BLADERF WINDOWS® INSTALL GUIDE

INSTALLING BLADERF SOFTWARE WITH MATLAB® & SIMULINK® SUPPORT

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Revisions

Comments, feedback, improvements, and fixes may be sent to <bladeRF@nuand.com>.

Revision	Date	Summary
1	2015-01-08	Initial revision for 2016.01-rc1 installer
2	2015-06-29	Updated for 2016.06 release.

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Overview

This document describes the Windows® installation procedure for pre-built bladeRF software and its associated MATLAB® & Simulink® support.

System Requirements and Recommendations

PC system requirements, such as processor and RAM specifications, are largely dependent upon one's target SDR application. While the bladeRF can be used on a USB 2.0 port, a USB 3.0 controller is recommended in order to fully leverage the sample rate capabilities of the device.

Recommended minimum configuration:

- Quad-core 64-bit processor (3 GHz)
- 4 GB RAM
- USB 3.0 Controller
- Windows® 7 64-bit

Supported Windows® versions:

- XP (32-bit & 64-bit)
- Vista (32-bit & 64-bit)
- 7 (32-bit & 64-bit)
- 8.1 (32-bit & 64-bit)

Supported MATLAB® versions:

- 2014b
- 2015a
- 2015b
- 2016a

Installation Procedure

Download

The latest available installer may always be found at:

`https://nuand.com/windows_installers/bladeRF-win-installer-latest.exe`

Previous installer versions are located at:

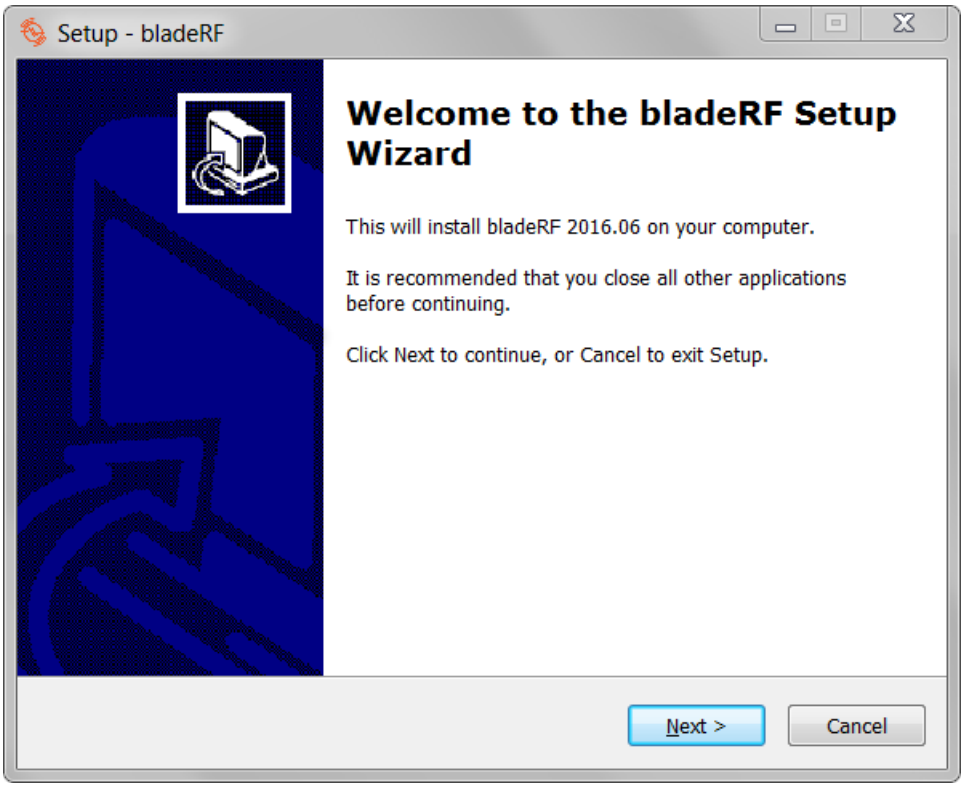
`https://nuand.com/installers.php`

Execute Installer

Ensure the bladeRF is not connected to the system. Do not connect it until after the installer completes successfully, or until instructed to do so by the firmware upgrade console.

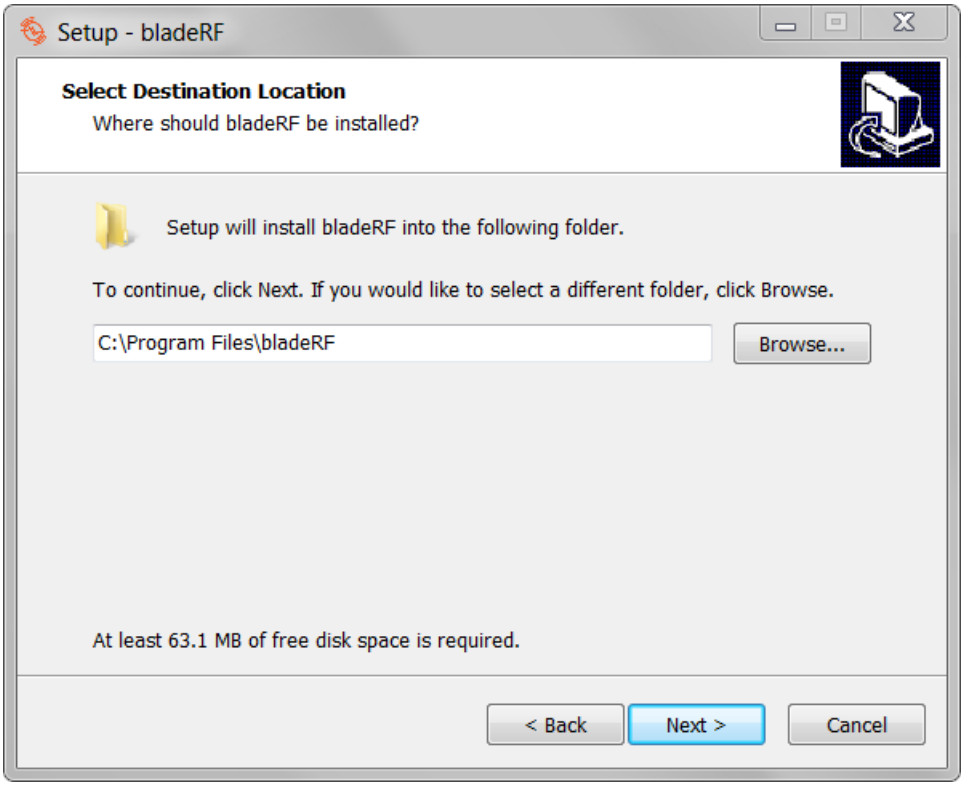
Begin by running the installer executable. If Windows® prompts whether the program should be allowed to execute, verify that the publisher is listed as `Nuand, LLC` before clicking `Yes`.

