

RIIoT Net Controller

Quick Start

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Related Documentations

- **RIIoT Net Controller Socket API Guide**

Abbreviations

Abbreviation	Description
BBB	Beaglebone Black
JSON	JavaScript Object Notation
RIIoT	Radiocrafts Industrial Internet of Things
TCP	Transmission Control Protocol

1 RIIoT Network Overview

The RIIoT network consists of some key elements

- The RC1880-SPR module
 - o The module that can be programmed with user application through the SPR Software Development Kit (SDK)
- The SPR SDK
 - o Software development kit with Application framework and tool for building and uploading end application to the RC1880-SPR module
- The RC1880-GPR module for use in the gateway/concentrator
 - o Support the concentrator of the gateway. Normally connected to a Linux gateway, but can also be controlled by MCU through a UART protocol
- The RIIoT Net Controller Linux middleware
 - o A middleware SW that can be used on a Linux gateway. Interfaces the RC1880-GPR module and supply user application a socket interface for controlling and sending/receiving data through the wireless network.

Below is an illustration of the different element and the documentation available

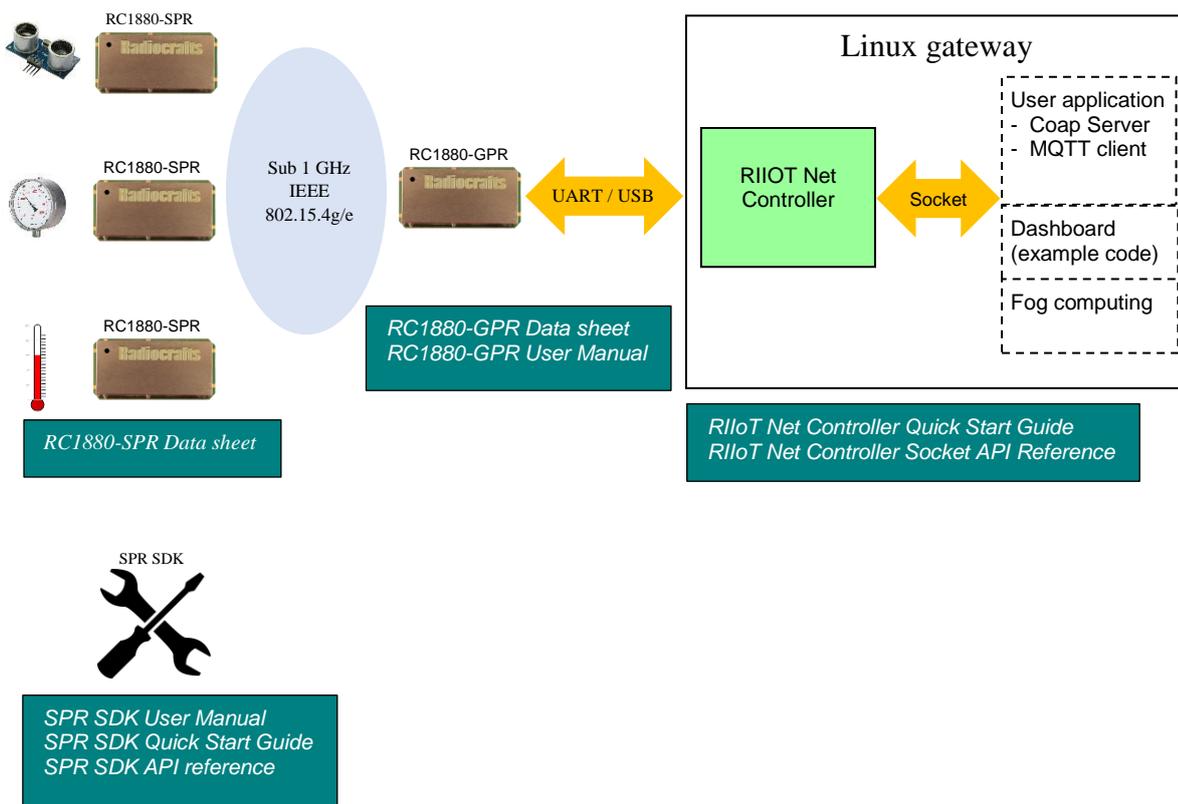


Figure 1. RIIoT network – system and documentation overview

2 Introduction

This guide helps you to get started with RIIoT Net Controller, a Linux middleware service that interfaces your application to the RF network.

As shown in Figure 2, RIIoT Net Controller is the interface layer between the user application and the RC188x-GPR RF module.

