REDZ
SMART COMMUNICATION

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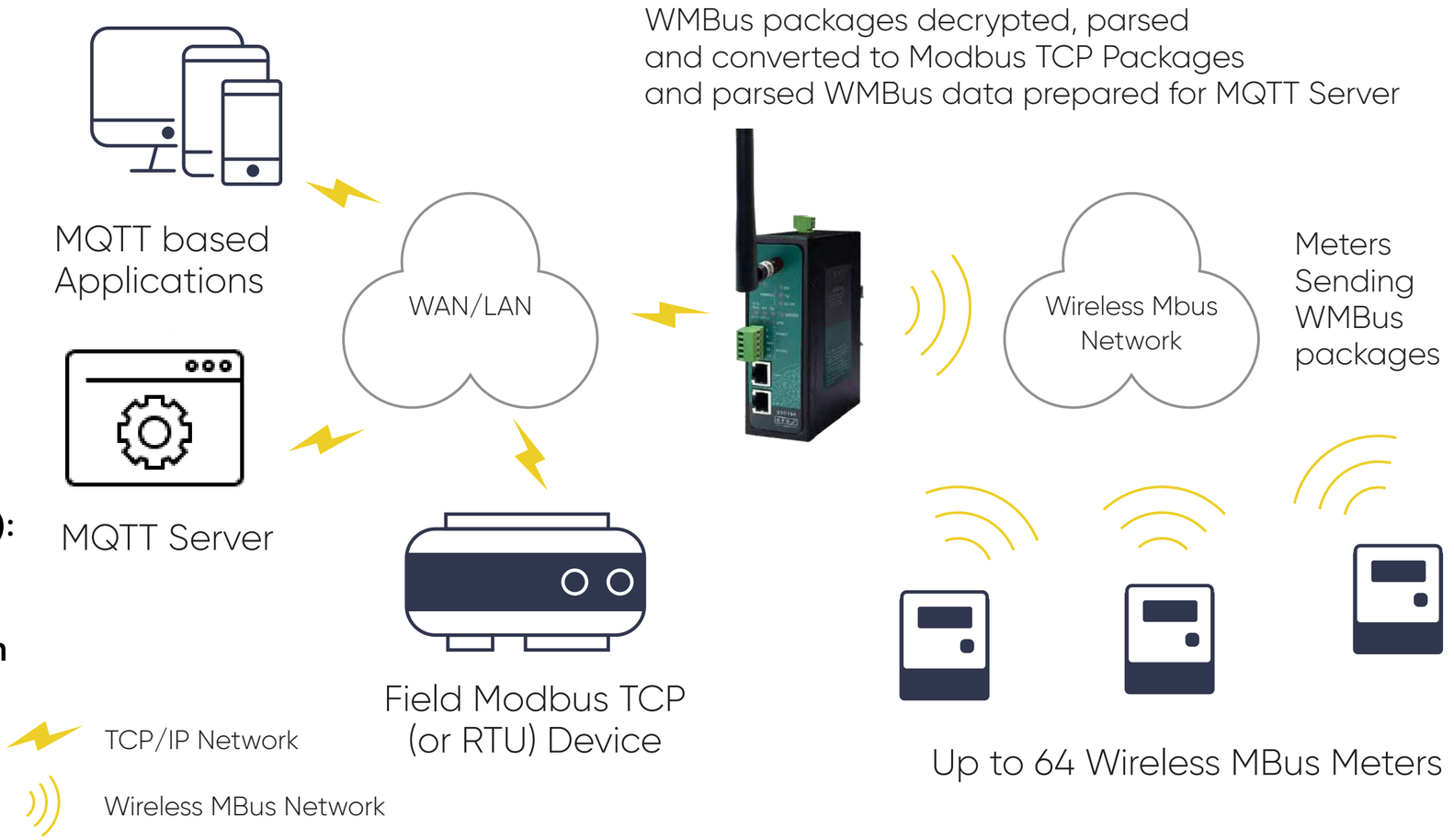
STG Series WMBUS (Wireless MBus) Gateway

WMbus to Modbus TCP/RTU Gateway
with MQTT Data Send Function
WMbus to Serial/TCP Transparent Conversion Function
WMbus Repeater Function

with 2 × 10/100Base-T(x) Ports,
1 × RS232 and 1 × RS485 Serial Ports
and option for BPL (Broadband Power Line Link)

