ND65 LoRaWAN Gateway User Manual

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This symbol indicates the presence of danger that may result in severe injury or death and permanent equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.



This symbol indicates the potential of personal injury or equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.

Failure to observe the following instructions may result in severe injury or death and/or equipment damage.

- Installation, operation and maintenance of the device should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices.
- Ensure that all power sources are turned OFF before performing any work on the device.
- Under no circumstances should the meter be connected to a power source if it is damaged.
- > To prevent potential fire or shock hazard, do not expose the device to rain or moisture.
- Setup procedures must be performed only by qualified personnel familiar with the instrument and its associated electrical equipment.

Table of Contents

Chapter 1 Introduction	1
1.1 Overview	1
1.2 Typical Application	1
1.3 Front Panel LED Indicators	2
1.4 Rear Panel	2
Chapter 2 Installation	3
2.1 Package List	3
2.2 Dimensions	3
2.3 Mounting	3
2.3.1 Install SIM Card	3
2.3.2 Wiring Ethernet Cable & Power Cable	4
2.3.3 Install the Antenna (optional)	4
2.3.4 Mounting the ND65	4
Chapter 3 Configure Device via Web Server	6
3.1 Web Accessing	6
3.1.1 Wireless Access	6
3.1.2 Wired Access	6
3.2 Network Connection	8
3.2.1 Ethernet Connection	8
3.2.2 Wi-Fi Connection	8
3.2.3 Cellular Connection1	.0
3.3 Packet Forwarder Configuration1	1
3.4 Configure ND65 as a Network Server1	15
Chapter 4 An Application Example1	19
4.1 PMC-350-C device setup	19
4.2 ND65 Gateway Configuration2	20
4.3 Troubleshooting	25
Contact us	27

Chapter 1 Introduction



1.1 Overview

The ND65 is a robust 8-channel indoor LoRaWAN[®] gateway, adopting SX1302 LoRa chip and highperformance quad-core CPU, it supports more than2000 nodes connection. The ND65 has a line of sight of up to 10km and can cover about 2km in urbanized areas, ideally suited for smart offices, smart buildings and many other indoor applications. In addition to supporting multi-backhaul backups with Ethernet, WiFi and cellular, the ND65 is compatible with popular network servers. It has an integrated network server and Milesight IoT Cloud for easy deployment.

The following are the main features of the ND65:

- Industrial, Commercial and Utility Substation Metering
- Building, Factory and Process Automation
- Sub-metering and Cost Allocation

1.2 Features

- Quad-core industrial processor with large memory
- Equipped with SX1302 chip, handling a higher amount of traffic with lower consumption
- 8 half/full-duplex channels
- IP65 enclosure and industrial design for parts of outdoor applications
- Desktop, wall or pole mounting (optional)
- Multi-backhaul with Ethernet, cellular (4G/3G) and WiFi
- DeviceHub and Milesight IoT Cloud provide easy and centralized management of remote devices
- Enable security communication with multiple VPNs like IPsec/OpenVPN/L2TP/PPTP/DMVPN
- Compatible with mainstream network servers like TTN, ChirpStack, etc.
- Built-in network server and MQTT/HTTP/HTTPS API for easy and quick deployment
- Embedded Python SDK for users' secondary development

1.3 Typical Application



1.4 Front Panel LED Indicators

There are six LED indicators on the Front Panel as described in the table below.

Indicator	Color	Status	Description			
	Plue	Off	Power is off			
POWER	вше	On	Power is on			
CTATUS	Blue	On	The device is running normally			
STATUS	Red	On	The device is running abnormally			
LoPo	Pluo	On	Packet Forwarding mode is enabled			
LUKd	вше	Off	Packet Forwarding mode is disabled			
\A/:F:	Plue	On	WiFi is enabled			
VVIFI	Diue	Off	WiFi is disabled			
	Blue				Off	SIM card is registering or fails to register, or no SIM cards are inserted
ITE		Blinking slowly	SIM card has been registered and is ready for dial-up			
(Cellular)		Blinking rapidly	SIM card has been registered and is dialing up now			
		On	The SIM card has been registered and dialed up successfully			
ETH	Dive	Off	Disconnected			
(Ethernet Port)	війе	On	Connected			

1.5 Rear Panel



The following steps describe how to reset the ND65 using the **Reset** button:

- 1. When the LED indicators are all **On** (the LTE and ETH would be off if the Cellular and Ethernet are not equipped), press and hold on the **Reset** button for more than 5 seconds.
- 2. Release the **Reset** button when the LED indicators blink.
- 3. When the LED indicators are all On again, the reset operation is completed, and the ND65 is reset to factory default.

Chapter 2 Installation

2.1 Package List

Before mounting the ND65, please check the package contents to ensure you have received all the items below.



Steps:

- a. Use a screwdriver to open the protective cover on the rear panel of ND65.
- b. Insert the SIM card into the device according to the direction icon on the device (see figure below).
- c. To take out the SIM card, push in the SIM card, and it will pop up automatically.

Notes:

1) The ND65 does not support hot plugging, and please turn off the power before inserting or taking off the SIM card.



2.3.2 Wiring Ethernet Cable & Power Cable

Notes:

1) Do not connect the power before the Ethernet cable is connected correctly. Otherwise, PoE devices or Gateway may be damaged.



Steps:

- 1. Connect the Ethernet cable and power cable to the Ethernet Port and Power Supply port, respectively.
- 2. Pass two cables through the waterproof silicone and slid into the grooves.
- 3. Screw the protective cover back to the device.

2.3.3 Install the Antenna (optional)

Rotate the antenna into the antenna connector accordingly. The external antenna should always be installed vertically on a site for good signal status.



Notes:

1) Please do not let the front panel of the ND65 faces to walls if using an embedded LoRa antenna.

2.3.4 Mounting the ND65

The ND65 can be mounted to a wall or a pole. Before the installation, please make sure that the SIM card has been inserted, the antennas have been attached, and all cables have been installed properly.

2.3.4.1 Wall Mounting

- 1. Before installation, make sure that the desired position is marked.
- 2. Drill four 32 mm-depth holes with a 6 mm drill.
- 3. Insert four wall plugs into the holes respectively.
- 4. Install the mounting bracket horizontally to the wall and secure it using the wall mounting kits.
- 5. Secure the bracket fixing screws to the device's back panel, then hang the device to the mounting bracket on the wall.



2.3.4.2 Pole Mounting

- 1. Open the hose clamp by turning the locking mechanism counterclockwise.
- 2. Straighten the hose clamp, and slide it through the rectangular rings in the mounting bracket, and wrap the hose clamp around the pole.
- 3. Use a screwdriver to tighten the locking mechanism by turning it clockwise.



4. Screw the bracket fixing screws to the device's back panel, then hang the device to the mounting bracket on the pole.



Chapter 3 Configure Device via Web Server

3.1 Web Accessing

The default IP addresses of the ND65's Ethernet Port and WIFI are 192.168.23.150 and 192.168.1.1, respectively.

3.1.1 Wireless Access

- 1. Power on the ND65.
- 2. Enable Wireless Network Connection on your computer and search for access point "Gateway_******" to connect it.
- 3. Open a Web browser on your PC (Chrome is recommended) and type the IP address 192.168.1.1 to access the web page.
- 4. Enter the username and password, and click "Login".
 - o Username: admin
 - Password: password

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.



3.1.2 Wired Access

- 1. Setting PC's IP Address
 - a) To determine the PC's IP Address, click the Start icon [■], then the Settings button ^③ on Windows 10 (for other MS Windows systems, please refer to this <u>link</u> for more instructions).

			W	/indows Settings				
			Find a setting	g	Q			
旦	System Display, sound, notifications, power	Devices Bluetooth, printers, mouse		Phone Link your Android, iPhone		Network & Internet Wi-Fi, airplane mode, VPN	Ę	Personalization Background, lock screen, color:



b) Click (Network & Internet, select Change adapter options and then find the appropriate Ethernet connection.

