

Wireless Modbus RTU Gateway
(WMB11X-10)



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Modbus RTU is an open, serial (RS-232 or RS-485) protocol with a Master/Slave architecture. It is a widely accepted protocol due to its ease of use and reliability. Modbus RTU is widely used within Building Management Systems (BMS) and Industrial Automation Systems (IAS).

The WMB11X-10 wireless Modbus RTU gateway enables integration of wireless sensors and actuators in to an existing Modbus backbone.

Features

- Wired communication between Modbus master and slave wireless Modbus gateway available in RS485 half/full duplex modes.
- Low power wireless (Sub 1 GHz) radio used for wireless communication to sensors and actuators.
- Reliable sub-GHz, low power and low latency network.
- Wireless Modbus Gateway can support up to 128 simultaneous wireless nodes in a single network.
- Wireless nodes are bi-directional. They can report sensor data such as temperature, RH etc to the gateway. They can also receive commands from the gateway.
- All Modbus RTU message types supported.
- Data received asynchronously from wireless nodes is stored on the Gateway. Latest sensor data from a wireless node will overwrite earlier

data. This latest data will be sent in response to a query from the Modbus master.

Note that gateway firmware and wireless node firmware can be fully customized to support your requirement.

Addressing

Modbus RTU Node Address to Wireless Node Address Mapping

- Standard Modbus RTU node addresses are 1-255, with 0 being reserved for broadcast messages.
- WiSense sensor nodes have a 64 bit / 8 byte permanent address (example: 0xfc:0xc2:0x3d:0x00:0x00:0xca:0x75). This address is IEEE assigned and globally unique.
- The WMB11X-10 maintains a mapping between the two address mentioned above.

Modbus Register Address to Sensor/Actuator Id Mapping

- Modbus register address range is from 40001 to 65535.
- WiSense sensor/actuator Ids range from 1 to 255.
- The WMB11X-10 also maintains a mapping between the id of a particular sensor/actuator to its corresponding register address.

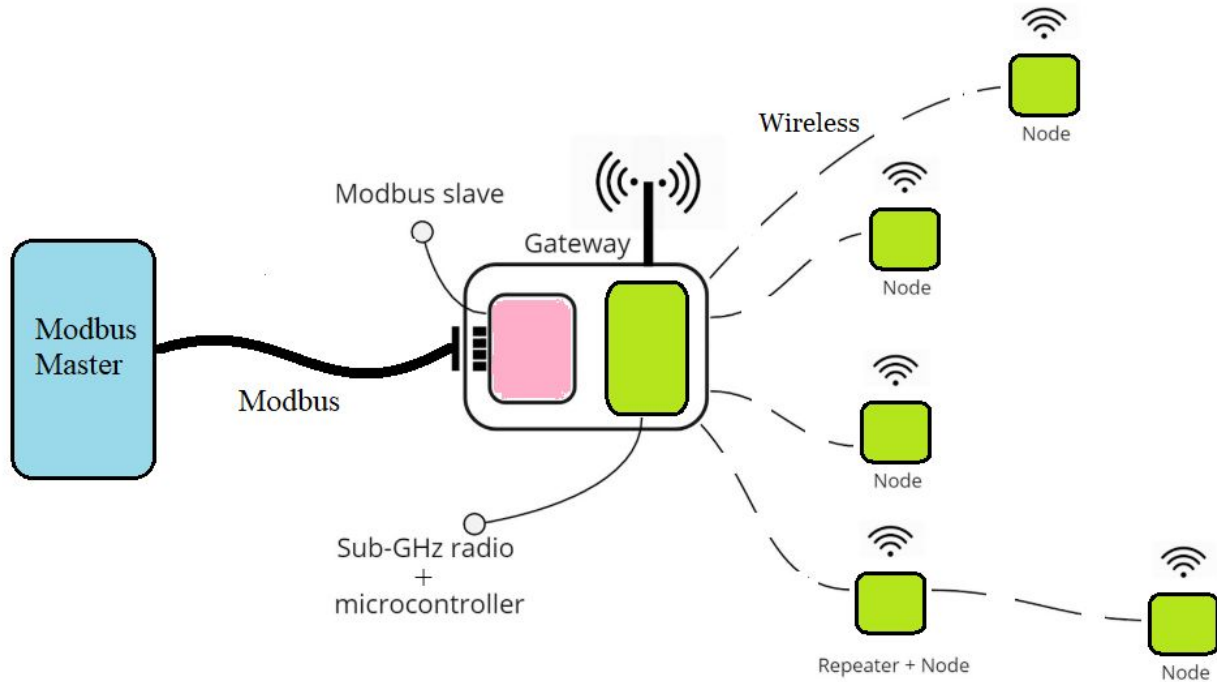
We provide PC based software to configure these mapping tables on the gateway.

