Options
Title: silversat receiver
Output Language: Python
Generate Options: QT GUI

Complexity: 3.113mbal

Import
Import: *from math import pi*=pi

QT GUI Tab Widget
ID: display
Num Tabs: 1
Label 0: Tab 0

QT GUI Range
ID: offset_frequency
Default Value: 5.3k
Start: -10k
Stop: 10k
Step: 100

QT GUI Range
ID: decimation
Label: decimation
Default Value: 40
Start: 1
Stop: 50
Step: 1

QT GUI Range
ID: squelch
Default Value: -43
Start: -100
Stop: 0
Step: 1

Variable
ID: center_frequency
Value: 433M

Variable
ID: samp_rate
Value: 2.048M

PlutoSDR Source
IIO context URI:
LO Frequency: *cent...requency*=433.005M
Sample Rate: *samp_rate*=2.048M
Buffer size: *32768*64*=2.09715M
Quadrature: True
RF DC Correction: True
BB DC Correction: True
Gain Mode (RX1): Manual
Manual Gain (RX1)(dB): 10
Filter Configuration: Auto
RF Bandwidth (Hz): 200k

Frequency offsets are handled here

QT GUI Waterfall Sink
FFT Size: 1024
Center Frequency (Hz): *...ncy*=433M
Bandwidth (Hz): *samp_rate*=2.048M

QT GUI Frequency Sink
Name: Input
FFT Size: 4096
Center Frequency (Hz): *...ncy*=433M
Bandwidth (Hz): *samp_rate*=2.048M

Variable
ID: fsk_deviation_hz
Value: *symbol_rate/2*0.67*=3.216k

Variable
ID: transition_bw
Value: 2k

QT GUI Frequency Sink
Name: Translated
FFT Size: 4096
Center Frequency (Hz): 0
Bandwidth (Hz): *sam...imation*=51.2k

Rotator
Phase Increment: *2*p...p_rate*=3.06796u

This and the next block are equivalent to the Frequency Translating FIR filter but broken down so I could verify it was working correctly

Decimating FIR Filter
Decimation: *decimation*=40
Taps: *firdes.l...ansition_bw)*=firdes.low_pass(1,sa...

Stock low pass filter, nothing optimized

Power Squelch
Threshold (dB): *squelch*=-43
Alpha: *.1*=100m
Ramp: 0
Gate: Yes

Quadrature Demod
Gain: *samp_rat...eviation_hz)*=2.53381

Virtual Sink
Stream ID: demod_out

Frequency Xlating FIR Filter
Decimation: *decimation*=40
Taps: *1*=1
Center Frequency: *ce...quency*=433.005M
Sample Rate: *samp_rate*=2.048M

QT GUI Waterfall Sink
FFT Size: 1024
Center Frequency (Hz): 0
Bandwidth (Hz): *sam...imation*=51.2k

Variable
ID: symbol_sample_rate
Value: *symbol_r..._per_symbol*=76.8k

Variable
ID: symbol_rate
Value: 9.6k

Variable
ID: samples_per_symbol
Value: 8

Variable
ID: TED_bandwidth
Value: 10m

QT GUI Time Sink
Name: demod out
Number of Points: *256*6*8*=12.288k
Sample Rate: *symbo...ple_rate*=76.8k
Autoscale: No

QT GUI Eye Sink
Number of Points: 128
Samples per Symbol: 8
Sample Rate: *symbo...ple_rate*=76.8k
Autoscale: No

Virtual Source
Stream ID: demod_out

Rational Resampler
Interpolation: *samp...ol_rate*=76.8k
Decimation: *int(s...cimation)*=51.2k
Taps:
Fractional BW: 400m

Symbol Sync
Timing Error Detector: Early-Late
Samples per Symbol: 8
Expected TED Gain: 50m
Loop Bandwidth: *TED_bandwidth*=10m
Damping Factor: 1
Maximum Deviation: 1.5
Output Samples/Symbol: 1
Interpolating Resampler: MMSE, 8 tap FIR

Binary Slicer

Virtual Sink
Stream ID: slicer_out

Correlate Access Code - Tag
Access Code: 10101...01010101
Threshold: 4
Tag Name: ss_packet

Looks for a AAAAAA33553355 with up to 4 errors

Variable Length Packet Tagger
Syncword Tag: ss_packet
Packet Length Tag: packet_len
Packet Length Size: 8
MTU: *239*8*=1.912k
Endianness: *gr.GR_MSB_FIRST*=MSB
Golay Decoding: Off

Extracts packets based on the length byte

Pack K Bits
K: 8

File Sink
File: /home/tom/stream.hex
Unbuffered: Off
Append file: Overwrite

Rename file if you want to save data between runs

UChar To Float

QT GUI Time Sink
Name: slicer out
Number of Points: 512
Sample Rate: *symbol_rate*=9.6k
Autoscale: No

QT GUI Time Sink
Name: symbol sync
Number of Points: 512
Sample Rate: *symbol_rate*=9.6k
Autoscale: No

Variable
ID: pkt_len
Value: 0

Message Pair to Var
Variable: pkt_len

Virtual Source
Stream ID: slicer_out

Sync and create packed PDU
Packet length (bytes): 239
Syncword: *'10101...101010101'*=101010...1101010101
Syncword threshold: 4

This is the beginning of the packet dissector flow

PDU Head/Tail
Mode: Head
Number: 20

Packet Header including AX5043 fields

PDU Head/Tail
Mode: Head
Number: 1

Length byte

PDU Head/Tail
Mode: Tail
Number: 19

PDU Head/Tail
Mode: Head
Number: 1

Command byte

PDU Head/Tail
Mode: Tail
Number: 18

PDU Head/Tail
Mode: Head
Number: 3

IL2P Frame Sync

PDU Head/Tail
Mode: Tail
Number: 15

PDU Head/Tail
Mode: Head
Number: 13

IL2P Header

PDU Head/Tail
Mode: Tail
Number: 2

IL2P Header Parity

Hexdump Sink