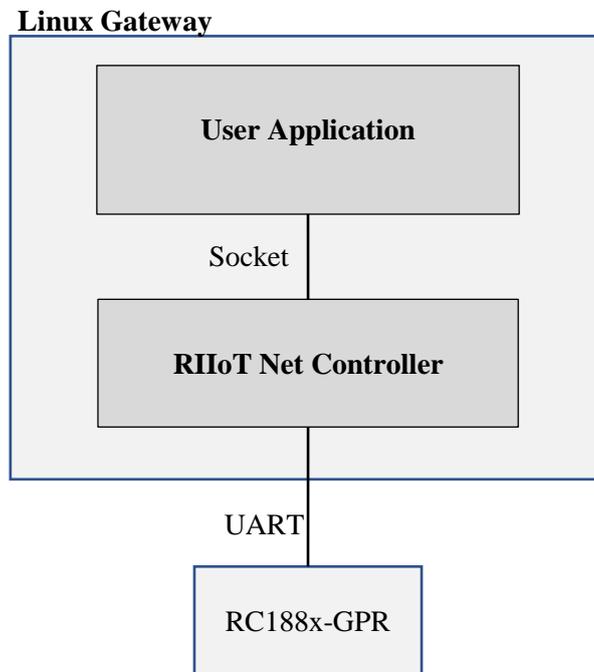


Figure 2: Architecture Overview

RIIoT Net Controller controls and manages the RF network through the RC188x-GPR RF module, which is connected to the gateway through UART. It manages the low-level RF networking while opening up a local socket API for the user application to access the RF network.

The socket API allows the user application to be written in any language, and can be used without needing to be an RF expert. The API commands are sent as JSON objects that are easy to parse and generate. For the complete guide, refer to the RIIoT Net Controller Socket API Guide.

RIIoT Net Controller is distributed as an executable binary for the supported platforms.

3 Supported Platforms

Currently, the following platforms are supported:

- Linux PC (or Virtual Machine/Virtualbox on a PC)
- Beaglebone Black
- Sierra Wireless FX30

If you wish to use RIIoT Net Controller on a different platform, please make the request by contacting our Sales team.

4 Installation

4.1 Linux PC (or VM)

If you have a Windows PC, an easy way to run Linux is to run Ubuntu as a Virtual Machine.

You can install [VirtualBox](#) and use one of the pre-made [Ubuntu images](#) to get started quickly.

This section is written as a step-by-step guide for engineers not familiar with Linux can follow. If you are familiar with linux, feel free to skip ahead.

4.1.1 Installing VirtualBox

In order to download [VirtualBox](#) click on it or go to <https://www.virtualbox.org/>

Internal testing of RIIoT Net Controller has used VirtualBox 5.2.20, but both later and earlier versions should work. Use the default setup as shown below.

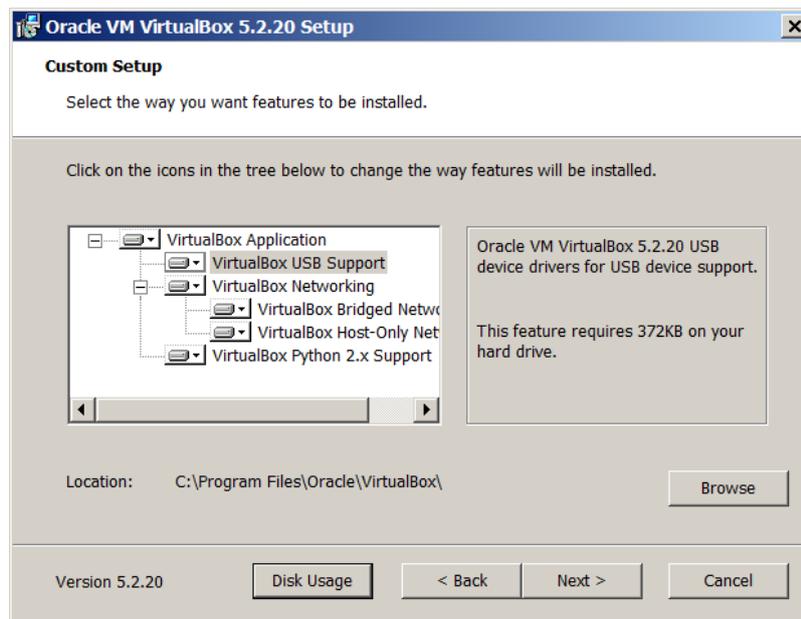


Figure 3. Default setup VirtualBox

On the next screen, choose your preferences for start menu and desktop shortcuts.

4.1.2 Installing Ubuntu Image

Download by clicking [Ubuntu images](#) or go to <https://www.osboxes.org/ubuntu/>

Recommended and verified Ubuntu version is Ubuntu 16.04.5 Xenial...UN Beaver (Final) or later should also work. Click on the VirtualBox image under selected image to start download. Be patient, download might take a while.

Unzip the Ubuntu Linux Machine to a local folder.

Open Virtualbox and create a new machine in *Expert mode*

In Hard disk, please select to Use an existing virtual hard disk file and select the downloaded Ubuntu Image.

