MANTHINK / INDUSTRIAL IoT

GD61x

LoRaWAN Gateway

Standardized Device Manual

VERSION	DOCUMENT
1.8	Device Manual

Revision History

Version	Change Description
1.8	Current published version

DOCUMENT NAVIGATION

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Document version: 1.8

Applicable models: GD61x series (GD614 and GD618 band variants)

1. Product overview

GD61x is an indoor LoRaWAN gateway based on the ESP32-S3, with a Semtech SX1301 or SX1302 concentrator according to the supplied configuration. Suffix –2 has a maximum transmit power of 22 dBm. It combines Ethernet, Wi-Fi and optional 4G backhaul and accepts Type-C or 5–24 V DC power. A 4G option code of G adds the 4G and PoE modules. A Web console provides network, LoRaWAN server, radio, logging and firmware-maintenance configuration.

The only external antenna is the LoRa antenna. The Wi-Fi antenna and, on configurations with 4G, the 4G antenna are installed inside the enclosure, making GD61x suitable for offices, buildings, campuses, equipment rooms and light-industrial indoor sites.

Figure GD61x front view with LoRa, REC and SIM interfaces

1.1 Product highlights

- ESP32-S3 controller with 8 MB Flash and 8 MB PSRAM.
- Semtech SX1301 or SX1302 concentrator according to the supplied configuration. Suffix –2 has a maximum transmit power of 22 dBm.
- A LoRa architecture: one LoRa antenna, 8 frequency points, 65 channels and half-duplex operation.
- GD614 is the 400 MHz-class RF version; GD618 is the 800 MHz-and-above RF version. The model number does not indicate channel count.
- Ethernet and Wi-Fi STA backhaul; a 4G option code of G adds 4G and PoE. Ethernet is preferred by default, with automatic failover.
- Wi-Fi Soft-AP for local configuration and recovery access.

- Semtech UDP Packet Forwarder, Basic Station and MQTT Bridge.
- DHCP, static IPv4, TLS certificates and a separate remote MQTT configuration channel; configurations with 4G support APN and SIM PIN settings.
- A/B OTA partitions, runtime logs, filesystem management and factory reset.
- External LoRa antenna; internal Wi-Fi antenna and internal 4G antenna when 4G is fitted.
- Type-C and 5–24 V DC input on all variants; PoE when the 4G option code is `G`.

1.2 Technical specifications

Category	Parameter	Specification
MODELS AND COMPUTE		
	Product family	GD61x
	Model-code format	`GD61{4|8}-A{N|G}-{regional-standard}-{version-code}-2`
	Band variants	GD614 and GD618
	4G / PoE option	In `-A{N|G}`, `N` means no 4G or PoE; `G` means 4G and PoE are fitted
	Version code	`N`: default version; other values: customer-specific or special versions
	Controller	ESP32-S3 (ESP32-S3-WROOM-1 N8R8)
	Flash	8 MB, QIO, 80 MHz
	PSRAM	8 MB Octal PSRAM, 80 MHz
	Configuration storage	SPIFFS; settings persist through power loss

Category	Parameter	Specification
LORAWAN		
	Concentrator	Semtech SX1301 or SX1302, as supplied
	LoRa architecture	`A`: one LoRa antenna, 8 frequency points, 65 channels, half-duplex
	Model and RF range	GD614: 400 MHz class; GD618: 800 MHz and above; the model number does not indicate channel count
	Channel bandwidth	Multi-SF channels default to 125 kHz; the LoRa Std channel is configurable
	Regional plans	GD614: CN470 and EU433; GD618: EU868, AS923, AU915 and US902; the ordered RF hardware and local regulations must match

Category	Parameter	Specification
	Uplink protocols	Semtech UDP Packet Forwarder, Basic Station and MQTT Bridge
	Basic Station	Direct LNS or CUPS bootstrap; TLS, token or client certificate
	Antenna	One external LoRa antenna connector; supplied omnidirectional antenna depends on configuration
	Transmit power	Suffix –2: 22 dBm maximum
	Receiver sensitivity	Determined by the ordered regional RF front end and antenna; no single value is declared in this guide

Category	Parameter	Specification
NETWORK AND BACKHAUL		
	Ethernet	W5500, 10/100 Mbps, RJ45
	Ethernet addressing	DHCP or static IPv4 with gateway and primary/secondary DNS
	Wi-Fi	ESP32-S3 integrated 2.4 GHz Wi-Fi, AP + STA
	Default Wi-Fi AP	SSID: `GD6-<Gateway EUI>`; falls back to `LGW-Config` only when no valid Gateway EUI is available; password: `wifi!0804`; management address: `192.168.4.1`
	4G option	Fitted when the 4G option code is `G`; omitted when it is `N`
	4G interface	miniPCIe on configurations with 4G; the modem can be replaced for different operator bands
	Default 4G class	LTE Cat 1 on configurations with 4G; default modem bands match GDI51
	LTE-FDD bands	Default modem with 4G: B1 / B3 / B5 / B8
	LTE-TDD bands	Default modem with 4G: B34 / B38 / B39 / B40 / B41
	SIM	External SIM slot on configurations with 4G
	Link selection	Automatic Ethernet/Wi-Fi STA failover; configurations with 4G add cellular backhaul; Ethernet is preferred by default

