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RN-T7-TAG-UG

# **RN-T7-TAG User's Guide**

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## Preface

### INTRODUCTION

This preface contains general information that will be useful to know before using the RN-T7-TAG asset tracking tag. Topics discussed in this preface include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [Document Revision History](#)

### DOCUMENT LAYOUT

This user's guide provides information for configuring Roving Networks WiFly modules, including a command reference, advanced features, and applications. The document is organized as follows:

- **Chapter 1. "Introduction"** – This chapter introduces the RN-T7-TAG module and provides an overview of Real Time Location Systems (RTLS).
- **Chapter 2. "Getting Started"** – This chapter describes how to configure the RN-T7-TAG module.

### CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

#### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File&gt;Save</i></u>
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
<b>Courier New font:</b>		



## DOCUMENTATION CONVENTIONS

Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets [ ]	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly braces and pipe character: {   }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

## RECOMMENDED READING

This user's guide describes how to configure the RN-131 and RN-171 modules. The module-specific data sheets contain current information on the module specifications. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources:

### **RN171 802.11 b/g Wireless LAN Module Data Sheet**

This data sheet provides detailed specifications for the RN171 module.

### **WiFly Command Reference, Advanced Features & Applications User's Guide**

This user's guide describes how to configure the RN131 and RN171 modules and provides details on the ASCII commands used for configuration. It also provides information on advanced features and applications.

To obtain any of these documents, visit the Microchip web site at [www.microchip.com](http://www.microchip.com).

## DOCUMENT REVISION HISTORY

### **Version 0.07 (December 2012)**

Updated introduction, screen shots, and tag usage.

# Chapter 1. Introduction

## 1.1 WHAT IS RTLS?

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Real Time Location Systems (RTLS) identify and track the location of objects (assets) or people in real time within a building or a confined area (such as basement storage) where GPS coverage is not available. Wireless RTLS tags are attached to assets or worn by people, and their location is determined by calculating the distance from fixed reference points using wireless signals.

RTLS reference points can either be transmitters or receivers, and are installed throughout the building to provide the desired coverage area for the asset. Typically, as you install more RTLS reference points you more accurately determine the asset's location.

## 1.2 FINDING THE ASSET'S LOCATION

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In a typical use case, asset tags transmit a wireless signal containing the tag's ID in response to a stimulus (sensors, programmable timer, etc.). The reference points in the tag's range receive the wireless signal. These reference points relay the signal strength and/or time difference of arrival (TDoA) information to a central system that runs specialized software to compute the tag's location.

RTLS location accuracy depends on the technology used (hardware and software) for its implementation. Two common methods to determine a tag's location are:

- **Choke points**—In this method, fixed reference points in a network receive short range wireless ID signals from a mobile tag to determine the tag's location. The tag's transmitted ID typically contains a unique serial number. The range of the reference points (such as magnetic exciters or choke point transmitter/receiver) and directional antennas define the system's accuracy. A user can find the tag's location at any time between any two reference points. This system is ideal for tracking assets in a production assembly line. Similarly, by mounting reference points on doorways, it can track when an asset leaves a particular room.
- **Relative coordinates**—In this implementation, a number of reference points in a network receive the tag's wireless ID signals. The system estimates the tag's position using one or more location algorithms such as triangulation. Alternatively, the tag receives wireless ID signals from several reference points and relays this information to a central location processor (also known as a location engine). The location engine estimates the tag's location based on the fixed location and the reference points's signal strength. Using this method, the system can estimate the tag's location in a particular room or area of a warehouse.

## 1.3 RTLS APPLICATIONS

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RTLS is used in numerous logistical and operational areas such as:

- Locating high-value assets such as medicines in a medical cart in a hospital.
- Providing a security alert if a medical cart has wrongly left the premises.
- To ensure proper staffing levels of an operational area, such as distributing guards appropriately in a high-security location.

- To account for all staff working in hostile conditions such as mining operations or during an emergency evacuation procedure.
- To track and timestamp the progress of people or assets through a process, for example, tracking a patient's hospital visit (time spent in ER, time spent in operation theater, time spent in recovery, and total time to discharge). Such a system can be used for process improvement.

## 1.4 USING WI-FI FOR RTLS

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The first RTLS systems generally used the unlicensed spectrum (408, 433, 900 MHz, etc.) for a wireless tag-to-reader interface. This technology required additional proprietary reference point hardware (readers) infrastructure to communicate. Because of the ratification and subsequent success of IEEE 802.11, a new group of systems emerged to standardize Wi-Fi usage. Newer RTLS use tag-to-access point air interface and can communicate with 802.11-capable access points (APs) directly, leveraging the existing Wi-Fi infrastructure. There are three major technological concepts that divide RTLS to determine the client location:

- Nearest AP
- Time Difference on Arrival (TDoA)
- Received Signal Strength Indicator (RSSI)

### 1.4.1 Nearest AP

Nearest AP is used for environments in which detecting the presence of an asset within an area is sufficient. A single AP detects tags and Wi-Fi devices. Examples include automated inventory counts and locating inventory by the “zone” in which it is located.

- **Pros**—Simple to implement and use.
- **Cons**—Location accuracy.

### 1.4.2 TDoA

This method uses the length of time it takes for a wireless packet to travel from a transmitting device to a receiving device. Using Wi-Fi, the client sends out a time-stamped packet, which is received by the APs. Knowing the sent and received time difference, the system calculates the distance between the AP and the client. With at least three visible access points, the system can estimate the client's location.

