

USRP-2974 Getting Started Guide

Contents

- 1 Kit Contents
 - 2 Verify the Contents of Your Kit
 - 3 Unpacking the Kit
 - 4 Proper Care and Handling
 - 5 Install and Setup the Software Tools on the onboard computer (SoM-System on Module)
 - 6 Basic Connectivity
 - 7 Test and Verify the Operation of the USRP
 - 8 Enabling PXE Boot
 - ◆ 8.1 Legacy PXE Boot
 - ◆ 8.2 UEFI PXE Boot
 - 9 NI USRP RIO PCIe Support
 - 10 Note on USRP-2974 Rev A Hardware
 - 11 Technical Support and Community Knowledge Base
 - 12 Legal Considerations
 - 13 Sales and Ordering Support
 - 14 Terms and Conditions of Sale
 - 15 Additional Resources
-
- NI USRP-2974
 - 30 dB SMA Attenuator
 - SMA-male to SMA-male Cable
 - Power Supply
 - Getting Started Guide



Make sure that your kit contains all the items listed above. If any items are missing, please contact your sales agent.

1. To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.
3. Never touch the exposed pins of connectors.
4. Unpack any other items and documentation from the kit.

NOTE: Do not install a device if it appears damaged in any way. Store the device in the antistatic package when the device is not in use.

All NI products are individually tested before shipment. The USRP? is guaranteed to be functional at the time it is received by the customer. Improper use or handling of the USRP? can easily cause the device to become non-functional. Listed below are some examples of actions which can prevent damage to the unit:

- Always properly terminate the transmit port with an antenna or 50? load.
- Always handle the USRP with proper anti-static methods.
- Never allow the USRP to directly or indirectly come into contact with any voltage spikes.
- Never allow any water, or condensing moisture, to come into contact with the USRP.
- Always use caution with FPGA, firmware, or software modifications.



Never apply more than **+10 dBm** of power into RF ports RF0 and RF1.



Never apply more than **+15 dBm** of power into the REF IN input.



Never apply more than **-15 dBm** of power into the GPS ANT input.



Always use at least 30dB attenuation if operating in loopback configuration

In order to use your Universal Software Radio Peripheral (USRP?), you must have the software tools correctly installed and configured on the SoM. A step-by-step guide for doing this is available at the [Building and Installing the USRP Open-Source Toolchain \(UHD and GNU Radio\) on the Linux Application Note](#). **Release 3.14.1.0** or later of the USRP Hardware Driver (UHD), is needed.

This USRP-2974 host supports multiple, high-speed, low-latency interface options to the FPGA. To setup the device, follow these basic instructions:

- Configure the host ethernet adapter (enp1s0f0) to use an IP address of 192.168.40.1 and a subnet mask of 255.255.255.0
- Configure the host ethernet adapter (enp1s0f1) to use an IP address of 192.168.30.1 and a subnet mask of 255.255.255.0 (loopback with SFP+ cable needed)
- To test communications, ping the USRP FPGA at address "192.168.40.2" or ?192.168.30.2?

For more details on network setup, including PCIe connectivity, please see the section [Interfaces and Connectivity](#) of the NI USRP-2974 Hardware Resources page.

Once the software tools are installed on the onboard computer, verify the correct operation of the USRP by running the utility programs on the onboard computer. More information is available at the [Verifying the Operation of the USRP Using UHD and GNU Radio Application Note](#).

- When rebooting the USRP-2974 open BIOS with DEL and go to Boot tab
- Enable PXE Network Boot with Legacy option, restart the system
- Go into the BIOS? Boot tab and set IBA CL Slot 00FE v0105 as first boot option, restart the system
- When rebooting the USRP-2974 open BIOS with DEL and go to Boot tab
- Enable PXE Network Boot with UEFI option, restart the system
- Go into the BIOS? Boot tab and set IPv4 as first boot option, restart the system

If you are connecting the USRP-2974 through the PCIe interface, then complete this section.

If you are connecting the USRP-2974 through the 1G or 10G Ethernet connection then do **NOT** complete this section.

1. Installer and commands taken from https://files.ettus.com/manual/page_ni_rio_kernel.html
2. Extract the installer and install as described (note the _ instead of ? in the folder name)
3. Enable or disable the PCIe link
 1. \$ sudo /usr/local/bin/niusrprio_pcie start
 2. \$ sudo /usr/local/bin/niusrprio_pcie stop
4. Check the status
 1. \$ sudo /usr/local/bin/niusrprio_pcie status
5. see the connection over PCIe with
 1. \$ uhd_find_devices

To find out if you have a **"Rev A"** hardware version of the USRP-2974 check the last character of the part number on the USRP-2974. E.g. "146873**A**"

To fully support Rev A with UHD software, install UHD as explained and run the following command:

```
$ /usr/local/lib/uhd/uhd/uhd_burn_mb_eeprom --args="addr=192.168.40.2" --value="product=31131"
```

After a reboot run:

```
$ uhd_find_devices
```

Under the product category section you will see the following:

```
NI-2974
```

Technical support for USRP hardware is available through email only. If the product arrived in a non-functional state or you require technical assistance, please contact support@ettus.com. Please allow 24 to 48 hours for response by email, depending on holidays and weekends, although we are often able to reply more quickly than that.

We also recommend that you subscribe to the community mailing lists. The mailing lists have a responsive and knowledgeable community of hundreds of developers and technical users who are located around the world. When you join the community, you will be connected to this group of people who can help you learn about SDR and respond to your technical and specific questions. Often your question can be answered quickly on the mailing lists. Each mailing list also provides an archive of all past conversations and discussions going back many years. Your question or problem may have already been addressed before, and a relevant or helpful solution may already exist in the archive.

Discussions involving the USRP hardware and the UHD software itself are best addressed through the **u?srp--users** ?mailing list at <http://usrp-users.ettus.com>.

Discussions involving the use of [GNU Radio](#) with USRP hardware and UHD software are best addressed through the **d?iscuss--gnuradio** ? mailing list at <https://lists.gnu.org/mailman/listinfo/discuss-gnuradio?>.

Discussions involving the use of [OpenBTS](#)® with USRP hardware and UHD software are best addressed through the **o?penbts--discuss** ? mailing list at <https://lists.sourceforge.net/lists/listinfo/openbts-discuss?>.

The support page on our website is located at <https://www.ettus.com/support?>. The Knowledge Base is located at ?<https://kb.ettus.com?>.

Every country has laws governing the transmission and reception of radio signals. Users are solely responsible for insuring they use their USRP system in compliance with all applicable laws and regulations. Before attempting to transmit and/or receive on any frequency, we recommend that you determine what licenses may be required and what restrictions may apply.

- NOTE: This USRP product is a piece of test equipment.

If you have any non-technical questions related to your order, then please contact us by email at orders@ettus.com?. Please be sure to include your order number and the serial number of your USRP.

Terms and conditions of sale can be accessed online at the following link: <http://www.ettus.com/legal/terms-and-conditions-of-sale>

- USRP-2974 Hardware Resource
- <http://www.ni.com/pdf/manuals/377416c.pdf>