



RTLS Development Kit Quick Start Guide

Version 1.1

Abstract

This quick start guide shows the steps to quickly set up a simple RTLS demonstration system using the development kit.

Category: Public

Revision History

| Revision | Date | Author | Notes |
|----------|-----------|-------------------|---------------------------|
| 1.0 | 22-Sep-15 | Anton Shpakovskiy | |
| 1.1 | 05-Oct-15 | Chunjie Duan | add FCC and IC statements |



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1. Before the Demonstration

Opening the Box

The following items are included in a standard development kit:

- One (1) RTLS Base Station (RBS, also referred to as server)
- Two (2) Bridge nodes in black enclosure (Bridges)
- Six (6) Anchor/Mobile nodes in red enclosure (A/M nodes)
- Two (2) Bluetooth nodes in blue enclosure (BT nodes)
- One (1) Wi-Fi router
- Two (2) Power-over-Ethernet Injector (POE)
- Two (2) Ethernet cables
- One (1) USB flash drive with RBS recovery image
- One (1) USB flash drive with documentation and software



Figure 1 - From left to right, RBS, Bridge, F/M, and BT nodes.

The following accessories may also be included in the kit:

- USB charge station
- micro-USB cables
- POE power injector
- CAT5e patch cables
- Sensors cable



Please note that a custom built kit may have different content. Please verify the content with the quotation specifically tailored for you.



Charging Radio Nodes

All A/M nodes and BT nodes have built-in rechargeable batteries and can be charged via the micro-USB port. Before setting up the system, we recommend you fully charge all nodes. While a node is being charged, a green (or yellow) LED is on. The LED is turned off when full charge is reached.



Figure 2 – Radio node at charging

Installing Software

End User Console application is a client GUI software that allows you to manage the system and visualize the node location. The software can be found on the USB flash drive included in the kit. Install it on a Windows® computer by running *setup.exe*. The installer automatically creates an icon on your desktop. You will also find the program in the *Start* menu, under Redpoint Positioning



2. Setting up the Demonstration

Step 0: Finding a Space

You will need a space to set up the demo. The kit is pre-configured for a 10m x 10m area but such a space is not required. There is no specific requirement for the space. However, please be advised that an open space generally gives you better location accuracy. Also the geometry of the anchors affects the position accuracy. A long, narrow space may result in relative poor precision.

Step 1: Connecting RBS

- Power on the Wi-Fi router
- Connect the RBS to one of the router's LAN ports using an Ethernet cable (note, do not connect to the WAN port!)
- Power on the RBS by pressing the power button briefly
 - RBS is on when the blue LED is lit and the hard drive icon starts flashing
 - It takes about 30 seconds to 1 minute for all RBS services to start



Figure 3 - Connection of the RBS, a POE powered bridge to the Wi-Fi router

Step 3: Installing Anchors

Anchors refer to nodes that are in static, known locations. Bridge, A/M, or even BT nodes can all be used as anchors. Note that Anchor nodes and Fixed nodes are used interchangeably in some of Redpoint's documents.

You may find some radio nodes pre-labelled (e.g., SE, SW, NW, NE) in the kit. If the nodes are labelled, simply take 1 bridge, and 3 A/M nodes. You can physically label them for easy identification.

Figure 4 illustrates a setup using 4 anchors (including one bridge and multiple mobile nodes).

- Connect the bridge labeled (SE) to the router's LAN port
 - To power the bridge via POE, connect **Data In** port of the POE injector to one of the router's LAN ports and the **Data & Power Out** port to the bridge's LAN port.
 - To power the bridge via USB, connect a USB power source to the micro-USB port of the bridge. Connect the router's LAN port and the bridge's LAN port directly with an Ethernet cable.
- Power on the three A/M node labeled 'SW', 'NE', and 'NW'
 - You should see a red LED blink a few times at about 1Hz when a node is powered on.
- Mount anchors at the desired location and take notes of the MAC address and corresponding coordinates (in mm)
 - To minimize signal blockage, it is a good practice to mount anchors at elevated positions. The default setting is 2m above the ground.



