

Using A Modified USB Sound Fob With App_rpt

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Intended Audience

This howto is at an advanced level. One must know how to compile asterisk, libpri, and zaptel from source code, use communications test equipment, and know how to interface repeater controllers to repeaters.

Required Items and Prerequisites

1. Zaptel, Libpri, and Asterisk Installed FROM SOURCE CODE. Asterisk configured to compile app_rpt, and RADIO_RELAXSET. “make samples” command executed. Use Asterisk 1.4.11 or later, and Zaptel 1.4.5 or later. For a guide on installing a compatible Asterisk configuration on your PC from tarballs, refer to our howto located at http://app-rpt.qrvc.com/app_rpt_howto.html. Follow the instructions in that howto up to the section “Default Configuration Files” before continuing with this howto. This howto assumes you have installed Asterisk, libpri, and Zaptel in the /usr/src directory on your system, and updated the sound files
2. app_rpt.c, chan_usbradio.c, and all files in the xpmr directory including the directory itself. These files may be downloaded from the link on the webpage at: <http://app-rpt.qrvc.com/usbsoundfob.html>
3. usbconfigs.tar.gz containing initial asterisk configuration files for a USB configuration. This may be downloaded from the link at: <http://app-rpt.qrvc.com/usbsoundfob.html>
4. libusb and libasound (lib-alsa) plus development headers. These need to be installed so that the chan_usbradio.c file can be compiled.
5. Modified CM-108 based USB sound fob which brings out PTT from pin 13 of the CM-108. Please refer to the article on <http://app-rpt.qrvc.com/usbradio/usbfob.pdf> on how to modify your USB sound fob to bring out the PTT line and add a DC blocking capacitor for the TX audio.
6. Test equipment: A service monitor, OR a deviation meter, and an RF signal source with an audio tone generator, plus a dummy load for the transmitter.
7. Root access to the machine which will have the software installed on it. All command examples are from a root bash shell prompt.

Updating the Asterisk Installation

The versions of app_rpt.c and chan_usbradio.c which come with Asterisk are not usually the latest versions. In order to ensure you are running the latest code, and are using the correct initial configuration files, please follow the instructions in this section.

1. Copy app_rpt.c to the /usr/src/asterisk/apps directory, overwriting the version which comes standard with Asterisk.

2. Copy `chan_usbradio.c`, and **the entire contents of the `/xpmr` directory**, to the `/usr/src/asterisk/channels` directory overwriting any older versions of these files.
3. Edit `xpmr.h` and check to see that:

```
#define DTX_PROG 0
```

is set. If it is set to '1' change it to '0'.

4. Unpack the default configuration files contained in `usbconfigs.tar.gz` in `/etc`
5. Add the following text to the end of the `/usr/src/asterisk/channels/Makefile` to allow the `chan_usbradio.c` channel driver to be compiled:

```
chan_usbradio.o: chan_usbradio.c xpmr/xpmr.c xpmr/xpmr.h\  
xpmr/xpmr_coef.h xpmr/sinetabx.h busy.h ringtone.h
```

```
chan_usbradio.so: LIBS+=-lusb -lasound
```

5. Recompile and re-install Asterisk with `make` and `make install`

Configuration

1. The configuration options for `app_rpt` are located in `/etc/asterisk/rpt.conf`. The `rpt.conf` file provided in the initial configuration only contains a subset of the configuration options. A complete list of settings are documented in the `rpt.conf.sample` file provided with the Asterisk source code. In the initial configuration files installed previously, one of the settings should be modified to set an ID for the repeater. The `idrecording` setting should be changed to send the correct morse code ID for the repeater. It is currently set to `liid`, while will send the letters "id". Change it to the callsign of the repeater, for example `liwz6zzz`. The default node number in `rpt.conf` and in `extensions.conf` is 1999. If you have received an allstar node number assignment, then change the node numbers in both files to your assigned node number.
2. The configuration options for `chan_usbradio` may need to be changed to suit your radio. The file `/etc/asterisk/usbradio.conf` holds the configuration settings for `chan_usbradio`. The `/etc/asterisk/usbradio.conf` configuration file is set up to use discriminator audio, and to output pre-emphasized and limited transmit audio directly to a modulator. Other configurations are possible, but are beyond the scope of this howto. The allowable settings are documented in the `usbradio.conf` configuration file.

Setup

Load the ztdummy zaptel module by typing:

```
modprobe ztdummy
```

Run asterisk by typing:

```
asterisk -c
```

If the usb device was found, then you should get an asterisk CLI prompt. Make sure your repeater is connected to the USB interface and turned on before proceeding.

From the Asterisk CLI, set the receiver noise baseline as follows:

```
radio tune rxnoise
```

Set the receive audio input level by supplying an FM signal at 1KHz with 3KHz of deviation (with no CTCSS) on the receiver's frequency. then once the signal is present, type:

```
radio tune rxvoice
```

Set the CTCSS tone level by supplying a CTCSS tone at 600Hz deviation your desired frequency (with no other modulation), and type:

```
radio tune rxtone
```

Save the receiver levels by typing:

```
radio tune save
```

Set the CTCSS tone level to zero by typing:

```
radio tune txtone 0
```

To set the transmit audio level, monitor the transmitter with a deviation meter and start with the setting of 500 (which is the midpoint) by typing:

```
radio tune txvoice 500
```

This will cause the transmitter to be keyed, and a brief tone be sent so that you can measure the transmit audio level with your deviation meter or service monitor. The last parameter is an audio level setting with a range of 000 to 999. Set the number to that which gives you 3KHz of deviation. Repeat the **radio tune txvoice** command using different numbers (successive approximation) until you get the desired 3 KHz of deviation.

Set the TX CTCSS tone level by typing the following:

radio tune txtone 500

This will cause the transmitter to be keyed, and a brief CTCSS tone be sent so that you can measure the TX CTCSS level with your deviation meter or service monitor. The last parameter is an TX CTCSS level setting with a range of 000 to 999. Set the number to that which gives you 0.6 KHz of deviation. Repeat the radio tune command using different numbers until you get the desired 0.6 KHz of deviation.

Save the settings by typing

radio tune save

You may now test the setup to see if it repeats audio. The default configuration file uses a tone of 88.5 Hz so be sure to encode that tone on your radio when trying the repeater.