$\rightarrow \rightarrow \cdot \cdot$	↑ 🦉 > Control Panel > Netv	vork and Internet > Network Co	onnections		
Organize 🔻	Disable this network device	Diagnose this connection	Rename this connection	View status of this connection	Change settings of this connection
		Ethernet		Wi-Fi	
		IBD-Wifi-5G		Not connected	

Figure 3-2 Network and Sharing Center

c) Right-click on it and select **Properties**. Then double-click on **Internet Protocol Version 4** (TCP/IPv4) to show its IP configuration.

letworking Shanng		General	
Connect using:		You can get IP settings assigned	automatically if your network supports
Realtek PCIe GBE Family Controller		this capability. Otherwise, you n for the appropriate IP settings.	eed to ask your network administrator
This connection uses the following items:	Configure	Obtain an IP address autor	natically
Client for Microsoft Networks	•	Use the following IP address	35:
File and Printer Sharing for Microsoft Network	works	IP address:	192 . 168 . 1 . 100
☑ 🐙 QoS Packet Scheduler		Subnet mask:	255.255.255.0
Internet Protocol Version 4 (TCP/IPv4) Internet Protocol Ve	rotocol	Default gateway:	192.168.1.1
Internet Protocol Version 6 (TCP/IPv6)	~	Obtain DNS server address	automatically
<	>	Use the following DNS serv	er addresses:
	Properties	Preferred DNS server:	192.168.1.1
Install Uninstall	1 top citize		
Install Uninstall Description Allows your computer to access resources on a	Microsoft	Alternate DNS server:	· · ·

- 2. Accessing Web Interface
 - a) Enter the IP Address of the ND65 (e.g.: https://192.168.1.23) in the Address area of **Google Chrome** and then press **<Enter>**.
 - b) The user must log in to the Web interface to view data or change setup parameters.
 - o Username: admin
 - Password: password

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

3. Changing password. After logging into the web, it's suggested that you change the password for the sake of security.

1 LoRa Antenna Type	2 Change Password
Step 1: Choose Your LoRa Antenna Type Please confirm whether your device uses external ant	ennas or not, which will affect your product signal.
	External Antenna
SKip	Next

4. You can check overview of the system information.

LoRaWAN

Status	Overview Cellul	ar Network	WLAN VPN	Host List	Notes:
Packet Forwarder	System Information				Region: LoRa Bands
	Model	ND65-L04EU	-868M-EA		 Uptime: normal operating time
Network Server	Region	EU868			since the ND65 is switch on
Network 🕨	Serial Number	6221B058384	40		RAM: Random Access Memory
	Firmware Version	60.0.0.37			• Emmc: Embedded Multi Media
System •	Hardware Version	V1.1			Card
	Local Time	2022-09-05 1	0:48:03 Monday		
Maintenance >	Uptime	12days,20:26	:10		
APP >	CPU Load	12%			
	RAM (Capacity/Available)	512MB/54ME	8(10.55%)		
	eMMC (Capacity/Available)	3.0G/2.8G(90	0.71%)		

3.2 Network Connection

This section explains how to connect the Gateway to network via Ethernet port, WiFi or cellular.

3.2.1 Ethernet Connection

1. Click **Network > Interface > Port** on the left hand, and the following page allows users to select the connection type and configure the Ethernet port information.

- Port_1	
Port	eth 0
Connection Type	Static IP 🗸
IP Address	192.168.1.150
Netmask	255.255.255.0
Gateway	192.168.1.1
MTU	1500
Primary DNS Server	8.8.8.8
Secondary DNS Server	114.114.114.114
Enable NAT	

Notes:

- 1) MTU: Maximum Transmission Unit, the largest size frame or packet in bytes or octets (eight-bit bytes) that can be transmitted across a data link. Range: 46-1500. Default: 1500.
- DNS Server: Domain Name Server. A DNS server is a computer server that contains a database of public IP addresses and their associated hostnames. In most cases, it resolves or translates those names to IP addresses as requested.

The Primary and Secondary DNS servers are used if one of them happens to fail, in which case the second is used to resolve the hostnames you enter.

- 3) Enable NAT: (Network Address Translation), mapping an internet protocol (IP) address to another by changing the header of IP packets while in transit via a router.
- 2. Click Save & Apply and the changes will take effect immediately.
- 3. Connect the ND65 to a router or a modem via the Ethernet port.
- 4. Log in to the web page via the newly assigned IP address and click **Status > Network** to check the Ethernet port status, where **up** represents the Ethernet Port is enabled.

	Overview	Cellular	Network	WLAN	VPN	Host List			
D	WAN								
	Port	Status	Туре	IP Addre	iss	Netmask	Gateway	DNS	Duration
	eth 0	up	Static	192.168.1	.150	255.255.255.0	192.168.1.1	8.8.8.8	4days,29m 51s

3.2.2 WiFi Connection

- 1. Click **Network > Interface** on the left hand and click **the WLAN** tab.
- 2. Click Scan to search for the WiFi access point.

Notes:

- 1) SSID: Service Set Identifier, is the identifier (name) that tells you which service set (or network) to join.
- 2) BSSID: Basic Service Set Identifier, and it's the MAC physical address of the access point or wireless router that is used to connect to the WiFi.

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Status	Port	WLAN	Cellular	Loopback	VLAN Trunk
Packet Forwarder	WLAN				
Network Server	Enable Work Mode		✓	~	Scan
Network 👻	SSID		Gateway	y_F1639F	
Interface	BSSID Encryption N	lode	08:f4:58	:23:56:d1	•
Firewall	IP Setting				
DHCP	Protocol		Static IF	> v	·
DDNS	IP Address Netmask		192.168	.8.196	
Link Failover	Gateway		192.168	.8.1	
VPN	Save				
System 🕨					
Maintenance					

3. Select one WIFI and click Join Network.

< GoBack							
SSID	Channel	Signal	Cipher	BSSID	Security	Frequency	
APP-TEST	Auto	-80dBm	AES	d0:c7:c0:e1:e1:40	WPA-PSK/WPA2- PSK	2437MHz	Join Network
OPPO Reno4 5G	Auto	-69dBm	AES	7e:71:14:d9:28:b8	WPA2-PSK	2462MHz	Join Network
TP-LINK_35F632	Auto	-72dBm	AES	30:b4:9e:35:f6:32	WPA-PSK/WPA2- PSK	2412MHz	Join Network
CET	Auto	-72dBm	AES	44:67:47:40:85:20	WPA-PSK/WPA2- PSK	2462MHz	Join Network
chinwu	Auto	-72dBm	AES	8e:a1:67:a0:17:da	WPA2-PSK	2437MHz	Join Network
DIRECT-3NCHANGm sYZ	Auto	-66dBm	AES	36:f6:4b:4c:1a:ee	WPA2-PSK	2442MHz	Join Network
CET	Auto	-76dBm	AES	44:67:47:40:ad:80	WPA-PSK/WPA2- PSK	2437MHz	Join Network
ZYSOF	Auto	-75dBm	AES	18:31:bf:4a:d0:d8	WPA2-PSK	2412MHz	Join Network
TP-LINK_5CA1	Auto	-69dBm	Auto	74:05:a5:51:5c:a1	No Encryption	2412MHz	Join Network

4. Type the key of WiFi and click **Save**.

Enable		
Work Mode	Client	 ✓ Scar
SSID	CET	
BSSID	44:67:47:40:85:20	
Encryption Mode	WPA-PSK/WPA2-PSK	~
Cipher	AES	~
Кеу		
IP Setting		
Protocol	Static IP	~
IP Address	192.168.8.196	
Netmask	255.255.255.0	
Gateway	192.168.8.1	

5. Click **Status > WLAN** to check WiFi connection status, where **Enabled** represents the ND65 is connected to the specified WiFi successfully.