Indoors, TDoA location accuracy suffers from multipath problems caused by signals reflecting on obstacles. These reflections make it difficult to distinguish the original correct signal from the reflected signals. Additionally, with TDoA, the APs and tags must be specially designed to measure the time difference.

- **Pros**—Provides better location accuracy than nearest AP.
- **Cons**—Suffers from multipath signals.

### 1.4.3 RSSI

In this implementation, the client device measures the signal strength of the APs and sends the RSSI reading to a server. The server can calculate the client's location if at least three values can be measured.

RSSI suffers from variable signal strength if objects are in the path between the tag and reference points. Additionally, using RSSI for computing location typically involves a location survey when installing reference points (APs). If the tag computes the RSSI level, it must scan for APs, which requires more energy and depletes battery life.

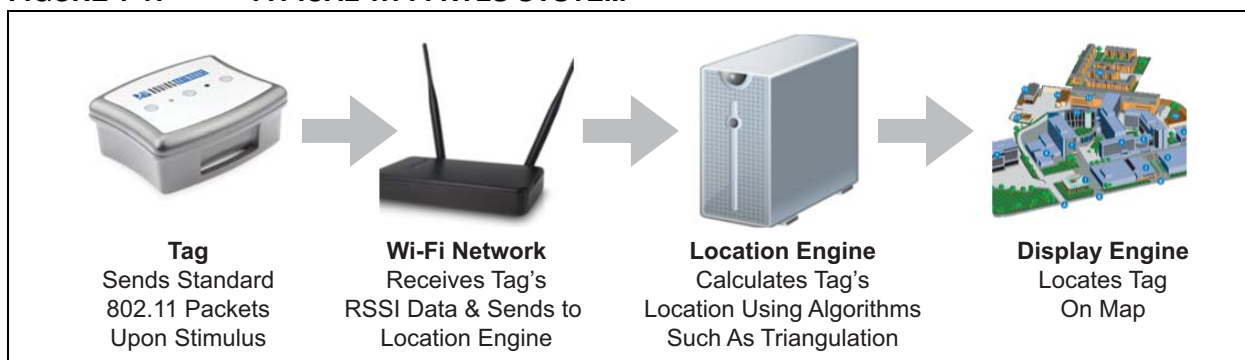
- **Pros**—Provides better accuracy than nearest AP and TDoA.
- **Cons**—Requires complex location algorithms to compute the asset's location.

Pairing the proper technology to the correct environment leads to improved performance and reduced development costs. For example, you can combine RSSI with fingerprinting: several positions are calibrated so that the engine can refine its calculations with triangulation.

## 1.5 HOW DOES WI-FI RTLS WORK?

Figure 1-1 shows a typical Wi-Fi RTLS system.

**FIGURE 1-1: TYPICAL WI-FI RTLS SYSTEM**



The system has the following components:

- **Tags**—You attach these battery powered devices to mobile assets to track them. The tags transmit a few 802.11 (Wi-Fi) packets periodically or upon external triggers such as a button press, motion sensor, etc. The transmitted packet data includes RSSI readings of all APs the tag finds during a scan. This data is time stamped and sent to the Wi-Fi network. The tag can also send additional data such as the tag ID, real-time clock value (for time stamping data), and sensor readings, such as temperature, humidity, etc.
- **Wi-Fi network**—The Wi-Fi network uses standard APs, which can be from various manufacturers. You install the APs at known fixed locations and broadcast a wireless network Service Set Identifier (SSID). When the tag scans for APs, it finds the SSID of the APs in its vicinity. The tag creates a Wi-Fi packet from this RSSI data and sends it to the network. The network is connected to a central location engine at the back end and forwards this data to it.



- **Location engine**—The location engine receives the data sent by the tags via the Wi-Fi network. It run specialized location algorithms, such as triangulation, based on RSSI levels to locate the tag.
- **Display engine**—The display engine uses information from the location engine to map the tag's real-time location, handle alerts, and create reports.

## 1.6 ROVING NETWORKS RN-T7-TAG

The Roving Networks RN-T7-TAG is a small, battery-powered wireless device for building RTLS based asset tracking systems. It uses a standard 802.11 b/g Wi-Fi network to track assets using customer-developed or third-party location engines. The RN-T7-TAG is a reference design to help designers get started implementing a RTLS solution.

The RN-T7-TAG is based on Roving Networks ultra-low-power RN171 Wi-Fi module. The tag's low-power hardware and specialized WebScan firmware—coupled with a range of sensors such as motion sensor, pushbuttons, and a Reed switch—makes it possible to achieve multi-year battery life.

The uniquely shaped IP67 case is dustproof and waterproof and can be mounted easily on a variety of assets. The tag contains three pushbuttons to send alarms for different events. Two multi-colored LEDs provide the tag's status visually. The tag also contains an on-board temperature sensor. [Figure 1-2](#) shows the tag.

