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《使用前说明》

本示例仅作为演示如何使用我司 LoRaWAN 节点模块和 LoRaWAN 网关接入 TTN 服务器 建立 LoRaWAN 网络。

说明**:**

1、本示例中使用 TTN 开源服务器进行演示,由于 TTN 服务器版本会存在升级或其他原因,本示例中涉及 TTN 服务器配置内容有可能无法适配后续更新后的 TTN 服务器的配置。

2、本示例使用节点模块型号为: E78-400TBL-02(搭载了 E78-470LN22S(6601)模组的测试板); 网关型号为: E870-L470LG11。

E78-400TBL-02 购买地址:

https://detail.tmall.com/item.htm?id=609798136700&skuld=4860568252176

E870-L470LG11 购买地址:

https://detail.tmall.com/item.htm?id=667696115203&skuld=4850172833243

一、 TTN 服务器配置

首先浏览器输入 https://www.thethingsnetwork.org/,进入服务器官网。如果已经注册了 TTN 服务器账号的话,可以直接点击 log in 进行账号登录,若第一次使用 TTN 服务器的话, 先点击 Sign Up 进行账号注册。输入需创建的账号、密码及邮箱后点击 Create account,建立 账号完成。创建账号完成后,返回主界面点击 Log in 登录自己创建的账号。

登录完成后按以下步骤操作:

1、点击账号头像,选择 Console,进入 Cluster 选择界面。



2、这里示范选择 Australia 1 来创建设备和网关。

	Choose a network cluster
	Doka is genera (satar Clima v
Existing clusters Existing clusters And the Named And Conference (Salar) And Conference (Salar) And Conference (Salar) And Conference (Salar) And Conference (Salar)	

3、创建新的网关:

(1) 点击 "+Register gateway" 开始创建:

 ← → Q 	O A https:/	au1.cloud.thethingc.network/console/gateways		ች 습 🙂 🛛 🖄 =
	ø	Gateways > List		+ Add 🗸 🖓 🖓 🖉 🖾 minim 🕲 🗸
Home Applications	Gateways	Gateways (0)		Search gatesways + Register gateway
Q, Search	(Cal X)	1 NAME AND ID 0		салтими вол в 515705 Стелято А в 2
			No items found	

(2) 输入 Gateway EUI, Getaway EUI 是 E870-L470LG11 网关需要的参数,必须和网关 配置的 EUI 一致,这里我们设置"010101010101FFFF",输入完成后点击 Confirm 进入下一步。

THE THINGS STACK		Gateways > Register gateway
Home Applications Gate	ways	Register gateway Register your gateway to enable data traffic between nearby end devices and the network. Learn more in our guide on III <u>Adding Gateways</u> .
		Does your gateway have a LoRaWAN® Gateway Identification QR Code? Scan it to speed up onboarding. (2) Scan gateway QR code
		Gateway EUI © * 01 01 01 01 01 01 FF FF Confirm To continue, please confirm the Gateway EUI so we can determine onboarding options

(3) 输入 Gateway ID 和 Frequency plan,这里由于我们使用的网关和节点分别是 E870-L470LG11 和 E78-400TBL-02,所以我们 Frequency plan 选择 470 频段。这两个填写完成 后点击最下方的"Register gateway"。

THE THINGS STACK	Gateways > Register gateway
Home Applications Gateways	Register gateway
Q Search Ctrl K	Register your gateway to enable data traffic between nearby end devices and the network. Learn more in our guide on III <u>Edding Gateways</u> .
	Does your gateway have a LoRaWAN® Gateway Identification QR Code? Scan it to speed up onboarding.
	Gateway EULO 81 81 81 81 81 81 FF FF Reset
	Gateway ID © * 470test
	Gateway name ()
	Frequency plan® * China 470-510 MHz, FSB 11 (used by TTN)
	+ Add frequency plan
	Note: most gateways use a single frequency plan. Some 16 and 64 channel gateways however allow setting multiple within the same band. Require authenticated connection ① Choose this option eg. if your gateway is powered by <u>LoRa Basic Station</u>
	Share gateway information Select which information can be seen by other network participants, including <u>Packet Broker</u> Share status within network (0)
	Share location within network \odot
	Register gateway