Status	Overview	Cellular	Network	WLAN	VPN	Host List	
Packet Forwarder	WLAN Status						
Network Server	Wireless Status MAC Address		Enabled 24:e1:24:f1:63:9f				
Network •	Interface Type			Client			
	SSID			Mobile WiFi			
System >	Channel			Auto			
	Encryption Type			No Encryption			
Maintenance >	Status			Disconnected			
APP	IP Address			0.0.0.0			
	Netmask			0.0.0.0			
	Connection Duration	1		12 days, 23:53:57			

3.2.3 Cellular Connection

- 1. Click **Network > Interface > Cellular** on the left hand and click the **Client** tab.
- 2. Enable the **Cellular** and fill in SIM card information like APN or PIN code.

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Port	WLAN	Cellular	Loopback	VLAN Trunk
Cellular S	etting			
Enable				
Network Ty	ype	Auto		~
APN				
Username				
Password				
Access Nu	imber			
PIN Code				
Authentica	tion Type	Auto	•	~
Roaming				
SMS Cente	er			
Connectio	on Setting			
Enable NA	π	<		
Restart Wr	nen Dial-up failed			
ICMP Serv	/er	8.8.8.8		
Secondary	ICMP Server	114.114.1	114.114	
ICMP Dete	ection Max Retries	3		
ICMP Det	ection Timeout	5		s
ICMP Det	ection Interval	15		s
SMS Sett	tings			
SMS Mod	le	PDU		~

- 3. Click Save.
- 4. Click **Status > Cellular** to check the WiFi connection status.

3.3 Packet Forwarder Configuration

The ND65 can function as a gateway and forward LoRaWAN data to the third party's LoRaWAN network servers. Here illustrates how to configure ND65 as a gateway.

1. Click **Packet Forwarder > General** on the left hand, and the following page appears.

Status		General	Radios	Advanced	Custom	Traffic		
Packet Forwarder		General Setting						
Network Server		Gateway EUI Gateway ID		24E124FFF				
Network	۲	Frequency-Sync		Disabled	~			
System	•	Multi-Destination Connect Status		Connected				
Maintenance	F		ID	Enable		Type	Server Address	Operation
APP	•		0	Enabled		Embedded NS	localhost	
								H

Notes:

1. Gateway EUI: The EUI of the Gateway is derived from the first number, typically of the form **58A0CBxxxxxx**, printed on the top of the sticker below the QR code. For example, if that

number is **58A0CB800BE7**, insert **FFFE** after the first 6 characters to make it a 16-character Gateway EUI (e.g., 58A0CBFFFE800BE7).

2. Click + to add a network server.

Enable	
Туре	Semtech ~
Server Address	eu1.cloud.thethings.network
Port Up	1700
Port Down	1700

3. Go to **Packet Forwarder > Radio** page to configure **Antenna Type**, **Center Frequency** and **Channels**. The channels of the gateway and network server should be consistent.

Click Save & Apply after the configuration.

General	Radios	Advanced	Custom	Traffic	
Antenna Type					Π
	Interna	l Antenna		External Ante	enna
		 ○ 		je 1.	
Radio Channel	Setting				
Supported Freq			EU868	~	
			No	ise Analyzer 👻	
	Nam	e		Center Freque	ency/MHz
	Radio	0		867.5	
	Radio	01		868.5	

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Multi Channels Sett	ing			
Enable	Index	Radio		Frequency/MHz
	0	Radio 1	~	868.1
	1	Radio 1	~	868.3
	2	Radio 1	~	868.5
	3	Radio 0	~	867.1
	4	Radio 0	~	867.3
	5	Radio 0	~	867.5
	6	Radio 0	~	867.7
	7	Radio 0	~	867.9
LoRa Channel Setti	ing			
Enable	Radio	Frequency/MHz	Bandwidth/kHz	Data Rate
	Radio 1	✔ 868.3	250KHZ 🗸	SF7 ~
FSK Channel Settir	ıg			
Enable	Radio	Frequency/MHz	Bandwidth/kHz	Data Rate
	Radio 1	✔ 868.8	125KHZ 🗸	50000
Save & Apply				

Notes:

- 1. The following ISM Bands are supported on the ND65: N865/RU864/EU868/US915/AU915/KR920/AS923-1/2/3/4
- The table below lists the supported ISM Bands and the corresponding channel assignments.

ISM Band	Channel (MHz)
EU433	433.175, 433.375, 433.575, 433.775, 434.065, 434.265, 434.465, 434.665
CN470	471.9, 472.1, 472.3, 472.5, 472.7,472.9, 473.1, 473.3 (8~15)
EU868	868.1, 868.3, 868.5, 867.1, 867.3, 867.5, 867.7, 867.9
IN865	865.0625, 865.4025, 865.6025, 865.985, 866.185, 866.385, 866.585,
	866.785
RU864	868.9, 869.1, 869.3, 867.3, 867.5, 867.7, 867.9, 868.1
AU915	916.8, 917, 917.2, 917.4, 917.6, 917.8, 918, 918.2 (8~15)
US915	903.9, 904.1, 904.3, 904.5, 904.7, 904.9,905.1, 905.3 (8~15)
KR920	922.1, 922.3, 922.5, 922.7, 922.9, 923.1, 923.3, 923.5
AS923	923.2, 923.4, 922, 922.2, 922.4 ,922.6, 922.8 ,923

4. Set advanced parameters via the Advanced tab, and then click Save & Apply.

General	Radios	Advanced	Custom	Traffic
Beacon Setting				
Beacon Period		0	~	s
Beacon Freq		869525000		Hz
Beacon Datarate		SF9	~	
Beacon Channel N	umber	1	•	
Beacon Freq Step		200000		Hz
Beacon Bandwidth		125000	~	Hz
Beacon TX Power		14		dBm
Intervals Setting				
Keep Alive Interval		10		s
Stat Interval		30		s
Push Timeout		100		ms
Forward CRC Set	tting			
Forward CRC Disa	bled			
Forward CRC Error	r			
Forward CRC Valid	I			
Save & Apply				

5. Click **Traffic** to view ND65's data communication, where **up** represents uplinks while **down** means downlinks.

Datarate: the rate at which data is transferred from one place to the other

Coderate: the proportion of the data-stream that is useful

RSSI: Received Signal Strength Indicator

SNR: Signal Noise Ratio

	General	Rad	dios	Advanced	Custom	Traffic			
I	Traffic Se Refre	tting sh	Clear						
	Rfch	Direction	Time	Ticks F	requency	Datarate	Coderate	RSSI	SNR
	1	up	06:57:35	343605977 9	868.5	SF7BW125	4/5	-54	11.8
	1	up	06:57:31	343205982 5	868.3	SF7BW125	4/5	-54	13.5
	1	up	06:56:47	338804979 4	868.1	SF7BW125	4/5	-55	13.2
	1	up	06:56:43	338403383 6	868.3	SF7BW125	4/5	-54	13.8
	1	up	06:56:39	338002362 3	868.1	SF7BW125	4/5	-54	13.8
	1	up	06:56:35	337606047 0	868.1	SF7BW125	4/5	-54	13.8

3.4 Configure ND65 as a Network Server

The ND65 can function as a network server, retrieve node data, and then transmit data to other cloud platforms.

1. Click **Packet Forwarder > General** on the left hand and make sure the embedded network server is enabled.

Status		General	Radios	Advanced	Custom	Traffic		
Packet Forwarder		General Setting						
Network Server		Gateway EUI Gateway ID	2	4E124FFF				
Network	•	Frequency-Sync	[Disabled	~			
System	•	Multi-Destination	C	onnected				
Maintenance	•		ID	Enabl	0	Type	Server Address	Operation
APP	.		0	Enable	ed	Embedded NS	localhost	
								(H)

- 2. Click **the Radio** tab to configure **Antenna Type, Center Frequency** and **Channels**. Please refer to Packet-Forwarder Configuration.
- 3. Click **Network Server > General,** and enable the network server mode.