**FIGURE 1-2: RN-T7-TAG**

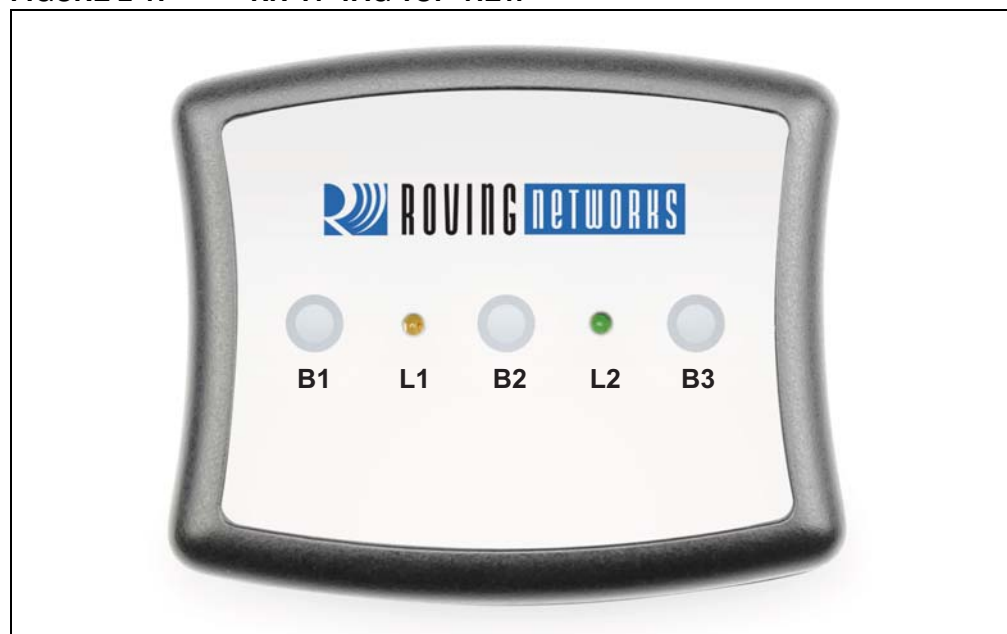


## Chapter 2. Getting Started

### 2.1 ACTIVATE THE TAG

The RN-T7-TAG ships with a CR-123 battery installed. To activate the tag, pull the plastic on the upper right corner of the tag so that the battery makes contact. The tag contains three push buttons and two multicolor LEDs. You use the pushbuttons to invoke different features; the LEDs indicate the tag's status. [Figure 2-1](#) shows the top view of the tag with labels called out for the pushbuttons and LEDs. [Table 2-1](#) and [Table 2-2](#) describe the pushbuttons and LED status, respectively.

**FIGURE 2-1: RN-T7-TAG TOP VIEW**



**TABLE 2-1: PUSHBUTTON ACTIONS**

Button Press	Duration (seconds)	Description
Black (B1), blue (B2), or white (B3)	1	Wakes the tag to associate it with an already stored network.
Black (B1) and white (B3) together	5	Creates a soft AP mode network to provision the tag.

**TABLE 2-2: MULTI-COLOR LED STATUS**

LED	Blink Color	Status
L1	Red	Not associated with a network.
L2	Green	Associated with a network.
L1 and L2 alternating	Red	Soft AP mode network created.
L1 and L2 alternating	Green	Client device connected to soft AP network.

Press either the black (B1) or white (B3) pushbutton to wake the tag up from sleep. The left LED (L1) flashes red for 10 seconds. During this time, the tag attempts to associate with the network defined in the factory default settings. Because the tag cannot find that network in your environment, it tries to associate for 10 seconds and then goes back to sleep to conserve battery power. The following sections describe how to configure the tag for your wireless network.

## 2.2 USING YOUR RN-T7-TAG

This section describes how to use the tag to send RSSI data to a central server. In this scenario, your AP serves as a fixed reference point, the Roving Networks web server located at [www.rovingnetworks.com](http://www.rovingnetworks.com) serves as the location engine, and your computer's web browser serves as the display engine.

You use the following steps for this process:

1. Configure the tag to join your wireless network.
2. The tag sends the RSSI data to the location engine (in this case, to the Roving Networks web server).
3. You browse Roving Networks' web site and view the RTLS data.

**Note:** By default, the tag sends RTLS data to Roving Networks test web site. You can view the RTLS data by going to the web site and entering your tag's MAC address.

### 2.2.1 Configure the Tag to Join your Wireless Network

You perform these steps to configure the tag to associate with an AP in infrastructure mode:

1. Put the tag in soft AP mode, which enables the tag's configuration web server.
2. Connect your client device (PC, smartphone, tablet, etc.) to the tag's soft AP network.
3. Access the tag's configuration web page from your client device's web browser.
4. Save the settings (SSID and passphrase) to the tag and exit.

#### 2.2.1.1 PUT THE TAG IN SOFT AP MODE

To put the tag in soft AP mode and invoke the tag's configuration web server, press and hold the B1 and B3 pushbuttons simultaneously for five seconds. The LEDs blink red alternately, indicating that the web server is running.

The tag creates a network with the settings shown in [Table 2-1](#).

**TABLE 2-1: SOFT AP MODE NETWORK SETTINGS**

Setting	Soft AP Mode Default
SSID	T7-TAG-XX:YYwhere XX:YY are the last two bytes of the tag's MAC address
Channel	1
DHCP server	Enabled
IP address	1.2.3.4
Netmask	255.255.255.0
Gateway	1.2.3.4

### 2.2.1.2 USE THE WEB SERVER TO CONFIGURE THE TAG

In this section you use the web server to configure the tag with the AP's SSID and passphrase. The example uses the Internet Explorer web browser running on a Windows 7 machine, however, the same concepts apply to any device with a Wi-Fi interface (e.g., iPhone, Android smartphones, tablets, or PCs,) running a web browser (e.g, Chrome, Firefox, or Safari).

To configure the tag using a web browser, perform the following steps:

1. Associate your PC to the tag's AP network. [Figure 2-2](#) shows a screen shot displaying the network name. In this example the tag's SSID is T7-TAG-57:a5.