- All radio nodes have linear polarized antenna and therefore it is recommended to mount them with the long side straight up or down (i.e., the RPP logo should be on the top or bottom). Mounting the device sideways will degrade the system performance.

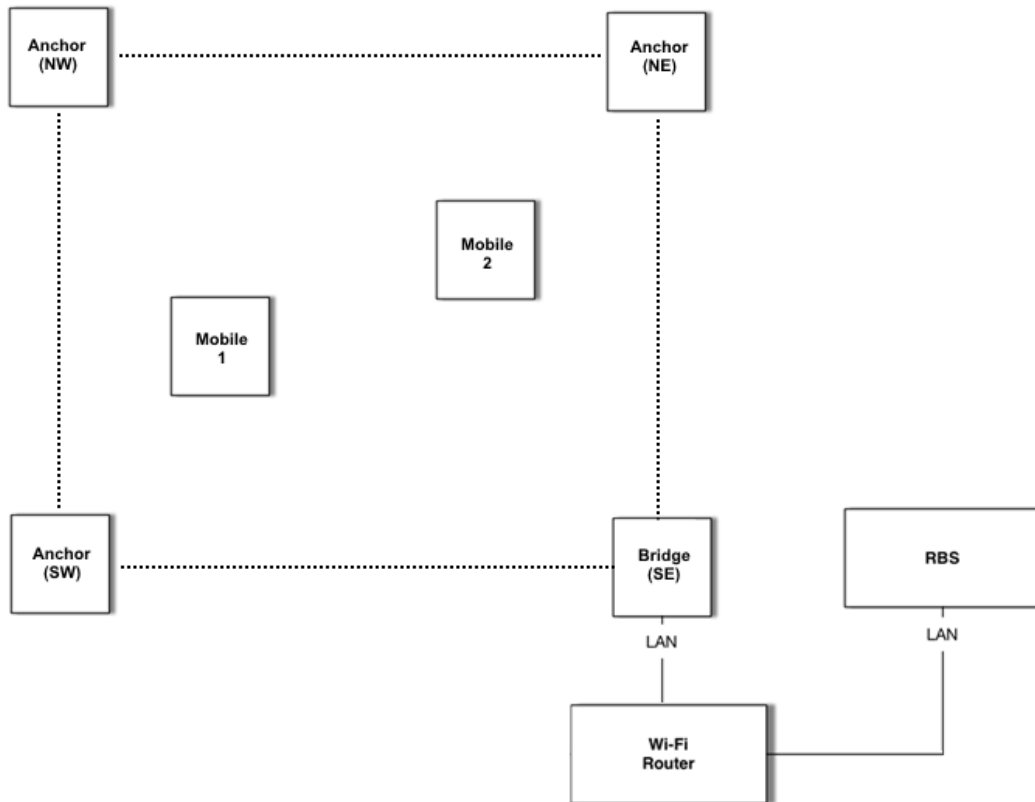


Figure 4 - Sample RTLS configuration

Step 4: Launching End User Console

- Wait for a minute or so to allow all nodes to join the network
- Connect the Windows computer to the Wi-Fi RTLS network
- Launch EndUserConsole program (EUC)
- If it's the first time to run this program, a *Welcome* screen will show up, follow the prompt to complete the setup
- If it's not the first time, click on + on the top of the left panel, then follow the prompts
 - When prompted to select a server selection method, click on **Automatic**
 - Once server IP address appears, highlight the IP address, then click **Add Selected Server**