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General	Applications	Profiles	Device	Multicast Groups	Gateway Fleet	Packets
General Setting						
Enable						
Cloud Mode						
NetID	010203					
Join Delay	5		sec			
RX1 Delay	1		sec			
Lease Time	8760-0-0		hh-mm-ss			
Log Level	info	~				
Global Channel	Plan Setting					
Channel Plan	EU868	~				
Channel						
Additional Chan	nels					
Fre	quency(MHz)		Min Datarate		Max Datarate	Operation
						Ŧ

4. Click the **Application** tab to add a new application.

General	Applications	Profiles	Device	Multicast Groups	Gateway Fleet	Packets
Applicati	ons	-				
Name		MQTTTEST1				
Descriptio	in	MQTTTEST1				
Payload 0	Codec	None	~			
Data Tran	smission					
		Туре		Ope	eration	
		MQTT		<u>I</u>	? ×	
					+	
Sav	e Cancel					

5. After saving the application, select HTTP, HTTPS or MQTT protocol and fill in corresponding server information to send data to another server.

Data Transmission		
Туре	MQTT	×
	HTTP	
Status	MQTT	
	HITPS	
General		
Broker Address		
Broker Port		
Client ID		
UNUT ID]
Connection Timeout/s	30	
Keep Alive Interval/s	60	

6. Click the **Profiles** tab to add a new profile for the device.

General	Applications	Profiles	Device	Multicast	Groups Gatewa	y Fleet	Packets
Device Profiles							
	Name	Max TXPov	ver	Join Type	Class Type	Operation	
	PMC-350-C	0		OTAA	Class A Class C		
						Ħ	
General Device Profiles	Applications	Profiles	Device				
Name	Class	A-OTAA					
Max TXPower	0						
Join Type	OTA	4	~				
Class Type	Clas	s A 🗌 Class B] Class C				
Advanced Save	Cancel						

7. Click **Add** to add LoRaWAN[®] node devices via the **Device** tab.

General	Applications	Profiles	Device	Multio	cast Groups	Gateway Fleet	Packets
Device							
Add	Bulk Import	Delete All				Search	Q
Device Name	Device	e EUI C	Device-Profile	Application	Last Seen	Activated	Operation
pmc-350-c	009569060	0000150A	PMC-350-C	MQTTTEST1	25 seconds ag	• •	2×
Showing 1 to 1 of 1	1 rows						
		Device Name		[lora-sensor		
		Description			a short description	on of your node	
		Device EUI			000000000000000000000000000000000000000	000	
		Device-Profile	e		PMC-350-C	~	
		Application			MQTTTEST1	~	
		Frame-counte	er Validation				
		Application K	еу				
		Device Addre	SS				
		Network Sess	sion Key				
		Application S	ession Key				
		Uplink Frame	-counter		0		
		Downlink Fra	mo countor				
		Downlink ria	me-counter		U		
					Save & Apply		
Click Bulk Im	port to ad	ld nodes in	batches.				
						×	
Import File	e	0	Browse In	nport Temp	blate Download		

Click **Template Download** to download the template file and add device information to this file. The application and device profile should be consistent with what you will create on the web page.

ND65-20220906-1413-60.0.0.37-devices_example.csv - Notepad File Edit Format View Help hame,description,deveui,application,deviceprofile,appkey,devaddr,appskey,nwkskey 24e1242191323266,,24e1242191323266,cloud,ClassC-0TAA,112233445566778899aa112233445566,,

8. Click the **Packets** tab to check the packets from LoRaWAN[®] node devices. The type **UpCnf** means uplinks, while **DnUnc** means downlinks.

General	Appli	cations	Pr	ofiles	Device	Multica	st Grou	ips	Gat	eway Fleet	Packe
Send Data To I	Device										
De	vice EUI		Ţ	ype		Payload			Po	rt Confirmed	
00000000	0000000		ASCI	I ¥					85		Send
Send Data to N	Multicast G	Group									
Multio	cast Group)	т	ype		Payload			Po	rt	
		~	ASCI	I ¥					85		Send
Network Serve	er								Se	earch	0,
Device EUI/G	Group	Gateway	D	Frequency	Datarate	RSSI/SNR	Size	Fcnt	Туре	Time	Details
00956906000	0150A 2	4E124FFFEF	1639E	868500000	SF7BW125	-/-	0	6924	DnUnc	2022-09-08 15:54:49+08:00	0
00956906000	0150A 2	4E124FFFEF	1639E	868500000	SF7BW125	-53/10.8	31	6886	UpCnf	2022-09-08 15:54:49+08:00	0

Click Details to check the properties and load contents of packets.

Packet Details		×
Dev Addr/Multicast Addr	06162C01	^
GwEUI	24E124FFFEF1639E	
AppEUI	0102030405060708	
Device EUI/Group Name	009569060000150A	
Class Type	Class C	
Immediately	false	
Timestamp	2576026808	
Туре	DnUnc	
Adr	true	
AdrAcKReq	false	
Ack	true	
Fcnt	6924	
Port		-
GwEUI	=Gateway Identifier	
AppEUI	= Application Identifier	
Device EUI	= End-Device Identifier (G	lobal Uniqu

Chapter 4 An Application Example

Here is an example to describe the necessary configuration to receive data from PMC-350-C via the ND65. Including:

- PMC-350-C Device Setup
 - Install PMC-350-C driver and PMC-EasyConfig software
 - Configure the PMC-350-C
 - Set the Wiring Mode and enable Auto-Push

• ND65 Gateway Configuration

- Setup to make sure the PC and ND65 Gateway are in the same subnet
- LoRaWAN ND65 Gateway setup
 - a) Set Network Server Mode
 - b) Select a Region Radio Frequency
 - c) Add an application
 - d) Create a Device Profile
 - e) Add devices to LoRaWAN
 - f) Verify the sending status
- Cellular Connection

4.1 PMC-350-C Device Setup

- 1. Download and install the PMC-350-C driver and PMC-EasyConfig software, and please refer to the PMC-EasyConfig(EN) and the PMC-350-C User Manual.
- 2. Configure the PMC-350-C via the PMC-EasyConfig.

Communication Setup is required for PMC-350-C on RS-485, LoRaWAN and LoRaWAN Auto-Push. See figure below.

文件(F) 通信(C) 工具(T) 初至(V)	创助(H)				
	0880	88			
Online Device	* RS-485	LoRaWAN ×			٠
▼ ■ PMC-350-C ▼ ■ Setup Ratic Cattion	1 B B.	Q, Search	1.	Range/Ortalis	
Ir/RTD Setting	1 LoRal 2 LoRal 3 LoRal	NAN APPEUI NAN APPKEY NAN DEVEUI	0102030405060708 98929692109e2daf576d546d0f61d25 0095690E00000E6C	20	
♥ Comm. Setting RS-485 LoRaWAN	4 LoRal 5 LoRal	NAN_ADR	Enable 20dBm	It is recommended to enable the LoRAVIAN ADR so that the LoRAVIAN Network infrastructure can manage the data rate and power for meter, which will optimize the network capacity and the LoRAVIAN ADR is enabled; the LoRAVIAN ADR is enabled; the LoRAVIAN Power register is invalid ince the transmission power of the LoRAVIAN ADR is enabled; by the network infrastructure.	nd battery lifetime.
LoRaWAN Auto-Push Metering Setting Saturate Setting	6 LoRal 7 LoRal	NAN_Datarate NAN_Class NAN_TransCot	SF7 Class C 2	men control do a seaded, the Control NV Power register is maind since the data safe of the Control NV meter would be adjusted by the network intrastructure.	
Data Recorder S	Operation Lo	9		2. Information, Parameters and configuration of	+ 3 ×
. Click on "LoRaW	AN " 03/05 1 03/05 1 03/05 1	10:31:36] Read ti 10:30:03] Read ti 10:27:50] Connec	re LoRaWAN of device PMC-350-C re RS-485 of device PMC-350-C rt to device PMC-350-C succeeded	LokaWAN showed up	
Metering Status IP Power Quality	(2021)03/05 1	10:17:33] Add dr	iver succeeded, Device Type: PMC-350-C,	C Protocol Type Modbuc, Driver Version 1.0.210001.1	
Online Device Configuration	Operation Lo	g Debug Info	rmation		
Device : PMC-350-C Prototype : M	odbus Protocol V	ersion : V1.0	Firmware Version: V1.02.02	⊘ Connected Send	Receive