(4) 完成上述操作即可完成网关的创建,最终界面见下图:

SANDBOX	Gateways > 470test > Gateway overview				
Home Applications Gateways	470test ID: 470test				
earch Ctrl K		General information			
470test		Gateway ID	4781est	🛱 Gateway status •	NOC
Sateway overview		Gateway EUI	01 01 01 01 01 01 01 FF FF		
ive data		Frequency plan	China 470-510 MHz, FSB 11 (used by TTN)		
ocation		Created at	Mar 2, 2025 22:53:06		
Collaborators				This gateway has not made any connection	
eneral settings		Network settings		attempts yet.	
		Require authenticated connection ()	O Disabled	If you have recently registered this gateway, please wait for a few moments to allow the gateway to connect. Otherwise	
ttenniys T		Public status ①	© Enabled	please refer to our III gateway troubleshooting documentation.	
		Public location ()	© Enabled		
		Packet Broker forwarding ()	© Enabled		
		Status location updates 🕢	O Disabled		
		Enforce duty cycle ③	@ Enabled		
					Mar.
				Cocation	мар →
				No location yet	
				There is no location data available	
				@ Set up a location	

(1) 点击 "+Add application"来创建生产节点的界面:

	Ð	Applications > List			+ Add	 ☆
Home Applications G	Seteways	Applications (1)	Search applications		+ Add application	
Q, Search	Ctd K	NAME AND D :		DEVICES	CREATED IN	
Top applications	+	-				

(2) 输入 "Application ID" (这里 ID 随便输入一个没有被使用的就行) 后点击最下方的 "Create application"。

	Applications > Create application	
Home Applications Gateways		Create application
Q Search (Dr)		Within applications, you can register and manage end devices and their network data. After setting up your device fleet, use one of our many integration options to pass relevant data to your external services.
Top applications		
		Application ID * ##Thisduada
		Application name Mg new application
		Description Description Description
		Optional application descriptions can also be used to save notes about the application
		Create application

(3) 按照上述步骤创建完成界面如下:

THE THINGS STACK	Ð	Applications > MpStation overview	Add N
Home Applications	Gateways	ffffadada @ http: 10: ffffadada	recen
Q. Search	CH K		
← fffffsadsada		End devices Top end devices Recently active All	
St Application overview			
End devices Live data			
Payload formatters	~	No top devices yet	
☆ Integrations	~		
R Collaborators		+ Register and divice	
D API keys			
No top end devices yet	+		
		12 Latest decoded payload See in two data -	
		No recent activity No location yet There haven't been any upfields recordly in this application There is no location data available	

(4) 在 End devices 界面中配置节点,选择 End devices,点击右上角的 "+Register end

device"进行创建:										
	Ð	Applications > fffffsadsada > End devices					+ Add 🗸 🏠			
Home Applications Gate	eways	fffffsadsada 10: fffffsadsada					R No recent activity			
Q, Search	CH K		End devices (0)		Search	Import end devices	+ Register end device			
+ mmsadsada			NAME AND ID 0		DEVEL	JONEU	LAST ACTIVITY 3			
C Application overview				No items found						
Live data Payload formatters	÷									