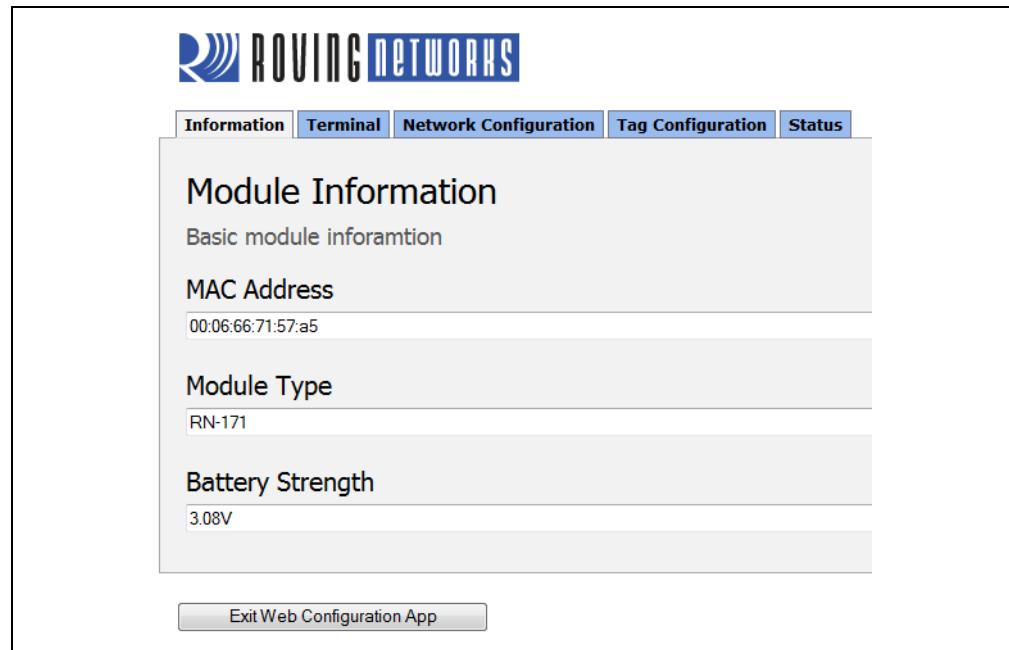
**FIGURE 2-2: ASSOCIATE PC WITH TAG'S AP NETWORK**



2. Launch your web browser.
3. Type in <http://tag> to launch the tag's configuration page. The page has 5 tabs:
  - **Information**—Displays information about the tag's WiFly module.
  - **Terminal**—Used to configure the tag's WiFly module via ASCII commands.
  - **Network Configuration**—Used to set the AP's SSID and passphrase.
  - **Tag Configuration**—Used to change tag ID and host server name, and enable CCX.
  - **Status**—Used to display graphs for temperature and reason for waking.
4. Click the **Information** tab (see [Figure 2-3](#)). In this tab you configure the tag's basic parameters and view information about the module, including:
  - Tag's MAC address (note the tag's MAC address, you need it in a later step).
  - Module type (RN131 or RN171).
  - Battery strength.

**Note:** You need the MAC address to view your tag's sent RTLS data on the Roving Networks website.

FIGURE 2-3: INFORMATION TAB



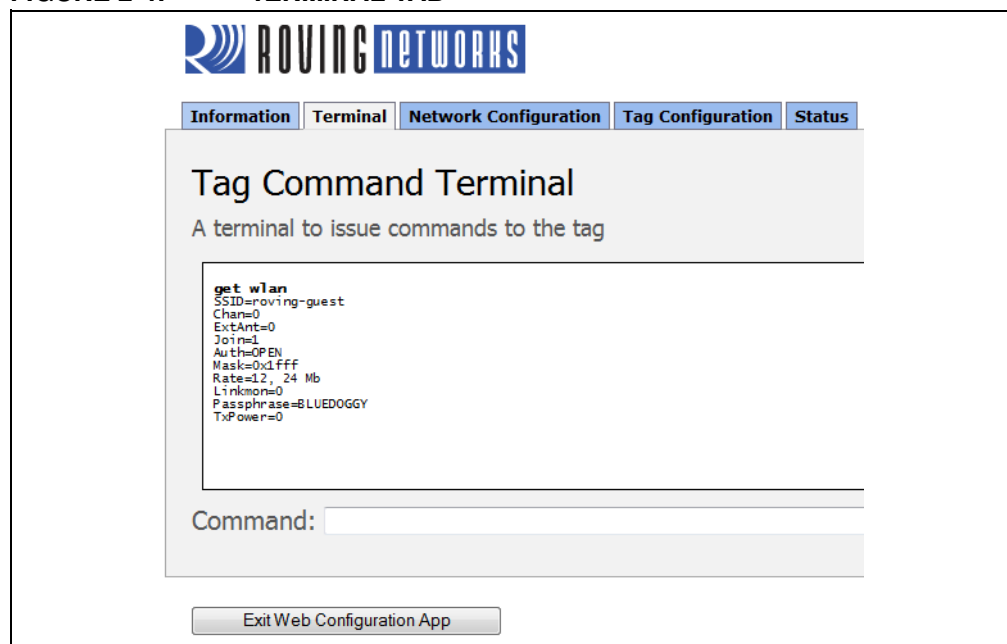
5. Click the **Terminal** tab (see [Figure 2-4](#)). In this tab you issue ASCII commands to configure the WiFly module's parameters.

**Note:** The web server includes a help utility to guide you through the module's configuration. To use help, type `help` in the terminal.

For detailed information on the commands used to configure the module, refer to the [WiFly Command Reference, Advanced Features & Applications User's Guide](#), which is available on the Roving Networks web site.