 Set the Wiring Mode to DEMO under the Setup > Basic Setting before installing the meter to the target power system. Enable the Auto-Push under the Setup > Comm. Setting > LoRaWAN Auto-Push.

e Device								
	* Basic Se	ntting ×						
MC-350-C	15 1	Q Search 1	4					
Setup	No.	Option	Config	Range/Details				
Basic Setting	1	PT Primary	100V	1~1000000V				
Ir/RTD Setting	2	PT Secondary	100V	1~690V				
I/O Setting	3	CT Primary	100A	1-30000A (SA Output CT only)				
 Comm. setting 	4	CT Secondary	100A	1-100A (SA Output CT only, Range: 1~SA)				
F metering setting	5	SCCT Type	100A					
Data Recorder Settion	6	Wiring Mode	DEMO	•				
TOU Setting	7	P# Convention	DEMO					
Time Setting	8	kVA Calculation	1P2W L-N	PMC-350-C - PMC-EasyConfig				
UNIX Time Setting	9	la Polarity	1P3W	文件(F) 通信(C) 工具(T) 祝園(V) i	帮助(H)			
Real Time Data	10	Ib Polarity	3P3W					
Metering	11	Ic Polarity	3P4W		• • •	······································		
Status	12	THD Calculation	3P3W_2CT	Online Device	Basic Sett	ting LoRaWAN LoRaWAN Auto-Pu	ush ×	
Power Quality	13	Demand Period	15min	▼ ■ PMC-350-C	BB	O family		
Demand	14	No. of Sliding Windows	1	T Satur	Et Et	Search T +		
Information	15	Predicated Response	70	7 • 🔤 setup	No.	Option	Config	Range/Details
C Record	16	Arm before Execute	Disable	Basic Setting	Y 1	Auto-Push Config.		
SOE	17	Self-Read Time	Month End	Ir/RTD Setting		Energy and Domand	Enable	
Max. Demand	18	Monthly Energy Log Self-Read Time	Month End	I/O Setting		chergy and bemand	chable -	
Max/Min.	19	Energy Pulse Constant	100 imp/kWh	▼ Comm. Setting		Basic Measurements	Enable	
Daily Freeze Log	20	Monthly Heeze Set-Read Time	Month End	PS-485		lr/TC	Enable	
Monthly Freeze Log	- 21	Dary Freeze Sen-Nead Time	Month End	1.0 405		Harmonics	Enable	
Maintenance	Operati	on Log		LORAWAIN		Basic PQ	Enable	
Remote Control				LoRaWAN Auto-Push		Max. Demand	Enable	
Clear				Metering Setting		May Voltage/Current	Enable	
	(2021/0	s/16 10:42:37] Kead the Basic Setting of d	Sevice PMC-350-C	Constantian Continue		wax. voltage/current	chable	
	[2021/0	3/16 10:42:29] Connect to device PMC-35	IO-C succeeded	Setpoint Setting		and and the second second	e 11	
	(2021/0	I/16 1042:29] Connect to device PMC-35	0-C succeeded	Data Recorder Setting		Min. Voltage/Current	Enable	
e Device Configuration	Operati	I/16 10:42:29] Connect to device PMC-35	0-C succeeded	Data Recorder Setting		Min. Voltage/Current Max. Power/Freq./PF	Enable Enable	
e Device Configuration	Operat	on Log Debug Information	ID-C succeeded	Data Recorder Setting TOU Setting Time Setting		Min. Voltage/Current Max. Power/Freq./PF Min. Power/Freq./PF	Enable Enable Enable	
e Device Configuration	Operat	(/16/104229) Connect to device PMC-35	0-C succeeded	Data Recorder Setting TOU Setting Time Setting		Min. Voltage/Current Max. Power/Freq./PF Min. Power/Freq./PF Max. Ir/TC	Enable Enable Enable Enable	
e Device Configuration	Operat	(/16104229) Connect to device PMC-15	0-C succeeded	Data Recorder Setting ToU Setting Time Setting UNIX Time Setting		Min. Voltage/Current Max. Power/Freq./PF Min. Power/Freq./PF Max. Ir/TC Min. Ir/TC	Enable Enable Enable Enable Enable	
e Device Configuration	Operat	(/16 104229) Connect to device PMC-13	0-C succeeded	Setpoint setting Data Recorder Setting ToU Setting Time Setting UNIX Time Setting ♥ ▲ Real Time Data		Min. Voltage/Current Max. Power/Freq./PF Min. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic	Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operat	U16 104223) Connect to device PMC-13	IO-C succeeded	Serjoint setting Data Recorder Setting FOU Setting Time Setting UNIX Time Setting UNIX Time Setting ♥ € Real Time Data Metering		Min. Voltage/Current Max. Power/Freq./PF Min. Power/Freq./PF Min. Ir/TC Min. Ir/TC Max. Harmonic Min. Harmonic	Enable Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operat	(16 104229) Connect to device PMC-13	0-C succeeded	Serioni setting Data Recorder Setting TOU Setting Time Setting UNIX Time Setting Construction Metering Status		Min, Voltage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Min. Ir/TC Max. Harmonic Min. Harmonic	Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operat	(16 104239) Connect to device PMC-13	0-C succeeded	Serpont serving Data Recorder Setting ► TOU Setting Time Setting UNIX Time Setting ♥ @ Real Time Data Metering Status ► Status		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Min. Harmonic Max. Current TDD	Enable Enable Enable Enable Enable Enable Enable Enable	
e Davice Configuration	Operat	(16 10423) Connect to device PMC-13	0-C succeeded	Sergioni Seruing) Data Recorder Setting Time Setting UNX Time Setting VIXX Time Setting VIXX Time Setting VIXX Time Setting Satus Power Quality Dermand		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/Freq./PF Max. Ir/TC Max. Isamonic Max. Harmonic Max. Current TDD Max. Current TDD	Enable Enable Enable Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operat	Ul 9 1942.93 Connect to device PMC-13 on Log Debug Information	0-C succeeded	Serpont Sering Data Recorder Setting ► TOU Setting UNIX Time Setting UNIX Time Setting UNIX Time Setting UNIX Time Setting UNIX Time Setting Satus ► Power Quality Demand Information		Min. Volage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Min. Harmonic Max. Current TDD Min. Current TDD Max. K-Factor/Crest Factor	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
Divice Configuration	Operat	(16 1942:5) Connet to device PMC-13	0-C succesded	Sergoni Serung Das Recorder Setting Time Setting UNX Time Setting UNX Time Setting CMX Time Data Metering Status Power Quality Demand Information		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Max. Harmonic Max. Current TDD Min. Current TDD Min. Current TDD Min. K-factor/Crest Factor Min. K-factor/Crest Factor	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
Device Configuration	Operati	Unit 1942.59 Connect to device PMC-13	anan O	Sergont Setting Data Recorder Setting Tot V Setting UNX Time Setting UNX Time Setting ✓ @ Real Time Data Metering Satus > Power Quality Demand Information ✓ ③ Record		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Max. Current TDD Max. K-Factor/Crest Factor Min. Screent TDD Max. K-Factor/Crest Factor Min. K-factor/Crest Factor Dialiy Freeze Log	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operati	(16 1942:5) Connet to device PMC-13	non	Sergoni serung Data Recorder Setting TOU Setting UNIX Time Setting UNIX Time Setting UNIX Time Setting Comparison Status Power Quality Demand Information SOE		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Max. Harmonic Max. Current TDD Max. Current TDD Max. K-factor/Crest Factor Min. K-Factor/Crest Factor Daily Frees Log Monthly. Frees Log	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
e Divice Configuration	Operat	(16 1942:5) Connect to device PMC-13	0-C succeeded	Sergont Setting Data Recorder Setting Time Setting UNIX Time Setting UNIX Time Setting Will A Setting Status Power Quality Demand Information SG Record SGE Max. Demand		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Max. Harmonic Max. Current TDD Max. K-Factor/Crest Factor Min. K-Factor/Crest Factor Dilly Freese Log Monthly Freese Log	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operat	Uto 1942.59 Connect to device PMC-33	0-C succeeded	Sergons serving Data Recorder Setting Time Setting UKIX Time Setting UKIX Time Setting UKIX Time Setting UKIX Time Setting UKIX Time Setting Saturus Power Quality Demand Information ♥ ③ Record SOE ▶ Max, Demand ▶ Max/Min,		Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Min. Harmonic Min. Harmonic Min. Current TDD Max. K-Factor/Crest Factor Min. K-Factor/Crest Factor Daily Freez Log U/O Status	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	
e Device Configuration	Operation	(16 1942:5) Connet to device PMC-13	0-C succeeded	Serpont setting Data Recorder Setting Time Setting UNX Time Setting UNX Time Setting Viii Real Time Data Metering Status Power Quality Dermand Information ♥ ③ Record SOF > Max, Demand ↓ Max, Min. Daily Freeze Log	2	Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Min. Ir/TC Min. Ir/TC Max. Harmonic Max. Current TDD Max. Current TDD Max. Current TDD Max. Factor/Crest Factor Daily Freeze Log Monthly Freeze Log Monthly Freeze Log (V O Status Energy and DMD Data Push Interval	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable	1-1440min
e Device Configuration	Operation	Uto 1942.59 Connect to device PMC-13	enen O	Sergons serving Data Recorder Setting Time Setting UNIX Time Setting UNIX Time Setting ✓ ▲ Real Time Data Metering Satus > Power Quality Demand Information ✓ ③ Record SOE > Max. Demand > Max./Min. Daily freeze Long Methylb freeze Long	23	Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Max. Harmonic Max. Current TDD Max. K-Factor/Crest Factor Min. Screent TDD Max. K-Factor/Crest Factor Min. K-Factor/Crest Factor Dolly Freeze Log U/O Status Energy and DMD Data Stush Interval Real-time Measurement Data Push Interval	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Innable	1-1440min 1-1440min
Paris Configuration	Operation	(16 1942:5) Connet to device PMC-13 on Log Debug Information	0.C succeeded	Sergoni serung Das Recorder Setting Time Setting UNX Time Setting UNX Time Setting Val Time Data Metering Status Power Quality Dermand Information ♥ () Record SOE Max. Demand Max. Min. Daily Freeze Log Monthly Freeze Log	234	Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Max. Harmonic Max. Current TDD Min. Current TDD Min. Current TDD Min. K-factor/Crest Factor Min. K-factor/Crest Factor Daily Freez Log Monthly Freez Log Monthly Freez Log Wonthly Freez Log Wonthly Freez Log Wonthly Freez Log Monthly Freez Log Monthly Freez Log Wonthly Freez Freez Freez Free	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Innin	1-1440min 1-1440min 1-1440min
Device Configuration	Operati	(16 1942;5) Connect to device PMC-13	non	Sergont setting Data Recorder Setting Time Setting UKIX Time Setting UKIX Time Setting ■ Real Time Data Metering Satus > Power Quality Demand Information © Record SOE > Max, Demand > Max, Min. Daily Freze Log Monthly Freze Log	2 3 3 4 5	Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Min. Ir/TC Max. Harmonic Max. Harmonic Max. Current TDD Max. K-Factor/Crest Factor Min. K-Factor/Crest Factor Dilly Freeze Log Monthly Freeze Log U/O Statos Energy and DMD Data Push Interval Read-time Measurement Data Push Interval Power Quality Data Push Interval Power Quality Data Push Interval	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Imin Imin Imin 105	1-1440min 1-1440min 1-1440min 1-3600s
e Device Configuration	Operati	(16 1942:5) Connect to device PMC-13	non O	Sergons serving Data Recorder Setting Time Setting UKIX Time Setting UKIX Time Setting UKIX Time Setting * ▲ Real Time Data Metering Satus > Power Quality Demand Information C © Record SOE > Max. Demand > Max. Min. Daily Freze Log Monthly Freze Log Monthly Freze Log Monthly Freze Log Monthly Freze Log	2 3 4 5 Operation	Min. Voltage/Current Max. Power/Freq./PF Max. Ir/TC Max. Ir/TC Max. Harmonic Max. Harmonic Max. Current TDD Max. K-Factor/Crest Factor Min. K-Factor/Crest Factor Min. K-Factor/Crest Factor Dilly Freeze Log Monthy Freeze Log U/O Statos Energy and DMD Data Push Interval Real-time Measurement Data Push Interval Power Quality Data Push Interval Max./Min. Data Push Delay	Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Enable Imin 1min 1min	11440min 11440min 1-1440min 1-3600s