(5)节点工作频段、LoRaWAN协议、ID 和密钥等数据选择和生成,完成下图信息填写 后点击最下方的"Register end device"完成生成。

λ Search	Ctrl K	Register end device Does your end device have a LoRaWAN® Device Identification QR Code? Scan it to speed up onboarding.
ffffsadsada		Scan end device QR code II <u>Device registration help</u>
Application overview		End device type
End devices		Input method \odot
Live data		Select the end device in the LoRaWAN Device Repository
Payload formatters	v	Enter end device specifics manually
Integrations	~	Frequency plan () *
Collaborators		China 470-510 MHz, FSB 11 (used by TTN)
API keys		LoRaWAN version ②* 相握你院的艺术会来的进行选择。这田/UNI
General settings		LoRaWAN Specification 1.0.2 字形-400TBL-02参数进行配置说明
top end devices yet	+	Regional Parameters version () *
		RP001 Regional Parameters 1.0.2 revision B
		Provisioning information
		JoinEUI③* 86 69 69 68 68 68 69 AA Reset 随意能输入
		JoinEUI [®] * 98 88 89 89 88 88 AA Reset This end device can be registered on the network
		JoinEUI©* 68 99 99 69 99 99 AA Reset This and device can be registered on the network DevEUI©* 79 83 D5 7E 09 66 EA 36 ③ Generate AppKey©* F8 11 89 45 7E 81 F3 3C 7B 37 13 C7 90 A2 2B A9 ③ Generate
		JoinEUIO* 66 96 96 96 96 96 96 96 9A R Reset This and device can be regulared on them network DevEUIO* 79 83 D5 7E D9 66 EA 36 C Generate 2/50 used AppKeyO* F8 11 89 45 7E B1 F3 3C 7B 37 13 C7 90 A2 2B A9 C Generate End device ID O*
		JoinEUU ^(0, *) 66 6 96 96 66 96 96 96 AA Reset This end device can be registered on the network DevEUI ^(0, *) 78 B3 D5 7E D9 66 EA 36 C Generate 2/50 used AppKey ^(0, *) F8 11 99 45 7E B1 F3 3C 7B 37 13 C7 90 A2 28 A9 C Generate End device ID ^(0, *) 470test
		JoinEUI©* 196 99 99 96 99 99 90 AN Reset The end device can be registered on the network DevEUI©* 79 B3 D5 7E D9 96 EA 36 C Generate 2/50 used AppKey©* F8 11 99 45 7E B1 F3 3C 7B 37 13 C7 90 A2 2B A9 C Generate End device ID©* 470test After registration
		JoinEUIO* Be de de de de de de AA Reset This end device can be registered on the network DevEUIO* 79 B3 D5 7E D0 66 EA 36 ② Centerate 2/50 used AppKey ©* FB 11 69 45 7E B1 F3 3C 7B 37 13 C7 90 A2 2B A9 ③ Generate End device ID ©* 470 test After registration ④ View registration ④ View registration

(6) 完成上述操作后最终节点界面如下图:

THE THINGS STACK	F	Applications > fffffsadsada > End devices > 470test > Dr	nice overview			
Home Applications	Gateways	470test ID: 478test				
Q. Search	Ctrl (K)	28 Device overview	8₽ Live data	↑↓ Messaging	Location	2 Payload formatters
← fffffsadsada						
28 Application overview			End device info	Device repository →	(-) Latest decoded payload	See in live data
End devices						
E Live data						
Payload formatters	~		470test		No recent ac There haven't been any uplinks re	tivity cently in this application
A Integrations	~		This end device is o	urrently not part of our Device Repository		
8 Collaborators						
🖉 API keys						
General settings						
Top end devices	+		General information		O Location	Мар →
@ 470test			End device ID	470test		
			Frequency plan	China 470-510 MHz, FSB 11 (used by TTN)		
			LOD WALL MARRISON	LoP-WAN Specification 10.2		
				control operation fine		
			Regional Parameters version	RP001 Regional Parameters 1.0.2 revision B		
			Created at	Mar 2, 2025 23:17:32		
			Activation information		No location	i yet
			AppEUI	AA 98 99 99 99 99 99 99 99 99		
			DevEll	78 55 D5 7F D8 05 F4 35	@ Set up a loc	ation
			АррКеу			
			Session information			
			This device has not joined the network yet			

二、 使用 E78 节点+E870 网关接入 TTN

1、E870 网关参数配置

(1) 在保证网关有网的情况下,使用电脑连接网关 WiFi 后,打开浏览器输入 192.168.10.1,进入网关网页配置界面(用户名以及密码默认为 root)。