Category	Parameter	Specification
INTERFACES		
	LoRa	External antenna connector
	SIM	Front SIM slot for configurations with 4G

Category	Parameter	Specification
	REC (Recovery)	Factory-reset button
	Type-C	5 V power and local maintenance
	RJ45	Ethernet data on all variants; PoE when the 4G option code is `G`
	Terminal block	`5–24V`, `G`, `A+`, `B–`
	RS-485	`A+` and `B–` are reserved and have no user function in the current release

Category	Parameter	Specification
POWER		
	Type-C	5 V DC
	DC terminal	5–24 V DC
	PoE	Fitted when the 4G option code is `G`; use PoE equipment matched to the delivered hardware
	Multiple power inputs	Do not connect more than one input unless project-specific delivery documents explicitly allow it

Category	Parameter	Specification
SOFTWARE AND MAINTENANCE		
	Management	Chinese/English Web console, REST API and separate remote MQTT configuration channel
	Network time	SNTP with multiple-source retry
	Firmware update	Web OTA with A/B application partitions
	Logs	Live logs, level/component filters, pause, clear and download
	User security	Password login, token authentication and first-login password-change reminder
	Factory reset	Restores network and gateway settings and resets the login password; preserves the programmed Gateway EUI

Category	Parameter	Specification
ENCLOSURE AND INSTALLATION		
	Environment	Indoor

Category	Parameter	Specification
	Operating temperature	-25°C to 60°C (all GD6-series gateways)
	Mounting	Desktop or wall mounting with the rotating bottom bracket
	External antenna	LoRa only
	Internal antennas	Wi-Fi and, when fitted, 4G
	Dimensions, weight and ingress rating	Not declared in this revision; use the order or delivery specification for project selection

2. Before you begin

This guide covers GD61x model identification, interfaces, installation, power-up and hardware precautions. GD614 and GD618 use the same gwTool6 configuration system; see the gwTool6 Configuration Guide for Web login, network backhaul, LoRaWAN server, radio and system-maintenance tasks. The 4/8 distinction identifies the LoRa RF range, not the channel count: GD614 is the 400 MHz-class version, while GD618 is the 800 MHz-and-above version.

Prepare the following:

- A LoRa antenna matching the ordered RF band.
- Type-C 5 V or 5–24 V DC terminal power; a 4G option code of `G` can also use compatible PoE.
- Ethernet or a Wi-Fi network; an activated SIM is also required when the 4G option code is `G` and 4G backhaul is used.
- A computer or phone able to reach the gateway's local address.

NOTE Important: Attach the LoRa antenna before applying power. Do not connect multiple power sources at once, do not apply power to the reserved `A+/B−` pins, and do not remove power during OTA or factory reset.

3. Identify the model and device

3.1 Identify the complete model code

3.1.1 Model example

`GD618-AG-AS923-N-2`

3.1.2 Model component breakdown

- **GD618: product series and RF band.**
  - GD61 identifies a sixth-generation indoor LoRaWAN gateway.
  - 8 identifies the 800 MHz-and-above RF version for EU868, AS923, AU915 and US902.
  - Other band option: 4 identifies the 400 MHz RF version for EU433 and CN470.
- **-AG: LoRa architecture and 4G / PoE configuration.**
  - A identifies one LoRa antenna, 8 frequency points, 65 channels and half-duplex operation.
  - G identifies a configuration with both 4G and PoE modules.
  - Other 4G / PoE option: N identifies a configuration without 4G or PoE modules.
- **-AS923: LoRaWAN regional standard.**
  - AS923 means that the gateway supports the LoRaWAN AS923 regional parameters.
  - Other regional codes are CN470, EU433, EU868, AU915 and US902; US902 denotes the LoRaWAN US915 (902–928 MHz) regional parameters.
  - The regional code must match the RF version, antenna and local regulations.
- **-N: default version.**
  - N identifies the default version.
  - Other values identify customer-specific or special versions.
- **-2: transmit-power version.**
  - 2 identifies a maximum transmit power of 22 dBm.

3.1.3 Complete model meaning

The complete meaning of GD618–AG–AS923–N–2 is:

This is a sixth-generation indoor LoRaWAN gateway using the 800 MHz-and-above RF version for AS923, with one LoRa antenna, 8 frequency points, 65 channels and half-duplex operation. It includes the 4G and PoE modules, uses the LoRaWAN AS923 regional parameters, identifies the default version with N, and has a maximum transmit power of 22 dBm.