Once started, a welcome screen will be presented, as shown below. Click `Next` to continue.



Destination Location

Next, the installer will prompt for an installation destination. Update this field, if desired, and click `Next`.



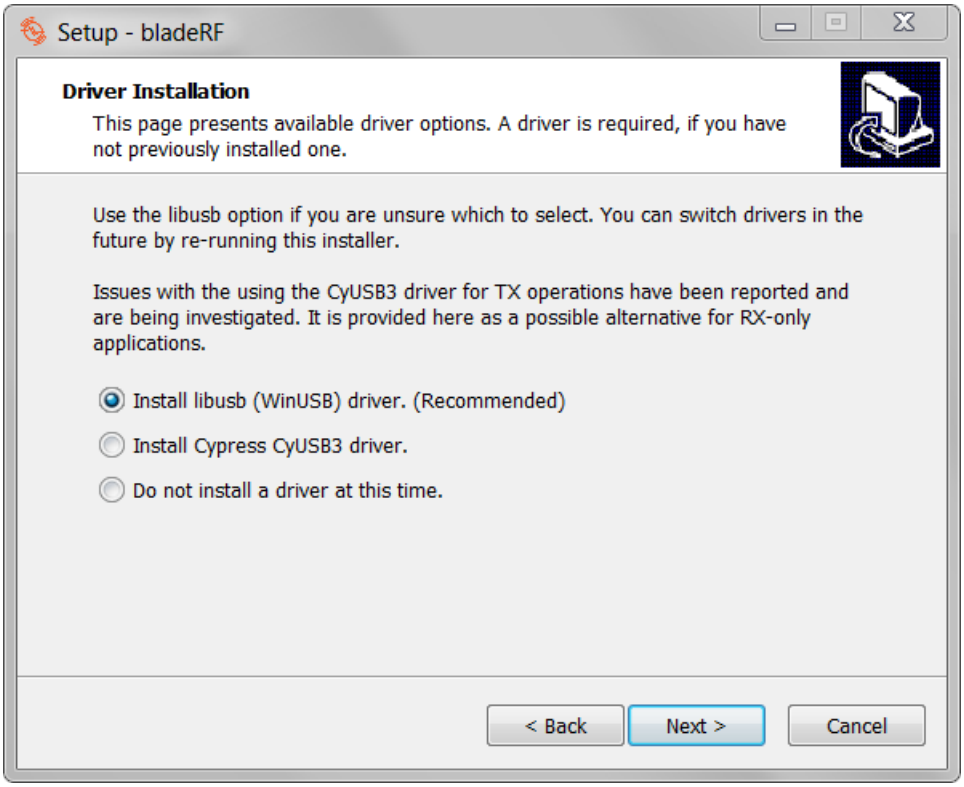
Driver Installation

This screen presents three driver installation options. If this is the first time installing bladeRF software on a machine, a driver must be installed. Otherwise, driver installation may be skipped using the last option.

As noted on this screen, some issues have been reported when using the CyUSB3 driver for applications utilizing transmit capabilities. (RX-only applications have not been found to be affected.)

Thus, until these issues have been further investigated and resolved, **it is recommended that the libusb driver be used**.

This installer can always be re-run to (re)install a driver, or install a different driver. Additionally, a driver may be installed at a later time using Zadig[1].



Click `Next` once the desired option is selected.

[1] `http://zadig.akeo.ie/`

Firmware Update

The following page provides the option to update the bladeRF firmware during the installation process. This is generally recommended, as firmware releases include feature updates and fixes.

As noted on this installation screen, the v2.0.0 bladeRF firmware introduces a new USB VID/PID. This requires libbladeRF (bladeRF.dll) v1.16.0 or later.

However, third-party applications or other systems (e.g., live images, Linux distributions) may provide older libbladeRF versions that cannot detect a device running this newer firmware. Therefore, the v1.9.1 firmware is also provided for reverse compatibility purposes.

It is always possible to upgrade (or downgrade) firmware at a later time using the `bladeRF-cli` program[2]. The FX3 firmware images are provided in a `fx3_firmware` folder within the bladeRF installation.

