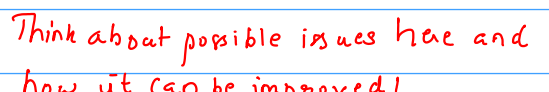


The screenshot displays the RTL-SDR software interface. On the left, a USB dongle is connected. The main window shows a waterfall plot with a title 'WX GUI Waterfall Sink'. The plot displays a signal at approximately 101.3 MHz. The interface includes several configuration blocks:

- RTL-SDR Source:** Sample Rate (sps): 2M, Ch0: Frequency (Hz): 101.3M, Ch0: Freq. Corr. (ppm): 0, Ch0: DC Offset Mode: Off, Ch0: IQ Balance Mode: Automatic, Ch0: Gain Mode: Manual, Ch0: RF Gain (dB): 30, Ch0: IF Gain (dB): 20, Ch0: BB Gain (dB): 20.
- Low Pass Filter:** Decimation: 4, Gain: 1, Sample Rate: 2M, Cutoff Freq: 100K, Transition Width: 1M, Window: Hamming, Beta: 6.76.
- WBFM Receive:** Quadrature Rate: 500K, Audio Decimation: 1.
- Rational Resampler:** Interpolation: 48, Decimation: 500, Taps: Fractional BW: 0.
- Multiply Const:** Constant: 1.
- Audio Sink:** Sample Rate: 48KHz.
- WX GUI Waterfall Sink:** Title: Waterfall Plot, Sample Rate: 2M, Baseband Freq: 0, Dynamic Range: 100, Reference Level: 0, Ref Scale (p2p): 2, FFT Size: 512, FFT Rate: 15, Freq Set VarName: None.

This extracts out samples of the modulating signal



RTL-SDR Source

Sample Rate (sps): 2M
Ch0: Frequency (Hz): 101.8M
Ch0: Freq. Corr. (ppm): 0
Ch0: DC Offset Mode: Off
Ch0: IQ Balance Mode: Automatic
Ch0: Gain Mode: Manual
Ch0: RF Gain (dB): 30
Ch0: IF Gain (dB): 20
Ch0: BB Gain (dB): 20

Low Pass Filter
Decimation: 4
Gain: 1
Sample Rate: 2M
Cutoff Freq: 100k
Transition Width: 1M
Window: Hamming
Beta: 6.76

Delay
Delay: 1

Complex Conjugate

Multiply

Complex to Arg

Low Pass Filter
Decimation: 5
Gain: 1
Sample Rate: 500k
Cutoff Freq: 100k
Transition Width: 10k
Window: Hamming
Beta: 6.76

Low Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 100k
Cutoff Freq: 15k
Transition Width: 5k
Window: Hamming
Beta: 6.76

Rational Resampler
Interpolation: 48
Decimation: 100
Taps: 1
Fractional BW: 0

Multiply Const
Constant: 1

Audio Sink
Sample Rate: 48KHz

WX GUI FFT Sink
Title: FFT Plot
Sample Rate: 100k
Baseband Freq: 0
Y per Div: 10 dB
Y Dims: 10
Ref Level (dB): 0
Ref Scale (p2p): 2
FFT Size: 1,024k
Refresh Rate: 15
Window: FlatTop
Freq Set Varname: None

Band Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 100k
Low Cutoff Freq: 37.8k
High Cutoff Freq: 38.2k
Transition Width: 500
Window: Hamming
Beta: 6.76

Multiply

WX GUI FFT Sink
Title: FFT Plot
Sample Rate: 100k
Baseband Freq: 0
Y per Div: 10 dB
Y Dims: 10
Ref Level (dB): 0
Ref Scale (p2p): 2
FFT Size: 1,024k
Refresh Rate: 15
Window: FlatTop

Band Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 100k
Low Cutoff Freq: 18.5k
High Cutoff Freq: 19.5k
Transition Width: 1k
Window: Hamming
Beta: 6.76

Band Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 100k
Low Cutoff Freq: 20k
High Cutoff Freq: 50k
Transition Width: 1k
Window: Hamming
Beta: 6.76

Band Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 100k
Low Cutoff Freq: 0
High Cutoff Freq: 0
Transition Width: 1k
Window: Hamming
Beta: 6.76

signals

L+R

Pilot cat

action and up conversion to 38 kHz

L-R cat action

Superhetrodyne receivers. (refer UM / Taub & Schilling for this).

Multiple signals (FM or AM) are transmitted at the same time using the idea of frequency division multiplexing. For example, if we are looking at our local FM

(I) (II) (III)

92.5 MHz 94.6 MHz 101.8 MHz

different heights
different
fixed power
for each state

Suppose we need to listen to channel (II) then a filter can be used to select the channel at (II). Note that for either AM or FM a simple receiver structure would use a single definition of k for both k is constant, however, it is not used itself.

The issue here is that this filtered signal needs to be amplified and if we are operating

at the carrier frequency, then doing this amplification at RF freq; requires a high Q factor filter with a large gain - which is difficult to realise.

The superheterodyne architecture helps us to address this issue.