4.2 ND65 Gateway Configuration

1. Make sure the PC and ND65 Gateway are in the same subnet.

Go to Control Panel > Network and Internet > Network and Sharing Center > Ethernet > Properties > Internet Protocol Version 4 (TCP/IPv4), and assign a static IP with the same subnet of ND65 Gateway to the PC.

receivers and analong wenter			H. 2		
	Netw V Ö P	Search Control Panel			
Control Panel Home	View your basic netwo	rk information and set up connections			
	View your active networks				
Change adapter settings					
Change advanced sharing settings	180EEf-now1s Public network	Connections: Ethernet			
Media streaming options					
	Change your networking sett	ngs			
	Set up a new conne	ction or network			
	Set up a broadband	, dial-up, or VPN connection; or set up a router or access p	point.		
	Diagnose and repai	ems r network problems, or get troubleshooting information.		Internet Protocol Version 4 (TCP/IP)	v4) Properties
Ethernet Status	×	Ethernet Properties	×	General	
Seceral		Networking Sharing		You can get IP settings assigned au	tomatically if your network suppor
		Connecturing		this capability. Otherwise, you need	to ask your network administrato
Connection		Bastek PCIe GhE Eamly Controller		for the appropriate P settings.	
IPv4 Connectivity:	Internet			Obtain an IP address automati	ically
Media State:	Enabled	Con	figure	Use the following IR address:	cony
Duration:	03:09:33	This connection uses the following items:		Gost die following in dealess.	
Speed:	1.0 Gbps	Gent for Morosoft Networks	^	IP address:	192.168.1.100
Details		C QoS Packet Scheduler		Subnet mask:	255 . 255 . 255 . 0
		Internet Protocol Version 4 (TCP/IPv4)		Default gateway:	192.168.1.1
Activity		Microsoft LLDP Protocol Driver			
	100 C	Internet Protocol Version 6 (TCP/IPv6)	~	Obtain DNS server address au	tomatically
Sent	Received	<u> </u>	· ·	Use the following DNS server a	addresses:
Ruter 812 562 053	5 266 477 210	Install Uninstall Prop	etes	Preferred DNS server:	192.168.1.1
0165. 014,004,004		Description Mena		Alternate DNS server:	
Properties Otisable	Diagnose	network.	ML .		
				Validate settings upon exit	
	Close				Advanced.
		ОК	Cancel		OK Car
5ee also					

- 2. Set up the ND65 Gateway.
 - 1) Login to the ND65 Web GUI. Open the browser on the PC and enter the ND65 IP address into the address bar to access the ND65 web.
 - Enable localhost on the General tab under Packet Forwarder and click Save & Apply. The ND65 build-in Network Server will receive data from PMC-350-C.

