OWON IoT Offerings

A IoT Products

Off-the-Shelf Products for Resale / *Page 1~14*

By partnering with Tuya Smart, OWON offers a range of smart devices for distribution channels. These include power meters, thermostats, field sensors, and more, which can be controlled remotely via mobile apps and are available for OEM branding.

B IoT Device ODM

Transfer your ideas to tangible devices / *Page 15~18*

Whether you are a solution provider searching for a specialty device, or an equipment manufacturer seeking hardware to match your equipment, OWON can deliver "well-tailored" hardware at different levels along with APIs to meet your technical requirements.

C Wireless BMS System

Complete IoT system for quick deployment / *Page 19~20*

You can build your BMS system in a blink by simply choosing from a variety of wireless devices, quickly deploying OWON's software on your cloud or local server, and flexibly configuring the PC dashboard in accordance with your project's unique requirements.

D IoT Solutions

End-to-End Platform for System Integration / *Page 21~24*

OWON provides a full line of IoT components along with APIs at different levels (e.g., end device, gateway, and private server), enabling system integrators to either integrate any of the above components into their existing system or build their own ecosystem from scratch.

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owon-smart

IoT Device Original Design Manufacturer

IoT End-to-End Solution Provider

Energy Management | HVAC Control | Wireless BMS | Smart Hotel

Since 1993

Who we are ?

OWON Technology (part of LILLIPUT Group) is an ISO 9001:2015 certified **Original Design Manufacturer** specializing in the design and manufacturing of electronic products since 1993. Backed by a solid foundation in embedded computer & IoT technologies, as well as strong insight into **Energy Management, HVAC Control & Smart Building** industry, OWON offers both standard IoT products and customized **IoT solutions** for Telcos, utilities, home builders, property management, contractors, system Integrators, equipment manufacturers, and retail channels.

At the device level, in addition to providing a variety of standardized models, OWON also designs and manufactures "well-tailored" devices as per customers' requirements to perfectly match their technical goals.

At the system level, on top of the off-the-shelf residential and commercial IoT SaaS system, OWON also provides complete APIs for system integration in achieving our partners' unique business goals.

What we offer ?

A. Off-the-Shelf IoT Products

B. IoT Device ODM Services

C. Wireless BMS for Quick Deployment

D. IoT Solutions for System Integration

Whom we serve ?

Distribution Channels
Distributor, Wholesaler, Retailer, Contractor

System Integrators
Telcos, Utilities, Home Builders, BMS Platforms

Equipment Manufacturers
Solar Invertor, Energy Storage, HVAC Equipment


SMT


Dust-free Workshop


Assembly Line


Environmental Chambers


Mold Workshop


Plastic Injection


Canada Office


US Office


UK Office


Factory

A – IoT Products

B – IoT Device ODM

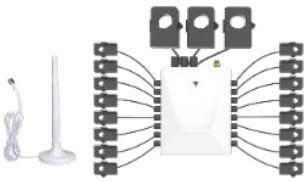
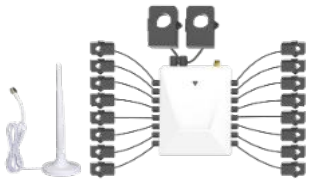
C – Wireless BMS System

D – IoT Solutions

IoT Products

Smart Energy Meter

Model	PC 321 Single/3-phase Power Clamp	PC 311 Single-phase Power Clamp
Picture		
Operating Voltage (RMS for each Phase)	• L-N: 90~277 Vac 50/60Hz • L-L: 156~480 Vac 50/60Hz (Optional)	• L-N: 90~277 Vac 50/60Hz
Supported Systems	• Single-Phase / Split-Phase / Three-Phase (No Delta / wye / Y / Star Connection) • Three-Phase Three Wire (Optional)	• Single-Phase
CT Clamp Quantity	• Max. 3 CTs	• Max. 2 CTs • Max. 1 CT (Relay version)
CT Clamps Available	80A, 120A, 200A, 300A, 500A, 750A	20A, 80A, 120A, 200A, 300A
Relay	/	16A Dry Contact Relay (Optional)
Antenna	External Wi-Fi Antenna	Internal Wi-Fi Antenna
Measurement	Real-time Voltage, Current, Frequency, Power Factor, Active Power	
Measurement Direction	Support Bi-Directional Energy Measurement: Energy Usage / Solar Production	
Cloud	TUYA APP or Integration API via MQTT / HTTP / Modubus TCP	
Installation	Screw-in Bracket or DIN rail Bracket	Sticker and DIN rail Bracket
Dimension	86(W) x 37(D) x 86(H)mm	46(W) x 19(D) x 46(H)mm

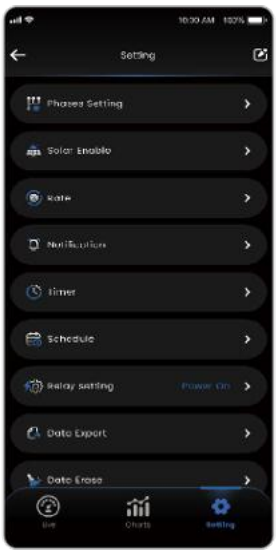
Model	PC341-3M16S Multi-Circuit Energy Monitor	PC341-2M16S Multi-Circuit Energy Monitor
Picture		
Operating Voltage (RMS for each Phase)	• L-N: 90~277 Vac 50/60Hz	• L-N: 90~277 Vac 50/60Hz • L-L: 240 Vac 50/60Hz
Supported Systems	Single-Phase / Three-Phase Four Wire (No Delta / wye / Y / Star Connection)	Single-Phase / Split-Phase
CT Clamp Quantity	Max. 3 Main CTs / 16 Sub CTs	Max. 2 Main CTs / 16 Sub CTs
CT Clamps Available	• Main CTs 200A, Sub CTs 50A • Main CTs 300A/500A, Sub CTs 80A/120A (Optional)	
Antenna	External Wi-Fi Antenna	
Measurement	Real-time Voltage, Current, Frequency, Power Factor, Active Power	
Measurement Direction	Support Bi-Directional Energy Measurement: Energy Usage / Solar Production	
Cloud	TUYA APP or Integration API via MQTT / HTTP / Modubus TCP	
Installation	Screw-in / DIN rail Bracket	
Dimension	81(W) x 41(D) x 111(H) mm	

Smart Energy Meter

Model	PC 473 Power Meter	PC 472 Power Meter
Picture		
Operating Voltage (RMS for each Phase)	L-N: 90~277 Vac 50/60Hz	
Supported Systems	Single-Phase / Three-Phase (No Delta / wye / Y / Star Connection)	Single-Phase
CT Clamp Quantity	Max. 3 CTs	Max. 2 CTs
CT Clamps Available	20A, 80A, 120A, 200A, 300A, 500A, 750A	
Relay	16A Dry Contact Relay	16A Dry Contact Relay (Optional)
Antenna	Internal Wi-Fi Antenna	
Measurement	Real-time Voltage, Current, Frequency, Power Factor, Active Power	
Measurement Direction	Support Bi-Directional Energy Measurement: Energy Usage / Solar Production	
Cloud	TUYA APP or Integration API via MQTT / HTTP / Modubus TCP	
Installation	DIN rail	
Dimension	35(W) x 65(D) x 90(H)mm	

Model	PC 4713 Smart Energy Meter	PC 4711 Smart Energy Meter
Picture		
Operating Voltage (RMS for each Phase)	• L-N: 90~277 Vac 50/60Hz • L-L: 156~480 Vac 50/60Hz (Optional)	• L-N: 90~277 Vac 50/60Hz
Supported Systems	• Single-Phase / Split-Phase / Three-Phase (No Delta / wye / Y / Star Connection) • Three-Phase Three Wire (Optional)	• Single-Phase
CT Clamp Quantity	Max. 3 CTs	Max. 2 CTs
CT Clamps Available	50A, 80A, 120A, 200A, 300A, 500A, 750A	
Relay	5A Dry Contact Relay (Optional)	
Antenna	• Internal Wi-Fi Antenna • External Wi-Fi Antenna (Optional)	
Port	• RJ45 (Optional) • RS485 (Optional)	
Measurement	Real-time Voltage, Current, Frequency, Power Factor, Active Power, Reactive Power, Apparent Power	
Measurement Direction	Support Bi-Directional Energy Measurement: Energy Usage / Solar Production	
Cloud	TUYA APP or Integration API via MQTT / HTTP / Modubus TCP / Modbus RTU	
Installation	DIN rail	
Dimension	19 (W) x 69(D) x 90 (H) mm	

