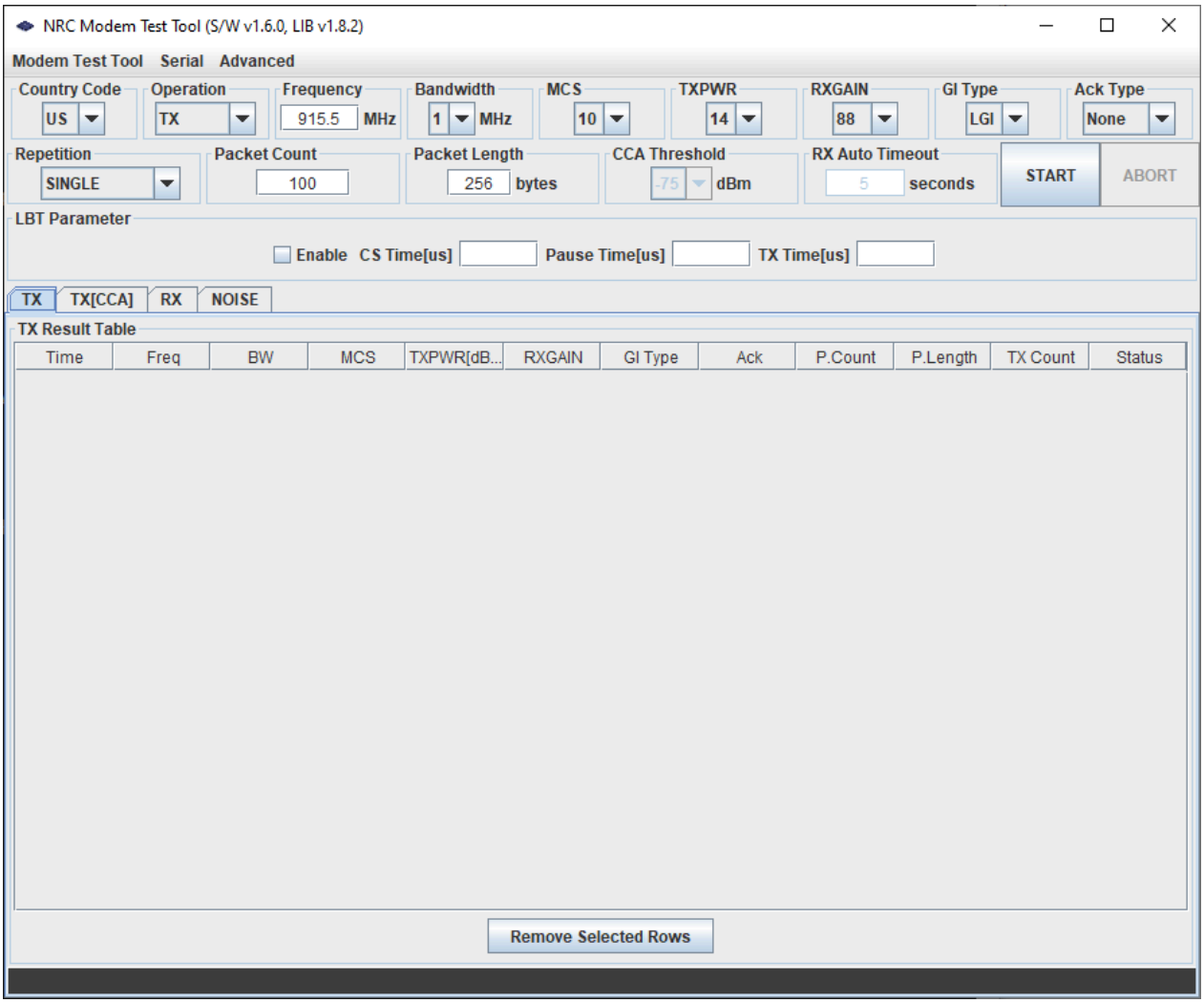
Modem Test Tool



Overview

NRC7394 Modem Test Tool is a GUI utility for controlling **calibrated** NRC7394 transceivers at the PHY/RF level. A typical usage scenario would be to analyze the signal quality in depth with the help of a VSA (vector signal analyzer) or manually measuring PER (packet error rate) / RSSI (received signal strength indicator) with a VSG (vector signal generator). The tool could also be used to run simple TRX testing between two NRC7394 transceivers.

