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Quick Start Guide Sentrius RG1xx

Version 2.1



REVISION HISTORY

Version	Date	Notes	Approver
1.0	20 July 2017	Initial Release	Jonathan Kaye
1.1	28 July 2017	Minor fixes	Dave Drogowski
1.2	3 Aug 2017	Clarified web interface URL in section 4 : Log into the Gateway. Identified separate mDNS address.	Shewan Yitayew
2.0	29 Nov 2017	Update info for compatibility with GA2 (93.7.2.x) firmware.	Ryan Erickson
2.1	19 April 2018	Minor typo correction	Shewan Yitayew

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1 OVERVIEW

This quick start guide describes how to configure the Sentrius gateway to forward LoRaWAN data to a cloud platform. The steps listed in this guide use the RG191 (US version) gateway and an RM191 (US version) module. The steps for using an RG186 and RM186 are similar.

Note: This guide uses the The Things Network (TTN) to show how to register your Gateway and visualize the incoming data on a Network server. If you are working with Stream IOT-X or LORIOT.io server, a similar guide will be available through their page to help you configure your gateway.

For more detailed information on how to use all the features of the Sentrius gateway, please see the Sentrius RG1xx User Manual, available from documentation tab at: www.lairdtech.com/products/rg1xx-lora-gateway.

2 ABOUT THE GATEWAY

2.1 Product Overview

The Sentrius[™] RG1xx LoRa-Enabled Gateway from Laird is the ultimate in secure, scalable, robust LoRa solutions for end-to-end control of your private LoRaWAN network. Leveraging Laird's field-proven and reliable 50 Series "Wireless Bridge" certified module, it also offers enterprise dual-band Wi-Fi, BT v4.0 (BLE and Classic) and wired Ethernet for complete design freedom. Based on the Semtech SX1301/SX1257 chipset designs, it offers a LoRa range up to 10 miles and pre-loaded LoRa Packet Forwarder software, perfect for highly scalable, flexible IoT networks. The Sentrius RG1xx Gateway works with Laird's **Sentrius RM1xx Series** LoRa+BLE certified modules for simple out-of-the-box integration and is compatible with 3rd party Cloud and LoRa partners, as well as any LoRaWAN certified client devices.







Figure 1: Top of the Sentrius™ RG1xx gateway



Figure 2: Back panel of the Sentrius™ RG1xx gateway

3 CONNECT THE HARDWARE

3.1 Connect the Gateway

To use the gateway, you must power up the gateway and access the web interface via the Ethernet port. To do this, complete the following steps:

- 1. Follow the label on the box and connect the three antennas. Refer to *Antenna Configuration* for additional information.
- 2. Connect the power supply (see #2 in Figure 3).
- 3. Connect the gateway to your router (#3 in Figure 3) using the Ethernet cable (#1 in Figure 3).



Figure 3: Connecting the gateway

Embedded Wireless Solutions Support Center: http://ews-support.lairdtech.com www.lairdtech.com/ramp

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1. LoRa and Wi-Fi antennas

- 2. LEDs
- 3. Fixing holes
- 4. User button
- 1. DC power input
- 2. User button
- 3. Reset button
- 4. SD card slot
- 5. Ethernet connector

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3.1.1 Antenna Configuration

To configure the antenna properly, complete the following steps:

- 1. Attach the two shorter antennas to the 2.4/5.5 GHz (Wi-Fi) ports.
- 2. Attach the third and longer antenna to the 868 MHz/900 MHz (LoRa) port.



3.1.2 WiFi Quick Config

The gateway includes a mode to allow you to configure without ethernet access, in the case that you wish to join a wireless network.

Apply power to the gateway and allow to start, then perform the following:

- 1. Depress and hold the user button (see #2 in Figure 2) for 7 seconds.
- 2. From a wirelessly enabled device perform a scan.
- Connect to the access point rg1xx29378B, where "29378B" are the last 6 digits of the Ethernet MAC address found on the label on the bottom of the gateway (Figure 4).
 The network is secured with WPA2 with a password that is the same as the SSID. It is recommended that the default password is changed for security reasons. The password can be changed on the Wi-Fi -> Advanced web page.

Upon logout or client disassociation, WiFi Quick Config will shut down and normal operation will resume.



4 LOG INTO THE GATEWAY

To log into the gateway web interface, follow these steps:

1. Determine the last three bytes of your gateway's Ethernet MAC address. This can be found on the label on the bottom of the gateway; the last three bytes are highlighted (Figure 4).