Smart Energy Meter

Model	CB431/R Din-Rail Relay	CB431/2R Din-Rail Relay	CB432 Din-Rail Relay
Picture			
Operating Voltage (RMS for each Phase)	L-N: 90~277 Vac 50/60Hz		
Supported Systems	Single-Phase		
Relay	16A Relay*1	16A Relay*2	100A Relay*1
Max. Current	16A	16A each, total up to 25A	100A
Antenna	• Internal Wi-Fi Antenna • External Wi-Fi Antenna (Optional)		• Internal Wi-Fi Antenna
Port	• RJ45 (Optional) • RS485 (Optional)		/
Measurement	Real-time Voltage, Current, Frequency, Power Factor, Active Power, Apparent Power		Real-time Voltage, Current, Frequency, Power Factor, Active Power
Cloud	TUYA APP or Integration API via MQTT / HTTP / Modubus TCP / Modbus RTU		TUYA APP or Integration API via MQTT / HTTP / Modubus TCP
Installation	DIN rail		
Dimension	19 (W) x 69(D) x 90 (H) mm		36 (W) x 66(D) x 82 (H) mm
Smart Power Meter APP	  		

Smart Thermostat (24Vac System)

PCT 513 4.3" Touchscreen Smart Thermostat

Zone Sensor Touchscreen Smart Thermostat SmartPhone

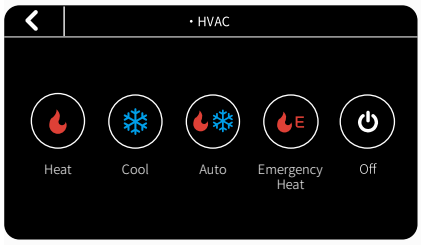
tuya Version — Works with Tuya APP

Wi Fi Version — MQTT API for Integration

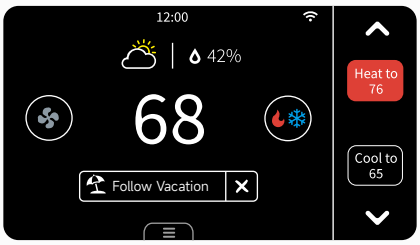
Modbus Version — Works with BMS System

Version — Works with Separate Wiring Module

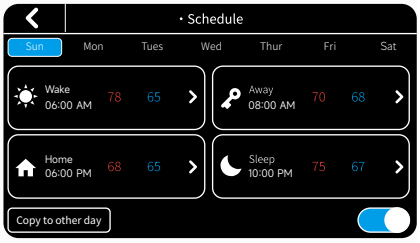
Smart HVAC Control



2H/2C Conventional & 4H/2C Heat Pump



Automatic heating & cooling changeover



Flexible 4-period/7-day Scheduling

New Comfort Experience

Touch Screen
4.3" TFT LCD Display

Vacation Mode
Run your system economically when you are on vacation

Weather Forecast
5-day local weather forecast

Voice Control
Works with Alexa & Google Home

Remote Zone Sensor
Scattered multi-sensors enable location-based temperature control

Smart Warm-up
Preheat or precool before you get home

Smart Alerts
Heating or cooling alerts and air filter change reminders

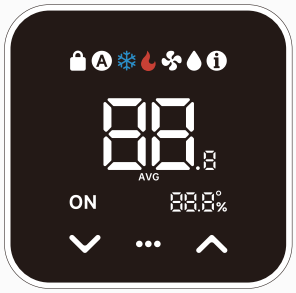
Device Lock
Multi-level Keypad Lockout

Open API
Device-level and cloud-level API for system integration

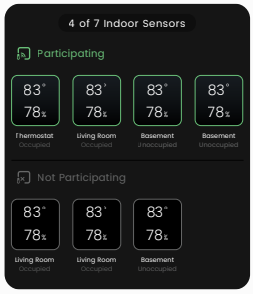
Smart Thermostat (24Vac System)

PCT 523 Wi-Fi Smart Thermostat

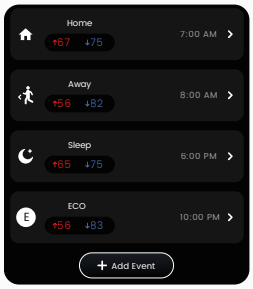
Smart HVAC Control



Support up to 4H/2C system & local configuration



Monitor each room: active or inactive, temp & humidity



Up to 8-period/7-day Scheduling

New Comfort Experience

Touch-sensitive Buttons
LED Display

Enhanced Schedules
Enhance your comfort with advanced fan mode and sensor preference scheduling

Usage Tracking
View heating and cooling times and track usage trends

Voice Control
Works with Alexa & Google Home

Remote Zone Sensor
Scattered multi-sensors enable location-based temperature control

Smart Warm-up
Preheat or precool before you get home

Smart Alerts
Heating or cooling alerts and air filter change reminders

Device Lock
Multi-level Keypad Lockout

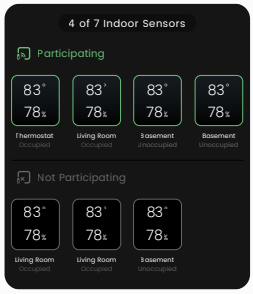
Open API
Device-level and cloud-level API for system integration

Smart Thermostat (24Vac System)

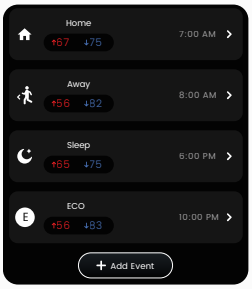
PCT 5231 Wi-Fi Smart Thermostat

Smart HVAC Control

Support up to 4H/2C system & local configuration



Monitor each room: active or inactive, temp & humidity



Up to 8-period/7-day Scheduling

New Comfort Experience

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LED Display

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Device Lock
Multi-level Keypad Lockout

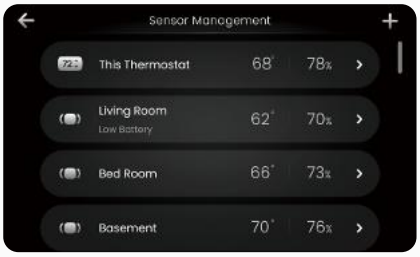
Open API
Device-level and cloud-level API for system integration

Smart Thermostat (24Vac System)

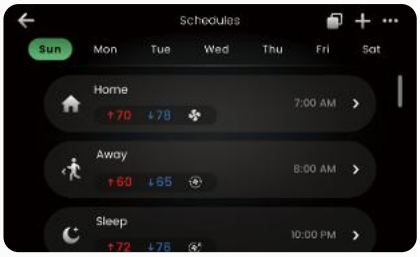
PCT 533 4.3" Touchscreen Smart Thermostat

Smart HVAC Control

2H/2C Conventional &
4H/2C Heat Pump



Monitor rooms and select sensor
participation for balanced comfort



Up to 8 periods of daily
Temperature & Fan Scheduling

New Comfort Experience

Premium Design & UI
High-res display with a modern, intuitive interface

Wireless Room Sensors
Eliminate hot/cold spots by prioritizing specific rooms

Energy Tracking
Monitor heating and cooling usage to manage costs

Voice Control
Works with Alexa & Google Home

Accessory Control
2-wire terminal for humidification or dehumidification systems

Smart Warm-up
Preheat or precool before you get home

Smart Alerts
Heating or cooling alerts and air filter change reminders

Device Lock
Multi-level keypad lockout to prevent unauthorized changes

Open API
Device-level API for full control with your platform

Smart Thermostat (24Vac System)

Main Features

Basic HVAC Control
- Multiple HOLD options
- Prevent accidental changes with lock feature
- 7-day customizable Fan/Temp programming schedule
- Periodically circulates fresh air for comfort and health
- Automatic heating and cooling changeover

Advanced HVAC Control
- Preheat or precool to meet setpoint on time
- Restrict allowable temperature range to control energy costs
- Dual-fuel switching based on outdoor temperature
- Adjustable temp swing can help with short cycling or save more energy
- Customizable fan delay to utilize residual heating/cooling energy

User Interaction
- 4.3-inch High-Resolution LCD Touchscreen
- Modern aesthetics with sleek, curved glass
- Vivid, modern interface with a sleek and fluid touch response
- Animated rotating fan and color changes provide instant system status
- Voice control: Amazon Alexa and Google Assistant

Information & Reminder
- Standby Display: Weather & Indoor/Outdoor temps
- Provides Daily/Weekly/Monthly energy usage
- Periodic filter replacement reminders
- On-screen notifications keep users informed of system activity
- Indoor humidity sensing