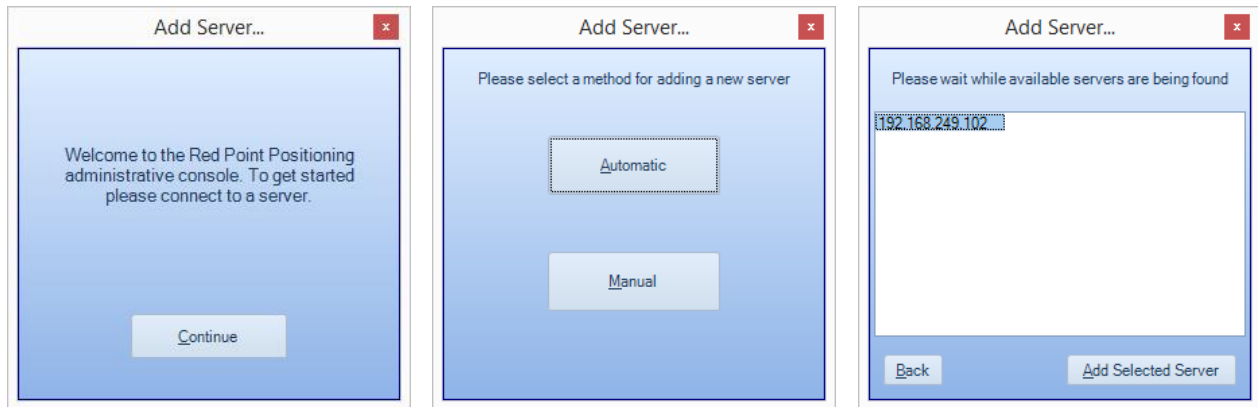


Figure 5 - EUC. Connecting to the server

Step 5: Setting Anchor Positions

- Four (4) anchors should appear in the Console, including one bridge, and three fixed nodes
 - If less than 4 anchors are shown in the list, wait for a few seconds and then click **Refresh**
 - Note that only the last 5 digits of the MAC address are displayed
- Anchor nodes have to be Bridge or Fixed types. The type of a node can be changed by double clicking on it
- Verify anchor locations. If the locations are incorrect,
 - 1) manually enter the new locations
 - 2) click **Save** to push the new anchor locations to the server
 - 3) click on **Refresh** to update the screen

