ATIM Cloud Wireless

LoRaWAN Gateway Modbus & MQTT





Concerned model: AGT/INDUS2





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Document version history

Version	Date	Description	Author	Concerned software version
1.0	07/03/2022	Document creation	JA	
1.1	30/03/2022	NTP server time synchronization	JA	
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1.3	19/10/2022	TLS text boxes, power off icon, Modbus reception rates	JA	Modbus app 1.1 Chirpstack 3.14.5

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Declaration of compliance

All ACW Atim Cloud Wireless[®] products comply with the regulatory requirements of the R&TTE Directive (1999/5/EC), article 3:

CE

1 SAFETY (Article 3.1a of the 1999/5/EC Directive)
NF EN60950-1 Ed. 2006/A1:2010/A11:2009/A12:2011 (health)
EN62479: 2010 (power <20mW) or EN62311:2008 (power > 20mW)
2 Electromagnetic Compatibility (Article 3.1b of the 1999/5/EC Directive)
EN 301489-3 v1.4.1, EN 301489-1 V1.9.2
3 Efficient use of the radio frequency spectrum (Art.3.2 of the 1999/5/EC Directive)
ETSI EN300 220-2 v2.4.1 and EN300 220-1 v2.4.1

Environmental recommendations

Respect the temperature ranges for storage and operation of all products. Failing to respect these guidelines could disrupt device operation or damage the equipment.

Follow the instructions and warnings provided below to ensure your own safety and that of the environment and to protect your device from any potential damage.



General hazard – Failure to follow the instructions presents a risk of equipment damage.



Electrical hazard – Failure to follow the instructions presents a risk of electrocution and physical injury.



WARNING: do not install this equipment near any source of heat or any source of humidity.



WARNING: for your safety, it is essential that this equipment be switched off and disconnected from mains power before carrying out any technical operation on it.



WARNING: the safe operation of this product is ensured only when it is operated in accordance with its intended use. Maintenance may only be performed by qualified personnel.



Waste disposal by users in private households within the European Union. This symbol appears on a product or its packaging to indicate that the product may not be discarded with other household waste. Rather, it is your responsibility to dispose of this product by bringing it to a designated collection point for the recycling of electrical and electronic devices. Collection and recycling waste separately at the time you dispose of it helps to conserve natural resources and ensure a recycling process that respects human health and the environment. For more information on the recycling center closest to your home, contact your closest local government office, your local waste management service or the business from which you purchased the product.

Radio

Modems in the ACW line are radio-communication modems that use the ISM (industrial, scientific and medical) bands, which may be used freely (at no cost and with no authorization required) for industrial, scientific and medical applications.

IMPORTANT NOTE

- Basic IT network knowledge is required to set up ATIM LoRaWAN gateways.
- Contact your IT service before installing the gateway.
- Configuration options are explained in this document.
- Further details about Chirpstack network server are available on <u>https://www.chirpstack.io/</u>
- Gateway power supply is 5VDC 2,5A max.
- LoRaWAN 868 MHz antenna should be connected to SMA connector before starting the gateway.

Presentation

ATIM 1gate gateway is designed to set up a private LoRaWAN network based on open source Chirpstack server. Devices' uplink messages can then be forwarded using either:

- MQTT protocol
- MODBUS TCP protocol



When 1gate Gateway is configured in **MQTT** it behaves as a MQTT client and publishes uplink messages to an external MQTT broker.

When 1gate gateway is configured in **MODBUS**, it behaves as a MODBUS TCP server (slave) whose registers values can be extracted from external MODBUS master (for example a PLC).

Connection to the gateway

To configure the gateway start connecting an ethernet cable between the gateway and a computer. The computer should automatically connect to local gateway LAN network via DHCP.



CONFIGURATION mode (default)

Once connected, the gateway configuration page can be accessed through a web page using the default IP address: **192.168.1.1**



Configuration changes can be made from this webpage.