Figure 4: Bottom label – last three bytes of the Ethernet MAC address highlighted

- Enter the URL into the web browser to access the web interface. For example, for the gateway used in this guide, the URL is https://rg1xx29378B.local, where "29378B" are the last 6 digits of the Ethernet MAC address. In Wi-Fi quick config mode, the gateway can also be accessed via the IP address at https://192.168.1.1
- 3. Accept the self-signed security certificate in the browser.
- 4. Click Advanced (Figure 5).



Figure 5: Web interface – first screen

5. Click **Proceed** (Figure 6).



Privacy error x	
← → C ▲ Not secure ⊨ ₩₽5%//10.16.130.9	
	Your connection is not private
	Attackers might be trying to steal your information from 10.16.130.9 (for example, passwords, messages, or credit cards). NET:ERR_CERT_AUTHORITY_INVAUD
	HIDE ADVANCED Back to safety
	This server could not prove that it is 10.16.130.9 ; its security certificate is not trusted by your computer's operating system. This may be caused by a misconfiguration or an attacker intercepting your connection. <u>Learn more</u> .
	20cced to 10157309 Annafel

Figure 6: Web interface – second screen

6. Log on using the following default credentials (Figure 7):

Username: sentrius						
Password: RG1xx						
Laird Dashboard LA	Wi-Fi LoRa Settings					
	Login					
	Username					
	Password					
	Login					
	_					

Figure 7: Gateway interface login screen

5 CONNECTING THE GATEWAY TO THE INTERNET

5.1 Setting Up Ethernet

By default, the Ethernet port is set up for DHCP addressing. Connect the Ethernet cable to a network with internet access. If more advanced Ethernet configuration is needed, please see the Sentrius RG1xx User Manual in the documentation tab of the RG1xx product page at lairdtech.com: www.lairdtech.com/products/rg1xx-lora-gateway.

5.2 Setting Up Wi-Fi

By default, the Wi-Fi in the gateway is not configured to connect to a Wi-Fi network. You must access the web interface on the gateway via the Ethernet interface to setup the Wi-Fi connection.

To set up the Wi-Fi, follow these steps:

1. Once logged into the web interface, navigate to the Wi-Fi page (Figure 8).

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Laird	Dashboard LAN W	Vi-Fi LoRa	Settings	Logout
Scan		Access	is Point Scan	
Profiles Advanced			Scan	
Status	Connected	1		
SSID	BestWiFi			
Channel	6			
Bit Rate	54 Mbps			
Client IP	192.168.1.27			
RSSI: -50 dBr Disable Wi-Fi	n			

Figure 8: Wi-Fi page

2. To connect to a Wi-Fi network, click **Scan** to scan for nearby Wi-Fi networks (Figure 9). Scanning continues until you click **Stop** or select one of the scan results in the list.

		Scar	nning O		
	Stop		and generative and the second s		
	SSID	BSSID	Channel	RSSI	Security
nnected					
stWiFi	CATS_CATS_CATSSS	CA:10:39:39:29:CA	6	-22	WPA_PSK
Mhos	Ezurio WPA	90:72:40:17:26:28	11	-52	WPA2_PSK,WPA2_PSK_TKI
	Ezurio WPA	90:72:40:17:26:29	36	-66	WPA2_PSK,WPA2_PSK_TKI
2.168.1.27	≚ ssid1				
	ssid1	11:22:33:33:22:11	1	-54	WPA2_PSK
	ssid1	11:22:33:33:22:12	1	-58	WPA2_PSK
	Ben's Mobile	11:22:33:33:22:11	3	-71	WPA2_PSK
	ssid2	19:29:39:39:29:19	6	-73	WPA2_AES
		Ites 127	Arts_CATS_CATSS C-10-39-39-29-CA WMPi ~ Exurio WPA 90.72-40.17.26-28 Parallel Exurio WPA 90.72-40.17.26-28 Exurio WPA 90.72-40.17.26-29	Exurio WPA CA10 39 39 29 CA 6 Mbps Exurio WPA 50 72 40 17 26 28 11 Exurio WPA 90 72 40 17 26 29 36 * said1 11 22 33 33 22 11 1 said1 11 22 33 33 22 12 1 Berls Mobile 11 22 33 33 22 11 3	CATS_CATS_CATS_CATSS CA10.39.39.29.20.A 6 -2 WDps ~ Exuio WPA 90.72.40.17.26.28 11 -52 Exuio WPA 90.72.40.17.26.29 36 -66 * said1 112.23.33.22.11 1 -54 said1 112.23.33.22.12 1 -56 Beris Mobile 112.23.33.22.11 3 -71

Figure 9: Wi-Fi scan results

- 3. Click on the applicable scan result.
- 4. Enter the information for the Wi-Fi network (Figure 10).