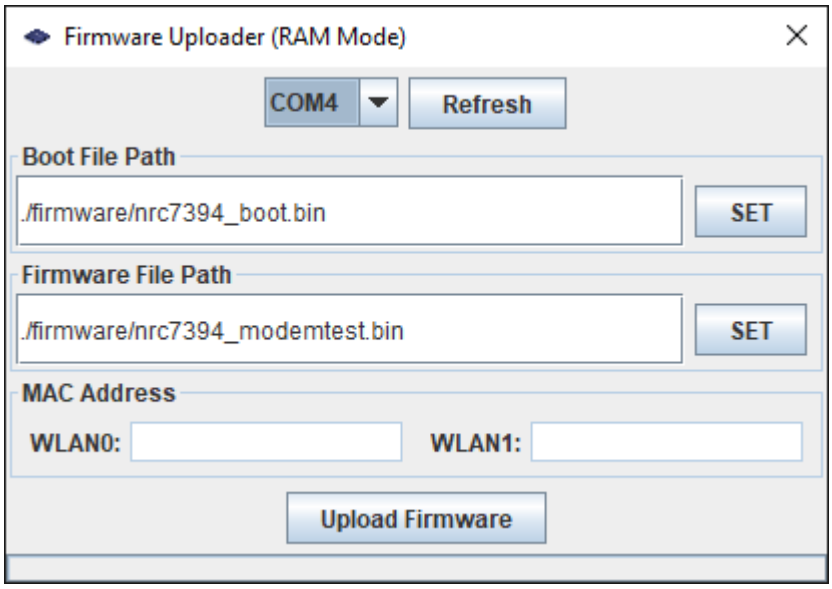
Tool Version

v1.6.0

Setting Up the Board and Uploading the Firmware

1. Configure the mode pin to **Download Mode / Host Mode** as described on the page NRC Board Operation Mode Selection and Power Supply.
2. Press the reset button on the board.

3. From the top program menu bar, access the menu item **SERIAL -> UPLOAD FIRMWARE** to open the in-built firmware uploader dialog.



4. After uploading the firmware, exit the firmware uploader dialog and access the menu item **SERIAL -> CONNECT** to connect the PC to the module via a UART serial channel.

Program Operation Types

The program supports three types of transceiver operation:

1. **TX:**

   Transmitting 802.11ah OFDM signals.

2. **RX:**

   Receiving 802.11ah OFDM signals.

3. **NOISE:**

   Running the noise/interference level estimator.

Program Operation (TX)

1. Select the **Country Code**.
2. Either select **TX** or **TX[CCA]** from **Operation**. For uncoordinated transmission without CCA (clear channel assessment) and LBT (listen-before-talk), select **TX**. For coordinated transmission with CCA and LBT, select **TX[CCA]**.
3. Configure the parameters **frequency**, **bandwidth**, **MCS**, **TXPWR** (TX output power level at the antenna), **MCS** and **GI TYPE**. Leave the internal parameters **RXGAIN** and **Ack Type** as default.
4. The **Repetition** parameter has four modes:

- **SINGLE:**

  one-time finite OFDM transmission

- **CONTINUOUS:**

  continuous infinite OFDM transmission

- **DUTY99%:**

  continuous infinite OFDM transmission with a 99% duty cycle.

- **SINE WAVE:**

  sine wave transmission.

> **Warning**
>
> the sine wave TX output power level will not correspond to the TX output power level specified by the parameter TXPWR since the module power calibration is performed with respect to the OFDM packets rather than sine wave signals.

Modify the **Packet Count** and **Packet Length** if applicable (i.e. for SINGLE mode). For TX[CCA] mode, see the note below for the description of the CCA behavior as a function of the related CCA/LBT parameters.

5. Press **START** to start TX operation.

> **Note**
>
> **LBT (listen-before-talk) / CCA (clear channel assessment) Mechanism:** Before transmitting packets, the NRC7394 transceiver senses the channel for the duration equal to **CS (carrier sense) time**. If the channel is busy, the transceiver will defer the transmission of packets. If the channel is idle, the transceiver will transmit packets for the

maximum duration determined by the **TX time** parameter. Whether or not the channel is busy or idle is determined by the **CCA threshold** parameter, which defines the maximum idle energy level within the operating bandwidth.

Program Operation (RX)

1. Select the **Country Code**.
2. Select **RX** from **Operation**.
3. Configure the parameters **frequency** and **bandwidth**. The non-functional parameters **MCS**, **TXPWR** (TX output power level at the antenna), **MCS**, **GI TYPE** and **Packet Length**. are for logging purposes only. Leave the internal parameters **RXGAIN** and **Ack Type** as default.
4. The **Repetition** parameter has two modes:

- **SINGLE:**

  the transceiver will continuously receive OFDM signals until there is no incoming OFDM signal for the duration defined by **RX Auto Timeout**.

- **CONTINUOUS:**

  the transceiver will continuously receive OFDM signals until the **ABORT** button is pressed.

For measuring the PER (packet error rate), the **Packet Count** parameter should be set to the expected number of transmitted packets by the remote receiver to ensure the validity of the reported PER.

5. Press **START** to start RX operation.

Program Operation (NOISE)

1. Select the **Country Code**.
2. Select **NOISE** from **Operation**.
3. Configure the frequency range (**Freq Start** and **Freq End**) and press **SET**. Leave the parameters **Dwell Time** and **CCA Busy Threshold** as default.
4. The **Repetition** parameter has two modes:

- **SINGLE:**

  cycling through the specified frequency range once.

- **CONTINUOUS:**

  continuously cycling through the specified frequency range until the **ABORT** button is pressed.

5. Press **START** to start noise/interference measurement operation.