Options can be changed with toggle switches and desired fields can be filled before clicking on **OK** button to confirm form changes.

.....

Rebooting the gateway can be necessary after changes, click the **RESTART** button when it appears.

It is also possible to power off the gateway clicking on the ${f O}$ in	con.
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In any case gateway should be turned off disconnecting power supply.

a. LAN tab

The LAN (Local Area Network) tab can be used to integrate the gateway in an existing Ethernet network.

C 🔺 Non sécurisé http://192.168.1.1/#menu1	아 Q 년 ☆ 🚺 🛊 🔲 😩
1gate configurator	Modbus app version 1.1 Chirpstack version 3.14.5
LAN MQTT MODE	BUS
Ethernet :	
Current IP : 192.168.1.1	
Hostname : 1gate-b827ebb76197	
Static IP address:	
Netmask:	
Gateway:	
<u>Wifi hotspot :</u>	
ON OFF	
NTP server :	
ON OOFF	
IP address:	

Connecting gateway to an existing ethernet network

Two methods are possible for the gateway to get an IP address: STATIC or DHCP.

- Static addressing : gateway will set a specific IP address, for that **Static IP address**, **Netmask** and **Gateway** fields must be filled before confirming with **OK**.
- DHCP addressing : gateway will automatically get an IP address according to network DHCP server.



STATIC or DHCP modes (default)

ATIM_1GATE_INDUS2_UG_EN_V1.3

Accessing gateway through ethernet network

Once connected to Ethernet network, gateway configuration page can be accessed using either:

- Gateway IP address
- Gateway hostname

Gateway hostname is unique and composed of the EMAC address with format below:

1gate-[EMAC address]

NOTE

EMAC is written on gateway label.

To access configuration webpage, open a web browser and enter the URL below: <u>http://1gate-[EMACaddress].local/</u>.

Accessing gateway through WIFI hotspot

When WIFI hotspot option is set, the gateway broadcast a WIFI network.

This network can be used to configure the gateway without connecting to Ethernet network.

To connect to WIFI hotspot use SSID and WPA KEY written on gateway label.

Once connected to gateway WIFI, the configuration page can be accessed with IP address 192.168.1.1

IMPORTANT NOTE

Activating WIFI hotspot can result in IP conflicts.

Time synchronization

Gateway time needs to be synchronized. By default, the gateway will try to get reference time from the internet.

In case there is no internet access from the Ethernet network, an NTP server can be used filling the NTP IP address fields and enabling NTP.

b. MQTT tab

MQTT tab can be used to fill MQTT broker information.

				Modbus app version 1.1
1gate configurator				Chirpstack version 3.14.5
	LAN	ΜQTT	MODBUS	
MQTT integration: ON OOFF				
URL & port:				
:				
Username:				
Password:				
Client ID:				
Event topic:				
Command topic:				
TLS secured connection: ON OFF				
CA certificate:				
HIDDJCCA1+gAwIBAgIBAgAAUTANBgkqhkiG9w0BAQUFADBaMQswCQYDVQQGEwJJ				

When MQTT integration is ON, then all fields must be filled so that the gateway can connect to remote MQTT broker. When using TLS secured connection, certificate files can be directly pasted into text boxes.

IMPORTANT NOTE

Before filling MQTT fields please make sure connection to MQTT broker is possible using MQTT emulator (MQTT box, Postman,)

c. MODBUS tab

All devices registered and activated in Chirpstack should appear in the MODBUS tab (Provided that device has sent at least one uplink message).

The order in MODBUS tab is defined by the order the devices first sent Uplink messages.

The MODBUS webpage is convenient to match device devEUI to MODBUS adresses.

For example, below device **70b3d59ba000f934** is registered in addresses from 100 to 149 in MODBUS server.

The Last seen field indicates the date of the last uplink message that has been sent by device.

The **Rate** field indicates the percentage of LoRa Uplink message correctly received by the gateway.