Laird Dashboard LAN WI-FI	LoRa Settings	_
	Wi-Fi Profile: ssid1	×
Scan	Ac	
Profiles	Profile Name	
Advanced	ssid1	
	SSID	
Status Connected	ssid1	Security
	CAT	VPA_PSK
SSID BestWiFi	E	VPA2_PSK,WPA2_PSK_TKIP,WPA_PSK
Channel 6	WPA2_PSK	VPA2 PSK
Bit Rate 54 Mbps	PSK	
Client IP 192.168.1.27	Ezu	VPA2_PSK,WPA2_PSK_TKIP,WPA_PSK
RSSI: 40 dBm	SSIC PSK required, needs to be at least 8 characters.	VPA2_AES
NOT. OF COM	ssid	VPA2_AES,CCKM_AES
Disable Wi-Fi	Connect Cancel	

Figure 10: Wi-Fi profile dialog

5. Click **Connect**.



6 LORA PACKET FORWARDING SET UP

To set up LoRa packet forwarding on the gateway, follow these steps:

- 1. Click the **LoRa** tab in the main menu (Figure 11).
- 2. In the dropdown labeled *Select Preset*, select the preset for **The Things Network Legacy (TTN)**.
- 3. Click **Apply**.

Laird Dashboard LAN WI-Fi	LoRa Settings	Logout
Presets	select preset	
Forwarder	The Things Network Legacy - US	
Radios	You may lose your LoRa settings when applying a preset!	
Advanced		
Traffic		THE THINGS
	Apply	NETWORK
Gateway Connected false		
Gateway EUI AwesomeSauce		https://www.thethingsnetwork.org/
Region Code US		Forwarder:
Mode semtech		semtech
		Preset Server Address: router.us.thethings.network
		Preset Upstream / Downstream Ports: 1700 / 1700

Figure 11: LoRa page – TTN preset

Note: In addition to the TTN, Laird currently supports presets for other LoRa network servers.

	shboard LAN	Wi-Fi	LoRa	Settings
Presets			selec	t preset
Forwarder			no	preset selected v
Radios			no	preset selected
			Th	e Things Network - US
Advanced	Advanced		Th	e Things Network Legacy - US
Traffic			Str	eam IOT-X - US
			LO	RIOT.io - US
Gateway Connected	true		Se	net - US
Gateway EUI	AwesomeSauce			
Region Code	US			
Mode	semtech			

Figure 12: LoRa presets

Note: If operating with a network server that is not available as a preset, you may also manually configure the forwarder in the **Forwarder** page, available in the left menu. More information on this is available in the RG1xx User Guide, available in the documentation tab of the RG1xx product page at lairdtech.com: www.lairdtech.com/products/rg1xx-lora-gateway



The network server must be compatible with the packet forwarder being used on the gateway. The packet forwarder can be custom configured on the forwarder, radios, and advanced pages.

If the LoRa network operated on a different channel plan it is also necessary to program this into the gateway on the radios page.

7 CONFIGURATION WITH THE THINGS NETWORK

7.1 Set up your account with The Things Network

To set up your account with The Things Network, follow these steps:

- 1. Go to https://www.thethingsnetwork.org/.
- 2. Create an account or log in to your existing account (Figure 13).

THETHINGS	HOME CONSOLE
	THE THINGS N E T W O R K
	Please log in to see this page
	EMAIL OR USERNAME
	PASSWORD
	Login
	Forgot your password? Create an account

Figure 13: TTN login page

3. Click Console.

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- 4. Register your gateway:
 - a. From the console screen, click **Gateways** (Figure 14).

THE THINGS CONSOLE			Applications	Gateways	*
	👋 Hi, 🚥				
	Welcome to The Th	ings Network Console.			
· · · · · · · · · · · · · · · · · · ·	This is where the magic happens. Here you devices and gateways, manage your	can work with your data. Register applications, collaborators and settings.	tions,		
		\hat{l}			
8	\sim		>		
АР	PLICATIONS	GATEW	AYS		

Figure 14: TTN console screen

b. Click register gateway (Figure 15).

THETHINGS CONSOLE		Applications	Gateways	~
Gateways				
GATEWAYS				😌 <u>register gateway</u>
	You do not have any gateways			
	Get started by registering one!			

Figure 15: Click register gateway.

c. Obtain the gateway ID from the Sentrius RG1xx web interface (Figure 16) or from the bottom label (Figure 17) on the Gateway.