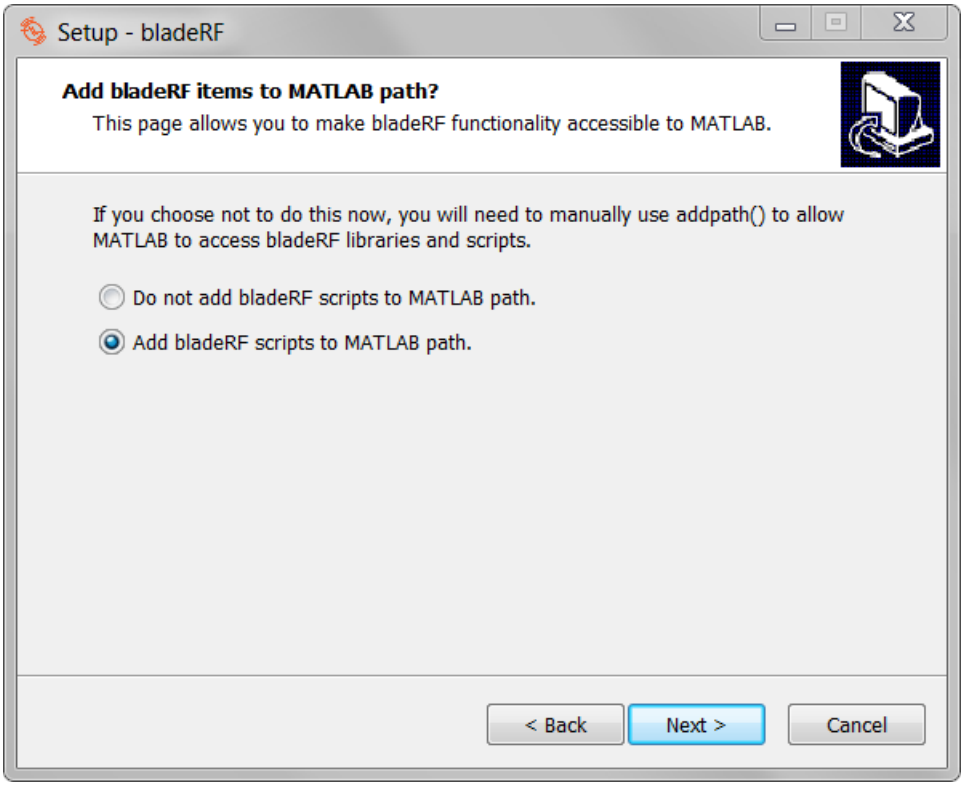
This installer may also be re-run to switch between the v1.9.3 and v2.0.0 firmware.

Use `Next` to advance to the next screen.

[2]See `https://github.com/Nuand/bladeRF/wiki/Upgrading-bladeRF-firmware`

MATLAB® Search Path

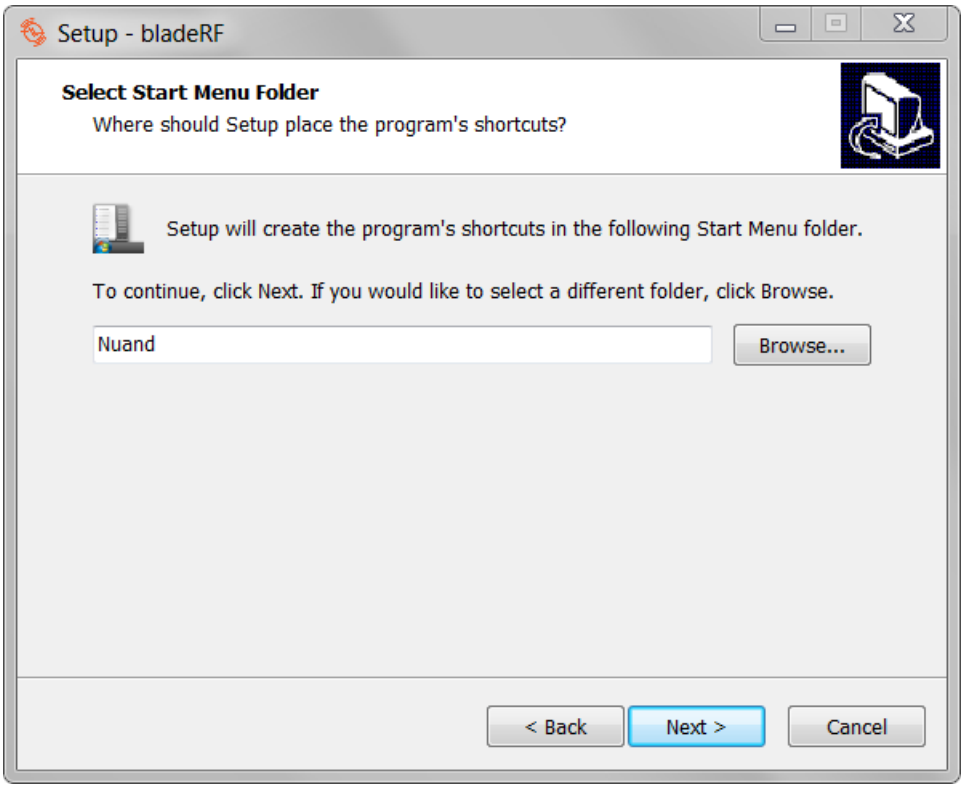
If a 64-bit MATLAB® installation is detected, the following screen will be presented. It is recommended to select the default option of adding bladeRF items to the MATLAB® search path.



Click `Next` when the desire option is selected.

Start Menu Folder

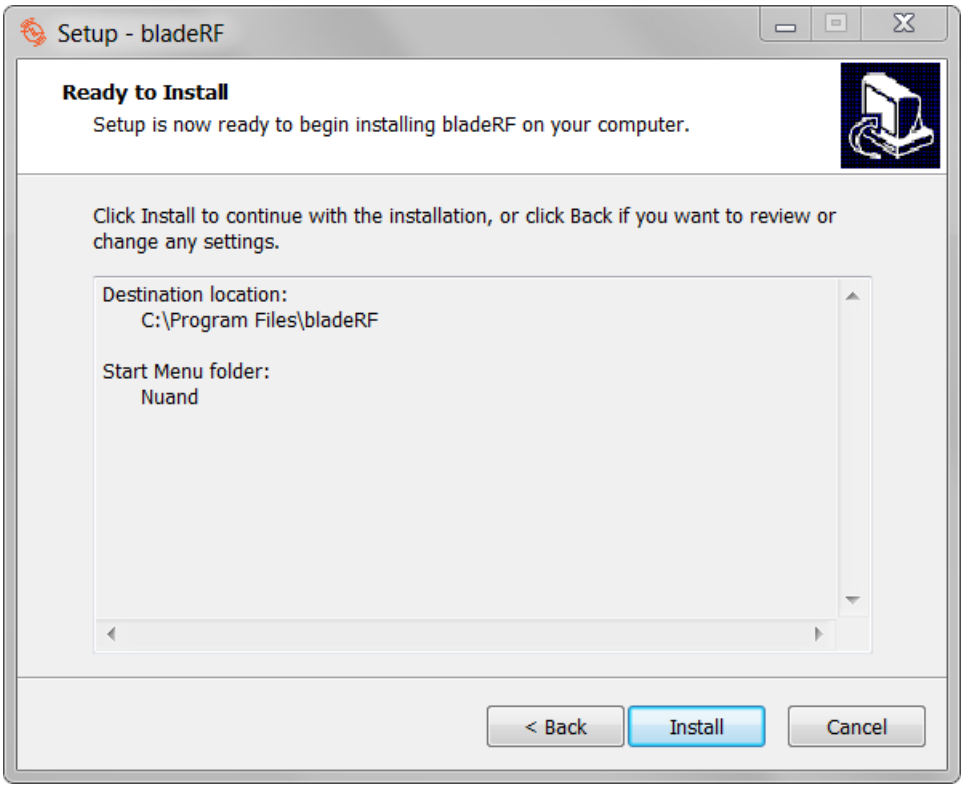
This page provides the ability to customize the Start Menu location under which shortcuts to the `bladeRF-cli` and uninstall program are placed.