FIGURE 2-4: TERMINAL TAB



6. Click the **Network Configuration** tab (see Figure 2-5). In this tab you configure the tag's network settings (SSID and passphrase). Configure these settings using the following steps:
  - a. Enter your network's SSID in the **Access Point SSID** box.

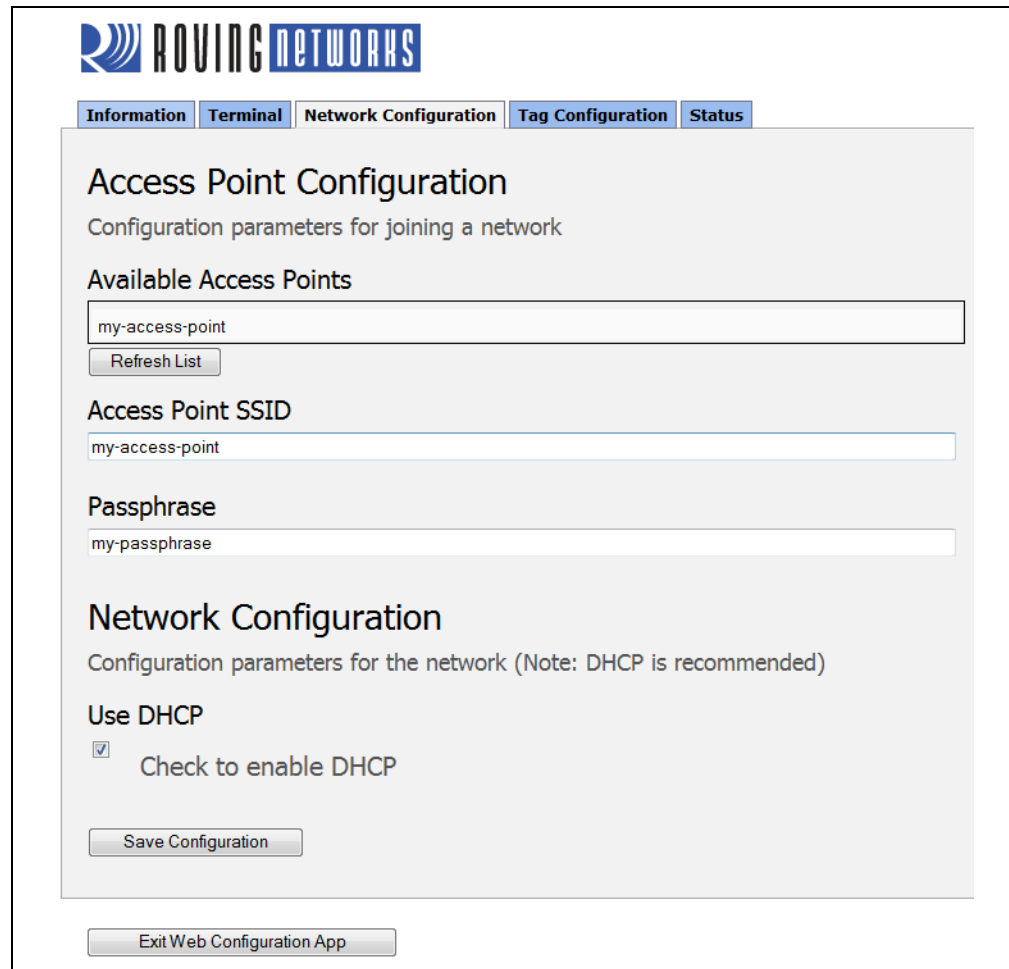
Alternatively, click the Refresh button. The tag's scans for networks and displays a list of found networks. Select your network from the **Available Access Points** list or type it in the **Access Point SSID** box. Clicking an SSID displays a drop-down menu with more information about that network, such as channel, RSSI, security mode (WEP, WPA, WPA2), capabilities, WAP configurations, WPS configuration, and the AP's MAC address (also called BSSID).

If you do not see your desired access point in the list, click **Refresh List** to scan again.

**Note:** If your wireless network is hidden (i.e., not broadcasting an SSID), it does not display in the scan output. In this case, you must manually enter the SSID.

- b. Type your AP's security passphrase in the **Passphrase** box.
  - c. (Optional) The module uses DHCP by default. If you want to assign the module a static IP, turn off the **Use DHCP** option and enter the static IP, subnet mask, and gateway.
  - d. Once you have configured the network settings, click **Save Configuration** to save the settings to the module.
  - e. Exit the web server by clicking **Exit Web Configuration App**. The tag reboots in infrastructure mode and joins your wireless network.

FIGURE 2-5: NETWORK CONFIGURATION TAB



The screenshot shows the Roving Networks web interface. At the top is the Roving Networks logo. Below it are five tabs: Information, Terminal, Network Configuration (selected), Tag Configuration, and Status. The main content area is titled 'Access Point Configuration' with the subtitle 'Configuration parameters for joining a network'. It contains three input fields: 'Available Access Points' (containing 'my-access-point'), 'Access Point SSID' (containing 'my-access-point'), and 'Passphrase' (containing 'my-passphrase'). There is a 'Refresh List' button below the first field. Below the input fields is a section titled 'Network Configuration' with the subtitle 'Configuration parameters for the network (Note: DHCP is recommended)'. It includes a 'Use DHCP' section with a checked checkbox and the text 'Check to enable DHCP'. At the bottom of this section is a 'Save Configuration' button. At the very bottom of the interface is an 'Exit Web Configuration App' button.

