

**Options**  
Title: QAM Hardware Simulation  
Author: Pross N...Sara Cinzia  
Output Language: Python  
Generate Options: QT GUI  
Realtime Scheduling: On

**Variable**  
Id: samp\_rate  
Value: 400k

**QT GUI Tab Widget**  
Id: params  
Num Tabs: 2  
Label 0: Channel  
Label 1: Receiver

**QT GUI Tab Widget**  
Id: plots  
Num Tabs: 4  
Label 0: Constellations  
Label 1: Frequency  
Label 2: Time  
Label 3: Bits

**File Source**  
File: ...SK/lena512color.tiff  
Repeat: Yes  
Add begin tag: ()  
Offset: 0  
Length: 0

**Variable**  
Id: sps  
Value: 4

**Variable**  
Id: excess\_bw  
Value: 350m

**Constellation Modulator**  
Constellation: <con... 16qam>  
Differential Encoding: Yes  
Samples/Symbol: 4  
Excess BW: 350m

**Constellation Object**  
Id: const  
Constellation Type: 16QAM

**QT GUI Constellation Sink**  
Name: Sent (with ISI)  
Number of Points: 1.024k  
Autoscale: No

**QT GUI Eye Sink**  
Number of Points: 1.024k  
Samples per Symbol: 4  
Sample Rate: 400k  
Autoscale: No

**UHD: USRP Sink**  
Device Address: ser...9AF59  
Sync: Unknown PPS  
Mb0: Clock Source: External  
Samp rate (Sps): 400k  
Ch0: Center Freq (Hz): 2.4G  
Ch0: Gain Value: 350m  
Ch0: Gain Type: Normalized  
Ch0: Antenna: TX/RX

**QT GUI Constellation Sink**  
Name: Received  
Number of Points: 2.048k  
Autoscale: Yes

**QT GUI Constellation Sink**  
Name: Synchron...and filtered  
Number of Points: 2.048k  
Autoscale: Yes

**QT GUI Constellation Sink**  
Name: Equalized  
Number of Points: 1.024k  
Autoscale: No

**QT GUI Constellation Sink**  
Name: Locked  
Number of Points: 1.024k  
Autoscale: No

**UHD: USRP Source**  
Device Address: ser...9AF6A  
Sync: Unknown PPS  
Mb0: Clock Source: External  
Samp rate (Sps): 400k  
Ch0: Center Freq (Hz): 2.4G  
Ch0: AGC: Disabled  
Ch0: Gain Value: 600m  
Ch0: Gain Type: Normalized  
Ch0: Antenna: RX2

**Polyphase Clock Sync**  
Samples/Symbol: 4  
Loop Bandwidth: 62.8319m  
Taps: rrc\_taps  
Filter Size: 32  
Initial Phase: 16  
Maximum Rate Deviation: 1.5  
Output SPS: 1

**CMA Equalizer**  
Num. Taps: 15  
Modulus: 2  
Gain: 10m  
Samples per Symbol: 1

**Costas Loop**  
Loop Bandwidth: 62.8319m  
Order: 4

**Constellation Decoder**  
Constellation Object: ...qam>

**Map**  
Map: 0, 1, 3, 2

**Null Sink**

**QT GUI Frequency Sink**  
Name: Received  
FFT Size: 1.024k  
Center Frequency (Hz): 0  
Bandwidth (Hz): 400k

**QT GUI Frequency Sink**  
Name: Synchron...and filtered  
FFT Size: 1.024k  
Center Frequency (Hz): 0  
Bandwidth (Hz): 400k

**QT GUI Frequency Sink**  
Name: Equalized  
FFT Size: 1.024k  
Center Frequency (Hz): 0  
Bandwidth (Hz): 400k

**QT GUI Frequency Sink**  
Name: Locked  
FFT Size: 1.024k  
Center Frequency (Hz): 0  
Bandwidth (Hz): 400k

**QT GUI Time Sink**  
Name: Received (RX)  
Number of Points: 1.024k  
Sample Rate: 400k  
Autoscale: Yes

**QT GUI Eye Sink**  
Number of Points: 1.024k  
Samples per Symbol: 4  
Sample Rate: 400k  
Autoscale: No

**Variable**  
Id: nfilters  
Value: 32

**Variable**  
Id: rrc\_taps  
Value: firdes.root\_raised\_...

**Variable**  
Id: timing\_loop\_bw  
Value: 62.8319m

**Variable**  
Id: eq\_mod  
Value: 2

**Variable**  
Id: eq\_ntaps  
Value: 15

**QT GUI Range**  
Id: eq\_gain  
Label: Equalizer Rate  
Default Value: 10m  
Start: 0  
Stop: 100m  
Step: 1m

**QT GUI Range**  
Id: phase\_bw  
Label: Phase Bandwidth  
Default Value: 62.8319m  
Start: 0  
Stop: 1  
Step: 10m