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Figure 16: Gateway ID

Laird		RG191 nt Gateway includi Bluetooth, and Eth	
Smart Technology. Delivered. Contains FCC ID: SQG-WB50NBT Contains IC: 3147A-WB50NBT Contains FCC ID: SQG-1001		IC	FC
Contains IC: 3147A-1001 Ethernet MAC ID: C0:EE:40:29:37:8B WiFi MAC ID: C0:EE:40:0A:D9:49		ev: 1	
M2 EUI: CO:EE:40:FF:FF:29:37:88 www.lairdtech.com/RG1xx_Getting_Started User Name: sentrius Password: RG1xx	0117174		

Figure 17: Gateway ID on bottom label

d. Fill in the information to register the gateway as shown in Figure 20.

If the gateway is set to use "The Things Network Legacy" preset, be sure to check *I'm using the legacy packet forwarder*. Otherwise, the gateway can use the "The Things Network" preset and the checkbox should be left unchecked.

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Figure 18: TTN Legacy Preset

Wi-Fi	LoRa Settings	Logout
	select preset The Things Network - US You may lose your LoRa settings when applying a preset!	
	Apply	THE THINGS NETWORK
		https://www.thethingsnetwork.org/ Forwarder: ttn

Figure 19: TTN Preset

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EGISTER GATEW	ΑΥ
Gateway EUI The EUI of the gateway as	s read from the LoRa module
C0 EE 40 FF FF 29 3	35 F2 O 8 bytes
I'm using the lega Select this if you are a Description	cy packet forwarder using the legacy <u>Semtech packet forwarder</u> .
A human-readable descri	
Sentrius RG191 LoRa G	ateway 🥥
Frequency Plan The <u>frequency plan</u> this g	ateway will use
United States 915MHz	•
	gateway. This will be used if your gateway cannot determine its location by itself. Set a location by clicking on the map.
	gateway. This will be used if your gateway cannot determine its location by itself. Set a location by clicking on the map.
The exact location of you	Pleasant Hill Rd Cetar Ln Bontwell Rd V MA 1 0 0
The exact location of you +	Pressant Hill Rd Richfield
The exact location of you +	Pleasant Hill Rd Pleasant Hill Rd Richfield Highland Rd Highland Rd Highland Rd Highland Rd Highland Rd
The exact location of you +	Presaart Hill Rd Presaart Hill Rd Richfield Hogy Hill Rd Prestadt Rd
The exact location of you +	Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Freistadt Rd Germantown To Detar Ln Bonswell Rd Highland Rd Highland Rd Freistadt Rd Germantown To Detar Ln Bonswell Rd W Freistadt Rd Germantown To Detar Ln Highland Rd Thiensville Thiensvi
The exact location of you +	Pleasant Hill Rd Pleasant Hil
The exact location of you	Pleasant Hill Rd Pleasant Hil
+	Pleasant Hill Rd Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Frentade Rd Hubertus Frentade Rd Hubertus Hubertu
The exact location of you	Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Freistadt Rd Freistadt Rd F
The exact location of you + - C C C C C C C C C C C C C	Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Freistadt Rd Freistadt Rd F
The exact location of you	Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Freistadt Rd Freistadt Rd F
The exact location of you + - C C C C C C C C C C C C C	Pleasant Hill Rd Pleasant Hill Rd Richfield Hubertus Freistadt Rd Freistadt Rd F

Figure 20: Gateway registration

e. Click Register Gateway.

Note: If using an RG186 gateway, be sure to select an EU router.

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Once the gateway is registered, and if the gateway is communicating to The Things network, the status should display as *connected* (Figure 21).



Figure 21: Registered gateway

7.2 Create an Application with TTN

To create an application that can receive data from your LoRa-enabled gateway, complete the following steps:

- 1. At The Things Network's website, click **Applications** in the top right of the menu.
- 2. Click Add Application
- 3. Complete the field as shown in Figure 22. Note that application ID should be in lower case and used to uniquely identify your application on the network.
- 4. Once you've created your application, click Add application to save it.

