Options
Title: DCF77 Receiver
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Output Language: Python
Generate Options: QT GUI

Complexity: 936ubal

Variable
ID: samp_rate
Value: 192k

Variable
ID: freq_DCF77
Value: 77.5k

Variable
ID: decimation
Value: 4

QT GUI Range
ID: hi_thres
Label: upper Threshold
Default Value: 125
Start: 0
Stop: 500
Step: 1

Adapt the upper threshold
so that the one value is provided
each time the signal is high

QT GUI Range
ID: lo_thres
Label: lower Threshold
Default Value: 2.5
Start: 500m
Stop: 50
Step: 100m

Adapt the upper threshold
so that the one value is provided
each time the signal is high

QT GUI Range
ID: gain1
Label: Gain1
Default Value: 150
Start: 1
Stop: 400
Step: 1

default real: 150
default simulation: 1

QT GUI Range
ID: gain2
Label: Gain2
Default Value: 150
Start: 1
Stop: 450
Step: 500m

default real: 290
default simulation: 1

osmocom Source
Device Arguments: airspyhf=0
Sync: Unknown PPS
Number Channels: 1
Sample Rate (sps): 192k
Ch0: Frequency (Hz): 77.5k
Ch0: Frequency Correction (ppm): 0
Ch0: DC Offset Mode: 0
Ch0: IQ Balance Mode: 0
Ch0: Gain Mode: False
Ch0: RF Gain (dB): 30
Ch0: IF Gain (dB): 30
Ch0: BB Gain (dB): 0
Ch0: Bandwidth (Hz): 4k
command
out

QT GUI Frequency Sink
FFT Size: 1024
Center Frequency (Hz): 77.5k
Bandwidth (Hz): 2k
in

Low Pass Filter
Decimation: 1
Gain: 150
Sample Rate: 192k
Cutoff Freq: 1.2k
Transition Width: 250
Window: Kaiser
Beta: 6.76
in
out

Simple Squelch
Threshold (dB): -50
Alpha: 1
in
out

filter out low noise
below given threshold

QT GUI Time Sink
Name: received...sband_signal
Number of Points: 768k
Sample Rate: 192k
Autoscale: No
in

Rational Resampler
Interpolation: 1
Decimation: 4
Taps:
Fractional BW: 0
in
out

Apply downsampling to
reduce computations on
total number of samples

Multiply Const
Constant: 150
in
out

Amplify signal

Virtual Sink
Stream ID: 0
in

TCP Source
Address: 127.0.0.1
Port: 55.554k
Mode: Client
out

This block takes the DCF77
signal from a simulated
Channel at 77.5 kHz.

Frequency Xlating FIR Filter
Decimation: 1
Taps: variable_low_pass_fi...
Center Frequency: 77.5k
Sample Rate: 192k
in
freq
out

Demodulation from 77.5 kHz
down to the base band.

Low-pass Filter Taps
ID: variable_...filter_taps_0
Gain: 1
Sample Rate (Hz): 192k
Cutoff Freq (Hz): 5k
Transition Width (Hz): 1k
Window: Hamming
Beta: 6.76

Rational Resampler
Interpolation: 4
Decimation: 1
Taps:
Fractional BW: 0
in
out

for correct timing-display
the previous down-sampled/decimated
signal must be upsampled/interpolated again

QT GUI Time Sink
Number of Points: 960k
Sample Rate: 192k
Autoscale: No
in

view the noisy input signal
to set the thresholds properly

Audio Sink
Sample Rate: 48 kHz
in

Virtual Source
Stream ID: 0
out

Complex to Mag^2
in
out

Compute real-valued signal

Virtual Sink
Stream ID: 1
in

Virtual Source
Stream ID: 1
out

Threshold
Low: 2.5
High: 125
Initial State: 1
in
out

Decide whether
the received signal
is a zero or a one

DCF77 Decoder
Scaling: 4
Sample_Rate: 192k
Tolerance: 20m
in
out
msg_out

syncs to falling edge
* decodes 0, 0.1sec zero and 0.9sec one
* decodes 1, 0.2sec zero and 0.8sec one
* decodes new minute if 1,8 or 1,9sec one

QT GUI Time Sink
Name: decoded_DCF77_bits
Number of Points: 192k
Sample Rate: 192k
Autoscale: No
in

Check if the output bitstream
is tagged properly at the edges

ZMQ PUSH Message Sink
Address: tcp://1....0.1:55555
Timeout (msec): 500
in

provide signal to a ZMQ server
to futher decode the bits
to human-readible
date & time information

Message Debug
PDU Vectors: On
print
store
print_pdu

show the decoded message protocol
(mostly with 0 and 1)
just for local debugging purposes