

# Quick Start Guide Sentrius RG1xx

Version 3.0



# **REVISION HISTORY**

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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 3 : Log into the Gateway. Identified separate mDNS address.		Shewan Yitayew
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# **1** OVERVIEW

This quick start guide describes how to configure the Sentrius<sup>™</sup> 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.

For more detailed information on how to use all the features of the Sentrius gateway, please see the Sentrius<sup>™</sup> RG1xx User Manual, available from documentation tab at: https://www.lairdconnect.com/wireless-modules/lorawan-solutions/sentriusrg1xx-lora-enabled-gateway-wi-fi-ethernetAbout the Gateway

#### 1.1 Product Overview

The Sentrius<sup>™</sup> 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<sup>™</sup> RG1xx Gateway works with Laird's **Sentrius<sup>™</sup> 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

- 1. LoRa and Wi-Fi antennas
- 2. LEDs
- 3. Mounting holes
- 4. User button
- 1. DC power input
- 2. User button
- 3. Reset button
- 4. SD card slot
- 5. Ethernet connector

**Note**: This guide uses 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 other network server vendors, please consult their user guide for help with configuring the network server.



# **2** CONNECT THE HARDWARE

#### 2.1 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

#### 2.1.1 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.





#### 2.1.2 Wi-Fi 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.
- 3. Connect to the access point rg1xx29378B, where "29378B" are the last six 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, Wi-Fi Quick Config will shut down and normal operation will resume.

# **3** 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).

Laird	Sentrius <sup>™</sup> RG191 (450-0179) 915 MHz Intelligent Gateway including	Sub-Assy: 450-00013	902-928MHz LoRaWAN Gateway Including Wi-Fi, Bluetooth, and Ethernet
Smart Technology, Delivered. Contains FCC ID: SQG-WB50NBT Contains IC: 3147A-WB50NBT Contains FCC ID: SQG-1001 Contains FCC ID: SQG-1001 Ethernet MAC ID: C0:EE:40:29:37:88 WIFI MAC ID: C0:EE:40:29:37:88 WWW.laitdech.com/RG1xx_Getting_Started User Name: sentrius	0117174	D/C: 0119412	LAIRED CONNECTIVITY Sentrus <sup>117</sup> RG191 Weiklardsonnect.com/rgibx/getting-started User Nare: sentrus Password R5lix. Contains FCC ID: SQG-WBSONBT Assy: 450-007 Contains FCC ID: SQG-001 Rev: R Contains FCC ID: SQG-001 Contains IC: 3147A-WBSONBT Contains IC: 3147A-WB

Figure 4: Bottom label (Standard GW – Left, AS923 & AU915 Region Supported/Latest Version – Right)– 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).

✓ Privacy error         ×           ←         ✓         ▲           Mot secure         ↓           ↓         ↓	
	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-SER_CERT_AUTHORITY_INVAUD
	BOWANCED Back to safety

Figure 5: Web interface – first screen

5. Click Proceed (Figure 6).



Privacy error ×	
C A Not secure   https://10.16.130.9	
	Your connection is not private
	Attackers might be trying to steal your information from <b>10.16.130.9</b> (for example, passwords, messages, or credit cards). NET:ERR_CERT_AUTHORITY_INVALID
	HIDE ADVANCED Back to safety
	This server could not prove that it is <b>10.16.130.9</b> ; 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. Learn more.
	Proceed to 10,16,10.9 (unsafe)

Figure 6: Web interface – second screen

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

Laird Dashboard LAN	WI-FI LoRa Settings	
	Login	
	Username	
	Password	
	Login	

Figure 7: Gateway interface login screen



# **4** CONNECTING THE GATEWAY TO THE INTERNET

#### 4.1 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<sup>™</sup> RG1xx User Manual in the documentation tab of the RG1xx product page at https://www.lairdconnect.com/wireless-modules/lorawan-solutions/sentrius-rg1xx-lora-enabled-gateway-wi-fi-ethernet

#### 4.2 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).

Laird Dashboard LAN Wi-F	LoRa Settings Logo	put
Scan	Access Point Scan	
Profiles Advanced	Scan	
Status Connected		
SSID BestWiFi		
Channel 6		
Bit Rate 54 Mbps		
Client IP 192.168.1.27		
essi: -80 dim Disable Wi-Fi		

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.

