TRXLIMADRM - A LINUX PROGRAM FOR SENDING AND RECEIVING DIGITAL SSTV

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Abstract

This document only addresses the differences between the programs trxlimadrm and txamadrm. Please consult the documents RXAMADRM and TXAMADRM for further information

1 INTRODUCTION

The program **trxlimadrm** can be used to transmit and receive (picture) files in the HAMDREAM standard with the LIMA-SDR. It interfaces directly to the I/Q-signals generated and used by the LIMA-SDR. There is no need for virtual audio cables or virtual comports. The software controls the frequency and PTT settings of the LIMA-SDR via its USB-connection. I/Q-signals from the LIMA-SDR should be routed to the Line-In and Line-Out connectors (stereo) of the computers soundcard.

In contrast to the program **trxamadrm**, **trxlimadrm** has a single make system that can compile all the (sub)programs needed from their sources in a single run if the need should arise. All sourcecode is in the ditributed archive.

2 DESCRIPTION OF THE PROGRAMS FOR CONTROL OF THE LIMA-SDR

2.1 usbio2 - USB communication

The program **usbio2** communicates with the LIMA-SDR over its USB-connection to set the frequency of the Si-570 chip. It needs the

wanted frequency setting as commandline argument formatted as a floating point number. The software assumes that JP1 jumper is set to the multiplier 8. For another setting change the value of lima_divider and recompile usbio2.c. The program searches for LIMA-SDR via its USB-signature. This means you cannot control two LIMA-SDR's from the same computer.

2.2 setpttlima - Setting of PTT

The program **setpttlima** communicates the PTT-setting also via its commandline argument (0 = PTT OFF, 1 = PPT ON).

2.3 choice of sideband

The choice of the sideband is determined by the dsp software. All dsp-programs therefore have two versions: an lsb- and an usb-version. The choice between them is made by the GUI programs based on the setting of the sideband parameter in the **rxamadrm.ini** file, lower sideband -1, upper sideband 1.

3 INSTALLATION

To install **trxlimadrm** untar and unzip the **trxlimadrmv0_1.tgz** archive in your home directory. This process will create a subdirectory called **trxlimadrm** with subdirectories where the sources as well as the executables can be found. To be able to run the program the alsa soundsystem should be installed. In most linux distributions this will be provided. Furthermore the following dynamic link libraries will be needed:

- libasound
- libfftw3
- libusb-dev

For the graphical user interface Tk/Tcl is needed and thus should be installed on your linux system. The **txamadrm.tcl** and **rxlima.tcl** scripts call the wish-interpreter of Tk/Tcl. The name and place of this interpreter depends on the version of Tk/Tcl. Try to find it (by the command **which wish**) and change the first line of the scripts if **/usr/bin/wish** is not OK.

There are several executables in **trxlimadrm**. All can be found in the subdirectory **linux**.

- - the GUI txamadrm.tcl
- - the main tx programs **drmlsb** and **drmusb**
- - the GUI rxlima.tcl
- - the main rx programs **drmtstlsb** and **drmtstusb**
- - the waterfall text GUI **wfaltxt.tcl**
- - the waterfall text programs **wfaltxtlsb wfalltxtusb**
- - the rs-encoders **rs1encode** etc.
- - the rs-decoders **rs1decode** etc.
- - the rs-decoders using erasure positions **rs2decoderas** etc.

The executable scripts for the GUI's do not need compilation. If you want to compile the other programs yourself, use the following steps:

1. cd to the main directory of **trxlimadrm**
   `cd ~/trxlimadrm`
2. configure the software to disable the use of the libs faac, faad2, portaudio, hamlib and qt and enable the use of alsa:
   `./configure --disable-faac --disable-faad2 --disable-qt --disable-portaudio --disable-hamlib --enable-alsa`
   This will produce the makefile.
3. run the makefile:
   `make`

4 OPERATION

4.1 Preliminaries

The collection of pictures or text files that you are planning to transmit should be transferred to the directory:
`~/trxlimadrm/linux/pics`

In principle any type of file can be sent with **txamadrm** but if you want your pictures to be shown in the right hand side pane of **txamadrm.tcl** they should be of the types supported by the **Img** package of Tk, i.e. jpeg, bmp, gif, ico, pcx, pixmap, png, ppm, ps, sgi, sun, tga, tiff, xbm and xpm. Files with the extension.txt will be shown in text mode. Unsupported file types popup an error screen for the fact that they cannot be displayed, but ignoring this error by clicking on OK in the error screen will nevertheless allow sending the file.

Picture files should be converted to a reasonable size to keep their sending time in check (20 - 30 kB).