3.2 Interfaces

The front panel contains the LoRa connector, REC (Recovery) factory-reset button and SIM slot. Only LoRa uses an external antenna. The Wi-Fi antenna and the 4G antenna on G configurations are internal.

Figure GD61x rear interfaces

Interface	Purpose
USB	Type-C 5 V input and local servicing
5–24V / G	Positive wide-range DC input / ground
A+ / B-	Reserved RS-485 pins; no operational device should be connected in this release
POE	10/100 Mbps Ethernet on all configurations; PoE input only on G configurations

The rotating bottom bracket supports wall mounting. Keep the bottom ventilation openings clear.

4. Installation and power-up

4.1 Attach the LoRa antenna

1. Verify that the antenna band matches the gateway RF version.
2. Hand-tighten the antenna on the LoRa connector without side-loading it.
3. Never start LoRa transmission with the antenna disconnected.

4.2 Install a SIM

This section applies only to G configurations. For 4G backhaul, power the gateway off and insert an activated SIM in the SIM slot. A SIM without a PIN can dial directly. If PIN protection is enabled, enter its 4–8 digit PIN in the Web console.

4.3 Select one power method

Use exactly one of these methods:

- Type-C: connect a stable 5 V supply.
- DC terminal: connect the positive lead of a 5–24 V DC supply to 5–24V and negative to G.
- PoE (G configurations only): connect a compatible powered Ethernet cable to POE.

After power-up, the LED slow-blinks continuously (1 s on / 1 s off by default). System initialization, IP acquisition and LoRa service startup take some time.

5. Configure the gwTool6 system

GD61x uses the shared gwTool6 configuration system. The following tasks are maintained in the gwTool6 Configuration Guide:

- Web-console access and sign-in.
- Ethernet, Wi-Fi and optional 4G backhaul.
- Semtech UDP, MQTT Bridge and Basic Station.
- LoRaWAN region, sub-band and channel settings.
- Logs, firmware, filesystem, users and remote configuration.
- Post-reset configuration state and common troubleshooting.

For initial setup, find the gateway in the Ethernet DHCP lease table, or join GD6–<Gateway EUI> and open http://192.168.4.1. The SSID falls back to LGW–Config only when the device has no valid Gateway EUI. The default AP password and default Web password are both wifi!0804; they can be changed separately. After saving a static Ethernet address, confirm a backup management path and restart the gateway before reconnecting at the new address.

For ChirpStack or TTN, follow the gwTool6-specific links under Related documents. Basic Station and Packet Forwarder are mutually exclusive, so changing drivers briefly interrupts LoRa forwarding. While Basic Station is active, the LNS-supplied router configuration controls the channels; local Radio settings are retained for a later switch back to Packet Forwarder.

The ordering code and technical specifications in this guide remain authoritative for the hardware capabilities of a particular GD61x unit.

6. REC (Recovery) button and factory reset

REC has one function only: factory reset. It does not enable the Wi-Fi AP or perform any other operation. Hold REC; the gateway follows this sequence: **solid at the 2 s threshold → reset runs → three fast flashes → reboot**.

Factory reset restores network, LoRaWAN, MQTT, remote settings and, on `G` configurations, 4G settings. It changes the login password back to `wifi!0804`, preserves the programmed Gateway EUI and does not overwrite the Web static files.

7. Indicator patterns

ID	Pattern	Meaning
FR6	LED slow-blinks continuously (1 s on / 1 s off by default)	Normal operation
FR7	Factory reset: solid at the 2 s threshold → reset runs → three fast flashes → reboot	Factory reset

8. Troubleshooting

Symptom	Checks and recovery
`LGW-Config` cannot be found	Look for `GD6-<Gateway EUI>`, derived from the programmed Gateway EUI; `LGW-Config` is used only when no valid EUI is available
A saved static Ethernet address is not active	Confirm a backup management path, restart the gateway, then reconnect at the new address
4G on a `G` configuration will not register	Check SIM, PIN, APN, signal and modem bands; verify internal antenna and miniPCIe modem installation
No LoRa uplink	Check antenna, regional band, Gateway EUI, LNS address/ports and active backhaul

Symptom	Checks and recovery
Gateway does not return after OTA	Allow the automatic reboot to finish; if still unavailable, recover through the Wi-Fi AP or a controlled serial service procedure instead of repeated power cuts
Web, login, Ethernet or Wi-Fi configuration problem	Follow Configuration troubleshooting in the gwTool6 Configuration Guide

9. Related documents

- gwTool6 Configuration Guide
- Connect to ChirpStack with Basic Station (gwTool6)
- Connect to TTN with Basic Station (gwTool6)
- LoRaWAN Gateway documentation index