Click `Next` to continue.

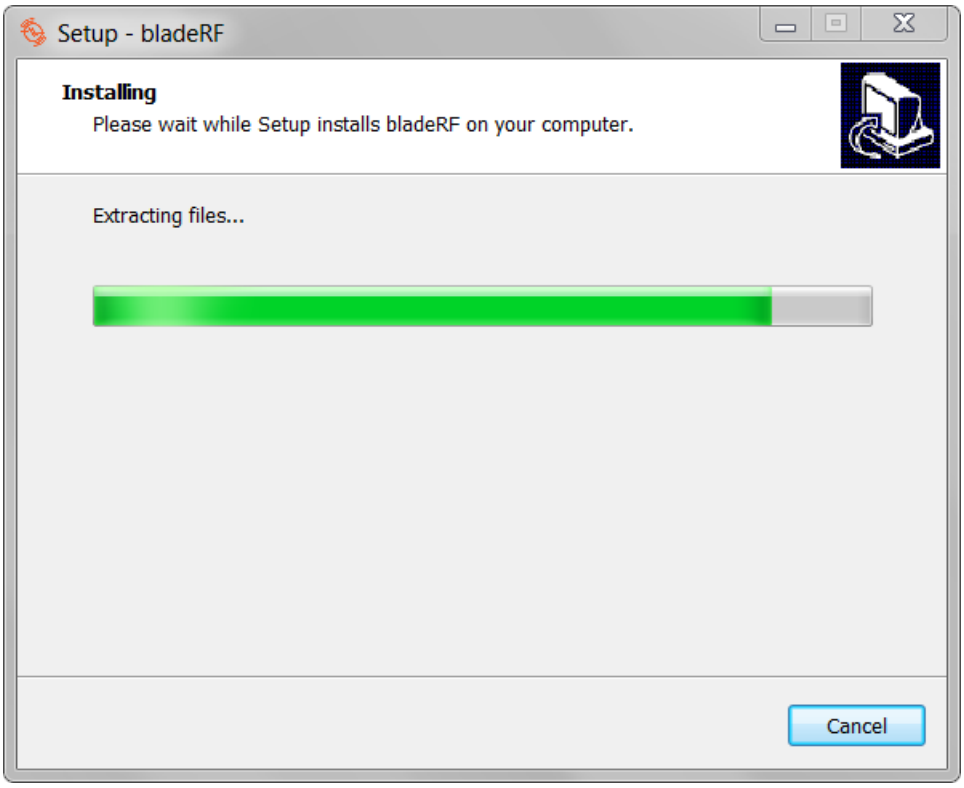
Ready to Install

Click `Next` be begin installing files to the system. This is the last step at which the program can be cancelled before changes are made.