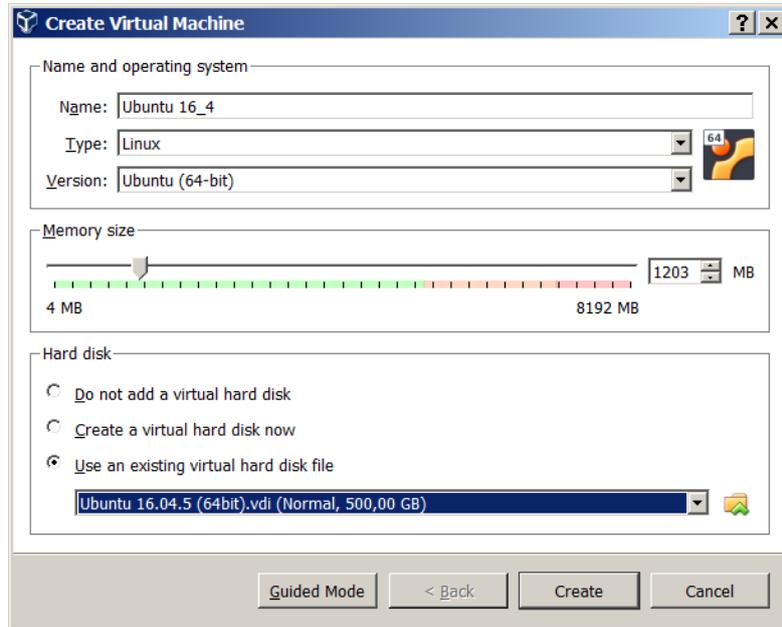


Figure 4. Memory setup virtual machine

When using VM image from osboxes.org, use the following login:

Username: osboxes

Password: osboxes.org.

4.2 Installing RIIoT Net Controller

The RIIoT Net Controller can be downloaded from www.radiocrafts.com

The easiest way is to unzip the RIIoT Net Controller package to a folder on your linux machine.

Open a terminal window, and navigate to the RIIoT Net Controller folder. Enter the folder for the architecture you are running on: 'x86-64' for PC, 'beaglebone' for BeagleBone Black.

Set the executable permission on the RIIoT Net Controller binary by running:

```
chmod +x ./riiot_net_controller
```

Before running the Net Controller, make sure to connect a RC1880-GPR module (e.g. development board) to the PC/gateway. If using VirtualBox, an extra step is needed to connect the USB port to the virtual machine by going to virtual machine's menu Devices->USB and check FTDI FT230X Basic UART. This give the virtual machine access to the USB device instead of Windows.

To start the net controller, run:

```
sudo ./riiot_net_controller
```

Verify from the terminal window that the RIIoT Net Controller starts successfully.

4.3 Beaglebone Black

Same as setting up on Linux PC. Use the binary for beaglebone black.

4.4 Sierra Wireless FX30

On the FX30, you can either choose to run the application in a sandbox as part of the Legato application framework, or you can run it like a regular Linux application outside the sandbox.

4.4.1 Running in a Legato sandbox

The instructions assume that you already have a Legato development environment setup on your PC.

If your FX30's legato version is 18.04, you can install the app on FX30 using the update file `'riiot_net_controller.wp85.update'`.

If your using a different Legato version, you can compile your own update package using the application definition file `'riiot_net_controller.adev'`.

4.4.2 Running outside the Legato sandbox

The steps are the same as running the application on a Linux PC. Copy the executable binary `riiot_net_controller` and configuration file `collector.cfg` to FX30, set the executable permission and run it.

5 Example Client applications

Two different Python client example are included to demonstrate the interface to the socket API.

- `python_client_demo` (Used with quick start development kit).
- `python_client_cli`.

To develop a user application please refer to the *RIIoT Net Controller Socket API Reference* for detailed information of the socket interface to the RIIoT Net Controller. The example applications covered here are examples of using the socket interface.

Keep the terminal window where RIIoT Net Controller is running. Start a second terminal window and go to the folder named `python_riiot_client_demo` or `python_riiot_client_cli`

Start the example application by running:

`python_riiot_client_demo.py` or `python_riiot_client_cli.py`

5.1.1 Development kit demo

The example application starts a network with default setting for the development kit.

- Channel = 23
- PAN-ID = 0xABCD
- Network is open for joining

The terminal window will show

- When devices join
 - o Reported temperature and humidity to the sensor boards included in the development kit.

5.1.2 CLI (Command Line Interface)

The application translates your CLI commands to the socket API of the RIIoT Net Controller.

Type your command after the prompt: `Enter Command:`

To get the version of RIIoT Net Controller:
`version`

To set the network configurations:
`config set frequencyBand=868 channel=15 panId=ABCD`

See the RIIoT Net Controller Socket API Guide for full list of configurations and permissible values.

To get the values of the configurations:
`config get frequencyBand channel panId`

To start a network as the coordinator:
`start`

To stop a network:
`stop`

To allow nodes to join:
`permitjoin true`

To allow nodes to join within 5 minute (300 seconds) window:
`permitjoin true 300`

To turn off the permission to join:
`permitjoin false`

To send a message to node 0001:
`send 0001 0A0B0C0D`

The application also prints out received notifications from RIIoT Net Controller like `nodeJoined` and `receivedMessage`. Please refer to the RIIoT Net Controller Socket API Guide.

Revision History

Revision	Date	Changes
0.5	June 28, 2018	Draft for alpha release
1.0	November 1, 2018	Added instructions for FX30, and example client application usage Updated Python CLI usage. Removed watermark for release. Guide on setting up virtual machine and running the demo

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