When you click the **Tag Configuration** tab (see [Figure 2-6](#)), the tag displays the configuration parameters to trigger the module to sleep or wake. You can also enable the CCX protocol to send out CCX blinks for CCX-based infrastructures. The fields that you can customize are:

- **Tag ID**—Sets the tag's device ID. The tag uses this parameter to create the soft AP network. If you change this parameter, the tag uses the new string to create the SSID for the soft AP network that is invoked when you press B1 and B3 buttons.
- **Wake-Up Functions**—Use these functions to enable or disable waking the tag when you press the pushbuttons or when the motion sensor triggers.
- **Sleep Time**—This setting is the time in seconds after which the tag wakes from sleep to scan for APs and report their RSSI values back to the location engine.
- **Host Server**—This setting is the server (typically the location engine) to which the tag sends the RSSI information. The tag is pre-programmed to connect to the Roving Networks server. To connect to your server, enter its URL or IP address.

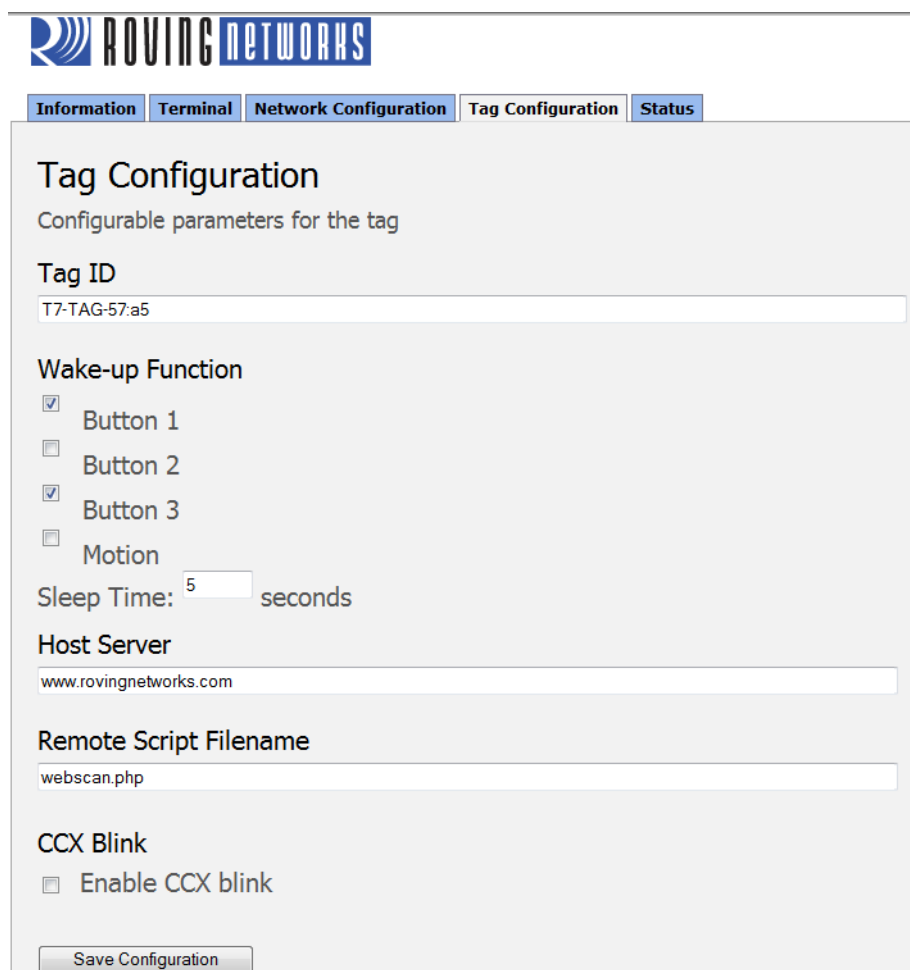
- **Remote Script Filename**—This parameter specifies the server script to which you want to send data. The default is the **webscan.php** script running on the Roving Networks web site.

**Note:** You use the **Host Server** and **Remote Script Filename** options together to contact the web server. When these parameters are set to the defaults, the tag sends data to [www.rovingnetworks.com/webscan.php](http://www.rovingnetworks.com/webscan.php).

- **CCX Blink**—This parameter enables and disables CCX blinks (they are disabled by default). When you turn on this option, you can configure CCX-specific parameters, such as blink count, transmit power, and transmission rate.

When you click the **Status** tab, the system displays a real-time temperature graph. It also graphically displays which method wakes the tag up.

**FIGURE 2-6: TAG CONFIGURATION TAB**



**Tag Configuration**

Configurable parameters for the tag

**Tag ID**

T7-TAG-57:a5

**Wake-up Function**

☒ Button 1

☐ Button 2

☒ Button 3

☐ Motion

**Sleep Time:** 5 seconds

**Host Server**

www.rovingnetworks.com

**Remote Script Filename**

webscan.php

**CCX Blink**

☐ Enable CCX blink

**Save Configuration**

## 2.2.2 View RSSI Data Tag Sends to the Location Engine

After you configure the tag, it scans for APs and sends the RSSI values to the location engine server. With the default settings, it sends the RSSI readings to the Roving Networks web site.

The tag sends the data to the web server as a HTTP message use key/value pairs. The web server parses the RTLS data based upon these key/value pairs.