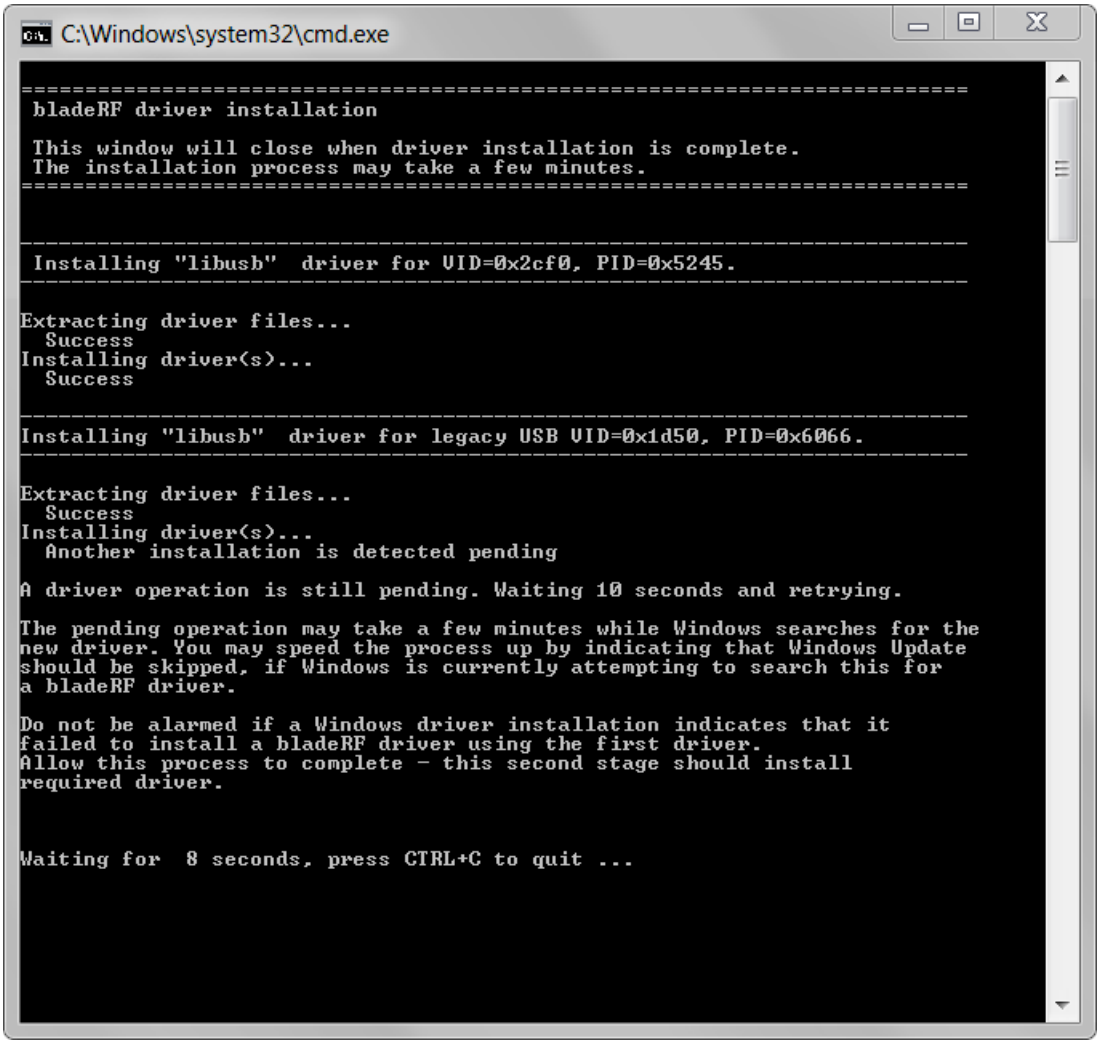
Installation Progress

The installation will display a progress bar, as shown below.



If a driver has been selected for installation, a dialog will appear during this stage, providing information about the driver install progress. This is shown on the following page.

If items are to be added to the MATLAB® path, a MATLAB® window will momentarily appear while this is updated.

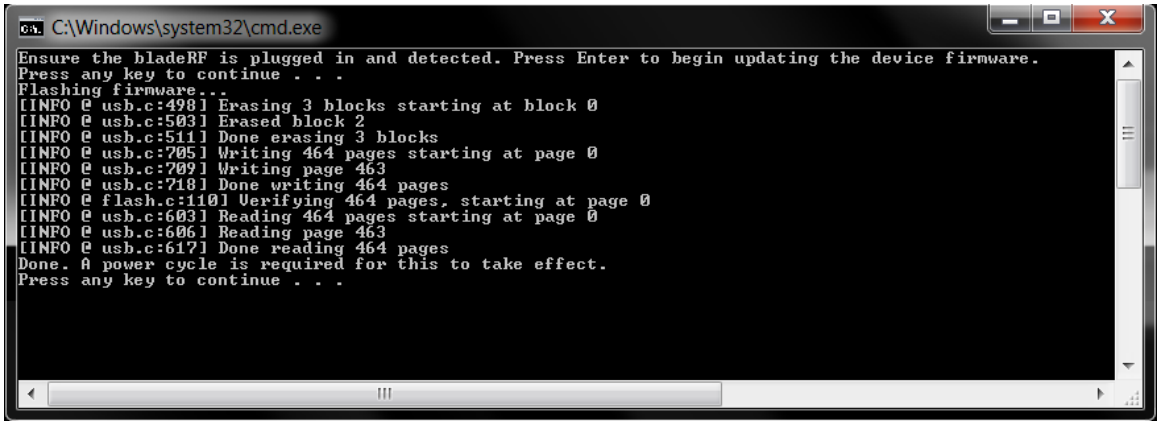

C:\Windows\system32\cmd.exe
bladeRF driver installation
This window will close when driver installation is complete.
The installation process may take a few minutes.
Installing "libusb" driver for VID=0x2cf0, PID=0x5245.
Extracting driver files...
Success
Installing driver(s)...
Success
Installing "libusb" driver for legacy USB VID=0x1d50, PID=0x6066.
Extracting driver files...
Success
Installing driver(s)...
Another installation is detected pending
A driver operation is still pending. Waiting 10 seconds and retrying.
The pending operation may take a few minutes while Windows searches for the new driver. You may speed the process up by indicating that Windows Update should be skipped, if Windows is currently attempting to search this for a bladeRF driver.
Do not be alarmed if a Windows driver installation indicates that it failed to install a bladeRF driver using the first driver.
Allow this process to complete - this second stage should install required driver.
Waiting for 8 seconds, press CTRL+C to quit ...

Firmware Update Progress

If a firmware update was selected, a console similar to the one shown below will appear.

A message is displayed, indicating that the bladeRF to update should be connected to the system. Connect a bladeRF and wait for Windows® to finish installing its driver. Check Device Manager if it is unclear whether this has been done.

After pressing `Enter`, the firmware update will begin. Progress messages will be displayed as the on-board flash is erased and reprogrammed.



