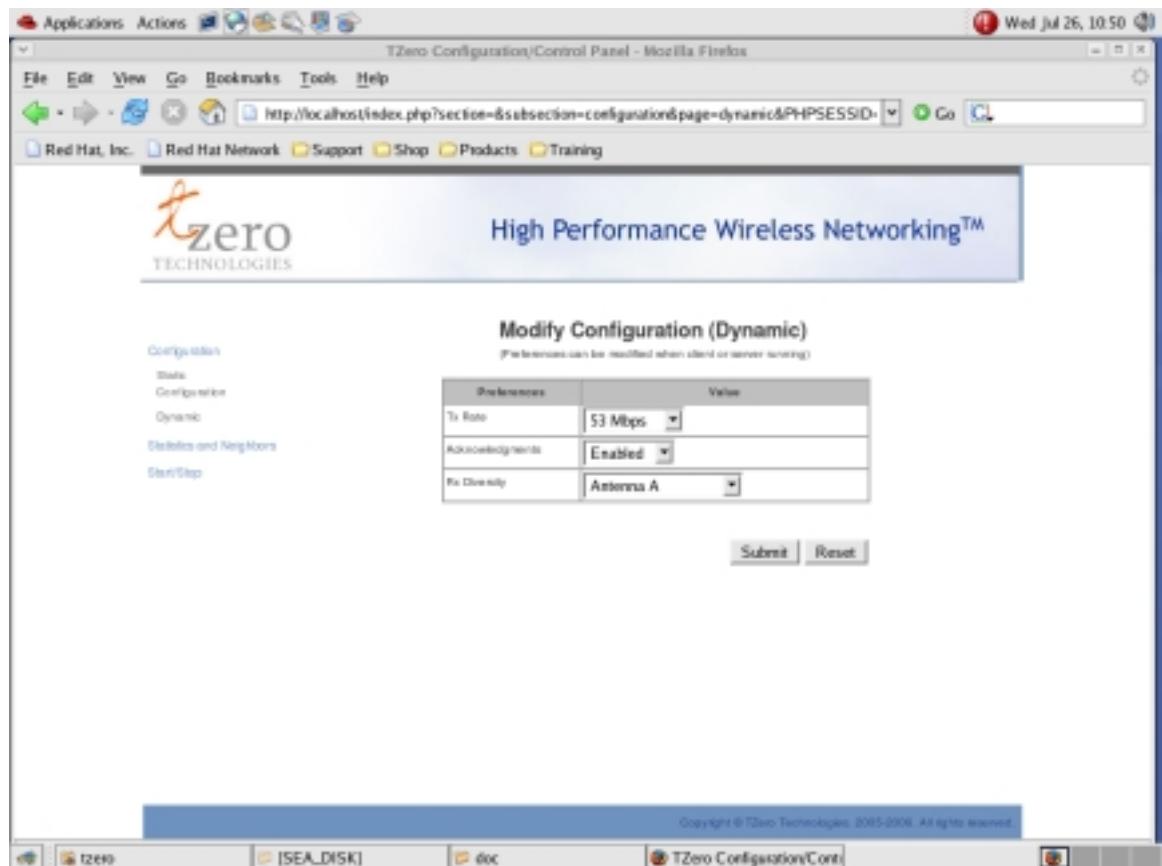


Figure 3. Dynamic Configuration

Setup the following for Server:

- In the **Static Configuration** tab, set IP Address to “11.11.1.1”.
- Set **Mode** to “Server”.
- Set **Scheduler** to “Bandwidth”.
- Set **Channel** to “TFC 6”.
- Click “Submit”.
- In the **Dynamic** tab, set Tx Rate to “53 Mbps”.
- Enable “Acknowledgement”.
- Set **Rx Diversity** to “Rx 1 only”.
- Click “Submit”.
- In the **Start/Stop** tab, click “Start”.

Setup the following for Client:

- In the **Static Configuration** tab, set IP Address to “11.11.1.2”.
- Set **Mode** to “Client”.
- Set **Scheduler** to “Bandwidth”.
- Set **Channel** to “TFC 6”.
- Click “Submit”.
- In the **Dynamic** tab, set Tx Rate to “53 Mbps”.
- Enable “Acknowledgement”.
- Set **Rx Diversity** to “Rx 1 only”.
- Click “Submit”.
- In the **Start/Stop** tab, click “Start”.