STG Series WMBus Gateways can get Wireless MBus frames over air, Decrypt Up to 64 device packets, parse and map those parsed data to Modbus registers as well as send data to MQTT Server. STG has auto configuration feature to automatically list the received WMBus packages on configuration web interface for easy configuration. STG has 6 Device Functions:

1. TCP/IP to WMBus Gateway: Receive WMBus frames and send to TCP Ip client device connected to STG. STG can also send WMbus frames from TCP side to WMbus side (generation of frames).
2. WMBus - Modbus TCP Gateway (and MQTT Publisher): STG can get WMBus frames, decrypt, parse, convert to Modbus TCP (and send to MQTT)
3. WMBus Decoder/Parser and MQTT Publisher: STG can get WMBus frames, decrypt, parse and send to MQTT (almost same like function 2 but no Modbus)
4. Serial to WMBus Gateway: Receive WMBus frames and send to Serial local device connected to STG over RS232 or RS485. STG can also send WMbus frames from serial side to WMbus side (generation of frames).
5. WMBus - Modbus RTU Gateway (and MQTT Publisher): STG can get WMBus frames, decrypt, parse, convert to Modbus RTU (and send to MQTT)
6. WMBus Repeater: STG can receive WMBus frames and send them again as WMBus messages to air. This is a repeater function.



STG In all function modes 1-2-3-4-5-6: STG can decrypt up to 64 devices frames, for example in Function 6: Repeater function.

Typical applications: Automated Meter reading, Home – Building – Industrial Automation, Wireless Sensors, Telemetry...

STG models with Broadband Power Line (BPL) link can communicate with full transparent TCP/IP standard over Low Voltage power lines and allows easy connection between TCP/IP based terminals without use of extra cables.

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Main Features

- Supports 2 x 10/100Base-T(X) ports
- Supports Full/Half-Duplex, auto MDI/MDI-X on each port
- DHCP Server Capability
- Supports 1 x RS232 and 1 x RS485 Serial Connection up to 460800 Baud
- Embedded web interface for ease of use
- 868MHz Wireless MBus (WMBus) Radio Frequency (RF) Communication
- 1 Device with Many Functions:
  WMbus to Modbus TCP/RTU Gateway
  with MQTT Data Send Function
  WMbus to Serial/TCP Transparent Conversion Function
  WMbus Repeater Function
- Allows connection of multiple Modbus Master devices in Modbus TCP or RTU Conversion Modes
- MQTT Publisher with different data transfer options
  Raw WMBus Decrypted Frame
  Parsed WMBus Frame As Objects
  Parsed WMBus Frame As Modbus Frame
- WMBus link mode Configurable (S - Mode, T - Mode, C - Mode, C/T - Mode together)
- AES Decryption of Received Frames for up to 64 Devices (Mode 5, Mode 7, Mode 128 and custom modes)
- Supported CI Values: 53h, 5Bh, 60h, 6Ch, 6Dh, 6Eh, 6Fh, 72h, 74h, 75h, 78h, 7Ah, 7Ch, 7Dh, 80h, 8Ah, 8Bh, 8Ch, 8Dh, 8Eh, 8Fh, C3h, C4h, C5h
- Decrypted WMBus data can be parsed based on WMBus OMS or custom data model of manufacturer
- Auto Configuration based on received WMBus frames
- Unlimited Numbers of WMbus device data can be listened over air and WMBus frames can be sent to remote/local TCP or Serial devices

Extra Features for Models with BPL (Broadband Powerline)

- Supports 2 x 10/100Base-T(X) ports + 1 x BPL link
- Wide range 3 phase AC input
- Supports up to 30Mbps PHY rate on BPL with Up to 10 hops and 1000 nodes
- Up to 432 sub-carriers from 2 to 28MHz analog bandwidth
- Support LDPC-C FEC with 128-bit AES core
- Plug and play with Master/Slave selection via web interface

- **WMBus Radio Power Level Configurable (-1 dBm to 13 dBm) when sending WMBus frames in WMbus to Serial/TCP Transparent Conversion Function and WMbus Repeater Functions**
- Easy to follow WMBus data packages on web interface
- Easy monitor of parsed WMbus OMS Parsed data on web interface
- Easy to follow Device Status on web interface
- Black List and White List based WMBus package filter
- Firmware Upgrade over Web
- 2 firmware storage capability on same device (1 active only)
- AC or DC wide range power options
- Wide operating temperature range from -25 to 70 °C AC and -40 to 85 °C DC power input versions
- Rugged Metal IP-40 housing design
- DIN-Rail mounting