$\leftarrow \rightarrow \circ$	O & 192.168.10.1/cgl-bin/lucl/			☆ ♡ ± O ≙ =
0.00 (2000 menance)	EBYTE LORAWAN GATEWAY			ла н и 7
状态 ^ 925 取6日8	状态			
11879年 系统 ~	网络			
服务 × LoRaWAN 网络设置 ×	10% 10%20 DHCP 10%20 10%21 (10%38 79%00%25%25%50 10%21 (2%38.3.1)	4 138	IPAG 138 INRE DHCP+6 66-98 IREE 240x395/758x2270wc73m6/t1864x/54 IREE 540x345/bHTR66x255 DMS 1160x245-bHTR664x255	
通出	95800062 2015 5000 15 255302 (0) 0.45 2016 2016 2017 2016 1000 27 2016 2016 2016 MAC 1004 725 158 8.00 2016		21 (BR: 559 VIAN: 1480.2* MAC (BL: 72AC7351388AC	
	国际管理		149 / 16384 (06)	
	已分配的 DHCP 租约			
	tHS	iPod Rik	MAC RIE	用余聪明
	已分配的 DHCPv6 租约 18 DESTOPJIABANS	1944 1844 1616/852/1700.564/128	D00 00100124605400000	Redata 10:598-325
	无线 應 MAGA221 002.110pn 應 11.242.040		nded	
	# 590-11.100-2008 805 (Mathian 8050) 724(2)1-8048 8050 124(2)1-8048 8050 124(2)1-8048			
	已连接站点			
	1415	MAC RM ±4	信号/編件	据收回单/ 发发回单

(2) LoRaWAN 网关设置中输入 TTN 服务器中提前设置的网关参数,参数输入后点击保存并应用即可。

THE THINGS STACK	•	Gateways > 47	Otest > General settings			
Home Applica	ations Gateways	470test				
Q Search	Ctrl K					
← 470test				Basic settings General settings, gateway updates and metadata		
🗂 Gateway overview						
Live data				Gateway ID 🗇 *		
D Location				470test		
& Collaborators				Gateway EUI 💿		
API keys				01 01 01 01 01 FF FF		
General settings				Gateway name ()		
•				My new gateway		
Top gateways	+			ny nen gateria)		
A70test				Gateway description ${}^{\oslash}$		
				Description for my new gateway		
				Optional gateway description; can also be used to save notes about the gateway		
				Gateway Server address		
				au1.cloud.thethings.network		
				The address of the Gateway Server to connect to		
				Require authenticated connection ①		
				Enabled		
				Controls whether this gateway may only connect if it uses an authenticated Basic Station or MQTT connection		
				LoRa Basics Station LNS Authentication Key		
				The Authentication Key for Lora Basics Station LNS connections. This field is ignored for other gateways.		
← → C 0	A 192.168.10.1/cgi-bin/luci/admin/li	arawan/network			습	ම ප් 0 කි ≣
010 2/08 concres	EBYTE LORAWAN GATEV					
状态 ~ 系统 ~	LoRaWAN 网关设置	Ē.				
服务 ~						
LoRaWAN 网络设置 へ	100	RHD	010101010101/FFFF			
LoftaWAN PEX 22		服务器地址	au1.cloud.thethings.network			
网络 ~		服务器上行第口	1700			
退出		副外級下行第四	1730			
		电空相时时间	100			
		(統計阿陽(形)	10			
		W2552R	转发正确的服文 。			
						944 MQ

(3) 几十秒后可看到网关的 LINK 灯亮, 这时打开 TTN 服务器查看网关状态, 可见网关已连上服务器。

	Gateways > 470test > Gateway overview					+ Add 🗸 🖄 🗸 🖨 🖉 🖉 👘 📾 🕅 🕲
Home Applications Gateways	470test ID: 470test					🕫 Last activity 21 seconds ago 🔹 14.0 up / 0 down
Q Search Col K						
-		General information		🚔 Gateway status •	NOC	-
4/Diest		Gateway ID	478test			
a Gateway overview		Gateway EUI	91,91 01 01 01 01 01 77 77	30 day uptime 🔾	Roundtrip times (ms) 🕢	
E Live data		Erecurrony of the	China 470,510 Miles ESE 11 Grand by TTM	Only admins have access to uptime	No data available	
D Location		reduced bus			This gateway doesn't have recent downlinks and	
A Collaborators		Created at	Mar 2, 2025 22:53:06		cannot display the roundtrip time.	