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			-	
	CONSOLE Applications	Gateways	V	
lications > Add Ap	plication			
DD APPLICAT	ION			
Application ID The unique identifier	of your application on the network			
rg1xx_quickstart			[A
A human readable de	escription of your new app			
A human readable de Quickstart applicat	escription of your new app tion for the Sentrius RG1xx Gateway ill be issued for The Things Network block for convenience, you can add your own in the application settings page.			0
Quickstart applicat	ion for the Sentrius RG1xx Gateway			•
A human readable de Quickstart applicat Application EUI An application EUI w Handler registrat	ion for the Sentrius RG1xx Gateway ill be issued for The Things Network block for convenience, you can add your own in the application settings page. EUI issued by The Things Network			0
A human readable de Quickstart applicat Application EUI An application EUI w Handler registrat	ion for the Sentrius RG1xx Gateway ill be issued for The Things Network block for convenience, you can add your own in the application settings page. EUI issued by The Things Network ion u want to register this application to			0
A human readable de Quickstart applicat Application EUI An application EUI w Handler registrat Select the handler yc	ion for the Sentrius RG1xx Gateway ill be issued for The Things Network block for convenience, you can add your own in the application settings page. EUI issued by The Things Network ion u want to register this application to			
A human readable de Quickstart applicat Application EUI An application EUI w Handler registrat Select the handler yc	ion for the Sentrius RG1xx Gateway ill be issued for The Things Network block for convenience, you can add your own in the application settings page. EUI issued by The Things Network ion u want to register this application to			

Note: If using an RG186 gateway, be sure to select an EU Handler registration.

7.3 Register your end-device with TTN

To register your end-device as the device that will send data to TTN, follow these steps:

- 1. From the applications screen, select the application that you added in the previous section.
- 2. Click register device (Figure 23).

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THETHINGS CONSOLE NETWORK COMMUNITY EDITION			Applications	Gateways		
Applications > 🥪 rg1xx_quickstart						
	Overview	Devices	Payload Formats	Integrations	Data	Settings
APPLICATION OVERVIEW						
Application ID rg1xx_quickstart Description Quickstart application for the Sentrius RG1xx Gateway Created 3 hours ago Handler ttn-handler-us-west (current handler)					dc	ocumentation
APPLICATION EUIS () 年 70 B3 D5 7E F0 00 57 AE 目					0	<u>manage euis</u>
DEVICES				register device	e c mai	nage devices
و <u>، ا</u> 0 م	egistered devices					
COLLABORATORS				o	manage c	ollaborators
*				collaborators del	ete device	es settings
ACCESS KEYS					0 1	manage keys
default key devices messages	•				≑ bas	e64

Figure 23: Application screen

3. Choose and enter a Device ID and an eight-byte Device EUI (Figure 24).

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REGISTER DEVICE Device ID This is the unique identifier for the device in this app. The device ID will be immutable. Imitx_dev_board_01 Device EUI The device EUI is the unique identifier for this device on the network. You can change the EUI later. Imitx_dev_board_01 Object Imitx_dev_board_01 Imitx_dev_board_0	THETHINGS CONSOLE				Applications	Gateways		~
REGISTER DEVICE Device ID This is the unique identifier for the device in this app. The device ID will be immutable. Imitx_dev_board_01 Device EUI The device EUI is the unique identifier for this device on the network. You can change the EUI later. Imitx_dev_board_01 Object Imitx_dev_board_01 Imitx_dev_board_0	lications > 🥪 rg1xx_quickstart > Devices							
Device ID This is the unique identifier for the device in this app. The device ID will be immutable. Immixe, dev_board_01 Device EUI The device EUI is the unique identifier for this device on the network. You can change the EUI later. Immixed app Key The App Key The App Key will be used to secure the communication between you device and the network. Immixed app Key The App Key but used to secure the communication between you device and the network. Immixed app Key The Bab DS 7E F0 e0 57 AE			Overview	Devices	Payload Formats	Integrations	Data	Settings
This is the unique identifier for the device in this app. The device ID will be immutable. Imixe, dev_board_01 Imixe, dev_board_01 Device EUI The device EUI site unique identifier for this device on the network. You can change the EUI later. Imixe, dev_board_01 Imixe, dev_board_01 Imixe, dev_board_02 Imixe, dev_board_02 Imixe, dev_board_03 Imixe, device and the network. Imixe, dev_board_04 Imixe, device and the network. Imixe, device, device, and the network. Imixe, device,	EGISTER DEVICE						bulk im	port devices
Device EUI The device EUI is the unique identifier for this device on the network. You can change the EUI later. Image:		e device ID will be immutable.						
The device EUI is the unique identifier for this device on the network. You can change the EUI later. It 2 34 56 78 90 AB CD EF	rm1xx_dev_board_01							0
App Key The App Key will be used to secure the communication between you device and the network.		the network. You can change the EUI later.						
The App Key will be used to secure the communication between you device and the network.	≍ 12 34 56 78 90 AB CD EF						0	8 bytes
App EUI 70 83 D5 7E F0 00 57 AE		etween you device and the network.						
70 83 D5 7E F0 00 57 AE	/	this field will be gene	rated					
	App EUI							
Cancel	70 B3 D5 7E F0 00 57 AE							0
Cancel								
Cancel Regis								
						Cance		Register

Figure 24: Enter a Device EUI

- 4. Click Register.
- 5. Make note of the Device EUI, Application EUI, and the App Key. These keys are needed later to set up the DVK- RM1xx (Figure 25).

