#### **UHD Overview**

- UHD = Universal hardware driver
  - for all Ettus Research products
- C++ library
- Gnuradio component gr-uhd

http://code.ettus.com/redmine/ettus/projects/uhd/wiki

## UHD hardware/feature support

- Supports all hardware
  - USRP1 classic
  - USRP2
  - Daughterboards
  - New products (exclusivly)
- Missing features
  - 16-bit complex samples over the wire
  - USRP2 "MIMO" cable support

# **UHD** requirements

- Cross-platfom w/ cmake
  - Linux
  - Windows
  - Macintosh







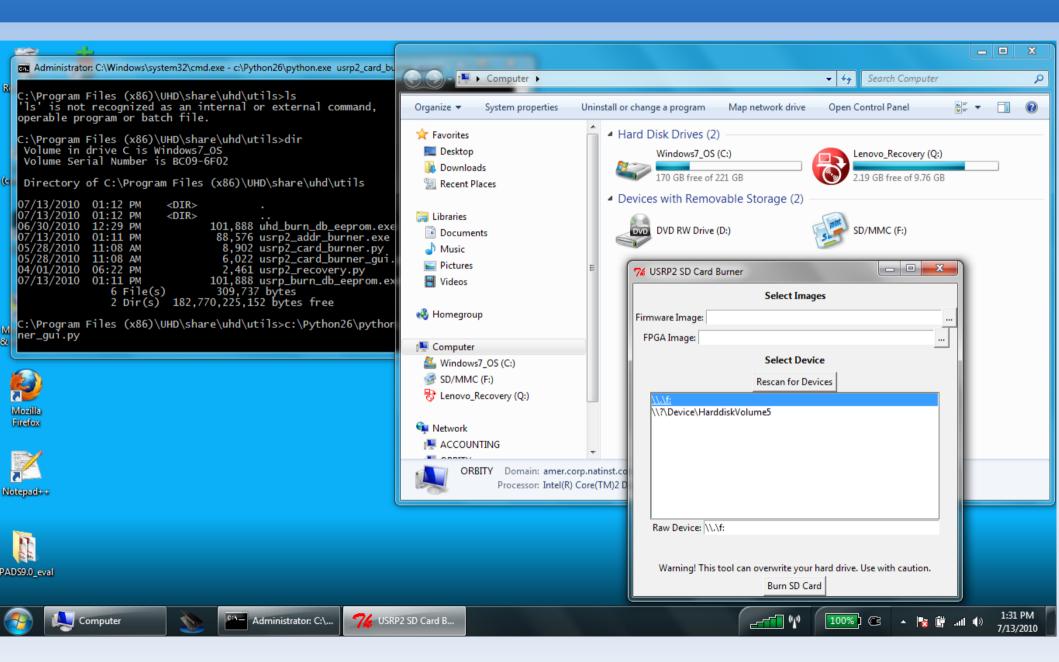
- Runtime requirements
  - Boost C++ library
  - Libusb (optional)
- Build time requirements
  - Python + Cheetah for code generation

## **UHD Images**

- git://code.ettus.com/ettus/uhd.git
  - FPGA and firmware code included
- Pre-built images available
  - http://www.ettus.com/downloads/uhd\_images/
  - No sdcc or Xilinx tools required
  - Debs/rpms/zip...



#### **UHD USRP2 Card Burner**



### **UHD Architecture**

- Device registry
  - Discovery (find device)
  - Factory (make device)
- Device address arguments
  - Key/value pairs
  - Serial, name, type, address...
- Device
  - Stream interface
  - Properties interface
  - Common set of properties

### **UHD Architecture cont...**

- Wrappers on top of properties
  - Single USRP and Multi USRP
  - FAT API set/get antenna, frequency, gains...
  - Cover 99% usage cases

#### **UHD vs Gnuradio USRP\* drivers**

- Common API
- More control
  - Individually set gains
  - Finer control over tuning
- Set antenna selections
  - set\_rx\_antenna("RX2")
- Select subdevices by name
  - set\_rx\_subdev\_spec("A:AB")

## **UHD Streaming Interface**

- RX Streaming
  - Stream continuous
  - Stream n samples
  - Timestamps on each packet
  - Inline messages/error packets
- TX Streaming
  - Send now
  - Send at time
- TX Async Messages
  - TX errors (late/underflow/burst ack)

# Gnuradio gr-uhd component

- Provides interfaces (multi-channel)
  - Single USRP source/sink
  - Multi USRP source/sink
- GRC wrappers



- Move gnuradio examples over to UHD
- Graphical status monitor + controls
- Non continuous streaming models with tags
- Passing metadata with tags



### **UHD** Conclusion

- Common API
- More features
- Cross platform
- Questions?