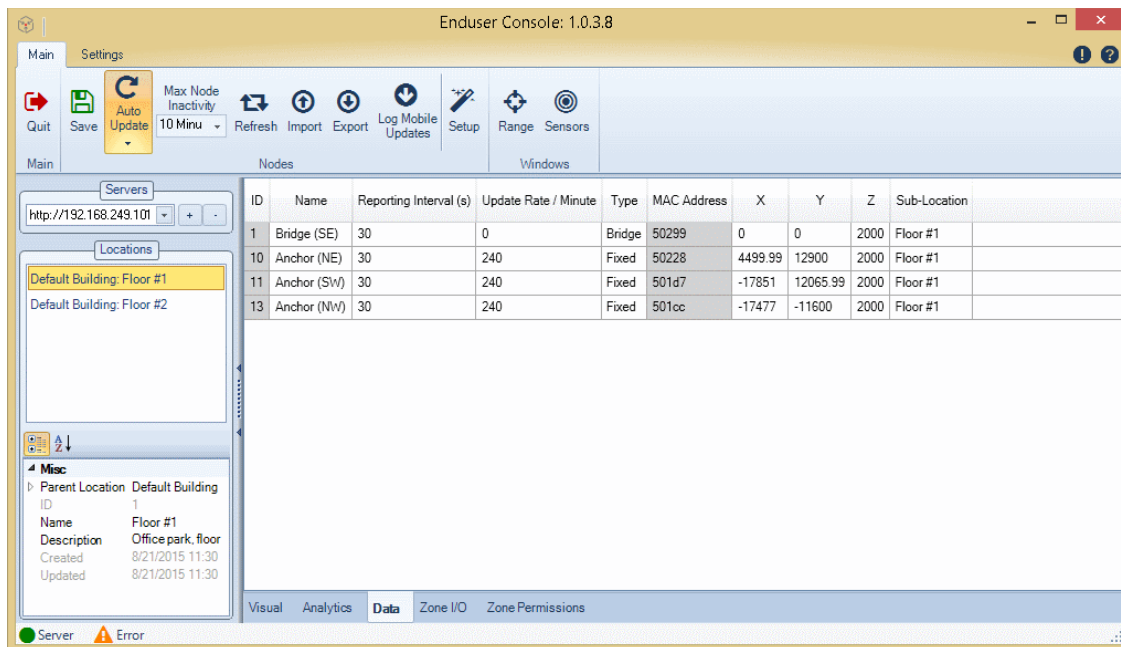


Figure 6 – EUC. Bridge with anchor nodes



By default, only a subset of node attributes are displayed in the data tab. To view other information of the nodes, put the mouse over the title area and right click. A list of properties will show up in a pop-up window, check the box next to the attribute you would like to view.

Step 6: Adding Mobile Nodes

- Power on one or more of the other nodes in the kit
- Wait for 10 seconds, click **Refresh** to refresh the screen
- All nodes in the kit should be pre-configured as *Navigation* node already. By default, their positions are updating at 2Hz.
- If some nodes are listed as *Anonymous*, change the node type to *Mobile*. Once the changes are saved, node positions will start updating. You may need to click on **Refresh** to refresh the list
- A node joins the server for the first time is assigned as *Anonymous*.

| ID | Name | Reporting Interval (s) | Update Rate / Minute | Type | Software Version | MAC Address | X | Y | Z | Sub-Location |
|----|----------------------------------|------------------------|----------------------|------------|------------------|-------------|-------|-------|------|--------------|
| 1 | Bridge (SE) | 30 | 0 | Bridge | 423849c5 | 50299 | 3281 | -1790 | 2000 | Floor #1 |
| 10 | Anchor (NE) | 30 | 240 | Fixed | dc3aeb25 | 50228 | 637 | 2212 | 2000 | Floor #1 |
| 11 | Anchor (SW) | 30 | 240 | Fixed | 6ed32d40 | 501d7 | 14229 | -1790 | 2000 | Floor #1 |
| 13 | Anchor (NW) | 30 | 240 | Fixed | dc3aeb25 | 501cc | 9740 | 5099 | 2000 | Floor #1 |
| 15 | Mobile - 1 | 30 | 240 | Mobile | dc3aeb25 | 50257 | 10437 | -3636 | 1008 | Floor #1 |
| 16 | Mobile - 2 | 30 | 240 | Mobile | dc3aeb25 | 502b1 | 10362 | -472 | 1008 | Floor #1 |
| 17 | Autogenerated anon node A5.02.A5 | 10 | 0 | Anonymous | dc3aeb25 | 502a5 | -1 | -1 | 1008 | Floor #1 |
| 18 | Mobile - BT1 | 30 | 240 | Navigation | 6ed32d40 | 5011d | 5072 | 6912 | 1008 | Floor #1 |

Figure 7 – EUC. Bridge, anchors, and mobile nodes

Step 6: Visualizing Node Locations

- Click on the **Visual** tab
- All nodes that have joined the network are displayed on the screen
- Use the sliding bar on the left of the image to zoom, use the rotation buttons to rotate the display
- From the panel on the right, assign colors for different node types if you wish
- Select the background
 - You can insert a layout in the background if it is available as an image file. You may need to manually adjust the scale, origin and orientation of the image

For using the EUC's advanced features, please refer to the complete *End User Console User Guide*.



This COMPLETE the demo setup, you should be able to walk around with the mobile nodes and observe the locations updated on the screen now.