Installation & Setup
- Built-In level for mounting
- Push-Button Terminals: Secure connection in seconds without tools
- Step-by-step setup with built-in on-screen guidance
- Pro mode for installers to perform advanced tuning and system tests
- MicroSD Slot for offline updates & diagnostics

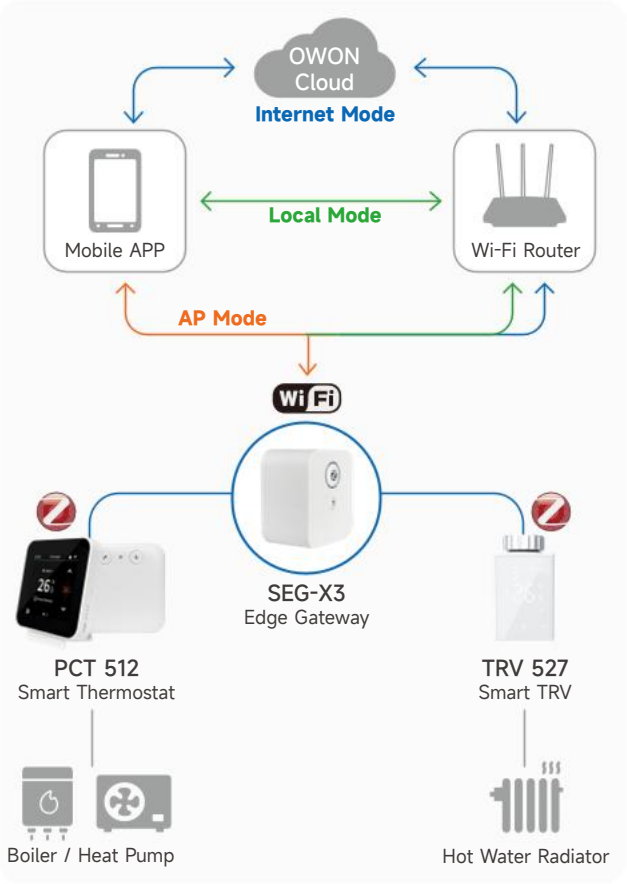
Smart IoT Features
- Bluetooth auto-detects device for fast pairing
- Control and setup the thermostat remotely using an APP
- Device-level API for full control with your platform
- Link with other smart devices for unified scenes and automation
- Over-the-Air firmware upgrade

Total Comfort & Air Quality
- Controls humidifier/dehumidifier directly (1-wire or 2-wire)
- Maintains optimal humidity levels throughout your home
- Monitors temperature and humidity in every sensor-equipped room
- Prioritizes the rooms you use, when you use them
- Eliminates hot or cold spots for balanced comfort

Technical Specifications

HVAC Systems	
Compatible Systems	• Conventional (2H/2C) • Heat Pump (4H/2C) • Emergency heat • Dual Fuel / Hybrid Heat • 2-stage Auxiliary heat or Alternative heat • Supports furnaces, air conditioners, boilers, and heat pumps with either forced air or radiant delivery • 1-wire or 2-wire HUM, or DEHUM
Wire Terminals	• Rc: 24VAC power from cooling transformer • Rh: 24VAC power from heating transformer • C: 24VAC common • W1: 1st stage Primary heating relay in conventional system / Auxiliary or Alternative 1st stage heat in heat pump system • W2: 2nd stage Secondary heating relay in conventional system / Auxiliary or Alternative 2nd stage heat in heat pump system / Emergency heat • Y1: 1st stage Primary compressor contactor • Y2: 2nd stage Secondary compressor contactor • G: Fan relay • O/B: Changeover valve for heat pumps • CWA: C-wire Adapter terminal • ACC1: For humidifiers or dehumidifiers • ACC2: For humidifiers or dehumidifiers
Wireless Connectivity	
Wi-Fi	• 802.11 b/g/n @ 2.4GHz
BLE	• For Wi-Fi Pairing
Physical Specifications	
Display	• 4.3 in. full-colorl LCD touchscreen • 480*800 pixel display
Sensors	• Occupancy • Temperature • Humidity
Power	• 24 VAC, 50/60 Hz
TF card slot	• For firmware updates and log collection • Format requirement: FAT32
Dimensions	• Thermostat: 143 (L) × 82 (W) × 21 (H) mm • Trim plate: 170 (L) × 110 (W) × 6 (H) mm
Temperature range	• Desired Temperature: 40° to 90° F (4.5° to 32° C) • Sensitivity: +/ – 1° F (+/ – 0.5° C) • Operating: 14° to 122° F (-10° to 50° C)
Humidity range	• Sensitivity: +/ – 5% • Operating: 5% to 95% RH (non-condensing)

Smart Thermostat & TRV Kit (Boiler + Radiator)



SEG-X3
Edge Gateway

- Installation: 90v~240v Plug-in
- Local-Area-Network: ZigBee 3.0
- Wide-Area-Network: Wi-Fi
- Internet Mode: APP connects to the Cloud Server, and controls the system remotely.
- Local Mode: APP connects to the gateway through Wi-Fi router. No Internet required.
- AP Mode: APP connects to the gateway directly. No Wi-Fi router required.
- MQTT API: MQTT API available for system integration.

PCT 512
Boiler Smart Thermostat + Receiver

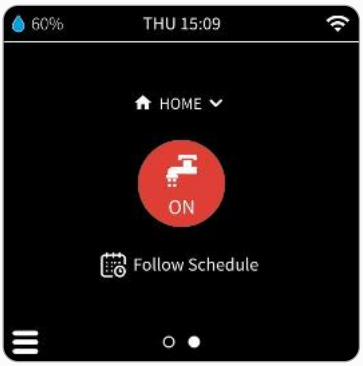
- ZigBee 3.0 Compliant
- 4-inch Full-color Touch Screen Thermostat
- Temperature, Hot Water Management
- Heating/Hot Water 7-day Programming Schedule
- Customized boost time for heating and hot water
- Away Control
- Stable communication between thermostat and receiver
- Freeze Protection
- Control your boiler or heat pump

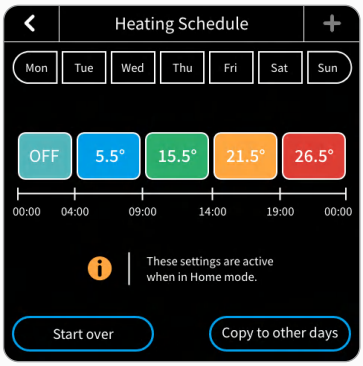
TRV 527
ZigBee Smart TRV

- ZigBee 3.0 Compliant
- Lcd screen display, Touch-sensitive Buttons
- 7, 6+1, 5+2 day Programming Schedule
- Open Window Detection
- Child Lock
- Low Battery Reminder
- Anti-scale
- Comfort/ECO/Holiday Mode
- Control your radiators in each room

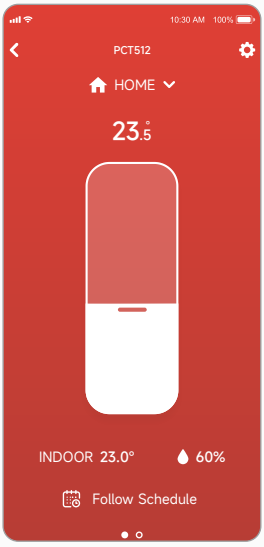
Smart Thermostat & TRV Kit (Boiler + Radiator)