A	тім			Igate	e co	nfig	urate	or															M Chi	odbus a irpstack	app vers versior	sion 1.1 1 3.14.5	
	LAN MQTT MODBUS																									_	
devEl	JI: 70b:	3d59ba	a000b2	201 La	st see	n: 202	2-10-1	3 17:3	8:49.1	03098	Rate:	99 %															
					-		_										1.										
0 70b2	1 d50b	2	3	4	5	6 0d11	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1003	0.90	a000	0201	0014	1008	outr	2031	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000			
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0240			
													0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0202			
devEl	JI:a84	041522 52	218410 53)49 La	st see	n: 202	2-10-1 57	3 17:3 58	6:37.9 ⁵⁹	60 60	Rate:	100 %	63	64	65	66	67	68	69	70	71	72	73	74			
50 a840	51 4152	041522 52 2184	218410 53 1049	049 La	55 160a	n: 202 56 0d11	2-10-1 57 2425	3 17:3 58 0000	6:37.9 59 0000	60 0000	Rate: 61 0000	100 % 62 0000	63 0000	64 0000	65 0000	66 0000	67 0000	68 0000	69 0000	70 0000	71 0000	72 0000	73 0000	74 0000			
50 8840	51 4152	041522 52 2184	218410 53 1049	049 La 54 0014	st see 55 160a	n: 202 56 0d11	2-10-1 57 2425	3 17:3 58 0000	6:37.9 59 0000	60 0000	Rate: 61 0000	100 % 62 0000	63 0000	64 0000	65 0000	66 0000	67 0000	68 0000	69 0000	70 0000	71 0000	72 0000	73 0000	74 0000			
50 a840 75	51 4152 76	041522 52 2184 77	218410 53 1049 78	049 La	st see 55 160a 80	n: 202 56 0d11 81	2-10-1 57 2425 82	3 17:3 58 0000 83	6:37.9 59 0000 84	60 0000 85	Rate: 61 0000 86	100 % 62 0000 87	63 0000 88	64 0000 89	65 0000 90	66 0000 91	67 0000 92	68 0000 93	69 0000 94	70 0000 95	71 0000 96	72 0000 97	73 0000 98	74 0000 99			
50 a840 75 0000	51 4152 76 0000	041522 52 2184 77 0000	218410 53 1049 78 0000	049 La 54 0014 79 0000	st see 55 160a 80 0000	n: 202 56 0d11 81 0000	2-10-1 57 2425 82 0000	3 17:3 58 0000 83 0000	6:37.9 59 0000 84 0000	60 0000 85 0000	Rate: 61 0000 86 0000	100 % 62 0000 87 0000	63 0000 88 0000	64 0000 89 0000	65 0000 90 0000	66 0000 91 0000	67 0000 92 0000	68 0000 93 0000	69 0000 94 0002	70 0000 95 b4bd	71 0000 96 1400	72 0000 97 2222	73 0000 98 370e	74 0000 99 8c64			
50 a840 75 0000 devEU	JI:a841 51 4152 76 0000 JI:70b	041522 52 2184 77 0000 3d59ba	218410 53 1049 78 0000 a000f9	049 La 54 0014 79 0000 34 Las	st see 55 160a 80 0000 st seer	n: 202 56 0d11 81 0000	2-10-1 57 2425 82 0000 2-10-1	3 17:3 58 0000 83 0000 3 15:55	6:37.9 59 0000 84 0000 9:10.6	052011 60 0000 85 0000 51965	Rate: 61 0000 86 0000 Rate:	100 % 62 0000 87 0000 83 %	63 0000 88 0000	64 0000 89 0000	65 0000 90 0000	66 0000 91 0000	67 0000 92 0000	68 0000 93 0000	69 0000 94 0002	70 0000 95 b4bd	71 0000 96 1400	72 0000 97 2222	73 0000 98 370e	74 0000 99 8c64			