THE THINGS CONSOLE Applications Gateways									
Applications > 🎯 rg1xx_quickstart > Devices > 📰 rm1xx_dev_board_01									
			Overview	Data	Settings				
DEVICE OVERVIEW									
	rg1xx_quickstart m1xx_dev_board_01 OTAA								
Device EUI Application EUI									
Арр Кеу	↔ = •								
	reverseen <u>reset frame counters</u>								

Figure 25: Device EUI, application EUI, and app keys



8 SENDING DATA TO THE CLOUD – SETUP

To set up the DVK-RM1xx to send data to the cloud, follow these steps:

1. Connect the DVK-RM1xx to a PC via the USB connector on the board (Figure 26).



Figure 26: Connect the DVK-RM1xx to the PC

- 2. Download UwTerminalX (version 1.06) from the following site: https://github.com/LairdCP/UwTerminalX/releases/tag/v1.06
- 3. Download *RM1xx-defs.h* and *lora.app.us.sb* (or *lora.app.eu.sb*) from https://github.com/LairdCP/RM1xx-Applications. Place them in the same directory on your PC.
- 4. Use UwTerminalX to configure the RM1xx by doing the following:
 - a. Open UwTerminalX.
 - b. Click Accept (Figure 27).

UwTerminalX (v1.06)	+ _	- 🗆	×
Terminal Config Update About Logs Editor			
Accept Decline Help Licenses			
This application is provided by Laird without warranty. You are welcome to check our website for This version is UTF-8 compliant. This message is displayed EITHER because "accept" is not specified in the command line OR at le line option has been specified with an invalid parameter. You can launch this application and bypass this window by creating a shortcut link and passing / command line option. Other command line options are:- ACCEPT Bypass About screen on startup COM=n	least one comm		○ N/A ● Busy ● Clear
Windows: COM[1255] specifies a comport number GNU/Linux: /dev/tty[device] specifies a TTY device Mac: /dev/[device] specifies a TTY device			
BAUD=n [1200921600] Could be limited to 115200 depending on PC hardware (limited to 230400 on	n most Macs)		
STOP=n		~	
UwTerminalX version 1.06 (Win), Built Sep 5 2016 Using QT 5.7.0			

Figure 27: UwTerminalX



- c. On the Config tab, select **RM186/RM191** from the Device drop-down menu.
- d. Select the virtual COM port that corresponds to your RM186/RM191 development board (Figure 28).
- e. Click **OK** (Figure 28).

📕 UwTerminalX (v1.06)		↔ – □ ×					
Terminal Config Update	About Logs Editor						
OK Quit	Duplicate Error Codes						
Port Settings Device RM186/RM191 V + - Refresh Auto Port COM27 V Baudrate 115200 V Parity None V Stop Bits 1 V Data Bits 8 V Handshaking CTS/RTS V Save Device Configuration	Terminal CR	Misc Run program Before After XCompile This allows you to run a program/batch/bash file before/after a smattBASIC file is XCompiled/ downloadd, %1 will be replaced with the sb/uwc file when the execution takes place. Run program even if XCompile fails Pre/Post-XCompile Execution Online XCompile Supported Devices By enabling Online XCompilation support, if a local XCompiler is not found the source code will be uploaded and compiled remotely on a Laird cloud server. Uploaded data is not stored by Laird.					
Log file: UwTerminalX.log Enable Logging Append to Log USB Serial Port (FTDI) [A502GV8PA]							
UwTerminalX version 1.06 (Win), B	uilt Sep 5 2016 Using QT 5.7.0						

Figure 28: Select the applicable virtual COM port

- f. Press Enter on the keyboard. The module should respond with 00.
- g. Type *at&f** to completely reset the module and clear the program flash.



Figure 29: Type at&f*

h. Load the *lora.app.us* (or *lora.app.eu.sb*) script by right-clicking in the window, clicking **Xcompile +** Load, and then selecting *lora.app.us* or *lora.app.eu.sb* (Figure 30 and Figure 31).