LoRaW	AN						
Status		General	Radios	Advanced	Custom	Traffic	
Packet Forwarde	er	General Setting					
Network Server		Gateway EUI		24E124	FFFEF0DEA3		
		Gateway ID		24E12	4FFFEF0DEA3		
Network	•	Frequency-Sync		Disab	led	~	
		Multi-Destination					
System	·	Connect Status		Connect	led		
Maintenance	•						
400		ID	Enable	Туре	e Server Add	Iress Operati on	
Arr	ľ	0	Enabled	Embedde	d NS localhos	st 🖉 🗵	
						+	
		Save & Apply					

3) Click Network Server > General and select frequency band on Channel Plan Setting.

LoRaWAN GATEWA	ү × +			- 🗆 ×
<) → ୯ û	0 🔏 192.168.1.23/#networkserve	er/generalsetting 90%		•
LoRaWAN			1	admin 🔁
Status	General Applications	Profiles D	evice Gateways	Packets
Packet Forwarder	General Setting			
	Enable			
Network Server	Milesight IoT Cloud			
Network	NetID	010203		
	Join Delay	5	sec	
System	RX1 Delay	1	sec	
Maintenance >	Lease Time	876000-0-0	hh-mm-ss	
	Log Level	info	~	
APP •	Channel Plan Setting			
	Channel Plan	AS923	~	
	Channel Mask	US915 AU915		
	Additional Channels	AS923 KR920		
	Frequency(MHz)	AS923-2 Min Datarate	Max Datarate	Operatio n
				Ŧ
	Save & Apply			

 Add an application. Go to Application under Network Server, and click "+" on the Operation column to add an application. Type the receiver IP address on Uplink data, and save the setting.

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Status		General	Applications	Profiles	Device	Gateways	Packets	?	
Packet Forwarder		Applications							
Network Server		Name		Joe-http					
		Description		Joe-http	_				
Network	•	Payload Codec		None	>			Data Type	URL
System	•	Data Transmission	1					Uplink data htt	p://220.135.105.114:3030
Maintenance	,		Туре			Operation		Join notification	
			HTTP			ℤ ×		ACK notification	
APP	•					•		Error notification	
		Save	Cancel						

5) Create the Device Profile. Define a name for the device on the **Profiles** tab under **Network Server** and select **Class Type**. Click **Save**.

Status	General	Applications	Profiles	Device	?
Packet Forwarder	Gateways	Packets			
Network Server	Device Profiles				¢
	Name		PMC-350-C		
Network	Max TXPower		0		
	Join Type	[OTAA	\sim	
System	Class Type		Class C	~	
Maintenance 🕨	Advanced	C			
	Save	Cancel			
APP •	Save	Gancer			

- 6) Add devices to LoRaWAN.
 - a. Click **Add** under the **Device** tab.

Status		General	Applications	Profiles	Device	Gateways	1	Packets
Packet Forward	ler	Device						
Network Server	1	Add	Bulk Import De	lete All		S	Search	Q
Network		Device Name	Device EUI	Device-Profile	Application	Last Seen	Activated	Operation
		PMC-350-C-95	0095690E00000E67	PMC-350-C	HTTP	6 seconds ago	~	ℓ ×
System	•	Joe-http	0095690E00000E73	PMC-350-C	Joe-http	1 second ago	~	2×
					las bits	2 accords acc		

b. Fill up the device information, and please refer to the label on the meter, like DevEUI, AppKey, Device Profile and Application. Click **Save & Apply**.

	Device Name	William				
Make a Device-Profile(see step d)	Description	LoRaWAN]			
wake a Device-Frojnej see step af	Device EUI	0095690E00000A6A				
	Device-Profile	PMC-350-C ~]	DevEUI	AppEUI	АррКеу
	Application	Joe-http ~		0095690E00000A6A	102030405060708	98929b92f09e2daf676d646d0f61d250
Create an Application (see ste p c)	Frame-counter Validation		-			
	Application Key	2f09e2daf676d646d0f61d250] •	-		
	Device Address					
	Network Session Key]			
	Application Session Key					
	Uplink Frame-counter	0				
	Downlink Frame-counter	0				
		Save & Apply				

c. Go to Packets under Network Server to view the data status (sending/receiving). The Device EUI, communication frequency, sending time, data size and sending status are shown on Packets. The UpCnf indicates data packet uplink is confirmed.
 LoRaWAN



3. Setup Cellular Connection.

Click **Network > Interface > Cellular**, fill in the cellular parameters under **Cellular Setting** and SMS text/PDU mode under **SMS Settings**.

Status	Port WLAN	Cellular	Loopback	
Packet Forwarder	Cellular Setting			
	Enable			
Network Server	Network Type	Auto	~	
Makunda 🛛	APN			
Network	Username			
Interface	Password			
Firewall	Access Number			
	PIN Code			
DHCP	Authentication Type	Auto	~	
DDNS	Roaming	~		
Link Failover	SMS Center			
VPN	Connection Setting			
	Enable NAT			
System 🕨	Restart When Dial-up failed			
	ICMP Server	8.8.8.8		
Maintenance	Secondary ICMP Server	114.114.114.114		
APP	ICMP Detection Max Retries	3		
	ICMP Detection Timeout	5	s	
	ICMP Detection Interval	15	S	
	SMS Settings			
	SMS Mode	PDU	~	

Please refer to the General Settings table for details.

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em	Description	Default	
nable	Check the option to enable the corresponding SIM card.	Enable	
etwork Type	Select from "Auto", "Auto 3G/4G", "4G Only" and "3G Only". Auto: connect to the network with the strongest signal automatically. 4G Only: connect to 4G network only. And so on.	Auto	
PN	Enter the Access Point Name for cellular dial-up connection provided by local ISP.	Null	
sername	Enter the username for cellular dial-up connection provided by local ISP.	Null	
assword	Enter the password for cellular dial-up connection provided by local ISP.	Null	
ccess Number	Enter the dial-up center NO. For cellular dial-up connection provided by local ISP.	Null	
IN Code	Enter a 4-8 characters PIN code to unlock the SIM.	Null	
uthentication ype	Select from "Auto", "PAP", "CHAP", "MS-CHAP", and "MS-CHAPv2".	Auto	
oaming	Enable or disable roaming.	Disable	
MS Center	Enter the local SMS center number for storing, forwarding, converting and delivering SMS message.	Null	
nable NAT	Enable or disable NAT function.	Enable	
estart When	When this function is enabled, the gateway will restart	Disabled	

Dial-up failed	automatically if the dial-up fails several times.	
ICMP Server	Set the ICMP detection server's IP address.	8.8.8.8
Secondary ICMP Server	Set the secondary ICMP detection server's IP address.	114.114.114.114
ICMP Detection Max Retries	Set max number of retries when ICMP detection fails.	3
ICMP Detection Timeout	Set timeout of ICMP detection.	5
ICMP Detection Interval	Set interval of ICMP detection.	15
SMS Mode	Select SMS mode from "TEXT" and "PDU".	PDU

4. Check the cellular network status. Click on the **Cellular** tab under the **Status**, and the page of Modem Information and cellular Network Status of the Gateway will be shown.