devEl 50 a840 75 0000 devEl	JI:a844 51 4152 76 0000 JI:70b	041522 52 2184 77 0000 3d59ba	218410 53 1049 78 0000 a000f9 103	049 La 54 0014 79 0000 34 Las	st see 55 160a 80 0000 st see 105	n: 202	2-10-1 57 2425 82 0000 2-10-1 107	3 17:3 58 0000 83 0000 3 15:59	6:37.9 59 0000 84 0000 9:10.6	952011 60 0000 85 0000 51965 110	Rate: 61 0000 86 0000 Rate: 111	100 % 62 0000 87 0000 83 % 112	63 0000 88 0000	64 0000 89 0000	65 0000 90 0000	66 0000 91 0000	67 0000 92 0000	68 0000 93 0000	69 0000 94 0002	70 0000 95 b4bd	71 0000 96 1400	72 0000 97 2222	73 0000 98 370e	74 0000 99 8c64			
devEl 50 a840 75 0000 devEl 100 70b3	JI:a840 51 4152 76 0000 JI:70b 101 d59b	041522 2184 77 0000 3d59ba 102 a000	218410 53 1049 78 0000 a000f9 103 f934	049 La 54 0014 79 0000 34 Las 104 0014	st see 55 160a 80 0000 st see 105 160a	n: 202 56 0d11 81 0000 n: 202	2-10-1 57 2425 82 0000 2-10-1 107 3b0a	3 17:3 58 0000 83 0000 3 15:59 108 0000	6:37.9 59 0000 84 0000 9:10.6 109 0000	60 0000 85 0000 51965 110 0000	Rate: 61 0000 86 0000 Rate: 111 0000	100 % 62 0000 87 0000 83 % 112 0000	63 0000 88 0000 1113 0000	64 0000 89 0000 1114 0000	65 0000 90 0000 115 0000	66 0000 91 0000 116 0000	67 0000 92 0000 1117 0000	68 0000 93 0000 118 0000	69 0000 94 0002 119 0000	70 0000 95 b4bd 120 0000	71 0000 96 1400 121 0000	72 0000 97 2222 122 0000	73 0000 98 370e 123 0000	74 0000 99 8c64 124 0000			
devEl 50 a840 75 0000 devEl 100 70b3	JI:a844 51 4152 76 0000 JI:70b 101 d59b	041522 2184 77 0000 3d59ba 102 a000	218410 53 1049 78 0000 a000f9 103 f934	049 La 54 0014 79 0000 34 Las 104 0014	st see 55 160a 80 0000 st see 105 160a	n: 202 56 0d11 81 0000 n: 202 106 0d0f	2-10-1 57 2425 82 0000 2-10-1 107 3b0a	3 17:3 58 0000 83 0000 3 15:55 108 0000	6:37.9 59 0000 84 0000 9:10.6 109 0000	852011 60 0000 85 0000 51965 110 0000	Rate: 61 0000 86 0000 Rate: 111 0000	100 % 62 0000 87 0000 83 % 112 0000	63 0000 88 0000 113 0000	64 0000 89 0000 114 0000	65 0000 90 0000 115 0000	66 0000 91 0000 116 0000	67 0000 92 0000 117 0000	68 0000 93 0000 118 0000	69 0000 94 0002 119 0000	70 0000 95 b4bd 120 0000	71 0000 96 1400 121 0000	72 0000 97 2222 122 0000	73 0000 98 370e 123 0000	74 0000 99 8c64 124 0000			
devEl 50 a840 75 0000 devEl 100 70b3	JI:a844 51 4152 76 0000 JI:70b: 101 d59b 126	041522 2184 77 0000 3d59ba 102 a000	218410 53 1049 78 0000 a000f9 103 f934 128	049 La 54 0014 79 0000 34 Las 104 0014	st see 55 160a 80 0000 st see 105 160a 130	n: 202 56 0d11 81 0000 n: 202 106 0d0f	2-10-1 57 2425 82 0000 2-10-1 107 3b0a 132	3 17:3 58 0000 83 0000 3 15:59 108 0000 133	6:37.9 59 0000 84 0000 9:10.6 109 0000	60 0000 85 0000 51965 110 0000 135	Rate: 61 0000 86 0000 Rate: 111 0000	100 % 62 0000 87 0000 83 % 112 0000 137	63 0000 88 0000 113 0000	64 0000 89 0000 114 0000	65 0000 90 0000 1115 0000	66 0000 91 0000 116 0000	67 0000 92 0000 1117 0000	68 0000 93 0000 118 0000	69 0000 94 0002 119 0000	70 0000 95 b4bd 120 0000	71 0000 96 1400 121 0000	72 0000 97 2222 122 0000	73 0000 98 370e 123 0000	74 0000 99 8c64 124 0000			