4.2 Sending pictures

Start with a change to the working directory:
`cd ~/trxlimadrm/linux`
Start the GUI's of the rx- and tx-program with:
`./startdrmtrx.sh`
and work through this checklist to prepare txamadrm:

1. In the RXAMADRM GUI activate the wanted radio button LSB or USB.
2. Set the frequency of the wanted SSTV channel in the box to the right handside of the label "Set QRG MHz" using a floating point format number representing MHz.
3. Use the "**SET SOUND DEVICE**" pull down menu to set the alsa device number of the soundcard that is used to read the I/Q-signals from the LIMA-SDR (Stereo !).
4. Go to the TXAMDRM GUI and use the "**SET SOUND DEVICE**" pull down menu to set the alsa device number of the soundcard that is used to provide the I/Q-signals going to the LIMA-SDR.
5. Change the entry "**CallSign**" at the left handside of the GUI to your own callsign.
6. Press the button "SAVE CFG"

Now you have to make your choices for the radiobuttons at the upper left of the GUI. These buttons set the sending parameters. Successful reception of the files you send depends very much on the right choice of the sending parameters. Mode A can only be used on very good quality channels. On hf mode B or E generally are used either in QAM-16 or QAM-4 when the going gets tough.

In heavy qsb or qrm situations burst error protection via Reed Solomon coding can be switched on by checking one of the rs-buttons

before hitting the TX-ON button. The higher the rs-number the more protection, but the longer it takes to transmit a file.

When all these choices have been made you are ready to load the file to be transmitted by clicking the **Load File** button and pick the right filename and filetype in the window that now pops up. Finally hit the **SET TXON button** and watch the actual segment numbers being sent. When the name of the **SET TXOFF** button changes back to **SET TXON** the work is done. If you want to abort a transmission just hit the **SET TXOFF** button.

The settings in the GUI are stored in a configuration file called **txamadrm.ini** when the "SET TXON" button is hit and will be retained between different sessions with TXAMADRM.

For good results it is very important not to overdrive your transmitter. The audio out level cannot be set from within the GUI. You have to use the program **alsamixer** to see to it that the ALC-level during transmission is very moderate.

4.3 Sending text files

The only difference of sending text files instead of picture files consists of loading the correct text file. When a file with the extension .txt is loaded its content will be shown in the GUI and can be edited there on the spot. Don't forget to click the "SAVE TXT" button before hitting the "SET TXON" button otherwise the original content will transmitted. The text file will be transmitted repeatedly until the "SET TXOFF" button is clicked. Rsencoding will be switched off, as text-files are always sent in the clear.

Having a number of "canned" messages as txt-files in the **pics** subdirectory will be very helpful. The files stndescr.txt, 73pa0mbo.txt, etc. can serve as examples to prepare your own often used texts. Give them some meaningful names with the .txt-extension so that you can find them easily using the "Load File" button in the GUI and changing the "Files of type" entry from the window that opens to "Text Files (*.txt)".

4.4 Waterfall text

You can use the **wfaltxt** button to send a signal that shows up as text in the receiving stations' waterfall display, i.e. to acknowledge the successful receipt of a picture, to announce the start of your transmission, etc. Left clicking on this button opens a text window that can hold

three lines of 10 characters each. You can enter the wanted text (only uppercase letters, the numbers 0 .. 9 and the slash) from your keyboard. There are some buttons for precanned messages, i.e. for siging off with 73 and your callsign, with the text "GUD CPY" followed by your callsign, etc.

Pressing the **SET TXON** button in this window puts your set in the TX-mode and starts the transmission. When all text has been sent the window disappears and the normal GUI unfreezes. As of version **txamadrmv11** the waterfall text window has a button labeled "TUNE". Pressing this button will transmit the three pilot tones for a short time.

4.5 BSR / FIX

The button "TX BSR" loads the bsr.bin file created by **rxamadrm** upon incomplete reception of a (picture) file and automatically starts its transmission. The file will be transmitted continously until you hit "SET TXOFF". It is common to send these short bsr.bin files at least several times and it is up to you to decide how long to continue this transmission. To make sure it will come across, sent it at least 4 times. You can count this by watching the rollover of the "act segmnts" counter.

If you successfully receive a bad segment request from another station after you have sent a picture you can repair his incomplete file by pressing "TX FIX". This will transmit his missing segments plus some overhead repeatedly. Again you have to stop this by pressing the button "SET TXOFF". Don't use this button if the received bsr.bin file regarding you last picture transmission was not complete. In that case you should retransmit the last picture completely.