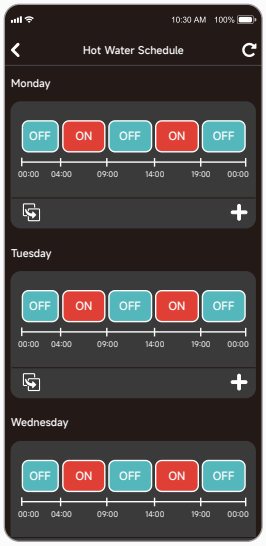
Thermostat Screenshots

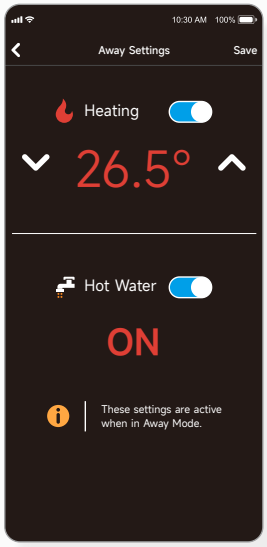




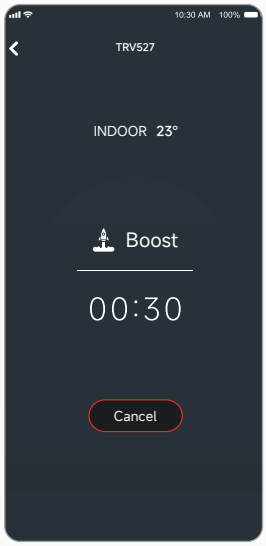
Thermostat APP Screenshots

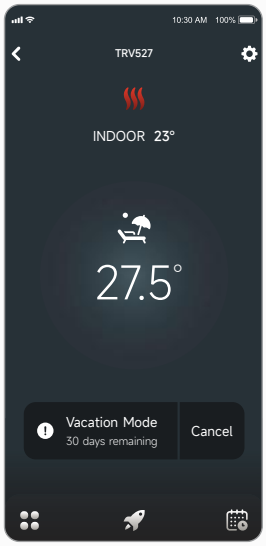


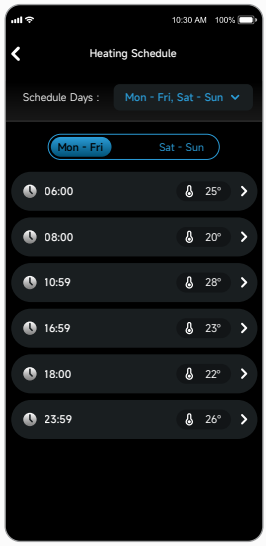




TRV APP Screenshots







IoT Products

ZigBee Energy Management Devices

ZigBee | ZigBee2MQTT | Home Assistant

Power Meters

PC 311
Single-Phase Power Meter
(with 16A Relay)

PC 472
Single-Phase Power Meter
(with 16A Relay)

PC 473
Three-Phase Power Meter
(with 16A Relay)

PC 321
Three-Phase Power Meter

Smart Relays / Switches

CB 432
Din Rail Switch
(63A Relay + Power Meter)

CB 432DP
Din Rail Switch
(32A Double Pole Relay
+ Power Meter)

LC 421
Load Control
(30A Relay)

SES 441
Wall Switch
(20A Double Pole Relay
+ Power Meter)

SLC 601
Smart Switch
(10A Relay)

SLC 611
Smart Switch
(10A Dry Contact + Power Meter)

SLC 631
Smart Switch
(1A x 3)

SLC 641
Smart Switch
(6A x 2)

Smart Plugs / Sockets

WSP 403
Smart Plug
(10A, Universal)

WSP 404
Smart Plug
(15A, USA)

WSP 405
Smart Plug
(16A, EU)

WSP 407
Smart Plug
(20A, USA)

WSP 406EU
Smart Socket
(16A, EU)

WSP 406FR
Smart Socket
(16A, French)

WSP 406UK
Smart Socket
(13A, UK)

WSP 406CN
Smart Socket
(10A, China)

ZigBee HVAC Field Devices

ZigBee | ZigBee2MQTT | Home Assistant

Room Temperature Control

PCT 503
Smart Thermostat
(24Vac)

PCT 504
Fan Coil Thermostat
(100~240Vac / 12Vdc)

PCT 504A
Fan Coil Thermostat
(DC 0~10v Output)

PCT 512
Combi Boiler Thermostat
(240Vac)

AC 201
Split A/C IR Blaster
(Plug-in Type)

AC 211
Split A/C IR Blaster
(with Power Meter)

AC 221
Split A/C IR Blaster
(for Ceiling Unit)

TRV 527
Thermostatic Radiator Valve

THS 317
Temperature / Humidity Sensor

Room Temp

SLC 621
Smart Switch
(10A)

THS 317-ET
Temperature Sensor with Probe

Room Temp

SLC 651
Underfloor Heating Controller
(for Manifold Valve Actuators)

Field Sensors

DWS 332
Door Window Sensor

PIR 313
Multi-Sensor
(Motion / Temp / Humi / Light)

PIR 323
Multi-Sensor
(Motion / Temp / Humi)

OPS 305
Occupancy Sensor

SD 324
Smoke Detector

GD 334
Gas Detector

CMD 344
CO Detector

FDS 315
Fall Detector

THS 317ET
Temperature Sensor with Probe

THS 327ET
Temperature Sensor with Probe & External Power

WLS 316
Water Leakage Sensor

AQS 364
Air Quality Sensor

IoT Products

ZigBee Gateways & Accessories

ZigBee | ZigBee2MQTT | Home Assistant

IoT Gateways

SEG-X3
ZigBee Gateway
(ZigBee / Wi-Fi)

SEG-X5
ZigBee Gateway
(ZigBee / BLE / Wi-Fi / Ethernet)

SEG-X6
ZigBee Gateway
(ZigBee / Cat1)

CCD 771
Central Control Display
(7" TFT LCD)

Accessories

RC 204
Remote

SLC 602
Remote Switch

SLC 603
Remote Dimmer

KF 205
Key Fob

PR 412
Curtain Controller

SAC 451
Access Control Module

LED 622
LED Bulb
(CCT)

SIR 216
Siren

Personal Care

PB 206
Panic Button

PB 236
Panic Button with Pull Cord

SPM 915
Sleep Monitoring Pad
(on / off bed)

ULD 926
Urine Leakage Detector

SPM 912
Sleep Monitoring Belt
(Heart Beat + Respiration)

SPM 913
Sleep Monitoring Pad
(Heart Beat + Respiration)

FDS 315
Fall Detector
(Wall Mounted)

FDS 315H
Fall Detector
(Ceiling Mounted)

ZigBee Hotel Room Management Devices

ZigBee | ZigBee2MQTT | Home Assistant

Control Center

SEG-X5
ZigBee Gateway
(ZigBee / Wi-Fi / Ethernet)

CCD 771
Central Control Display
(7" TFT LCD)

DSS 219
Door Signage

DND 229
DND Button

Room Sensors

DWS 332
Door Window Sensor

PIR 313
Multi-Sensor
(Motion / Temp / Humi / Light)

PIR 323
Multi-Sensor
(Motion / Temp / Humi)

OPS 305
Occupancy Sensor

Comfort Control

PCT 504
Fan Coil Thermostat
(100~240Vac)

AC 211
Split A/C IR Blaster
(with Energy Meter)

AC 221
Split A/C IR Blaster
(Ceiling Unit)

PR 412
Curtain Controller

Energy Management

PC 321
Three-Phase Power Meter

CB 432
Din Rail Switch
(63A Relay + Power Meter)

WSP 406EU
Smart Socket
(16A, EU)

WSP 406UK
Smart Socket
(13A, UK)