A low rate can indicate radio issues between a device and the gateway.

The display of the tabs is updated every minutes (Real Modbus tabs are updated instantly at message reception).

MODBUS server

When MODBUS integration is chosen, devices uplink messages are stored in MODBUS registers. The gateway behaves as MODBUS TCP server (slave) and registers can be read from external MODBUS master.

All data is encoded in hexadecimal.

50 registers (100 bytes) are allocated per device and can be divided into three parts:

- 4 registers are allocated to device EUI
- 4 registers are allocated to timestamp
- 42 registers are allocated to message data payload

EXEMPLE

For example, the tab below indicates:

Device EUI 70b3d59ba000a761 Timestamp 1416020f090739 Data payload 10cea0cea64

devEUI:70b3d59ba000a761 Last seen: 2022-02-15 09:07:57.610109

	_																							
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
70b3	d59b	a000	a761	0014	1602	0f09	0739	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49

For each part, data is stacked on the right, which implies that lot of registers are set to zero, particularly if payload is short. When a new device is registered and join Chirpstack LoRaWAN server, it will be added to the list automatically.

For example, if three devices have been registered on LoRaWAN network server first, then registers below will be set:

- Registers [0 49] allocated to device 1
- Registers [50 99] allocated to device 2
- Registers [100 149] allocated to device 3

If a device sends various type of message (for example life frames and data frames) no difference can be made, frames are stored in the same registers, which means that earlier frame will erase older one.

a. DevEUI

Device EUI is a unique 8 bytes id that is used to identify a LoRaWAN device. This id is stored at the beginning of MODBUS registers to make sure device can be identified.

b. Timestamp

4 registers (8 bytes) are allocated to timestamp. Timestamp includes last uplink message date and time.

Each byte contains a part of the date/time (i.e. year, month, hour,) **001415070d140014** can be decoded as below:

Register	Byte	Description	Hexadecimal	Decimal
Register 4	Byte 4.1	NC	00	-
	Byte 4.2	Century	14	20
Register 5	Byte 5.1	Year	15	21
	Byte 5.2	Month	07	07
Register 6	Byte 6.1	Day	0d	13
	Byte 6.2	Hour	14	20
Register 7	Byte 7.1	Minute	00	00
	Byte 7.2	Second	14	20

Decoded timestamp is 2021/07/13 20:00:20.

c. Payload

Remaining 42 registers are allocated to device data payload. Data payload comes from uplink LoRaWAN message (JSON format) such as below:



Data payload is written in MODBUS registers according to big-endian, starting from the last register allocated or "stacked on the right".

Registers that are not used are left to zero, this way data fields can be read from the same address with a constant length of 42 registers, for example:

- To get device 1 payload consult address 8 hex (8 dec), length 2A hex (42 dec)
- To get device 2 payload consult address 3A hex (58 dec), length 2A hex (42 dec)
- To get device 3 payload consult address 6C hex (108 dec), length 2A hex (42 dec)

Data is encoded in hexadecimal; it contains several information that are relative to the product / device registered. Please see specific product documentation.

