

# Running UHD and GNU Radio on NI USRP-RIO

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This AN explains the process to updating your NI USRP-RIO to run UHD and GNU Radio.

This application note will cover the details of converting your NI USRP-RIO into an equivalent Ettus Research X310 USRP. Once it is converted into a X310, you will be able to use the UHD API, GNU Radio and RFNoC as you would a proper X310.

Opening the chassis and changing the daughterboards will void your NI warranty. NI will not be able to provide support for UHD, GNU Radio, or RFNoC. Support questions should be directed to the [usrp-users](#) and [discuss-gnuradio](#) mailing lists or to [support@ettus.com](mailto:support@ettus.com).

This guide assumes that your USRP-RIO already has a valid IP address, and that you can ping the device.

You will need to install UHD on to your host system. For more information on installing UHD, please see the Building and Installing the USRP Open-Source Toolchain (UHD and GNU Radio) on [Linux](#), [OS X](#) and [Windows](#) Application Notes.

After UHD is installed, run the following command to download the corresponding FPGA images.

```
sudo uhd_images_downloader
```

Once the FPGA images are downloaded, you are ready to flash the FPGA image with the following command. Note, you will need to update the IP address of the USRP-RIO and the path to the FPGA image in the following command. Ensure power to the USRP-RIO and host computer is not interrupted during the flashing process. You will need to update the IP Address and FPGA Path in the following command.

If you are loading it via Ethernet:

```
Automatic FPGA path, detect image type:  
uhd_image_loader --args="type=x300,addr=<IP address>"
```

If you are using PCI Express, then:

```
Automatic FPGA path, detect image type:  
uhd_image_loader --args="type=x300,resource=<NI-RIO resource>"
```

Further information regarding the way to load FPGA images into the X3X0 device can be found in our [manual page](#)

Once the FPGA burner utility is completed, power cycle the USRP-RIO.

After you power cycle the USRP-RIO, test it with the following command.

```
uhd_usrp_probe
```

For details instructions on installing GNU Radio, please reference the GNU Radio section of the Building and Installing the USRP Open-Source Toolchain (UHD and GNU Radio) on [Linux](#) and [OS X](#) Application Notes.

Once GNU Radio is installed, you can test the operation of the USRP-RIO with the following utility.

```
uhd_fft
```

For a more detailed and through testing procedure, please see the [Verifying the Operation of the USRP Using UHD and GNU Radio](#) Application Note.

For detailed instructions on setting up RFNoC, please see the [RFNoC Getting Started Guides](#) page.