The HTTP message has the following parameters:

id	mac	bss	rtc	bat	io	wake	seq	tmp	cnt	data
----	-----	-----	-----	-----	----	------	-----	-----	-----	------

Below is an example HTTP message. [Table 2-2](#) describes the message parameters.

```
GET/webscan.php?id=T7TAG5a:65&mac=00:06:66:71:5a:65&bss=00:26:f2:4f:89:d6&rtc=10e&bat=3046&io=2c83&wake=4&seq=1&tmp=82.774&cnt=9&data=744401469483,3,-48,-48|000666804454,3,-62|00223F6B9542,3,-63,-62|CA783FBFFFFFF,6,-73|0016B6456398,11,-72,-70,-68|D8C7C8AAE7A0,6,-71|D8C7C8AAE7A1,6,-70|0026F24F89D6,6,-73,-74|CA783FBF89D6,6,-74
```

**TABLE 2-2: HTTP MESSAGE PARAMETERS (PART 1 OF 2)**

Parameter	Key/Value	Format	Description	Example
Tag ID	id	String	Tag's device ID configured using a web browser. The default is T7-TAG-XX:YY where XX:YY are the last two bytes of the tag's MAC address.	T7TAG5a:65
Tag's MAC address	mac	aa:bb:cc:dd:ee	Tag's MAC address.	00:06:66:80:e3:7b
Associated AP's MAC (BSSID)	bss	aa:bb:cc:dd:ee	MAC address of the AP with which the tag is associated.	00:26:f2:4f:89:d6
Real-Time Clock	rtc	Hex value	Real-time clock value. The number of seconds that have expired since batteries were installed or a hard reboot occurred.	10e
Battery Voltage	bat	Number	Battery voltage in millivolts.	3046
GPIO Status	io	Hex value	Two ASCII hex bytes representing the GPIO status.	2c83
Wake Reason	wake	Hex value	Wake-up register value: 1 Sensor 0 2 Sensor 1 4 Sensor 2 8 Sensor 3 1000 Sleep timer 4000 Choke point	4
Sequence Number	seq	Hex value	Number of HTTP posts sent.	1
Temperature	tmp	Temperature	Tag's temperature in Fahrenheit.	82.774
Count	cnt	Hex value	Number of APs found when scanning.	9

**TABLE 2-2: HTTP MESSAGE PARAMETERS (PART 2 OF 2)**

Parameter	Key/Value	Format	Description	Example
RTLS Data	data	String	<p>RSSI readings of APs found. Multiple APs are separated by a pipe character ( ). The format is:</p> <p>AP MAC address, channel, RSSI, RSSI AP MAC address, channel, RSSI, RSSI <a href="#">Note 1</a></p>	744401469483,3,-48,- 48 000666804454,3,- 62 00223F6B9542,3,- 63,62 CA783FBFFFFF,6,- 73 0016B6456398,11,-72,-70,- 68 D8C7C8AAE7A0,6,- 71 D8C7C8AAE7A1,6,- 70 0026F24F89D6,6,-73,- 74 CA783FBF89D6,6,-74

**Note 1:** A tag can report multiple RSSI readings for each AP it finds because the AP can reply to the tag with multiple probe responses. These readings are comma separated, allowing the location engine (web server) to parse them easily.

### 2.2.3 View Tag's RTLS Data on Roving Networks Web Site

You can view the tag's sent RTLS data on the Wi-Fi Technology page on the Roving Networks web site at [rovingnetworks.com/WebScan](http://rovingnetworks.com/WebScan). To view the data:

1. In a web browser, go to [rovingnetworks.com/WebScan](http://rovingnetworks.com/WebScan).
2. Click the link **CLICK HERE TO VIEW LIVE DATA**.
3. Enter your tag's MAC address.
4. Click **Show Results**.

**Note:** You can find the tag's MAC address in the configuration web server's **Information** tab.

The web site displays the tag's RTLS data as shown in [Figure 2-6](#). Click the **Refresh** button to see the most recent data. Scroll down in the browser window to see the RTLS data history.



**FIGURE 2-7: EXAMPLE RTLS DATA SENT BY TAG**

### TECHNOLOGY

- Technology Overview
- Bluetooth Technology
  - Smart Phones
    - Apple iOS Support
    - Android Support
  - Profiles
    - HID
    - SPP
    - iAP
    - Other Profiles
- Wi-Fi Technology
  - Software
    - WebScan
    - WiFly
  - Technology
    - WPS

**Contact:**  
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Contact Roving Networks:  
Select One

## WebScan

### WebScan Results

1 IDs reported over last 24 hours

Enter your TAG's MAC address: (Example of format: 00:06:66:80:e3:7b)

00:06:66:71:57:a5
SHOW RESULTS
Refresh

#### RECEIVING PACKAGE

Frame Control	Duration ID	Address 1	Address 2	Address 3	Sequence Control	Address 4	PAYLOAD	FCS
<div> <div>TIME</div> <div>Date: 12/21/12, Time: 11:56:16</div> </div> <div> <div>DEVICE_ID</div> <div>T7-TAG-57:a5</div> </div> <div> <div>MAC</div> <div>00:06:66:71:57:a5</div> </div> <div> <div>BSSID</div> <div>00:26:f2:4f:89:d6</div> </div> <div> <div>RTC</div> <div>279a6</div> </div> <div> <div>BAT</div> <div>3008</div> </div> <div> <div>GPIO_STATUS</div> <div>d82</div> </div> <div> <div>WAKE_REASON</div> <div>1000 (Sleep Timer)</div> </div> <div> <div>SEQ</div> <div>f6a</div> </div> <div> <div>TMP</div> <div>74.897</div> </div> <div> <div>COUNT</div> <div>b</div> </div> <div> <div>DATA</div> <div>001EE5488C1D,6,-71,-72 D8C7C8AAE7A0,6,-60,-60,-62 D8C7C8AAE7A1,6,-62,-62,-61 D8C7C8AAE7A2,6,-62,-61,-62 0026F24F89D6,6,-60,-76,-58 0016B6456398,11,-53,-56,-53 001802707EE8,11,-76,-75,-75 00223F6B9542,1,-62,-62 4CE67651EC84,1,-71,-71 841B5E625710,11,-80 014D1AF120C,11,-63,-61</div> </div> <div> <div>CHOKE_POINT</div> <div>0</div> </div>								