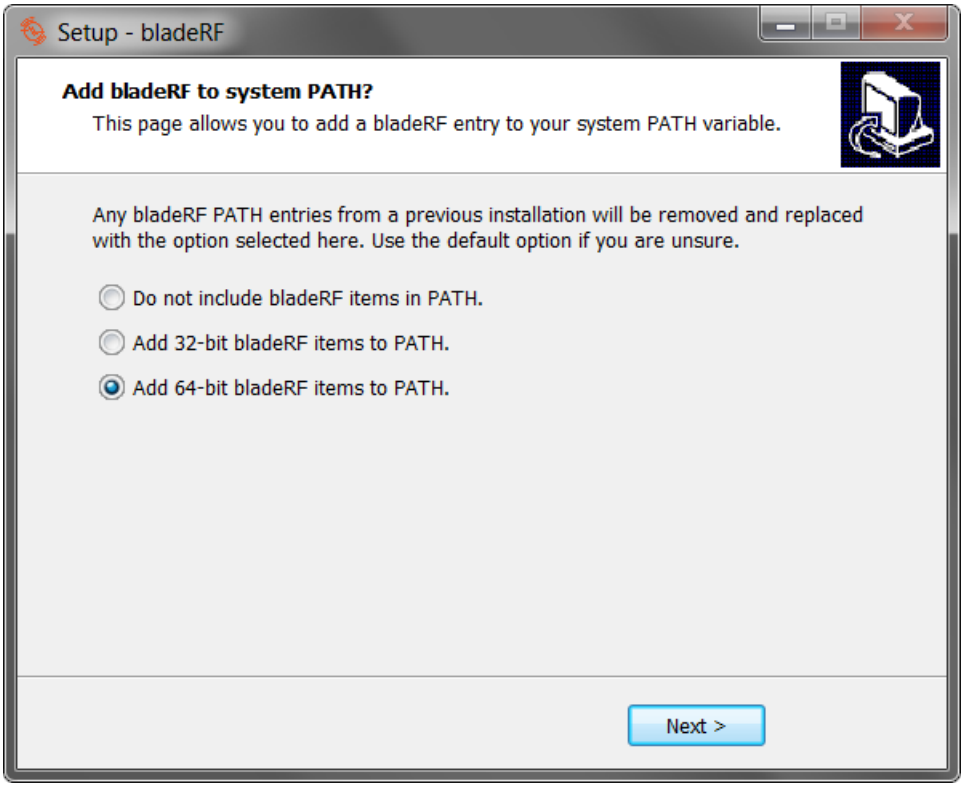
Do not disconnect the bladeRF until the console displays a message noting that this process has completed. After a firmware update, the bladeRF will need to be unplugged and reconnected for the changes to take effect.

Should one accidentally disconnect the device or encounter a failure, the device will enter a recovery bootloader mode. Information on re-flashing firmware while in this mode is available on the bladeRF wiki[3].

[3] `https://github.com/Nuand/bladeRF/wiki/Upgrading-bladeRF-firmware#Upgrading_using_the_FX3_bootloader`

System PATH

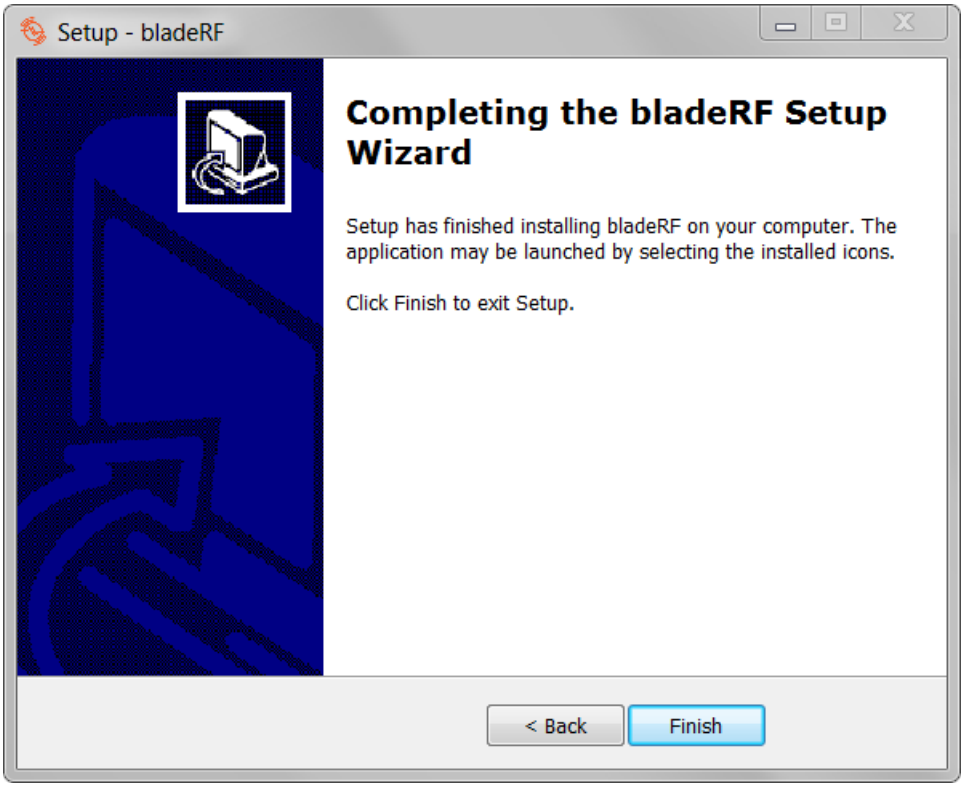
At the end of the installation, the following screen is presented. Adding bladeRF items to `%PATH%` will allow `bladeRF-cli` to be executed from `cmd.exe`, and other programs to locate `bladeRF.dll`



Installation Completed

Upon completion of the previous steps, the final screen is displayed.

Important: You may need to log out and log back in order for changes to the System PATH and MATLAB® search path variables to take effect.



Testing Basic Device Access

A quick means of verifying that the installation has succeeded is to view information about a bladeRF using the `bladeRF-cli` program.

A shortcut to `bladeRF-cli` may be executed from the Start Menu location selected in Section 3.2.1. Alternatively, it can be executed from `cmd.exe` as follows:

```
bladeRF-cli -i
```

Once in the command-line interface, information about the device may be obtained using the `version`, `info`, and `print` commands. Sample output is shown below.

MATLAB® and Simulink®

MATLAB® Search Path

If bladeRF items **were not** added to the MATLAB® search path in Section 3.2.4, then the following paths must be provided to the `addpath`[4] function.

- `C:\Program Files\bladeRF\x64`
- `C:\Program Files\bladeRF\matlab`

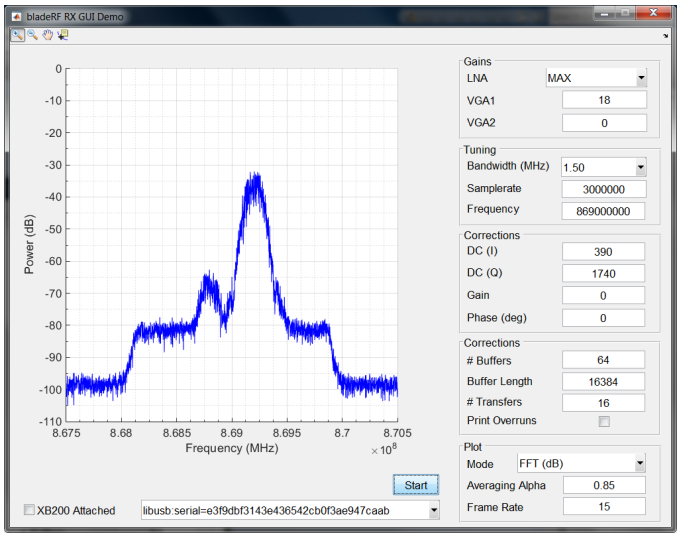
Change `C:\Program Files\bladeRF` as necessitated by the installation location.