Laird	Dashboard LAN Wi-Fi	LoRa Settings				Log
ican		Access Point Scan				
rofiles			Sca	nning		
dvanced		Stop				
		SSID	B \$ \$ID	Channel	RSSI	Security
Status	Connected					
S SID	BestWiFi	CATS_CATS_CATSSS	CA:10:39:39:29:CA	6	-22	WPA_PSK
Channel	6	* Ezurio WPA				
Rit Date	54 Mhos	Ezurio WPA	90:72:40:17:26:28	11	-52	WPA2_PSK,WPA2_PSK_TK
Dic Kate	ore mopo	Ezurio WPA	90:72:40:17:26:29	36	-66	WPA2_PSK,WPA2_PSK_TK
IP Address	192.168.1.27	≚ ssid1				
RSSI: -50 dBm		ssid1	11:22:33:33:22:11	1	-54	WPA2_PSK
		ssid1	11:22:33:33:22:12	1	-58	WPA2_PSK
Disable Wi-Fi		Ben's Mobile	11:22:33:33:22:11	3	-71	WPA2_PSK
		ssid2	19:29:39:39:29:19	6	-73	WPA2_AES
		7 Results(s)				H < 1 2 > H

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-	t LoRa Settings WLFI Profile: ssid1 ×	·
Son Polles Advanced	Ad Profile Name ssid1 SSID	
Status Connected SSID BestWiFi	SSI ssid1 CAI Security	iecurity VPA_PSK VPA2_PSK_WPA2_PSK_TKIPWPA_PSK
Channel 6 Bit Rate 54 Mbps	WPA2_PSK •	VPA2_PSK VPA2_PSK,WPA2_PSK_TKIP,WPA_PSK
Client IP 192.168.1.27 RSSL-50 dBm	SSM PSK required, needs to be at least 8 characters. SSM	VPA2_AES VPA2_AES,CCKM_AES
Disable Wi-Fi	Connect	

Figure 10: Wi-Fi profile dialog

5. Click Connect.

## 5 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**.

aird Dashboa	ard LAN WI-FI LoRa Se	tings	
sets varder anced fic		Select Preset The Things Network Legacy - US You may lose your LoRa settings when applying a preset! Ander	
Gateway Connected	true	Appy	THE THINGS
Region Code	US		
Mode	semtech		https://www.thethingsnetwork.org/ Forwarder: sentech Preset Server Address: router.us.thethings.network Preset Upstream / Downstream Ports: 1700 / 1700



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



Presets	Select Preset	
Forwarder	The Things Network Legacy - US	~
	no preset selected	
Radios	The Things Network - US	
Advanced	The Things Network Legacy - US	
Autorod	Stream IOT-X - US	
Traffic	LORIOT.io - US	
	Senet - US	
	Senet Legacy - US	

#### 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 Ihttps://www.lairdconnect.com/wireless-modules/lorawan-solutions/sentrius-rg1xx-lora-enabled-gateway-wi-fiethernet

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.



# **6** CONFIGURATION WITH THE THINGS NETWORK

# 6.1 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).

THE	THINGS TWO R K	E CONSOLE
		THE THINGS
		Please log in to see this page
	<u>N</u>	EMAIL OR USERNAME name.name@lairdtech.com
		PASSWORD
		Log in
		Forgot your password? Create an account

Figure 13: TTN login page

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

THE THINGS CONSOLE NETWORK COMMENTITY FORTION	Applications Gateways
Hi, — Welcome to The TI This is where the magic happens. Here you devices and gateways, manage your	nings Network Console. can work with your data. Register applications, Integrations, collaborators and settings.
APPLICATIONS	GATEWAYS

Figure 14: TTN console screen



b. Click register gateway (Figure 15).

THE THINGS CONSOLE Application	s Gateways	÷
Gateways		
GATEWAYS		e register gateway
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.

Laird	Dashboard	LAN	Wi-Fi	LoRa
Presets				sele
Forwarder				1
Radios				
Advanced				
Gateway Connected	true			
Gateway ID	C0EE40FFF	F2935F2	2	
Region Code	US			
Mode	forwarder			

Figure 16: Gateway ID



Figure 17: Gateway label (Standard GW – Left, AS923 Region Supported/Latest Version – Right)

- d. Select the preset "The Things Network Legacy US"
- e. Fill in the information to register the gateway as shown in Figure 18.

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.







f. Click Register Gateway.

Note: Be sure to select a frequency plan appropriate for the region your device was purchased for.

Once the gateway is registered, and if the gateway is communicating to The Things network, the status should display as *connected* (Figure 19).