Quick Start Guide



🛄 UwTerr	ninalX (v1.	06)				↔	() -))		×
Terminal	Config	Update	About	Logs	Editor				
CTS 🔵 DSF					BREAK 🗌 LocalEcho 🗹 Lin	eMode 🗹	Clear	Close Port	t
COM27-11	5200 N 8 1		inload TY R	emaining	g: 0 Tx: 7 Rx: 34	500-100 H		Cano	al
[00/12/111	5200,14,0,1,			Cernal any	, 0 1X. 7 KX. 51			Carro	
00									
atsf*									
			~						
00	sed, Rebo	ooting	÷						
					XCompile				
					XCompile + Load				
					XCompile + Load + Run				
					Load				
					Load + Run				
					Lookup Selected Error-Co	ode (Hex)			
					Lookup Selected Error-Co	ode (Int)			
COM27:11	5200, N, 8, 1,	H]{cr}			Enable Loopback (Rx->Tx	()			
Tr.					Download	•			
				1.11	Font				
•					Run		1. 19 M		
					Automation				
					Batch		and the		
					Clear module				
				1.44	Clear Display		·		
•				1	Clear RX/TX count				
			-		Сору		1		
		3. 1		K.	Copy All		32		
				1	Paste				
		1			Select All				

Figure 30: Right-click and select XCompile+Load



Figure 31: File downloaded

i. The command **at+dir** provides the content of the flash file system, which shows the loaded LoRa app (Figure 32).

Quick Start Guide



□ UwTerminalX (v1.06) ↔	_		×
Terminal Config Update About Logs Editor			
CTS 🌑 DSR 🌑 DCD 🗣 RI 🗣 RTS 🗹 DTR 🗹 BREAK 🗌 LocalEcho 🗹 LineMode 🗹	Clear	Close Port	
[COM27:115200,N,8,1,H] {cr} Download TX Remaining: 0 Tx: 12171 Rx: 896		Cance	2
10 0 RM191_PE 00 10 13 2AF8 78D7 00 XCompile complete (4.85KB) Finished downloading file 00 00 at+dir 06 lora 00			<

Figure 32: Loaded LoRa app

5. Right-click the Terminal window and select Automation. The automation window appears (Figure 33)

🖪 Autor	nation	×
Send		
Load	Save Un-Escape Strings 🗹 On Top (0/190) TOP Up Down BOTTOM Clear Close	
[Status]		:

Figure 33: Automation window

a. Enter the security data to configure the module. The data from the TTN website, in our example, is as follows (yours will vary):

Application EUI: 70B3D57EF00057AE Device EUI: 1234567890ABCDEF App Key: CE9FB3010C14A5ED6558CD60D89BA21F

To enter this data using the automation window, enter the following in the first three fields of the automation window (replacing the hex strings with your App EUI, Device EUI, and App Key):

```
at+cfgex 1010 "70B3D57EF00057AE"
at+cfgex 1011 "1234567890ABCDEF"
at+cfgex 1012 "CE9FB3010C14A5ED6558CD60D89BA21F"
```

In the fourth line, you may set the proper channels for the RM191 by entering the following command:

at+cfgex 1009 "0002000000000000000000

Note: This command does not apply to the RM186.

Americas: +1-800-492-2320 Europe: +44-1628-858-940 Hong Kong: +852 2923 0610



Enter the commands as shown in Figure 34.

🛄 UwTe	minalX (v1.06)	↔	_		×	-
Terminal	Config Update About Logs Editor				10	
CTS 🔵 D:	SR 🗣 DCD 🗣 RI 🗣 RTS 🗹 DTR 🗹 BREAK 🗌 LocalEcho 🗹 LineMod	e 🗹 🛛	Clear	Close Port		
	15200,N,8,1,H]{cr} Download TX Remaining: 0 Tx: 12171 Rx: 896			Cance		
10 (00	RM191_PE				<u>^</u>	
	.3 2AF8 78D7					
	mpile complete (4.85KB)					
Fini	shed downloading file					
00						
00 at+dir					1.1	
	ora					
00						
					. .	
					.:: •	
🖪 Autor	nation					×
Send	at+cfgex 1010 "70B3D57EF00057AE"					
Send	at+cfgex 1011 "1234567890ABCDEF"					
Send	at+cfgex 1012 "CE9FB3010C14A5ED6558CD60D89BA21F"					
Send	at+cfgex 1009 "0002000000000000ff00"					
Send	atz					
Send						
Send						4
Send						=
Send	<u> </u>					\dashv
Send		Deu	n BOTT	DM Class	class	
Load	Save Un-Escape Strings On Top (0/190) TOP Up	Dow		DM Clea	ar Close	:
C:/Users/	ryan.erickson/Desktop/UwTerminalX_v1.06_Windows/ttn_quickstart.txt: 5 li	nes sav	/ed.			:

Figure 34: TTN website data entered



b. Send the commands to the module by clicking **Send** next to each command.