Hardware Specification

Modbus interface

- Texas Instruments SN65HVDX based RS-485 interface with IEC ESD, 250 kbps
- Configurable baud rate - default is 9600 bps.
- Supports both half (default) and full duplex configurations.
- Modbus specification:
 - Low Power Consumption
 - Low Standby Supply Current: < 2 μ A
 - ICC < 1 mA Quiescent During Operation
 - 5-V Tolerant Logic Inputs Compatible With 3.3-V or 5-V Controllers
 - Signaling Rate Options Optimized for: 250 kbps, 20 Mbps, 50 Mbps
 - Glitch Free Power-Up and Power-Down Bus Inputs and Outputs
 - Large Receiver Hysteresis (80 mV) for Noise Rejection
 - Extended Industrial Temperature Range -40°C to 125°C

Block Diagram



Microcontroller Specification

Texas Instruments MSP430F5419A based gateway

- 16-Bit Ultra-Low-Power Microcontroller
- 16-Bit RISC Architecture: Extended Memory, Up to 25-MHz System Clock
- 12-Bit Analog-to-Digital Converter (ADC)
 - Internal Reference, Sample-and-Hold, Autoscan Feature,
 - 14 External Channels, 2 Internal Channels

- Serial Onboard Programming, No External Programming Voltage Needed.
- 3-Channel Internal DMA
- 4 USCs, I2C, Synchronous SPI

Radio Specification

- Texas Instruments Sub-1 GHz CC1101/CC1120 Transceiver
- Max Transmit Power: + 13 dBm (limited by FCC/ETSI/WPC rules)
- Antenna
 - Standard
 - Half-wave dipole antenna
 - Gain: +3 dBi
 - Length: 185 mm
 - Other antenna options (including PCB) available
- Range: Around 1 KM (line of sight)

Wiring

- Data A
- Data B
- V (+5 V)
- Gnd

Enclosure

- Material: ABS, PLA
- Dimensions: 103 mm x 116 mm x 33 mm
- External on/off switch
- Enclosure is customizable according to your requirements.

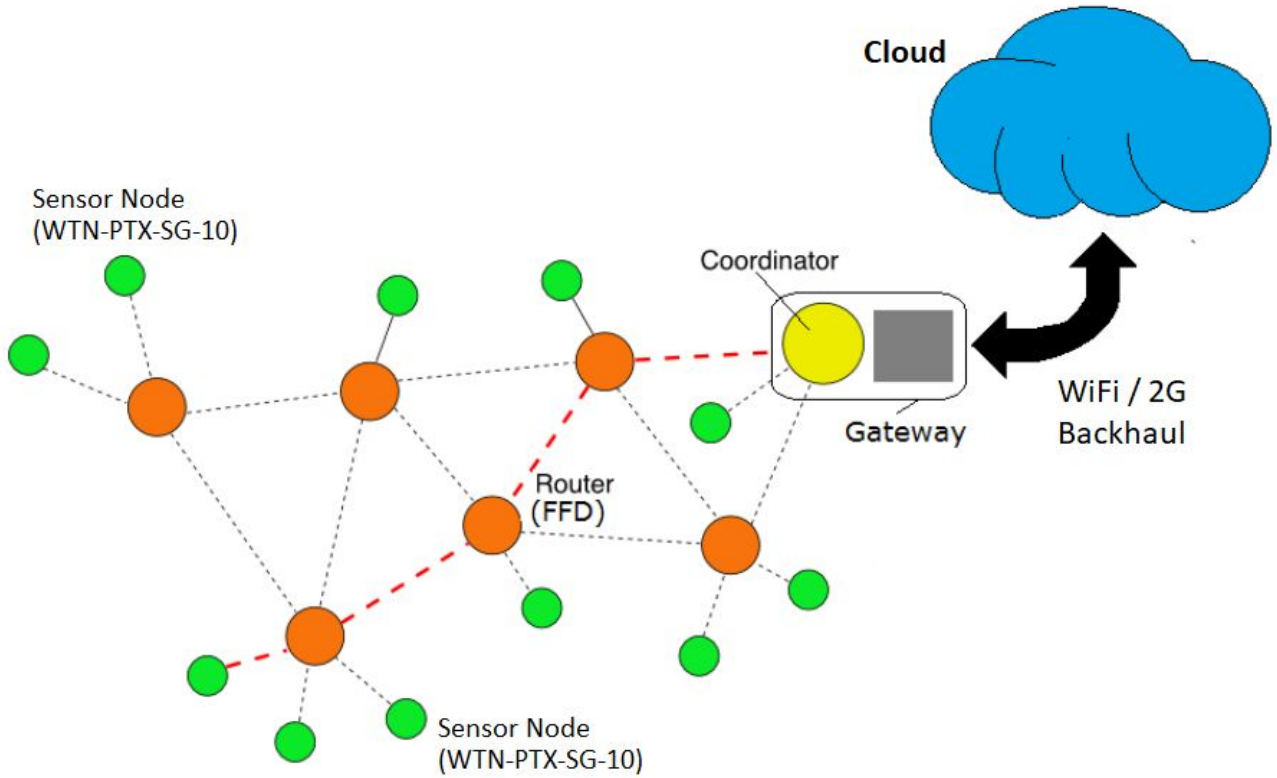
Data Reporting Options

- Report measured values periodically with configurable interval - Minimum (1 sec) / Maximum (1 day).
- Report measured values only when it changes by a configurable percentage value with respect to the prior value reported. Also report measured temperature if no report sent for a configurable period of time.
- Report measured values only when it crosses configurable high or low threshold value. High and low hysteresis values are also configurable. Also report if no message sent for a configurable period of time.
- Use case specific message reporting algorithm implementable.

Standards Compliance

Region	Operating Frequency Range	Certification
USA/Canada	902-928 MHz	FCC
EU	868-870 MHz	ETSI
India	865-867 MHz	WPC (Self Certified)

WiSense Wireless Mesh / Star Network Architecture



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