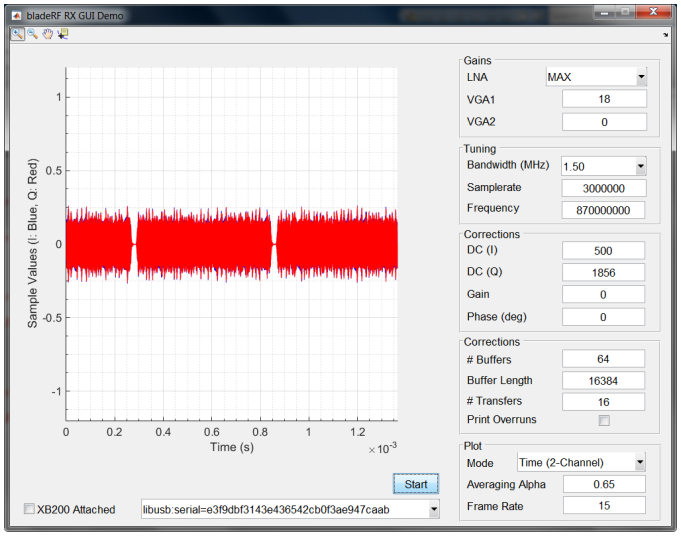
[4] `http://www.mathworks.com/help/matlab/ref/addpath.html?requestedDomain=www.mathworks.com`

RX GUI Demo

A receive-only demo program implemented entirely in MATLAB® may be executed via the command: `bladeRF_rx_gui`

As shown below, this program allows various parameters to be manipulated while viewing FFT plots and sample values in real time.





Viewing Documentation

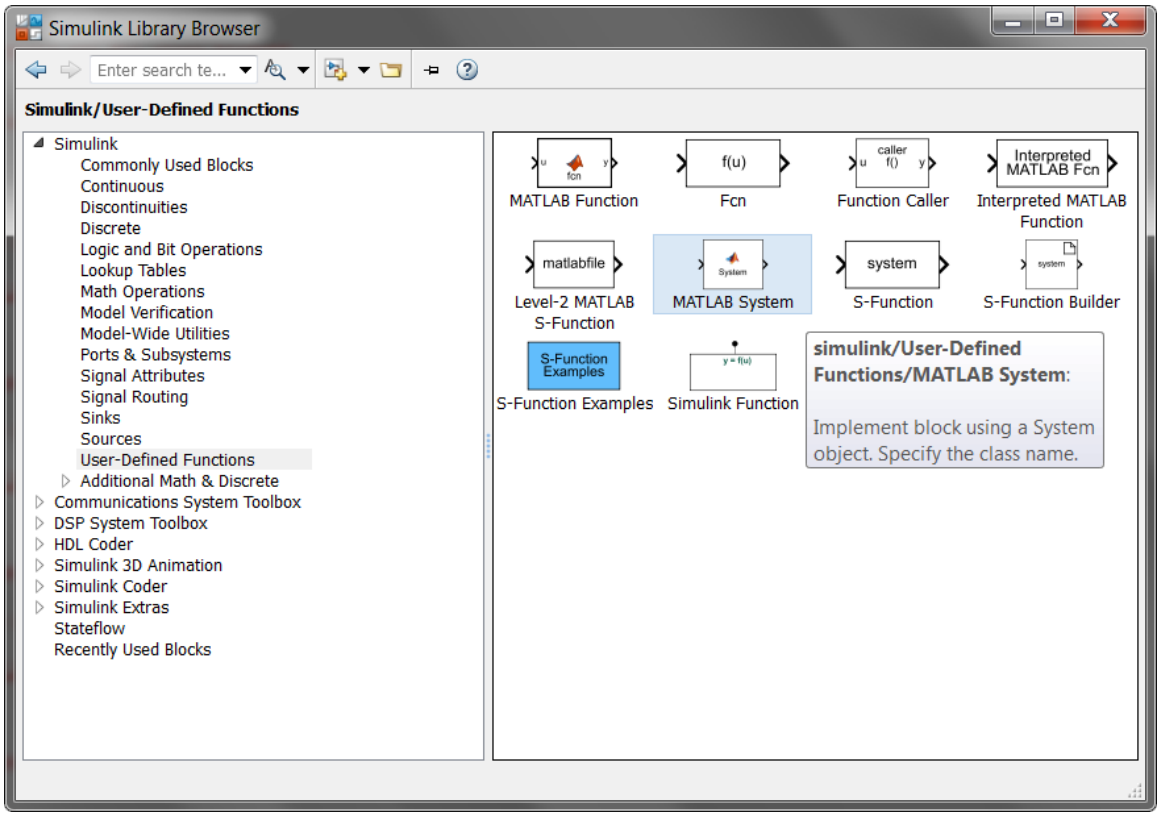
For information about available device properties and functions, run `doc bladeRF`.

Because the bladeRF MATLAB® support is implemented as a thin layer atop of `bladeRF.dll`, the libbladeRF API documentation[5] may also be referenced for more detailed information.