STG - Lite Model Differences

- 1 x 10/100 Ethernet Port
- 1 x RS485 Port
- 9-36V DC (max 40V) Power Input
- Console Connection for Logs is not available (UDP Log still available)
- AES Decryption of Received Frames for up to 20 Devices (Mode 5, Mode 7, Mode 128 and custom modes)

Technical Specifications

Connectors and Ports

SMA Antenna Connector	1 Standard SMA Female Interface for WMBus, 50 ohm
Console Port	Micro USB or USB Type-C connection for LOG in 115200 baud
10/100T(X) RJ45 Ports	Ethernet Connection on 2 ports
Serial Ports	5 pin wired Terminal Connection Tx, Rx, GND for RS232 A and B for RS485
Reset Buttons	Reset to Client and Reset to Server Operating modes buttons

WMBus Technology

WMBus Module	868MHz Wireless MBus (WMBus) Radio Frequency (RF) Communication

Link Budget	Up to 130 dB
Communication Distance	Up to 3km (line of sight) ~100m, Typical Communication Distance Indoor/Urban
Link Modes	Configurable (S - Mode, T - Mode, C - Mode, C/T - Mode together)
Supported CI Values	53h, 5Bh, 60h, 6Ch, 6Dh, 6Eh, 6Fh, 72h, 74h, 75h, 78h, 7Ah, 7Ch, 7Dh, 80h, 8Ah, 8Bh, 8Ch, 8Dh, 8Eh, 8Fh, C3h, C4h, C5h for standart models
Decryption	AES Decryption of Received Frames for up to 64 Devices (Mode 5, Mode 7, Mode 128 and custom modes) in standart models There is also version with up to 16 device decryption and supports only Mode 5
Parsing	Decrypted WMBus data can be parsed based on WMBus OMS or custom data model
Auto Configuration	Automatically lists the received WMBus frames with signal strength (RSSI) for easy configuration
WMBus to Serial/TCP Conversion Function	Receiving WMBus frames can be turned off if not used Unlimited Numbers of WMbus device data can be listened over air and WMBus frames can be sent to Local/Remote TCP or serial devices. Up to 64 device's frames still can be decrypted in this mode
Output Power Level	Configurable (-1 dBm to 13 dBm), used when sending frame in WMbus to Serial/TCP Transparent Conversion Function and WMbus Repeater Functions

Modbus Characteristics

Modbus Protocol	Modbus TCP or RTU Configurable
Modbus Devices	Allows connection of multiple Modbus Master devices in Modbus TCP or RTU Conversion Modes
Modbus Address	Modbus address freely can be assigned up to 64 WMBus Devices in standart models There is also version with up to 20 WMBus devices data parsing and modbus mapping (and decrypt 16 devices)
Modbus Data	Data can be read via Function Code 3 Read Holding Registers (4x)
Data Structure	Modbus data is stored in three parts: Status Block, several Data Blocks depends on number measurements stored in WMBus device and finally the Service Block. Status Block, 6 Registers: - WMbus Device ID: 2 Registers - WMbus Man ID: 1 Register - WMbus Version: 1 Register - WMbus Type: 1 Register - Total Data Count: 1 Register (Represents how many data blocks exists)
	Data Block, each 5 Bytes total n bytes: - Storage Number: 1 Register - Function Field: 1 Register - Data Type: 1 Register - Data Value: 2 Registers Service Block, 4 Registers: - Access Number: 1 Register - RSSI Value: 1 Register - Status (from Frame): 1 Register - Decrypt Status: 1 Register

MQTT Details

MQTT Publisher can be enabled and can be used in parallel with Modbus conversion (or stand alone)

MQTT Connection	Broker IP and Port can be entered Client ID , User name and Password can be set Publish Topic and Subscribe Topic can be defined from web interface
Data Send Interval	User can send Data send interval in seconds Default is 60 seconds and STG will send meter data to MQTT server in that interval
NTP Server	NTP server time will be added to each MQTT message
Data Format	There are 3 predefined formats RAW WMBUS DECRYPTED DATA: STG will share WMBus frame as it is but decrypted PARSED DATA AS OBJECTS: STG will share WMBus data as parsed objects PARSED DATA AS MODBUS FRAME: STG will share WMBus data as Modbus like frame