Lighting Control

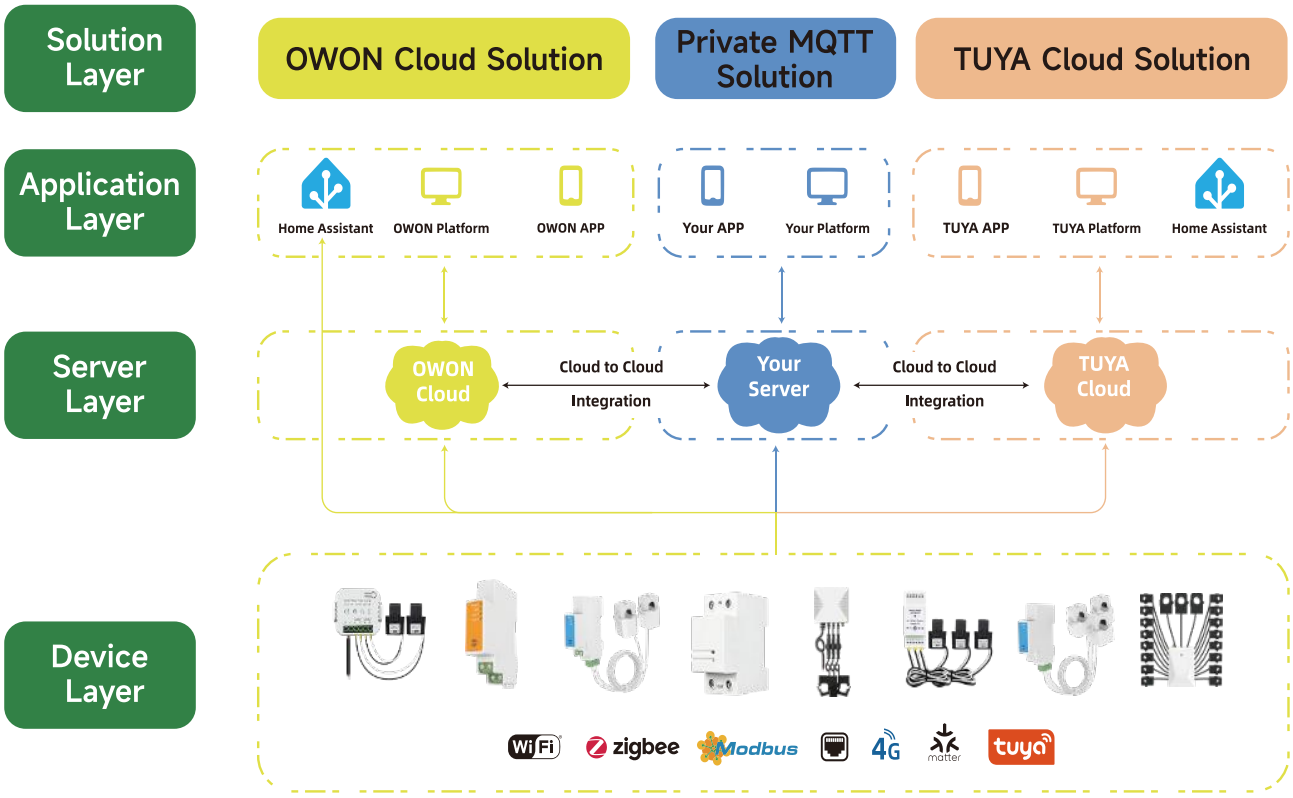
SLC 618
Wall Switch

SLC 638
Wall Switch

SLC 641
Smart Switch
(6A x 2)

LED 622 + SLC 602
LED Bulb + Remote Switch

Integration Solution of Energy Monitor



OWON provides three mainstream solutions for the application scenarios of smart energy meters, included Wi-Fi/Zigbee/Modbus/4G/Ethernet, etc. communication protocols.

01、OWON Cloud Solution

The smart energy meters connect directly to the OWON public cloud via the MQTT API. All device data is stored uniformly in the OWON cloud, providing a superior user experience, data encryption, and privacy protection. Users can directly view electricity usage data and control devices through the official OWON app/website. Furthermore, users wishing to connect to the Home Assistant platform can do so through OWON's official HA integration (cloud-based MQTT+HTTP integration or local MQTT integration).

The platform also supports cloud-to-cloud functionality, allowing users to synchronize data to their own private servers.

02、Private MQTT Solution

This device can be integrated into your self-built private server via the MQTT API. All data will be reported directly to your server, and you have complete control over the device. You can develop a dedicated application/website for management.

You can also synchronize data from OWON or TUYA public clouds to your server via cloud-to-cloud integration.

The data is completely independent and controllable, supporting deep customization and development to achieve automated scene linkage, creating smart home systems or energy management systems, etc., making it ideal for ODM brands and EMS system integration projects.

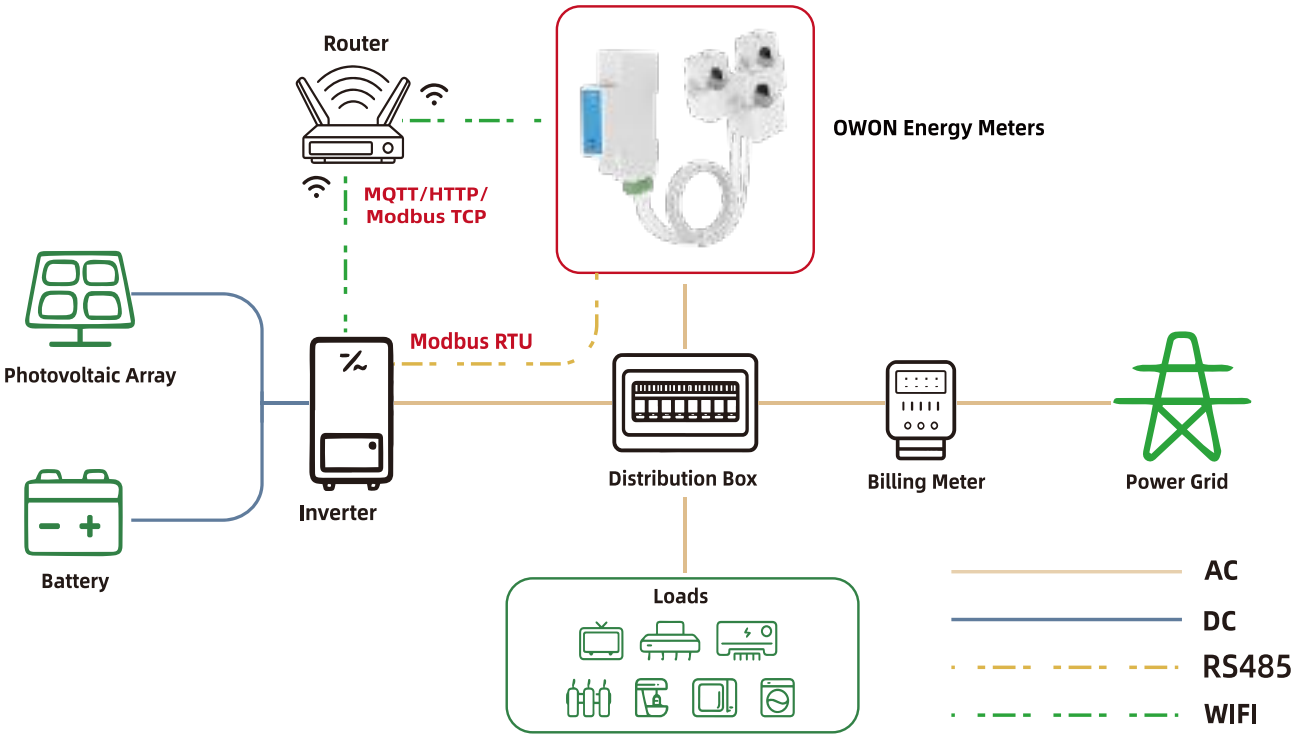
03、TUYA Cloud Solution

The device connects directly to the Tuya public cloud platform via the Tuya protocol.

Data is stored uniformly in the Tuya Cloud. Users can view real-time or historical data and manage devices through the official Tuya app"Smart Life". Leveraging Tuya's mature ecosystem, it supports automation scene creation and cross-platform device interaction.

Third-party platforms, such as Home Assistant, can be accessed and used. Data can also be synchronized with users' private servers via "cloud-to-cloud integration".

Anti-Backflow Solution



OWON provides an Anti-Backflow Solution for grid-connected photovoltaic (PV) + energy storage systems, designed to prevent electricity from flowing back to the grid from the user end.

The key to this solution is the OWON energy meter, which uses current transformers (CTs) to continuously measure real-time data at the grid connection point. It supports bidirectional monitoring and multiple communication protocols: local MQTT communication to report data to the inverter, or HTTP/Modbus TCP/ Modbus RTU communication, enabling the inverter to read energy meter data at any time.

√ Modbus RTU (RS485): Wired communication, stable network, strong anti-interference capability, low latency, suitable for long-distance, high-frequency polling applications.

√ MQTT/HTTP/Modbus TCP (Wi-Fi): Local Wi-Fi network, no cloud latency, no wiring costs, suitable for short-distance, high-frequency communication applications where wiring is inconvenient.

Anti-backflow principle: The inverter continuously analyzes real-time data from the smart meter. When the meter detects negative total active power (reverse current), the inverter automatically reduces its output power within 2 seconds to match the power consumption of the on-site load, or prioritizes storing excess power into the battery, bringing the total active power (grid-fed) of the household close to zero. This closed-loop control prevents net power output to the grid while maximizing the utilization of self-generated solar energy.

