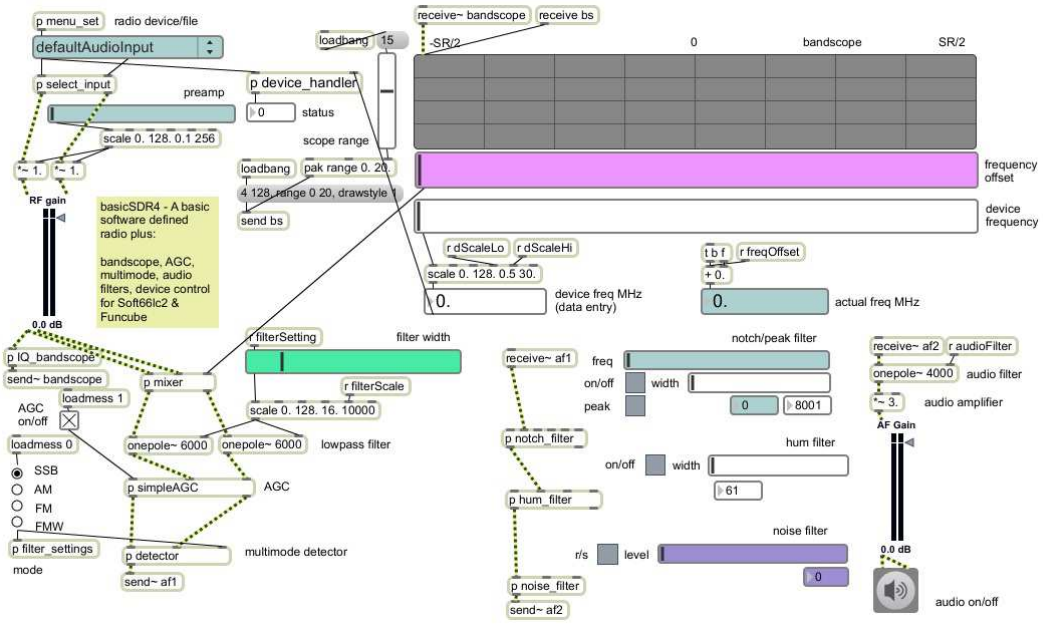
Software Defined Radio in Max/MSP

Tutorial 4 – Device Control

November 17th, 2011

Open the patch: **basicSDR4.maxpat**



This tutorial works with the Soft66lc2 and FUNCube software defined radios. If you don't have either of the devices, the patch will function just like the patch in tutorial-3. Even so, it's worth reading if you plan to secure your future in the burgeoning SDR development industry.

There are no presets with this patch because we don't know what signals your radio will hear.

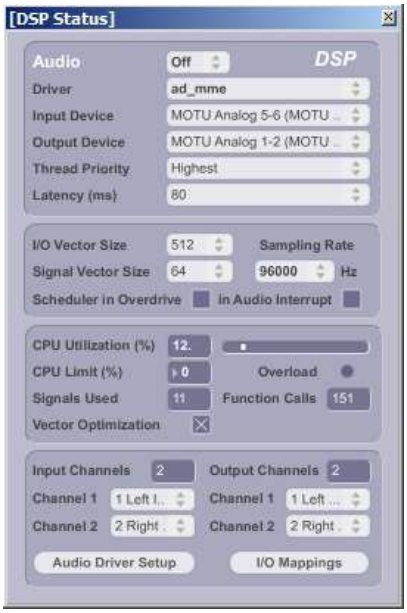
Device Setup

The Soft66LC2 requires installation of library files. Please check the README.txt file in the tutorial folder for current information about how to do this.

Audio Setup

The tutorial patch contains a green object called [audioSettings]

If you are using the runtime version of Max, double-clicking this object allows you to configure your audio hardware. It also works in the full version of Max and is the same as selecting: Options | Audio Status (DSP Status in Max5) from the Max menu. When you double-click [audioSettings] the following setup screen appears:



Select the drivers, input, and output for your hardware. The Soft66LC2 uses line-input. The FUNCube will show up as an input device.

- If possible set your audio sample rate to 96 KHz or higher. It improves bandwidth and audio quality.
- If audio is breaking up try increasing the Signal Vector Size to 512.
- For other troubleshooting tips, check the README file.

When you close this window, your audio settings will be saved automatically.

Selecting a Radio

Select a radio device (that is, “Soft66LC2” or “FUNCube”) from the **radio device/file** menu in the upper left area of the screen.

If the status number box changes to “1” your device is ready to go. Otherwise, here are a few suggestions…

- Using the Soft66lc2? Please check the README.txt file in the maxsdr5/ folder for important information about installing libraries.
- Try plugging in just one radio at a time
- Try removing non-essential USB devices (like external hard drives)
- With FUNCube you'll need firmware 18f or greater. Check http://www.funcubedongle.com
- Bring up the Max window (cmd-M) and check for error messages.

If it seems like the devices work fine, except with this Patch, please contact radio@zerokidz.com – I'd like to solve the problem.

Setting device frequency

Enter a device frequency in MHz by typing it into the device frequency data entry number box, or by adjusting the device frequency slider.

Writing Max Externals

Most SDR devices are controlled via USB. If your device responds to text based serial port commands, or a protocol like Open Sound Control (OSC), you may be able to operate the device using [serial] or [updsend]. We have written Max drivers for the TenTec RX-320 and Icom IC746 using [serial].

Unfortunately The Soft66lc2 and Funcube both require USB device libraries so it's necessary to write Max external objects in C. The externals have two basic functions:

- Look for a connected device and initialize
- Set frequency

Look inside [device_handler] to see how the externals are used.

Alternatively you could use other software for device control (like QTHid for the FUNCube) and use Max for signal processing.

If you are interested in writing your own Max externals you can download the latest version of the SDK from http://cycling74.com. It's a great topic for the next tutorial in this series.

Further Study

To learn more about developing radios in Max, download the latest version of the Max radio software and accompanying documentation from http://zerokidz.com/radio

In addition to the topics covered in these tutorials, the full (and free) version of this radio features:

- Better filtering and patch control
- Memory save/recall using [pattrstorage]
- Keyboard shortcuts
- Midi control surface support
- iPad control surface support with touchOSC
- Scanner interface
- Synthesizer interface
- Alternative [led] display

Please send comments and questions to radio@zerokidz.com