3. After the Demonstration

- Power off all the nodes and remove them from their mounting locations
- Press the **Power** button of the RBS briefly and wait for the RBS to shut down
 - A forced power off or unexpected power loss may corrupt the RBS software, therefore
 - **Do NOT** hold the power button down
 - **Do NOT** unplug the power before the RBS is completely shut down
- Disconnect the Wi-Fi router and other devices

Recharge the radio nodes, if necessary

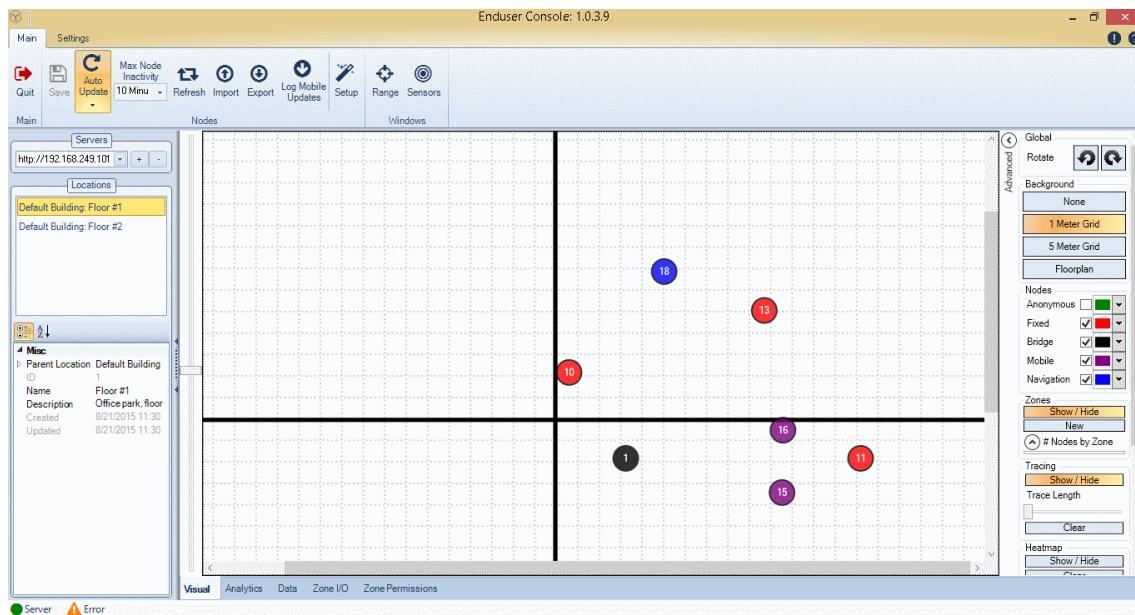


Figure 8 – EUC. Visual tab view

4. Regulatory Compliance

4.1. European Union

This equipment complies with the European Union Telecommunications Standard ETSI EN 302 065-2 V1.1.1 (2014-04) for Ultra-Wideband Transmission Systems.

Cet équipement est conforme avec l'Union européenne sur les télécommunications norme ETSI EN 302 065-2 V1.1.1 (2014-04) pour Ultra-Wideband Transmission Systems



4.2. United States of America

This equipment complies with the FCC Rules Part 15, subpart F section 517 and Part C section 250 for Ultra-Wideband and Broadband devices respectively.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

4.3. Canada

The device RPP-XRN-V4 is licensed to meet Industry Canada (IC) Radio Standards Specification RS-220 Issue 1, March 2009, Devices Using Ultra-Wideband (UWB) Technology. In particular,

- (1) Section 5.2: Ultra-Wideband indoor communication devices; and
- (2) Section 5.3: Ultra-Wideband hand-held communication devices



This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) The device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

le dispositif RPP-XRN-V4 est autorisé pour répondre à Industrie Canada (IC) les normes radioélectriques RS-220 Issue 1, Mars 2009, des dispositifs utilisant ultra-wideband (UWB). En particulier,

- (1) L'article 5.2: bande ultra-large de dispositifs de communication à l'intérieur; et
- (2) L'article 5.3: Ultra-Wideband appareils de communication portatifs

Cet appareil est conforme aux CNR exempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) Le dispositif ne doit pas causer d'interférences; et
- (2) Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent entraîner un mauvais fonctionnement de l'appareil.

5. Contact Us

Contact us directly for support:

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