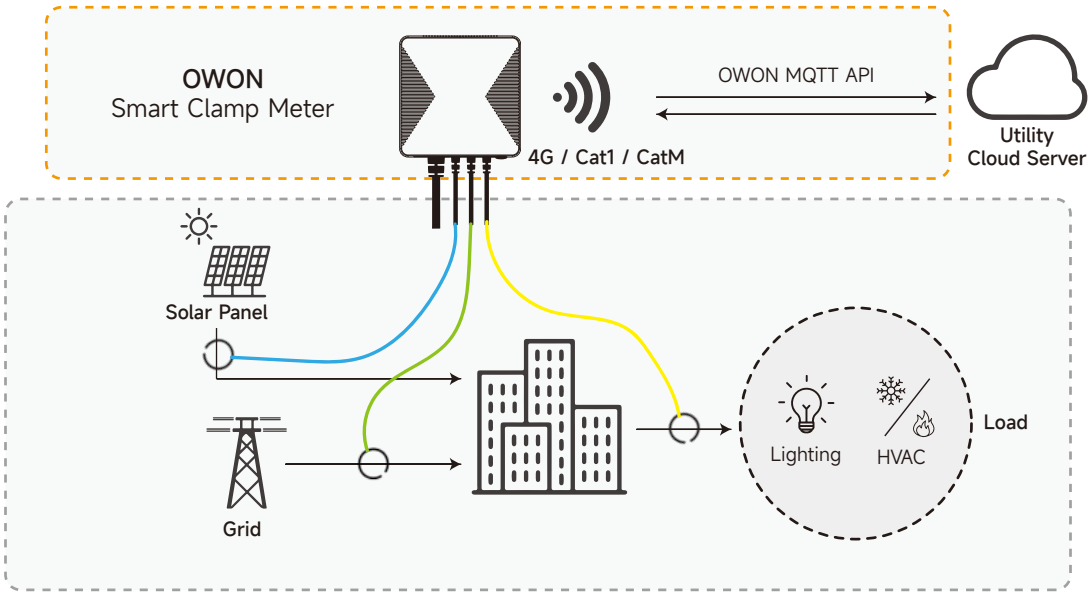
- It complies with grid specifications, prevents reverse power injection, and meets stringent grid regulations.
- It maximizes self-consumption, ensuring all generated solar energy is used on-site, thereby reducing dependence on the grid.
- It provides reliable monitoring, delivering accurate real-time data for reverse current prevention control and overall energy management.
- It offers flexible integration options, supports multiple communication protocols (Modbus, MQTT, HTTP), and is compatible with various inverters.

4G Clamp-Type Smart Meter

OWON has been engaged in developing IoT-based energy management and HVAC products for over 10 years, and has created a wide range of IoT-enabled smart devices including smart power meters, on/off relays, thermostats, field sensors, and more. Building upon our existing products and device-level APIs, OWON aims to provide customized hardware at various levels, such as functional modules, PCBA control boards, and complete devices. These solutions are designed for system integrators and equipment manufacturers, enabling them to seamlessly integrate the hardware into their equipment or system and achieve their technical goals.

Case Study 1

Client: A Global Energy Management Platform Provider
Project: Carbon Emission Monitoring System for Commercial Application



Project Requirements: The software platform provider, commissioned by several national energy management agencies, intends to develop a carbon emission monitoring system for commercial incentive or penalty purposes.

- This system requires a Smart Electric Meter that can be rapidly installed without disrupting the existing metering and billing systems, thereby minimizing deployment risks, challenges, timelines, and costs.
- A universal device that supports single-phase, split-phase, and three-phase circuits, along with various load scenarios ranging from 50A to 1000A, is preferred to minimize logistics and distribution costs.
- Given that this is a global project, the Smart Electric Meter must be compatible with different network environments in different countries, and maintain a stable connection at all times.
- The Smart Meter data transmission and storage must comply with data security and privacy regulations in each country.

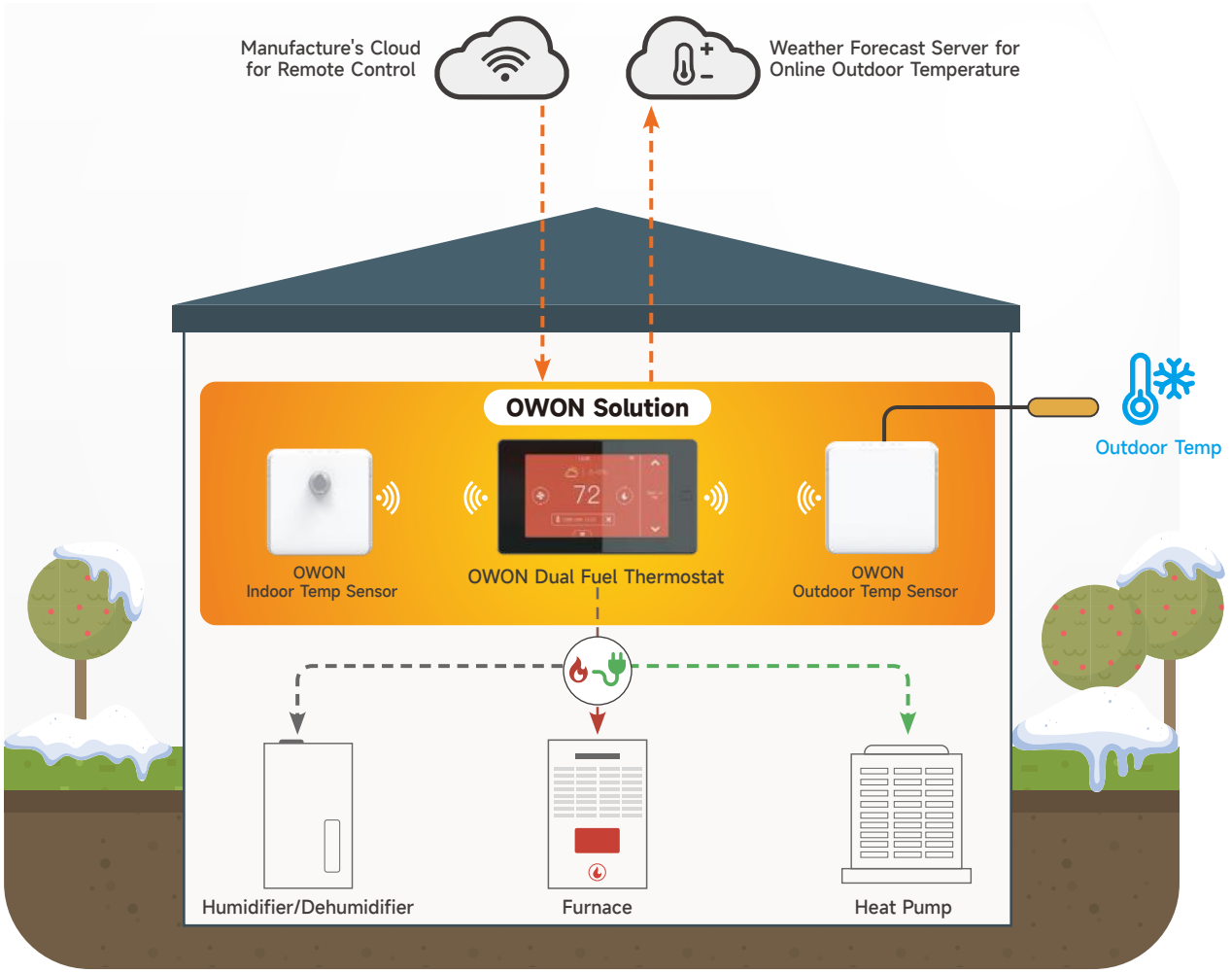
Solution: OWON offers a Smart Electric Meter along with device local API for data aggregation.

- The Smart Meter is equipped with open-type CTs, facilitating easy and quick installation. Meanwhile, it also measures energy data independently from the existing metering and billing systems.
- The Smart Power Meter supports single-phase, split-phase, and three-phase circuits. It can accommodate load scenarios of up to 1000A by simply changing the size of the CTs.
- The Smart Electric Meter communicates through LTE networks and can readily adapt to different countries' networks by replacing the LTE communication modules.
- The Smart Meter includes local APIs for devices allowing OWON to forward the energy data directly to each country's designated cloud server, thus avoiding security and privacy issues that may arise from data passing through intermediate data servers.

Hybrid Thermostat

Case Study 4

Client: A North American furnace and heat pump manufacturer
Project: Customize Thermostat for Dual Fuel Switch System