You now should have an UWB connection between Client and Server.

By default, the connection is set up at 53.3Mbps PHY data rate, at TFC 6, with a reservation scheme that allows Server to transmit 90% of the time and Client to transmit 10% of the time.

When it Fails to Connect

You should see “Neighbor” message in the **Statistics** tab after executing the above steps. If the connection attempt failed, you should reboot both Server and Client PC and retry.

Single Device Only

For data transmission to occur, the TZ7110 must receive beacons from a remote device. If a system does not receive a beacon, it will cease data transmission in less than 300ms. This brings the Tzero Mini-PCI card in compliance with Part 15 Subpart F Section 15.519 (a)(1): “(1) A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.”

Basic Network Performance Measurement

Throughput Measurement with Iperf

You run the application **iperf** to measure network throughput and packet error rate.

This application should not run at the same time you are streaming.

To start **iperf**, follow these steps:

Step	Server	Client
1		> iperf -s -u -i 1
2	> iperf -c 11.11.1.2 -t 100 -b 30M -i 1	

The example above shows how to push 30Mbps throughput from Server to Client, for a period of 100 seconds, using standard-sized (1470 bytes) UDP packets.

Round-Trip Delay Measurement with Ping

You run the application **ping** to measure round-trip delay. For example,

```
> ping 11.11.1.2
```

Advanced Connection Setup

What Can Be Configured?

By default, the connection is set up at 53.3Mbps PHY data rate, at TFC 6, with a reservation scheme that allows Server to transmit 90% of the time and Client to transmit 10% of the time.

But you may also change many other parameters that may affect network performance. The GUI provides options to configure parameters such as channel selection, PHY data rate, acknowledgement policy, reservation scheme, and so on.

Change to a Different Channel

To change to a different channel:

- 1) Stop connection.
- 2) Select **Static Configuration**,
- 3) Select **Channel**, then
- 4) Change the channel number.
- 5) Start connection.

Channel selection should be made before connection is started.

Change to a Different PHY Rate

To change to a different PHY data rate:

- 1) Select **Dynamic Configuration**,
- 2) Select **Tx Rate**, then
- 3) Change the data rate.

Currently supported data rates are: 53.3, 200, and 480.

Rate selection may be made after connection is started.

Modify the Connection Reservation

To change to a different bandwidth reservation:

- 1)** Stop connection.
- 2)** Select **Static configuration**,
- 3)** Select **Scheduler**, then
- 4)** Select a bandwidth allocation scheme.
- 5)** Start connection.

Currently supported schemes are: Bandwidth, and Latency.

Reservation selection should be made before connection is started.

Disabling Acknowledgement

To set disable acknowledgement:

- 1)** Select **Dynamic Configuration**,
- 2)** Disable Acknowledgement

Advanced Network Performance Measurement

MAC Layer Packet Error Rate

You may use **iperf** to measure layer 2 packet error rate.

Prior to starting **iperf**, disable Acknowledgement. Refer to “Advanced Connection Setup” on how to disable Acknowledgement.

You may then start **iperf** as mentioned in previous section. The packet error rate reported by **iperf** reflects the packet error rate at layer 2.

Technical Support

How to Get the Latest Update

Online tech support is available at our website: <http://www.tzti.com>

You will be provided user name and password to log in to our support web site.

Once logged in, you may access all the latest updates of data sheets, schematics, characterization data, software releases, and FAQ.

Upgrading to a New Release

New software releases are packaged in one single TAR file.

You may download this TAR file and untar it into a directory of your choice.

For Further Technical Support

FAQ on our support Web site provides comprehensive answers to various questions.

You may also contact your designated Tzero application engineer, or email us at support@tzti.com.

Appendix: Diagnostic Software Mode

This mode is ONLY available for regulatory conformance testing purposes and the software to support it is not shipped as part of the standard Tzero evaluation package. It is also not available for any testing other than regulatory conformance testing.

It is only supported in the windows evaluation platform.