Ethernet Switch Technology

Ethernet Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-T(X) IEEE 802.3x Flow Control
Mac Table	1K MAC address entry
Processing	Store-and-Forward
Memory	448K bits packet buffer memory

BPL (Broadband Powerline) Technology for BPL Models

PHY Data Rate	Up to 240 MHz
MAC Layer Protocol	CSMA/CA
Modulation Technology	OFDM-432
VLAN	IEEE802.1q/ IEEE802.1p/ IEEE802.3d

NTP Time Synchronization

NTP is used to syncronize device time after a manual or system triggered restart and it only takes place if NTP time is available and device time difference from NTP time is + or - 60 seconds.

Led Indicators

Power indicator	Power LED
10/100T(X) Indicators	Activity LEDs: ETH1, ETH2 and STG (Activity of device itself)
WMBus Indicators	Alive (Blinks during normal operation), Tx and Rx of data LEDs
System Indicators	Status LED, Tx and Rx of data LEDs and Server LED (LED ON: Server Operating Mode, LED OFF: Client Operating Mode)
Console Indicators	Tx and Rx of data LEDs

Power - DC Models

Input Range	5-48V DC wide range Power Input (Allows up to 60 V DC)
Reverse Polarity Protection	Available
Thermal Shutdown and Current Limit Protection	Available

Power – AC Models

Input Range	100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC input
Isolation	Fully Isolated >4200Vrms, 5mA 1 Min
Insulation	Class II

Power – BPL Models

Input Range	3 Phase Input, 110V–240V 50Hz to 60Hz AC input
Power and Data	AC Power supply use L1-N only. Phase 2-3 connections are used for BPL signal transmission.

BPL Models can be purchased in 2 versions:
1. P-N Model: Phase to neutral model (Standart Model). That version gets power from terminal pins 1 and 2 from phase and neutral. It can also transmit data from that pins and other pins usage is optional (Ex: Master can be connected to all phases and slaves can be connected to relevant phases)

2. P-P Model: Phase to phase model. That version also gets power from terminal pins 1 and 2 from phase and neutral. Data transmission only done through terminal pins 3 and 4. Phase to phase connection can be done to data transmission pins for better performance. If phase to phase connection is not avilable then phase and neutral can still be connected for data transmission for terminal pins 3 and 4.

BPL Models can be purchased in DC model as well:
This model will be same as "P-P Model" (Phase to phase model) on data connection and gets 9-36V DC power from terminal pins 1 and 2 to power up device itself. Data transmission only done through terminal pins 3 and 4.