Example 1

MR4 configured with 2 counters, devEUI 70B3D59BA000C27E and payload below:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
70	D5	A0	C2	00	16	12	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B3	9B	00	7E	14	02	OF	2E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
25	26	27	20	20	20	21	22	22	24	25	26	27	20	20	40	11	10	12	11	45	16	47	40	40
25	20	27	28	29	30	51	32	33	54	30	30	37	38	39	40	41	42	43	44	45	40	47	48	49
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	04	00	85	00	00

A0

To extract counter 1 registers 45, 46 and 47 must be read and then filtered to remove headers. To extract counter 2 registers 48 and 49 must be read.

1B

Example 2

JUL

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MR4 configured with 1 counter, datalogging of 6 measurements every 10 minutes, devEUI 70B3D59BA000C27E and payload below:

A5003C04000001B00000090000007000000500000030000001

		Paylo	ad hea	ader	Со	unter	1 t		Cour	nter1	t-20m	in	Со	unter1	t-40n	nin								
				Cou he	I unter1 ader	_	Coun	l ter1 t	-10mi	n	Cou	Inter1	t-30m	nin	Cou	nter1	t-50m	in						
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
70	D5	A0	C2	00	16	12	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B3	9B	00	7E	14	02	OF	2E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
00	00	00	00	00	00	00	00	00	00	00	00	00	A5	3C	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	04	00	04	00	03	00	1B	00	02	00	08

Example 3

DIND80 frame, devEUI_70B3D59BA000D3EC and payload below:

SEFFFF0000000C000000B000000800000060000007000000800000060000000

		Head	ler <mark>C</mark>	ounte	r1 (Counte	er2											Cou	nter8					
0	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24															24								
70	D5	A0	D3	00	16	12	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B3	9B	00	EC	14	02	OF	2 E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
00	00	00	00	00	00	00	00	FF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	5E	FF	00	0C	00	0 B	00	08	00	06	00	07	00	08	00	06	00	00

To extract counter 1 registers 34 and 35 must be read To extract counter 2 registers 36 and 37 must be read ...

According to product configuration data extraction can require further operations that can be complicated on basic PLCs.

From MODBUS tab it is also possible to reset registers: clicking on Reset table button deletes the entire table and start allocation from scratch: first device emitting an uplink message will be allocated to registers 0-49, second device to registers 50-99 and so on.

MODBUS webpage also contains a link to download logs of MODBUS application for debug purposes.

d. Data extraction

To test MODBUS TCP connection to the gateway, a MODBUS emulator such as Kscada MODBUS DOCTOR can be used.



Please configure:

- IP address of the gateway that can be seen in the LAN tab
- Port is 502
- Slave ID is not specific since MODBUS server should respond to any slave ID
- Time Out can be left to 1000
- Mode HEXADECIMAL
- **Register**: the address corresponding to the device, for example

00h (0 dec) for the first device emitting 32h (50 dec) for the second device emitting 64h (100 dec) for the third device emitting 96h (150 dec) for the fourth device emitting

- Length: 32h (50 in decimal)
- **Type** 3 Holding Registers

Then click on **CONNECTION**, if connection is successful click on **READING** to get device data.

LoRaWAN server Administration

Chirpstack is an open-source software stack than can be used to set up a local (private) LoRaWAN network.

a. Connection to Chirpstack web page

To access Chirpstack configuration page, open a web browser and enter the IP address of the gateway followed by 8080 port:

<mark>& 192.168.1.1</mark> :8080/≉ <mark>/</mark> login	130 %	Alternatively, the gateway hostname can be used such as shown previously.
ChirpStack Login		To connect to Chirpstack enter the default IDs below:
Username / email *		 Username/email: admin Password: admin
Password *		
	LOGIN	

First page is named Dashboard, it shows the activity of the gateway and devices:

Gateway settings can be changed from **Gateway-profiles** tab, such as device settings from **Device-profiles** tab.