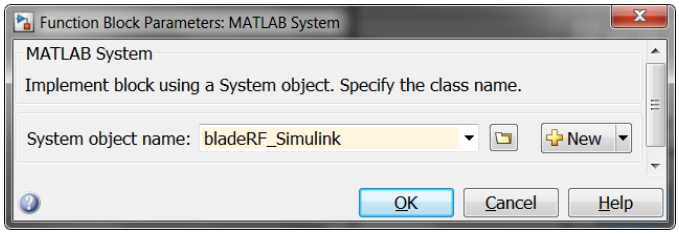
[5] `https://nuand.com/bladeRF-doc/libbladeRF`

Adding a bladeRF block to a Simulink® Model

Simulink® support is implemented via a System Object[6]. To add a bladeRF block to a model, select the `MATLAB System` block from the Library Brower:

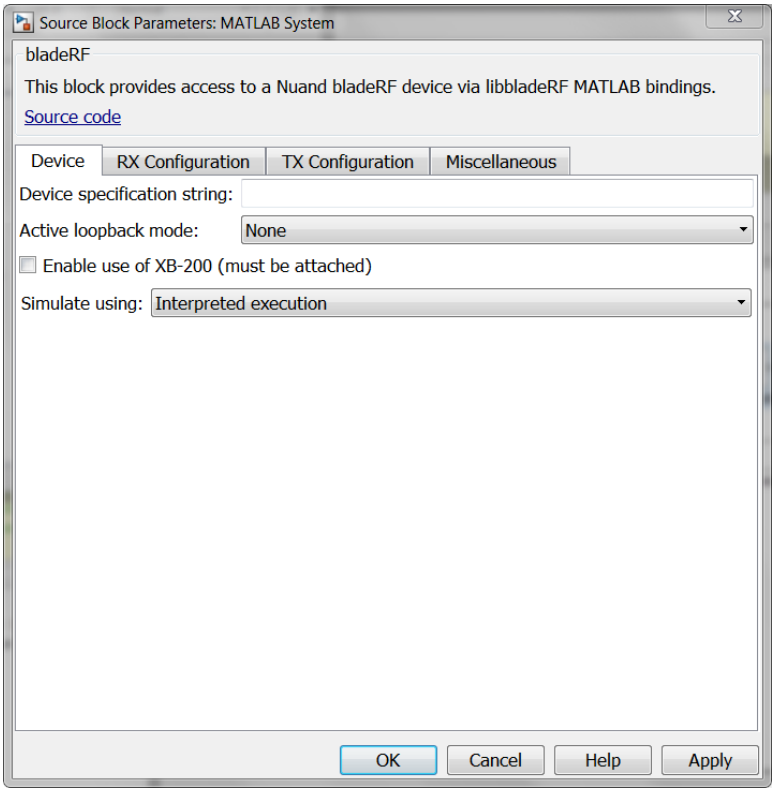


Once placed, double click the System block to specify that it should implement a `bladeRF_Simulink` object.

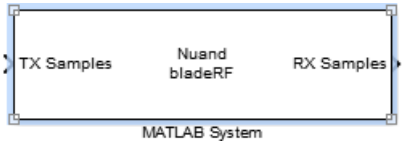


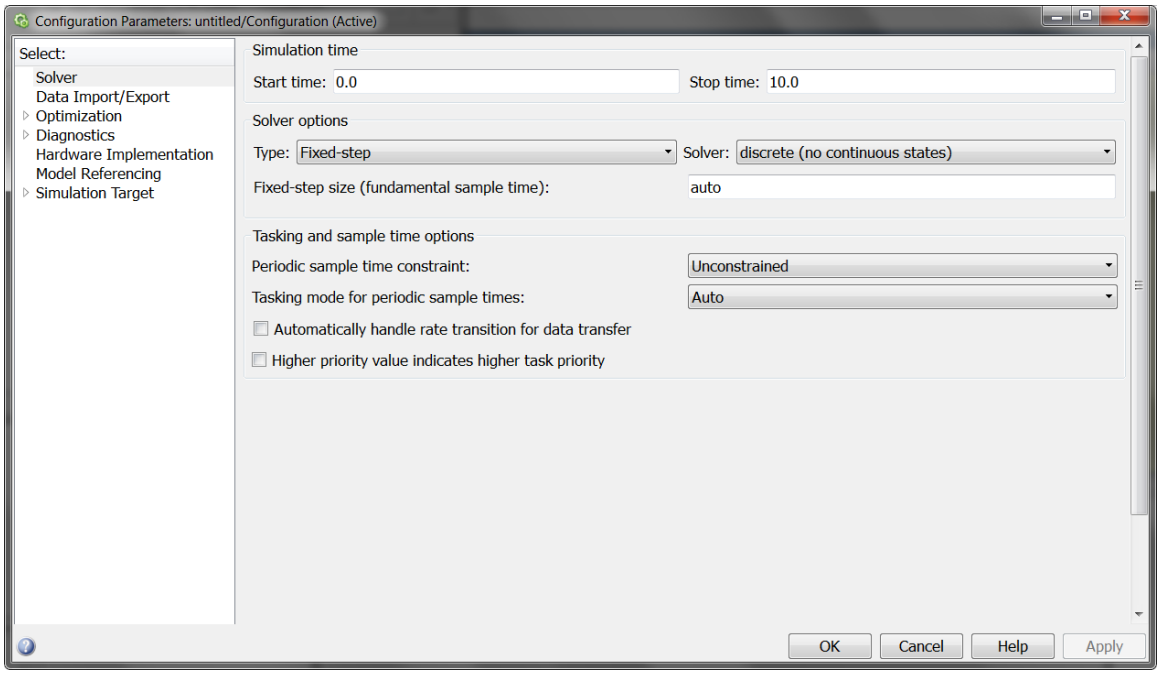
[6] `http://www.mathworks.com/help/vision/system-objects.html`

A bladeRF block will default to being receive-only, as denoted by only having an `RX Samples` output. Double-click the block to open up the block parameters. An input for the transmit path may be enabled in the `TX Configuration` tab.



As shown below, the block may be configured for a full-duplex configuration, with both RX and TX ports.



Before running a simulation, the following settings **must** be applied:

- Select `Simulate using: Interpreted Execution` in the block parameters `Devices` tab
- Configure the model's Solver Options for `Fixed-Step`, with a `discrete (no continuous state) Solver.`