	LE Applications	Gateways	÷.	
Gateways > 🚫 eui-c0ee40ffff29	35f2			
		Overview	Traffic	Settings
GATEWAY OVERVIEW				O settings
Gateway ID	eui-cDee40fff2935f2			
Description	Sentrius RG191 LoRa Gateway			
Owner				
Status	connected <u>What is this?</u>			
Frequency Plan	United States 915MHz			
Router	ttn-router-us-west			
Gateway Key	•		baseó	4
Last Seen	14 seconds ago			
Received Messages	251164			
Transmitted Messages	149			

Figure 19: Registered gateway

# 6.2 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 20. 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.

	CLE Applications G	ateways 🕯		~
Applications > Add Application				
ADD APPLICATION				
Application ID The unique identifier of your ap	plication on the network			
rg1xx_quickstart			<u>+</u>	0
Description A human readable description	f your new app			
Quickstart application for the	Sentrius RG1xx Gateway			•
Application EUI An application EUI will be issue	f for The Things Network block for convenience, you can add your own in the application settings page.			
	EUI issued by The Things Network			
Handler registration Select the handler you want to	egister this application to			
ttn-handler-us-west				0

Figure 20: Add application screen

Note: Be sure to select a handler registration appropriate for your location.



# 6.3 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 21).

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)					<u>dc</u>	xumentation
APPLICATION EUIS					0	manage euis
↔ 二 70 B3 D5 7E F0 00 57 AE 目						
DEVICES				register device	e 🗘 mar	nage devices
erregista	ered devices					
COLLABORATORS				o	manage c	ollaborators
				collaborators	ete device	settings
ACCESS KEYS					0 (	manage kevs
default key devices messages	∢				···· ≑ bas	e64 📓

Figure 21: Application screen



3. Choose and enter a Device ID and an eight-byte Device EUI (Figure 22).

						Applications	s Gateways I	¥	
lications > 🤤	<pre>g1xx_quickstart &gt; Devices</pre>								
				Oversiew	Deview	Devide and Ferrenate	Internetione	Data	c
				Overview	Devices	Payload Formats	integrations	Data	Set
	EVICE							bulkim	port de
LOISTER D									ipor e oc
Device ID									
This is the uniqu	e identifier for the device in this ap	p. The device ID will be im	mutable.						
rm1xx_dev_bo	bard_01								٩
Device EU									
The device EUI i		to on the network. You can							
	is the unique identifier for this devi	Le on the network. Tou can	change the EUI later.						
26 12 34 9	56 78 90 AB CD FE	e on the network. Tou can	change the EUI later.					0	8 byte
≍ 12 34 5	56 78 90 AB CD EF	e on the network. Fou can	change the EUI later.					0	8 bytes
≍ 12 34 5	56 78 90 AB CD EF	e on the network. For can	i change the EUI later.					0	8 bytes
ズ 12 34 5 App Key The App Key wil	56 78 90 AB CD EF	tion between you device a	nd the network.					0	8 byte:
≺ 12 34 5     App Key     The App Key wil	56 78 90 AB CD EF	tion between you device a	nd the network.	ated				0	8 bytes
≺ 12 34 5     App Key     The App Key wil	I be used to secure the communication of the secure secure the communication of the secure secure the secure the secure secure the secure secu	tion between you device a	nd the network.	ated				0	8 byte:
App Key The App Key wil	I be used to secure the communication of the secure secure the communication of the secure secure the communication of the secure secur	tion between you device a	change the EUI later. nd the network. this field will be gener	ated				0	8 bytes
X 12 34 5	I be used to secure the communication	tion between you device a	change the EUI later. nd the network. this field will be gener	ated				0	8 bytes
x         12         34         5           App Key         The App Key will         Image: Comparison of the compar	I be used to secure the communica	tion between you device an	change the EUI later. Ind the network. this field will be gener	ated				0	) 8 bytes
x         12 34 5           App Key         The App Key will           App EUI         70 B3 D5 7E F	I be used to secure the communication of the secure the secu	tion between you device a	change the EUI later. Ind the network. this field will be gener	ated				0	8 bytes
×         12 34 5           App Key         The App Key will               App EUI         70 83 D5 7E F	the dample identifier for this device of the second device of the s	tion between you device ar	change the EUI later. nd the network. this field will be gener	ated				0	8 byte
X     12 34 5       App Key     The App Key will       App EUI     70 B3 D5 7E F	the dample identifier for this device of the second device of the s	tion between you device a	change the EUI later. nd the network. this field will be gener	ated				0	8 bytes
×         12 34 5           App Key         The App Key will               App EUI         70 B3 D5 7E F	10 be used to secure the communication of the secure the se	tion between you device an	change the EUI later. nd the network. this field will be gener	ated					8 bytes

Figure 22: 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 23).