## 2.3 CONFIGURING THE TAG TO SEND DATA TO YOUR LOCATION ENGINE

After you have set up your location engine, you can configure the tag to send RTLS data to it using the following steps:

1. Put the tag into soft AP mode as described in [“Put the Tag in Soft AP Mode” on page 12](#).
2. Use a web browser to connect to the tag’s configuration web server as described in [“Use the Web Server to Configure the Tag” on page 13](#).
3. Click the **Tag Configuration** tab.
4. Change the **Host Server** and **Remote Script Filename** fields to point to your location engine. For example, if your custom location engine is located at the URL:

**www.my-server.com/location-engine.php**

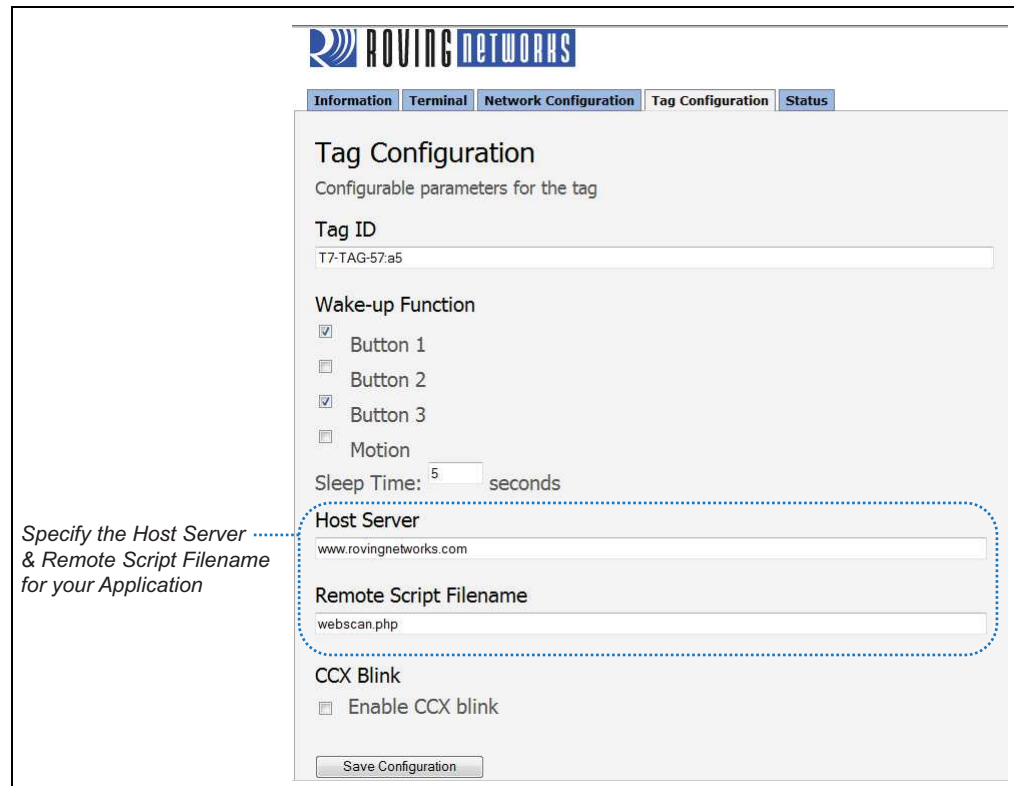
You use the settings (see [Figure 2-7](#)):

**Host Server:** www.my-server.com

**Remote Script Filename:** location-engine.php

5. Save your settings by clicking the **Save Configuration** button.
6. Exit and reboot the tag’s module by clicking the **Exit Web Configuration App** button.

**FIGURE 2-8: CHANGING THE HOST SERVER & REMOTE SCRIPT FILENAME**



Specify the Host Server & Remote Script Filename for your Application

## 2.4 NEXT STEPS

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The RN-T7-TAG is a reference design for customers who want to implement RTLS systems for tracking high-value assets and people. The tag's WebScan firmware is optimized for the ultra-low-power RN171 module, providing multi-year battery life.

To customize the WebScan firmware for your needs, Roving Networks provides an SDK for the tag. Contact Roving Networks for more details at:

<http://tickets.rovingnetworks.com/open.php?t=Pre-Sales>

## 2.5 TROUBLESHOOTING COMMON ISSUES

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### 2.5.1 How Do I Find My Tag's MAC Address?

You can find the tag's MAC address using the configuration web server:

1. Put the tag into soft AP mode as described in ["Put the Tag in Soft AP Mode" on page 12](#).
2. Use a web browser to connect to the tag's configuration web server as described in ["Use the Web Server to Configure the Tag" on page 13](#).
3. Click the **Information** tab. The tag's MAC address is displayed.

### 2.5.2 Why Isn't My Tag's Data on the Roving Networks Web Site?

The tag may not be configured correctly to join your network (e.g., incorrect SSID and/or password). Therefore, it may be unable to join your wireless network and send data to the Roving Networks web site. Ensure that you have the correct SSID and/or password using the configuration web server.