(€→	C" ŵ	Q 192.168.0.1 :8080	± lin\ □□ @° <mark>38</mark>	-
	∉	ChirpStack		Q Search organization, application, gateway or device 🕜 😝 admin	
→	A	Dashboard	Dashboard		
		Network-servers			
	\mathbb{R}	Gateway-profiles	Active devices Active gateways	Device data-rate usage	
		Organizations	New case and hading and data	000 005	
	•	All users			
	٩	API keys			
	chirpstack -				
	ŧ	Org. dashboard			
	*	Org. users			
	٩	Org. API keys			
	.≞≡	Service-profiles	Gateways		
	T	Device-profiles			
	R	Gateways	-		
		Applications			
	2	Multicast-groups			

b. Device registration

To add devices to LoRaWAN network, select **Applications** tab and then click on **defaultApplication**.

∉	ChirpStack				Q Search organizatio	n, application, gateway or device	0 B			
ħ	Dashboard									
	Network-servers	Applications / deta	plications / defaultApplication							
R	Gateway-profiles	DEVICES	DEVICES APPLICATION CONFIGURATION INTEGRATIONS							
	Organizations									
•	All users						+ 0			
٩	API keys						_			
chirp	stack -	Last seen	Device name	Device EUI	Device profile	Link margin	Battery			
		8 days ago	A00088D5_DONGLE	70b3d59ba00088d5	defaultDeviceProfile	n/a	n/a			
Π	Org. dashboard	8 days ago	A000A761_DONGLE	70b3d59ba000a761	defaultDeviceProfile	n/a	n/a			
-	Org. users	20 days ago	A000C33C_TH	70b3d59ba000c33c	defaultDeviceProfile	n/a	n/a			
4	Org. API keys	14 days ago	A000D45F_MR4	70b3d59ba000d45f	defaultDeviceProfile	n/a	n/a			
	Service-profiles					Powe per page: 10 -	14 of 4			
	Device-profiles					Rows per page. T0 ♥	1-4014			
R	Gateways			Device	list					
	Applications			Device	list					
2	Multicast-groups									

NOTE Initially no device should appear in the list.

For security reason, OTAA (Over The Air Activation) method is used to add devices.

Two IDs are necessary for that:

- A 8 bytes device EUI
- The 16 bytes application key attached to the devEUI

To add a device, click on +CREATE

In the GENERAL tab enter the device name and description and the Device EUI

Then select defaultDeviceProfile and confirm clicking on CREATE DEVICE

ŧ	ChirpStack		Q. Search organization, application, gateway or device	? 😁 admii
ŧ	Dashboard	Applications / defaultApplication / Devices	/ Create	
	Network-servers			
R	Gateway-profiles	GENERAL VARIABLES	TAGS	
	Organizations	Design pages 1		
•	All users	My_TH_sensor		
5	API keys	The name may only contain words, numbers and dashes. Device description *		
chirp	pstack 👻	ATIM TH sensor		
4	Org. dashboard	Device EUI * 70 b3 d5 9b a0 00 c3 3c		MSB C
	Org. users	Device-profile * defaultDeviceProfile		
2	Org. API keys			
=	Service-profiles	Disable frame-counter validation		
	Device-profiles		ecurity as it enables people to per onit repay-attacks.	
R	Gateways	ChirpStack Network Server will ignore received uplink frames and jo	bin-requests from disabled devices.	
	Applications			
2	Multicast-groups			CREATE DEVICE

In the next page complete Application Key field and confirm clicking on SET DEVICE-KEYS