	DITION		Applications	Gateways				
Applications > 🥪 rg1xx_quickstart	: > Devic	es > 📰 rm1xx_dev_boa	rd_01					
						Overview	Data	Settings
DEVICE OVERVIEW								
Application ID	rg1xx_qui	ckstart						
Device ID	rm1xx dev	board 01						
		-						
Activation Method	OTAA							
Device EUI	↔ ≒	12 34 56 78 90 AB CD EF	Ē					
Application EUI	↔ ≒	70 B3 D5 7E F0 00 57 AE						
Арр Кеу	$\leftrightarrow$	0		ί.				
Status	never see	n						
Frames up	0 reset fran	ne counters						
Frames down	0							

Figure 23: Device EUI, application EUI, and app keys



# 7 APPENDIX – SETTING UP DVK-RM1XX

#### 7.1 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 24).



Figure 24: 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 25).

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 This version is UTF-8 compliant. This message is displayed ETTHER because "accept" is not specified in the command line OR a line option has been specified with an invalid parameter. You can launch this application and bypass this window by creating a shortcut link and passin command line option. The command line options are:	e for the lates at least one co ng ACCEPT as	t version. ommand a	*	○ N/A ● Busy ● Clear
ACCEPT Bypass About screen on startup				
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 most Macs	;)		
			¥	
UwTerminalX version 1.06 (Win), Built Sep 5 2016 Using QT 5.7.0				.:

Figure 25: 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 26).



e. Click OK (Figure 26).

📕 UwTerminalX	(v1.06)		↔	_		$\times$
Terminal Con	fig Update	About Logs Editor				
ОК	Quit	Duplicate Error Codes				
Port Settings Device RM186/RM Refresh Port Baudrate Parity Stop Bits Data Bits Handshaking Save Device	1191     Image: Auto       COM27     Image: Auto       115200     Image: Auto       None     Image: Auto       1     Image: Auto       8     Image: Auto       CTS/RTS     Image: Auto       Configuration     Image: Auto	Terminal  CR CR CR LF CR LF CR AT+FWRH Line Size: 50 Confirm module clearing Skip download display Show Application filesize Escape CR/LF/Tab Shift+enter line seperator Enable SSL	Misc Run program Before This allows you to run a p before/after a smartBASIC downloaded. %1 will be replac when the execution takes plac When the execution takes plac Run program even if XComp Pre/Post-XCompile Execution Online XCompile By enabling Online XCompile Scompiler is not found the uploaded and compiled remo server. Uploaded data is not st  Enable Log	After program/l file ced with e. bile fails Support tion supp source tely on ored by l ging	r XCompi batch/bas is XCom the sb/uw ed Device bort, if a code w a Laird .aird. Append t	le h file npiled/ /c file s local ill be cloud
USB Serial Port (FT UwTerminalX vers	DI) [A502GV8PA] sion 1.06 (Win), B	uilt Sep 5 2016 Using QT 5.7.0				

Figure 26: 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.

🖪 UwTern	ninalX (v1.	06)					+	•	_		Х	
Terminal	Config	Update	About	Logs	Editor							
CTS 🔵 DSF	R 🔴 DCD (	🖲 RI 🔴	RTS 🗹 D	TR 🗹 E	BREAK	LocalEcho 🗸	LineMode 🗸	d	lear	Close Port		
[COM27:115	5200,N,8,1,	H]{cr} Dov	vnload TX R	emaining	: 0 Tx:	7 Rx: 34				Cance	I	
00 atsf* FFS Eras 00	ed, Reb	poting										
[COM27:115	5200, N, 8, 1,	H]{cr}										

Figure 27: 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 28 and Figure 29).





Figure 28: Right-click and select XCompile+Load



Figure 29: File downloaded



i. The command **at+dir** provides the content of the flash file system, which shows the loaded LoRa app (Figure 30).