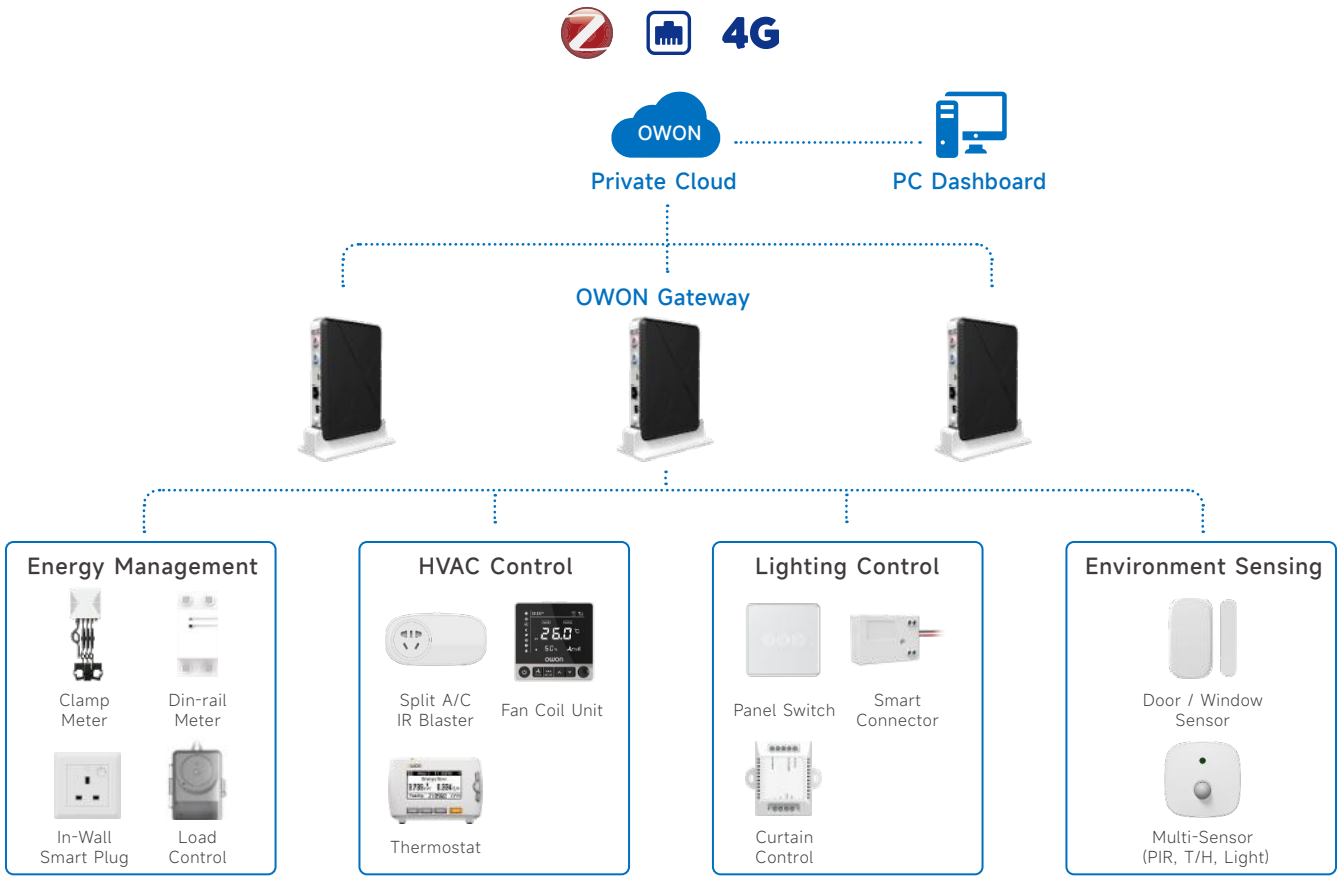
Project Requirements: Heat pumps have been widely deployed in recent years as a more efficient and economical heating and cooling solution. However, many households still retain another set of conventional cooling and heating devices.

- A special thermostat is needed to control both sets of equipment simultaneously and switch between them for optimal cost-effectiveness without sacrificing comfort.
- The system must acquire the outdoor temperature as the prerequisite of its operation mode.
- A specific Wi-Fi module is required to follow the manufacturer's designated communication protocol and interface with their existing backend server.
- The thermostat must be able to control a humidifier or dehumidifier.

Solution: OWON customized the thermostat based on one of its existing models, allowing the new device to be compatible with the client's system.

- Rewrote the thermostat's firmware according to the equipment manufacturer's specified control logic.
- Obtained the outdoor temperature either from online data or a wireless outdoor temperature sensor.
- Replaced the original communication module with the designated Wi-Fi module and transmitted the information to the client's backend server following the MQTT protocol.
- Customized the hardware by adding more relays and connection terminals to support both humidifiers and dehumidifiers.

WBMS 8000 Architecture & Features



WBMS 8000 is a configurable Wireless Building Management System ideal for various light commercial projects

Home · School · Office · Stores · Warehouse · Apartment · Hotels · Nursing Home

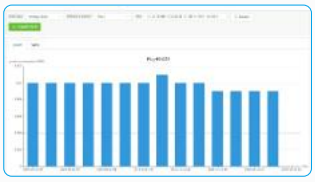
Key Features

Unlike the expensive and heavy-duty conventional BMS system, **OWON**'s Wireless BMS system featured:

- Wireless Solution with Minimal Installation Efforts
- Configurable PC Dashboard for Quick System Setup
- Private Cloud Deployment for Security & Privacy
- Reliable System with Cost Effectiveness

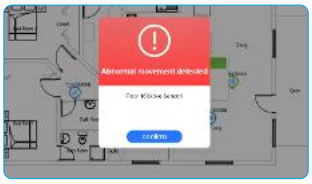
WBMS 8000 Screenshots

Functional Modules



Energy Management

Dashboard



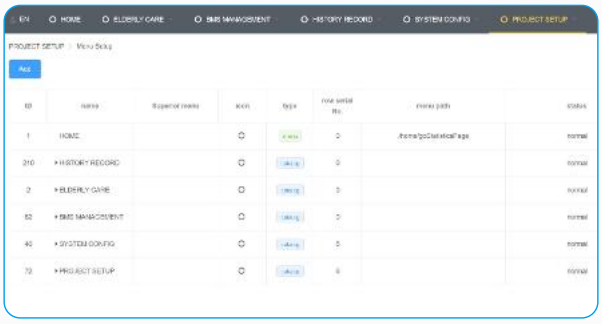
Security Monitor

HVAC Control

Environment Monitor

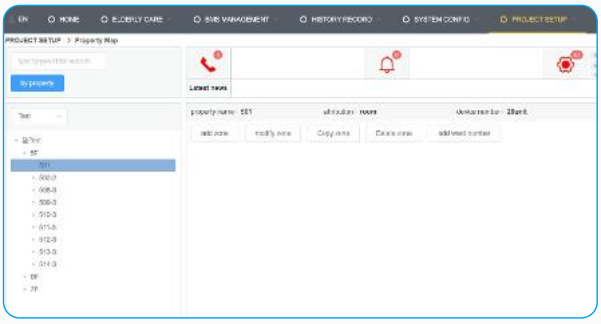
System Configuration

You could choose from a variety of devices; deploy a private back-end server; and configure the PC dashboard in accordance with the projects' unique requirements.