∉ ⊘@(ChirpStack								?	e adm
Dashbo Network	Application	ns / defaultAj	pplication / I	Devices / My_TH	_sensor					DELET
Gatewa	y-profiles DETA	ILS CONF	FIGURATION	KEYS (OTAA)	ACTIVATION	DEVICE DATA	LORAWAN FRAMES			
Drganiz	zations									
🚨 All user	S Application	3γ *								
🔦 🛛 API key	rs For LoRaWA	1.0 devices. In case y	ff ff ff your device supports	LoRaWAN 1.1, update the	device-profile first.			MSB	GI	00
chirpstack								ſ	SET DE	VICE-KEYS
n Org. da	shboard							_		
Crg. us	ers									
🔍 Org. AP	PI keys									
≡ Service	profiles									
∃⊨ Device-	profiles									
	iys									
Applica	itions									
Multica	ist-groups									

Once device has been registered it should appear on **defaultApplication** page. Click on its name to access device information

	ChirpStack						? 😁 admir
↑	Dashboard Network-servers	Applications / de	efaultApplication				DELETE
R	Gateway-profiles	DEVICES	APPLICATION CONFIGURATION INTE	GRATIONS			
	Organizations						
•	All users						+ CREATE
٩	API keys	Last seen	Device name	Device EUI	Device profile	Link margin	Battery
chirp	ostack 👻	8 days ago	A00088D5 DONGLE	70b3d59ba00088d5	defaultDeviceProfile	n/a	n/a
ŧ.	Org. dashboard	8 days ago	40004761 DONGLE	70b3d59ba000a761	defaultDeviceProfile	n/a	n/a
*	Org. users	o daya ego	NUTRICONCE	705003300000701	derout bender fortie	104	100
٩	Org. API keys	14 days ago	A000D45F_MR4	70b3d59ba000d45f	defaultDeviceProfile	n/a	n/a
¥≘	Service-profiles	n/a	My_TH_sensor	70b3d59ba000c33c	defaultDeviceProfile	n/a	n/a
빏	Device-profiles					Rows per page: 10 👻	1-4 of 4 < >
R	Gateways						
	Applications						
2	Multicast-groups						

Device activity can be seen from **DEVICE DATA** tab:

€	ChirpStack	Q. Search organization, application, gateway or device	admin
÷	Dashboard	Applications / defaultApplication / Devices / My_TH_sensor	DELETE
80 80 80	Network-servers		
\bigcirc	Gateway-profiles	DETAILS CONFIGURATION KEYS (OTAA) ACTIVATION DEVICE DATA LORAWAN FRAMES	
	Organizations		
<u>.</u>	All users	🅑 HELP 🚺 PAUSE 🛨 DOWNLOAD 🔳	CLEAR
٩	API keys	12.04.38 PM up	~
chirp	ostack -	12:04:38 PM join	~
ŧ	Org. dashboard		
<u>.</u>	Org. users		
٩	Org. API keys		
å≡	Service-profiles		
	Device-profiles		
\bigcirc	Gateways		
	Applications		
2	Multicast-groups		

Diverse events can be seen for debug and commissioning purposes:

- join: device join request to connect to gateway network
- **up**: uplink message, all fields can be seen clicking on the event
- txack: acknowledgment made next to a downlink message
- ack: message acknowledgement
- **status**: status frame made by the gateway regularly
- error



Data payloads and certain IDs are encoded in base64 by default in Chirpstack. However hexadecimal encoded payload is displayed under the **data_hex** field.

NOTE

It is also possible to register devices using ABP method, however it is necessary to create a new device-profile to do so.

DEVICE DATA list is not saved, and only real time events can be seen.

Technical support

For any further information or technical question, you can open a ticket on our <u>technical support dedicated webpage</u>.



IMPORTANT NOTE

ATIM provides you with a gateway but not the driver's license that goes with it, you must learn how to use and program it.

- For technical questions concerning the Packet Forwarder: <u>https://github.com/Lora-net/packet_forwarder</u>

- For technical questions concerning the integrated Network Server: <u>https://www.chirpstack.io/</u>