2、E78节点参数配置

(1) E78 节点设备通过 USB 连接电脑后,打开 TTN 服务器网页,找到配置好的节点参数,打开串口助手,通过 AT 指令配置 AppEUI, DevEUI 以及 AppKey 参数。



	串口调试助手			(上) (L) (L) (L) (L) (L) (L) (L) (L) (L) (L
串口设置	数据日志			UartAssist V5.0.14 🗇 🗘
串口号 COM5 #USI ▼ 波特案 9600 ▼ 数据位 8 ▼ 停止位 1 ▼	[2025 00 00 00 00 00 100] ASCII/29 >>> AT+CDEVEUI=70083067ED006EA36			۵
校验位 NONE 流控制 NONE	[2025-03-02 23:32:36.346]# RECV ASCII/6 <<<			
关闭 接收设置	12025-03-02 23:33:03.172]# 5B1D ASCII/29 >>> AT+CAPPENT=000000000000AA			
 ◆ ASCII ○ HEX ▽ 按日志模式显示 ▽ 接收区自动换行 □ 接收数据不显示 	[2025-03-02 23:33:03.293]# RECV ASCII/6 <<<			
□ 接收保存到文件 自动滚屏 <u>清除接收</u> 自动应答 占数打算	10000 00 02 20-00-21 10130 0000 X0022/40 //// AT+CAFFKEY-F61100457ED1F30C783713C790A22BA9			
<u>批留发送 校验计算</u> 数据波形 男面主题 ASCII/表 更多工具	[2025-03-02 23:33:21.924]# RECV ASCII/6 <<< OK			
发送设置				*
○ FILE #传輸文件 ✓ 自动解析转义符 ③ ✓ 自动发送附加位 ✓ 循环周期 1000 ms 快振指令 历史发送	数据发送 1.DCD ◆ 2.RXD 3.TXD <u>4.DTR</u> ◆ 5.GXD 6.DSR◆ <u>7.F</u> AT+CAPPKEY=F61109457EB1F33C7B3713C79DA22EA9	<u>TS</u>	9. RI 🗣	「有除 1 有除 【 有除 【 有除 【 支送
(♂ 就绪!		5/7	RX:53	TX:158 夏位计数

(2)当 E78-470LN22S 参数配置完成后,发送入网指令 AT+CJOIN=1,0,10,1,回复

JOIN:OK,即入	网成功。						
 ✓ 接收区目动拱行 厂 接收数据不显示 厂 接收保存到文件 自动滚屏 清除接收 	[2025-03-02 23:36:57.7 AT+CJOIN=1, 0, 10, 1	783]# SEND ASCII/19 >>	2				
自动应答 点發打宽 批量发送 拉验计算 数据波形 男面主题 ASCII/表 更多工具	[2025-03-02 23:36:57.6 0K [2025-03-02 23:37:03.0	86]# RECV ASCII/6 <<< 24]# RECV ASCII/11 <<	<				
 	数据发送 1. DCD ● 2.	RXD 3.TXD <u>4.DTR</u> •	5. GND 6. DSR 🏶	<u>7. RTS</u> ♦ 8. CTS ♦	9. RI 🏶	₹	除 た 清除 发送
# 就绪!				9/9	RX:89	TX:196	复位计数

服务器中节点显示如下:

THE THERE STACK	Ð	Applications > fffflsadsada > End devices > 470test > D	evice overview				사내 - 전 - 전
Home Applications	Gateways	470test ID: 470test				R Last activity 1 n	ninute ago 🔹 14 n/a up / n/a down
Q Search	CH K	98 Device overview	87 Live data	12 Messaging	Location	Payload formatters	③ Sattings
e mmsadsada							
\$8 Application overview			End device info	Device repository	(-) Latest decoded payload	See in live data	
Dind devices					SOURCE: LIVE DATA	Received 1 min. ago	
E Live data			470test				
2 Payload formatters	~		This end device is cu	device is currently not part of our Device Repository #0 0dBm	- 13	0 8	
A Integrations	~		08 0dB #0 0dBm				
2 Collaborators							
P API keys							
General settings							
Top end devices	+		General information		Ocation	Map	
470test			End device ID	479test			
			Frequency plan	China 470-510 MHz, FSB 11 (used by TTN)			

此时可通过指令"AT+DTRX=1,1,10,31323334353637383930"发送数据测试通信是否正常, 如返回下图结果则通信正常。



到此已完成 LoRaWAN 节点模块和 LoRaWAN 网关接入 TTN 服务器建立 LoRaWAN 网络。