Physical & Environmental Characteristics DC Models

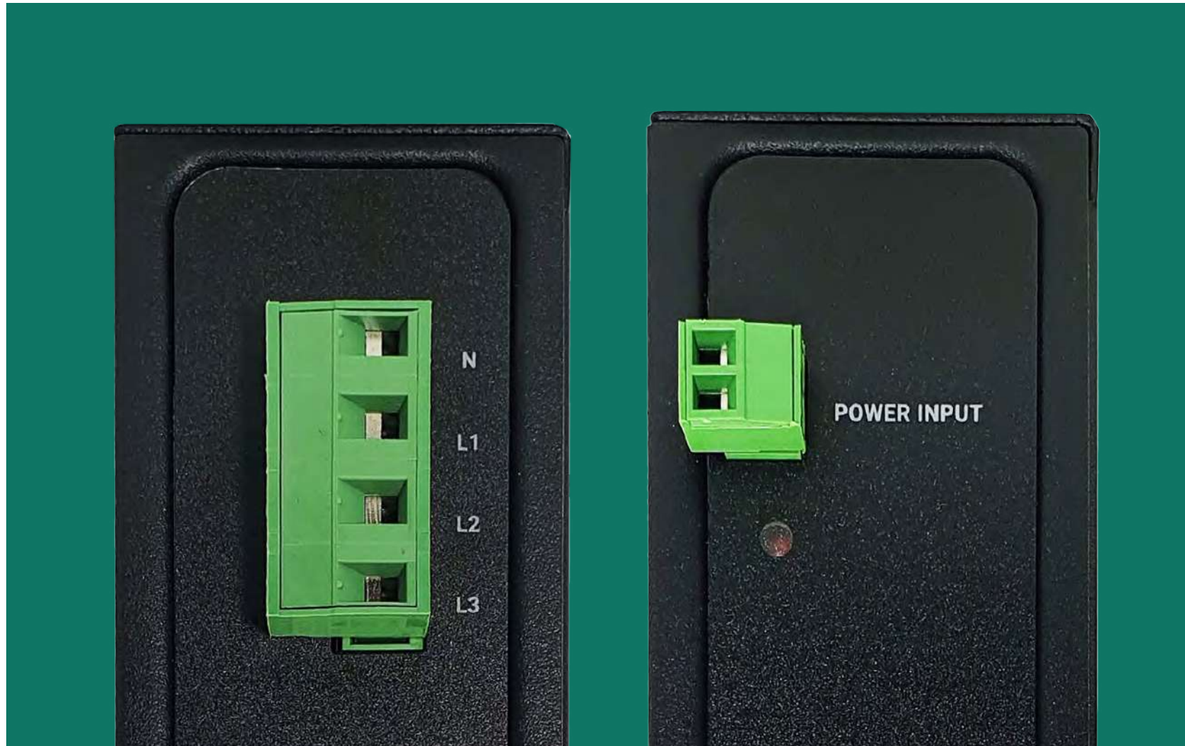
Enclosure	Metal, IP 40
Dimensions	43 × 95 × 124 (w × d × h) mm
Weight	~ 380 gr
Storage Temperature	– 65 to 150 °C
Operating Temperature	– 40 to 85 °C
Operating Humidity	5% to 95% Non-condensing

Physical And Environmental Characteristics AC Models

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-40 to 85 °C
Operating Temperature	-30 to 70 °C
Operating Humidity	10% to 95% Non-condensing

Physical And Environmental Characteristics BPL Models

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-65 to 150 °C
Operating Temperature	-40 to 85 °C
Operating Humidity	5% to 95% Non-condensing



STG – Lite

STG Lite Models are cost effective solution for Wireless MBus Gateway needs.

STG - Lite model hardware difference:
- 1 x 10/100 Ethernet Port
- 1 x RS485 Port
- 9-36V DC (max 40V) Power Input
- Console Connection for Logs is not available (UDP Log still available)

STG - Lite model functional difference:
- AES Decryption of Received Frames for up to 20 Devices (Mode 5, Mode 7, Mode 128 and custom modes)

Power - Lite DC Model

Input Range	9-36V DC wide range Power Input (Allows up to 40 V DC)
Reverse Polarity Protection	Available
Insulation Voltage	1500VDC for 1 minute with leakage current <1mA.

Physical And Environmental Characteristics Lite DC Model

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-55 to 125 °C
Operating Temperature	-40 to 85 °C
Operating Humidity	5% to 95% Non-condensing

Ordering Information

STG154: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V (max. 60V) DC Power Input

STG254: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

STG655: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485,
3 Phase AC Power Input, 110V–240V/50-60Hz

STG154 - D16: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V (max. 60V) DC Power Input

STG254 - D16: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

STG655 - D16: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input, 110V–240V/50-60Hz

STG154 - Lite: 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 1x 10/100 T(x) ETH port and 1 x RS485, 9-36V (max. 40V) DC Power Input

Product Comparison

Model	MQTT Connectivity	Decrypt Up to 64 WMBus Device Data	Decrypt Up to 16 WMBus Device Data	Decrypt Up to 20 WMBus Device Data	Decryption Mode 5, Mode 7, Mode 128 and Custom	Decryption Mode 5	9-36V (max. 40V) DC Power Input	5-48V (max. 60V) DC Power Input	100-240V AC (120-370V DC), 50Hz to 60Hz AC Power Input	3 Phase AC Power input, 110V-240V/ 50-60Hz AC Power Input	BPL (Broadband Power Line) Link
STG154	●	●			●			●			
STG254	●	●			●				●		
STG655	●	●			●					●	●
STG154 - D16	●		●			●		●			
STG254 - D16	●		●			●			●		
STG655 - D16	●		●			●				●	●
STG154 - Lite	●			●	●		●				