Figure 30: Loaded LoRa app

5. Right-click the Terminal window and select Automation. The automation window appears (Figure 31)

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

Figure 31: 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 "0002000000000000ff00"
at+cfg 1002 2
atz
```

Note: This command does not apply to the RM186.



b. Enter the commands as shown in Figure 32.

🕒 UwTerminalX (v1.10a) — 🗆 🗙								
Termina	al Config Speed Test Update About Logs Editor							
ст <b>з</b> С	DSR  DCD RI RTS DTR BREAK LocalEcho LineMode Clear Close Port							
[COM26:	[COM26:115200,N,8,1,H]{cr} Download Tx Left: 0 Tx: 61943 Rx: 5044 Last Rx: 15/01 @ 15:28:44 Cancel							
10 00 10 00 10 00 xcc	4 01 CAFC7154E663 0 RM191_US 13 581C A9B4 compile complete (4.9KB) nished downloading file							
00 at+din 06 00	r lora							
🖪 Auto	omation ×							
Send	at+cfgex 1010 "70B3D57EF00057AE"							
Send	at+cfgex 1011 "1234567890ABCDEF"							
Send	at+cfgex 1012 "CE9FB3010C14A5ED6558CD60D89BA21F"							
Send	at+cfgex 1009 "00020000000000000000000000000000000							
Send	at+cfg 1002 2							
Send	atz							
Send								
Send								
Send								
Send								
Load	Save Un-Escape Strings On Top (0/190) TOP Up Down BOTTOM Clear Close							
C:/Users	s/rikki.horrigan/OneDrive - Laird Connectivity/LoRa/RM191 LoRaCnfgs.txt: 5 lines loaded.							

Figure 32: TTN website data entered



c. Send the commands to the module by clicking Send next to each command.





d. Run the LoRa app by typing *lora* into UwTerminalX and pressing **Enter**. The module should join the network (Figure 34).



Figure 34: Run the LoRa app



## 7.2 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 35).

	LE EDITION		Applications Gateways					
Applications > 🥪 rg1xx_quickstart > Devices > 📰 rm1xx_dev_board_01								
			Overview Data Settings					
DEVICE OVERVIEW								
Application ID	rg1xx_qu	ickstart						
Device ID	rm1xx_dev_	_board_01						
Activation Method	OTAA							
Device EUI	↔ ≒	12 34 56 78 90 AB CD EF 🖹						
Application EUI	↔ ≒	70 B3 D5 7E F0 00 57 AE						
Арр Кеу	<> ≒	•	É					
Device Address	↔ ≒	26 02 2B 1D 🖺						
Network Session Key	↔ ≒	•	· · · · · · · · · · · · · · · · · · ·					
App Session Key	↔ ≒	•	· · · · · · · · · · · · · · · · · · ·					
Status	7 second	ds ago						
Frames up	5 reset fran	ne counters						
F <mark>rames down</mark>	5	-						

Figure 35: TTN device page



2. Click on the Data tab to view the data sent by the RM1xx (Figure 36).

APPI	LICATION	DATA						▶ <u>resume</u> 🍵 <u>clear</u>
Filter	uplink	downlink	activation	ack	error			
	time	counter	port					
-	15:57:16		0		devid: dvk-	rm191 42-c9-ef		<u> </u>
	15:57:15	37	2	confirmed	devid: <u>dvk-</u>	rm191 42-c9-ef	payload: 68 65 6C 6C 6F	
•	15:57:14		0		devid: dvk-	rm191 42-c9-ef		
	15:57:14	36	2	confirmed	devid: <u>dvk-</u>	rm191 42-c9-ef	payload: 68 65 6C 6C 6F	
•	15:57:12		0		devid: <u>dvk-</u>	rm191 42-c9-ef		
	15:57:12	35	2	confirmed	devid: <u>dvk-</u>	rm191 42-c9-ef	payload: 68 65 6C 6C 6F	
•	15:57:11		0		devid: <u>dvk-</u>	rm191 42-c9-ef		
	15:57:10	34	2	confirmed	devid: dvk-	rm191 42-c9-ef	payload: 68 65 6C 6C 6F	
•	15:57:10		0		devid: <u>dvk-</u>	rm191 42-c9-ef		
	15:57:09	33	2	confirmed	devid: dvk-	rm191 42-c9-ef	payload: 68 65 6C 6F	
•	15:57:07		0		devid: dvk-	rm191 42-c9-ef		
	15:57:07	32	2	confirmed	devid: <u>dvk-</u>	rm191 42-c9-ef	payload: 68 65 6C 6C 6F	
•	15:57:06		0		devid: dvk-	rm191 42-c9-ef		
	15:57:06	31	2	confirmed	devid: dvk-	rm191 42-c9-ef	payload: 68 65 6C 6F	
•	15:57:05		0		devid: dvk-	rm191 42-c9-ef		
	15:57:05	30	2	confirmed	devid: <u>dvk-</u>	rm191 42-c9-ef	payload: 68 65 6C 6F	
•	15:57:03		0		devid: <u>dvk-</u>	rm191 42-c9-ef		
	15:57:02	29	2	confirmed	devid: dvk-	rm191 42-c9-ef	payload: 68 65 6C 6F	
•	15:57:02		0		devid: <u>dvk-</u>	rm191 42-c9-ef		
	15:57:01	28	2	confirmed	devid: dvk-	rm191 42-c9-ef	payload: 68 65 6C 6F	

Figure 36: RM1xx data