UwTerminalX (v1.06)	_		\times
Terminal Config Update About Logs Editor			
CTS 🔵 DSR 🛑 DCD 🛑 RI 🛑 RTS 🗹 DTR 🗹 BREAK 🗌 LocalEcho 🗹 LineMode 🗹	Clear	Close Port	
[COM27: 115200,N,8,1,H]{cr} Download TX Remaining: 0 Tx: 12328 Rx: 916		Cance	el l
at+dir			
06 lora 00 at+cfgex 1010 "70B3D57EF00057AE" 00 at+cfgex 1011 "1234567890ABCDEF" 00			
at+cfgex 1012 "CE9FB3010C14A5ED6558CD60D89BA21F" 00 at+cfgex 1009 "0002000000000000ff00"			
at+cfgex 1009 "00020000000000000000000000000000000			*
			.:

Figure 35: Commands sent

c. Run the LoRa app by typing *lora* into UwTerminalX and pressing **Enter**. The module should join the network (Figure 36).

📕 UwTerr	minalX (v1.	.06)						↔	-	-		×
Terminal	Config	Update	About	Logs	Editor							
CTS 🔵 DS	r 🔴 DCD	🔴 RI 🔴	RTS 🗸	DTR 🗹	BREAK	LocalEcho	✓ LineN	1ode 🗹 🛛	Clear	C	ose Por	t
[COM27:11	5200,N,8,1	,H]{cr} D	ownload TX	Remaining	g: 0 Tx:	12333 Rx	c: 1313				Cano	el
Successi TxDone e TxComple TxDone e	event re fully Jo event re ete even 	ined net ceived - t receiv ceived -	twork ved - ne - "hello	world" xt pack 	sent to et can k sent to	o gateway be loaded o gateway be loaded	e gatewa	зу				~

Figure 36: Run the LoRa app

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9 VIEW DVK-RM1XX DATA IN THE CLOUD

To view DVK-RM1xx data in the cloud, do the following:

1. Navigate to the device page on the TTN website; the device should display as connected (Figure 37).

	L E EDITION				Applications	Gateways		
Applications > 🥪 rg1xx_quickstar	t ≻ [Devices	es > 📰 rm1xx_dev_board_01					
						Overview	Data	Settings
DEVICE OVERVIEW								
Application ID Device ID								
Activation Method	OTA	A						
Device EUI	0	÷	12 34 56 78 90 AB CD EF					
Application EUI	\diamond	\$	70 B3 D5 7E F0 00 57 AE 創					
Арр Кеу	\diamond	÷	<u> ۵</u>					
Device Address	•	↓	26 02 2B 1D 售					
Network Session Key	•	⇔	•	Ê				
App Session Key	0	÷	•	E				
Status	• 7 se	conds a	ago					
Frames up		t frame	acounters					
Frames down	5							

Figure 37: TTN device page

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2. Click on the Data tab to view the data sent by the RM1xx (Figure 38).

	HE THINGS	COMMUNITY	EDITION					Applications	Gateways	-	
lications	> 🤘 rg	;1xx_quicksta	art > Devices >	rm1x)	<_dev_board_01 > Data						
									Overview	Data	Setting
PPLIC	ATION	DATA								II pause	û <u>clear l</u>
Filters	uplink	downlink	activation a	ck error							
	time	counter	port								
▼ 13	:31:01		0								
^ 13	:31:01	8	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
▼ 13	:30:35		0								
▲ 13	:30:35	7	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
 13 	:30:09		0								
▲ 13	:30:09	6	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
 13 	:29:43		0								
▲ 13	:29:42	5	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
 13 	:29:17		0								
 13 	:29:16	4	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
• 13	:28:51		0								
▲ 13	:28:50	3	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
 13 	:28:24		0								
 13 	:28:24	2	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
• 13	:27:58		0								
▲ 13	:27:58	1	2 confirmed	payload: 68	65 6C 6C 6F 20 77 6F 72 6C 6	54					
+ 13	:27:43			dev addr: 26	02 2B 1D app eui: 70 B3 D5	7E EO OO 57 AE	dev.eui: 12 34 56 7	8 90 ABCDEE			

Figure 38: RM1xx data