Status		Overview	Packet Forward	Cellular	Network	WLAN	VPN	Item	Description
								Status	Show corresponding detection status of module and SIM card
Packet Forwarder		Modem						Model	Show the model name of cellular module.
		Status		Ready				Version	Show the version of cellular module.
letwork Server		Model		EC20E				Signal Level	Show the cellular signal level.
		Model		EC20P				Register Status	Show the registration status of SIM card.
etwork I	•	Version		EC20CEHCLGR06A0	3M1G			IMEI	Show the IMEI of the module.
		Signal Level		30asu (-53dBm)				IMSI	Show IMSI of the SIM card.
ystem I	•	Register Status		Registered (Home ne	twork)			ICCID	Show ICCID of the SIM card.
		IMEI		864388046520080				ISP	Show the network provider which the SIM card registers on.
laintenance	•	IMSI		454120626403639				Network Type	Show the connected network type, such as LTE, 3G, etc.
ibb I		ICCID		89852122004084036	394			PLMN ID	Show the current PLMN ID, including MCC, MNC, LAC and Cel ID.
		ISP		Mobile Duck Mobile D	Nuck			LAC	Show the location area code of the SIM card.
		Network Type		LTE				Cell ID	Show the Cell ID of the SIM card location.
		PLMN ID						Concernant Statement	
		LAC		9009				Network Status	
		Cell ID		190668e				Item	Description
								Status	Show the connection status of cellular network.
		Network						IP Address	Show the IP address of cellular network.
		Status		Connected				Netmask	Show the netmask of cellular network.
		IP Address		10.23.143.4				Gateway	Show the gateway of cellular network.
		Netmask		255 255 255 240				DNS	Show the DNS of cellular network.
		Gateway		10.23.143.5				Connection Duration	Show information on how long the cellular network has been connected.
		DNS		10.13.168.132					
		Connection Duration	1	0 days, 04:35:42					
							Manual Refresh 🖌	Refresh	

4.3 Troubleshooting

1. Ping. Login to the ND65 web and click Maintenance > Tools. Click Ping.

The figure left indicates IP Ping works, ND65 sent 4 packets to the application server, and 100% received in about 250ms, while the figure right represents the application server failed to respond to IP Ping.

LoRaWAN	🛓 admin 🛛 🔁	LoRaWAN	admin 🔁
Status	Ping Traceroute Qxdmlog	Status	Ping Traceroute Qxdmlog
Packet Forwarder	IP Ping	Packet Forwarder	IP Ping
Network Server	Host 43.242.156.65 Ping Stop PING 43.242.156.65 (43.242.156.65): 56 data bytes Stop Stop	Network Server	PING 220.135.105.114 Ping Stop
Network +	64 bytes from 43.242.156.65: seq=0 ttl=43 time=250.654 ms 64 bytes from 43.242.156.65: seq=1 ttl=43 time=154.845 ms 64 bytes from 43.242.156.65: seq=2 ttl=43 time=154.870 ms	Network 🕨	220.135.105.114 ping statistics 4 packets transmitted, 0 packets received, 100% packet loss
System +	o4 optes tran 4 2 42(-100 op; seq=s tu=43 time=129,514 ms 43 242 156 65 ping statistics 4 packets transmitted, 4 packets received, 0% packet loss	System 🕨	
Maintenance 👻	round-trip min/avg/max = 129.514/172.495/250.654 ms	Maintenance 🔻	
Tools		Tools	
Schedule		Schedule	
Log		Log	
Upgrade		Upgrade	
Backup and Restore		Backup and Restore	
Reboot		Reboot	
APP •		APP 🕨	

2. Traceroute. Traceroute is a tool for troubleshooting network routing failures. It sends packet data to the application server from the Gateway, finds out the hops (routers, switches, repeaters...) and how much time spend on each hop for the message passthrough.

LoRaWAN 2 admin 🕀								
Status	Ping Traceroute Qxdmlog	?						
Packet Forwarder	Traceroute	-						
Network Server	Host 220.135.105.114:9900 Trace Stop traceroute to 220.135.105.114:9900 (220.135.105.114), 30 hops max, 46 byte packets	l						
Network 🕨	1 *** 2 10.19 66.33 (10.19 66.33) 54.030 ms 24.462 ms 64.784 ms 3 10.19 67.154 (10.19.67.154) 36.827 ms 31.129 ms 39.697 ms 4 ***							
System	5 10 13.135.186 (10.13.135.186) 54.582 ms 41.861 ms 36.388 ms 6 223.119.0.9 (223.119.0.9) 63.424 ms 51.440 ms 41.935 ms 7 223.118.2.122 (223.118.2.122) 37.737 ms 223.118.2.170 (223.118.2.170) 43.267 ms 223.118.2.122 (223.118.2.122) 41.067 ms 8 r4006-s2.tp.hinet.net (211.72.233.146) 60.715 ms 61.526 ms 39.788 ms 9 r4106-s2.tp.hinet.net (220.128.6.174) 49.498 ms 41.737 ms 69.732 ms 10 TPDT-3011 hinet.net (220.128.11.166) 64.614 ms todt-3011 hinet.net (220.128.10.210)							
Maintenance 🔻								
Tools	78.157 ms 65.204 ms 11 220-128-26-6.HINET-IP.hinet.net (220.128.26.6) 58.807 ms 64.044 ms 59.939 ms	L						
Schedule	12 220-128-3-205 HINET-IP hinet net (220.128.3.205) 59.749 ms 64.005 ms tpe4- 3301 hinet net (220.128.3.133) 59.549 ms 13 * * *	1						
Log	14*** 15***							
Upgrade	16*** 17*** 18***							
Backup and Resto		-						

Appendix A Technical Specifications

Hardware						
CPU	Quad-core 1.5 GHz, 64-bit ARM Cortex-A53					
Memory	512 MB DDR4 RAM					
Flash	< 8 GB eMMC					
	LoRaWAN					
Antenna						
Standard	2 × Internal Antennas					
Optional	$1 \times 50 \Omega$ N-Female External Connector					
ISM Bands	N4/U/IN865/EU868/RU864/US915/AU915/KR920/AS923-1/2/3/4					
A3923-1	Theiland Cambodia etc					
AS923-2	Vietnam, Indonesia					
AS923-3	Denmark, Norway, Saudi Arabia, etc.					
AS923-4	Israel					
KR920	South Korea					
AU915	Australia, New Zealand, Argentina, Anguilla, Brazil					
EU868	Europe, United Arab Emirates, etc.					
Sensitivity	-140dBm Sensitivity @292bps					
1x Power	2/dBm Max					
Protocol	V1.0 Class A/Class C and V1.0.2 Class A/Class C					
	Ethernet					
Port	1 × RJ45 (POE PD supported)					
Physical Layer	10/100/1000 Base-1 (IEEE 802.3)					
Data Rate	10/100/1000 Mbps (Auto-Sensing)					
Modo	Auto MDI/MDIA Full or Holf Duploy (Auto Sonsing)					
Widde						
Antenna Internal Antenna						
Standards	IFEE 802 11 b/g/n 2 4GHz					
Mode	AP or Client mode					
Security	WPA/WPA2 authentication WEP/TKIP/AES encryption					
Tx Power	$802 \ 11b^{\circ} \ 18 \ dBm \ +/-2 \ 0 \ dBm \ (11 \ Mbns)$					
	802.11g: 15 dBm +/-2.0 dBm (6 Mbps)					
	802.11g: 15 dBm +/-2.0 dBm (54 Mbps)					
	802.11n@2.4 GHz: 14 dBm +/-2.0 dBm (MCS0 HT20)					
	802.11n@2.4 GHz: 14 dBm +/-2.0 dBm (MCS7_HT20)					
	802.11n@2.4 GHz: 13 dBm +/-2.0 dBm (MCS0_HT40)					
	802.11n@2.4 GHz: 13 dBm +/-2.0 dBm (MCS7_HT40)					
	Cellular (Optional)					
Antenna	Internal Antenna					
SIM Slot	1 (mini SIM-2FF)					
	Power Supply and Consumption					
Power Input	DC Jack Connector for 9-24 VDC power supply					
	1 × 802.3 af PoE Input					
Power Consumption	Typical 2.9 W, Max 4.2 W					
	Environmental Conditions					
Operating lemp.	-40° C to $+/0^{\circ}$ C (-40° F to $+158^{\circ}$ F)					
Storage Temp	Reduced Cellular Performance Above $60^{\circ}C$					
Storage lemp.	-40 C (0 + 85 C (-40 F (0 + 185 F)) 0% to $0%$ (non condensing) at $2%$ (77%					
Ethernet Isolation	0/0 to 55% (11011-condensing) at 25 C/77 F					
	Mechanical Characteristics					
IP Rating						
Dimensions	180 x 110 x 56 5 mm (7 09 x 4 33 x 2 22 in)					
Difference						

Contact us

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