Building and installing diagnostic software driver

The major directory used for diag is: **C:\tzero**. Under it the subdirectory **makediag** contains files to build the driver file. It is only necessary to build the driver file when switching from standard (or core) software to diagnostic software, or after installing a new Tzero Mini-PCI card. However, due to the experimental nature of this testing platform, occasionally the system does not perform correctly on reboot. If this is the case, rebuilding and reinstalling the driver and then rebooting the system often fixes the problem.

- 1) The subdirectory **C:\tzero\diag** contains the files for testing use.
- 2) To make diagnostic software driver and place it in the driver directory:

- a. **> cd c:\Tzero\makediag\users\operator**
- b. **> make_diag /i <rfid>**

Example for RFIC 2040: **> make_diag /i 2040**

- c. Reboot the system so that the proper driver is loaded.

Switching from standard (core) to diagnostic software

- 1) Re-make the diagnostic driver file, this process will re-install the driver.
- 2) There is a icon “DiagPrep” on the desktop. Click it and then read the message on the pop-up window.
- 3) Reboot the laptop after the pop-up window directs you to.
- 4) Check output spectrum on a spectrum analyzer. If it is not as expected, re-make the driver and reboot.

Testing with diagnostic software

Diagnostic software controls the mini-PCI card through a serial cable. A serial cable assembly is provided, attach one end of the serial cable assembly to the serial port on the laptop PC, and then the other end of the serial cable assembly to the 3 pin header on the mini-PCI card. The 3 pin serial cable assembly should have a black mark on one side. The alignment of the cable to the mini-PCI card is to place this black mark closer to the edge of the PC when the mini-PCI card is mounted.

Once the steps described in the section 2 are completed, we can start running the diagnostic software for transmit mode after the system is booted up. To do this, follow these steps:

- 1) Open a command window. Either click the icon on the desktop or run “cmd”.
- 2) **> cd C:\tzero\diag\users\operator**
- 3) **> gotx 1**

The **tzdiag** command transmits and/or receives a specified number of data frames, displaying TX/RX frame counts after each block. The command syntax is:

> tzdiag mode direction tfc rate [frames] [length] [txlevel]

The fields without brackets are mandatory. The fields in brackets are optional. All fields are case-insensitive.

- 1) Valid mode entries are: once, loop.
 - a. The once option performs PHY setup and a single test. It is NOT possible to stop this test by using CTRL-C, as although the program will exit, the Tzero chipset will continue to execute this command. The only way to stop the test is to wait for it to finish or reboot the computer. Therefore, be careful about transmitting a very large number of packets (>200,000).
 - b. The loop option performs PHY setup and performs the specified test repeatedly in a loop. To stop the looping command only employ CTRL-C once and then wait for the program to prompt to exit. If CTRL-C is hit twice, the tzdiag command will exit, but the Tzero chipset will be unavailable until it completes its current set of transmit frames.
- 2) Valid direction entries are: tx
- 3) Valid tfc entries are: 1, 2, 3, 4, 5, 6, 7. This controls the TF code used to transmit.
- 4) Valid rate entries are: 53, 80, 106, 160, 200, 480. This controls the payload data rate (TX only).
- 5) Valid frames entries are: 1 to 2147483649. This controls the number of frames per TX execution. If not specified, this field defaults to 10,000 frames.
- 6) Valid length entries are: 0 to 4095. This controls the number of payload bytes in each TX frame. If not specified, this field defaults to 1024 bytes per frame.

7) Valid txlevel entries are: 0 to 6 for TFI, 0 to 4 for FFI. This controls the TX power in 2-dB steps according to the WiMedia standard.

- a. FCC compliant TX power is txlevel 1.

Sample command:

```
> tzdiag loop tx 1 53 100000 4095 1
```

Transmit repeatedly 100,000 4095 byte frames in TFC 1 at 53.3 MBPS using txlevel 1.

Switching from diagnostic software back to standard (core) software

To prepare the laptop to run core software, there is an icon placed on the desktop named “CoreSwPrep”. Double-click on this icon. This will run a script. What this script does is

- 1) Copies the driver (NetVmini.sys) and the core software loader (tz7110.bin) files from the backup to the main versions.
- 2) Starts the Tzero connection manager service.
- 3) Displays a message to the user that the changes won't be in effect until the user reboots the computer. After this message, reboot the machine. Then the system is in standard software mode, and can be used according to the standard section of this User Guide.