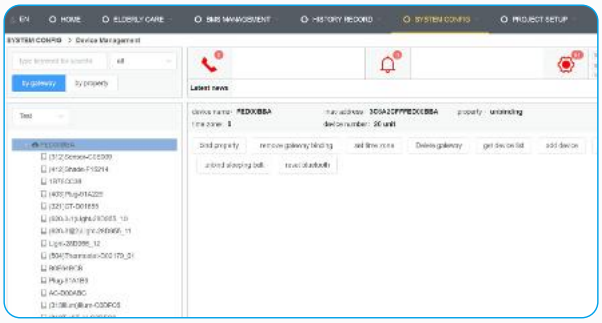
System Menu Configuration

Customize dashboard menus based on the desired functions



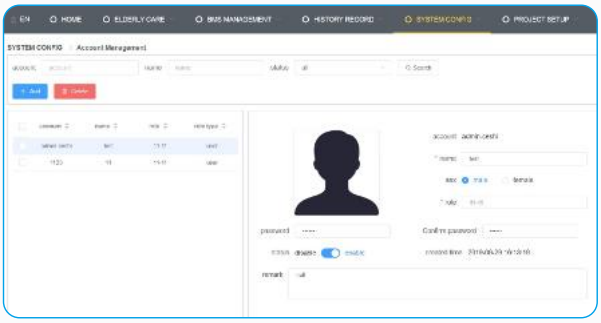
Property Map Configuration

Create a property map reflecting the actual floors and rooms within premises



Device Mapping

Match the physical devices with the logical nodes within a property map

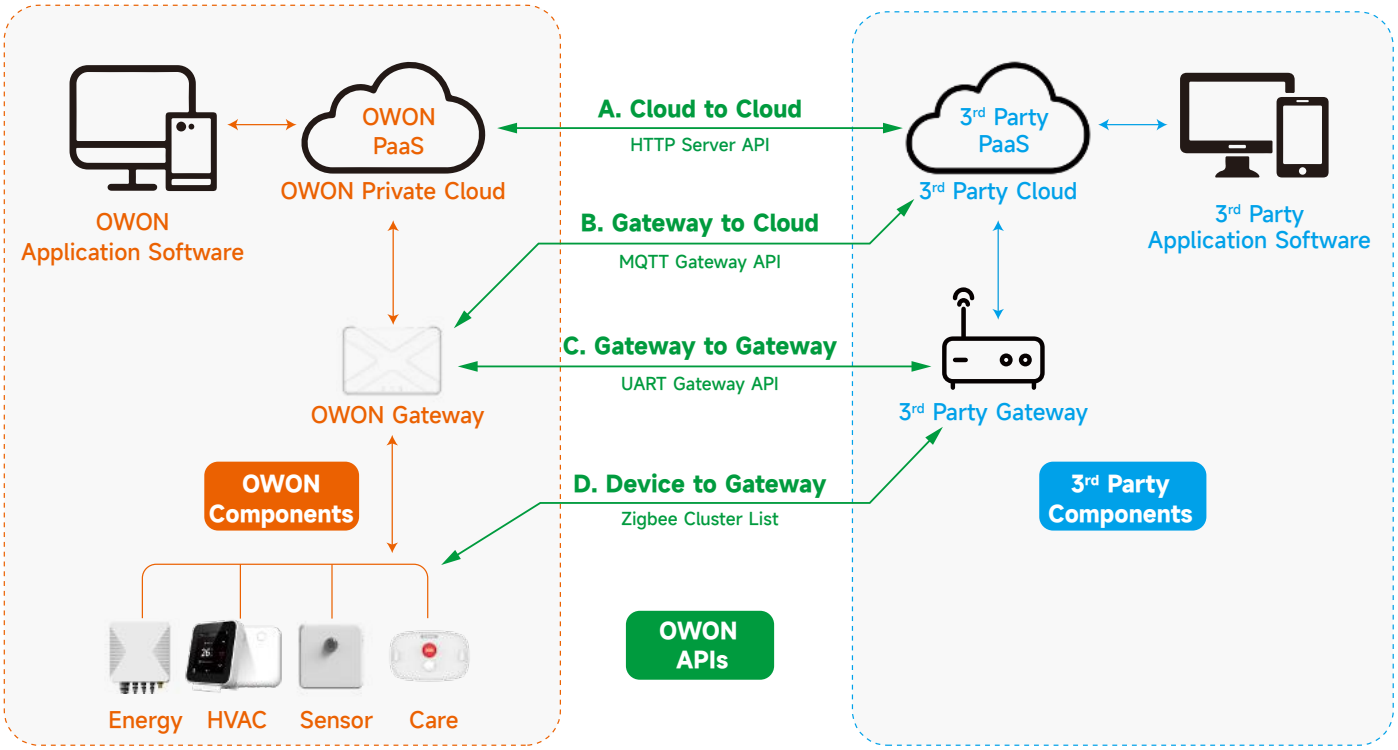


User Right Management

Create roles and rights for the management staff in supporting the business operation

OWON IoT Platform - EdgeEco®

Build your IoT system on OWON's existing platform – **EdgeEco®**
Save your time, efforts and investment



Creating an IoT system from scratch is a massive undertaking that involves various aspects, from hardware to software development, from Local-Area-Network formulation to Wide-Area-Network integration, from device-level functional design to cloud-based application design. As a result, building an IoT system from the ground up may take several months or even years, with the involvement of numerous engineers from diverse backgrounds.

With OWON's end-to-end IoT solution, **EdgeEco®**, partners can create and maintain their software ecosystem built on OWON's existing IoT platform, which includes Smart Devices, IoT Gateway, and a private cloud. This solution allows partners to tailor their systems with unique features and user experiences for various applications. By adopting **EdgeEco®**, partners can significantly reduce their efforts and investments in IoT technologies, while still maintaining the flexibility to design a system that meets project requirements.

OWON's partners have **FOUR** options for implementation:

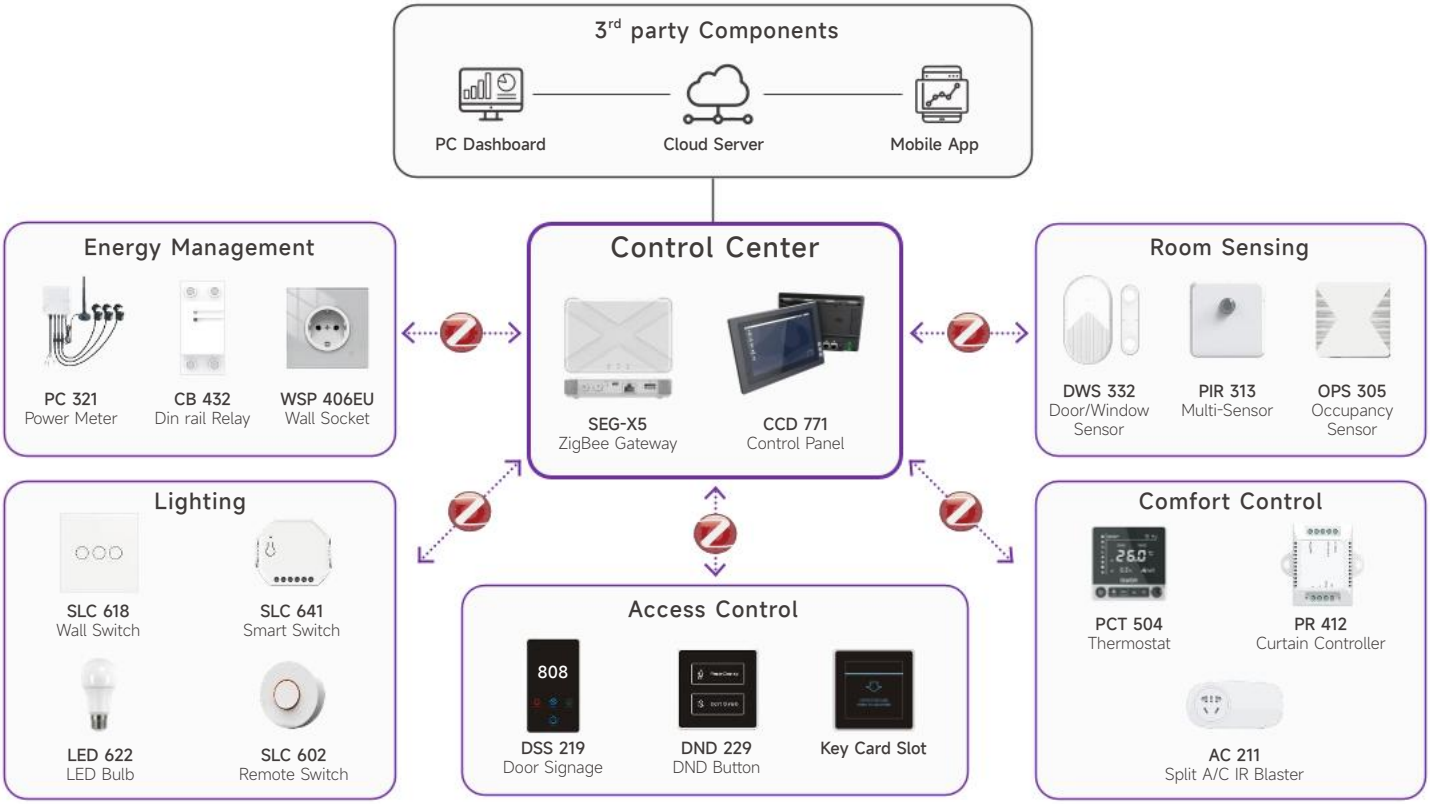
A. **Cloud-to-Cloud Integration**: A third-party cloud server interfaces with OWON's PaaS server using the **HTTP Server API**.
B. **Gateway to Cloud Integration**: Integrates OWON's Smart Gateway directly into a 3rd party cloud server by leveraging the **MQTT Gateway API**.
C. **Gateway-to-Gateway**: Establishes a hardware connection between OWON's Smart Gateway and a 3rd party Gateway following **UART Gateway API**.
D. **Device to Gateway**: Connects OWON's ZigBee devices with a 3rd party Gateway using the **ZigBee 3.0 Protocol.**

* OWON will continuously upgrade the APIs to accommodate system expansion.

Hotel Room Management

Case Study 1

Client: A Smart Hotel System Provider
Project: A Guest Room Management System for a Chain Resort Hotel



Project Requirements: Instead of traditional wired BMS, which is expensive and hard to install, the client seeks a wireless IoT system with lower costs, easier installation, and faster deployment.

- Use IoT gateway to aggregate all smart devices and provide a device-level MQTT API for system integration.
- The IoT gateway should ensure the normal operation of smart devices even when disconnected from the server.
- The IoT gateway must be open to integration with additional smart devices, including those from third parties.
- OWON should provide a full line of off-the-shelf IoT devices for immediate deployment.
- Device customization and new product development are available to meet special project needs.
- Some high-end locations require an Android-based touchscreen control panel as part of the system.

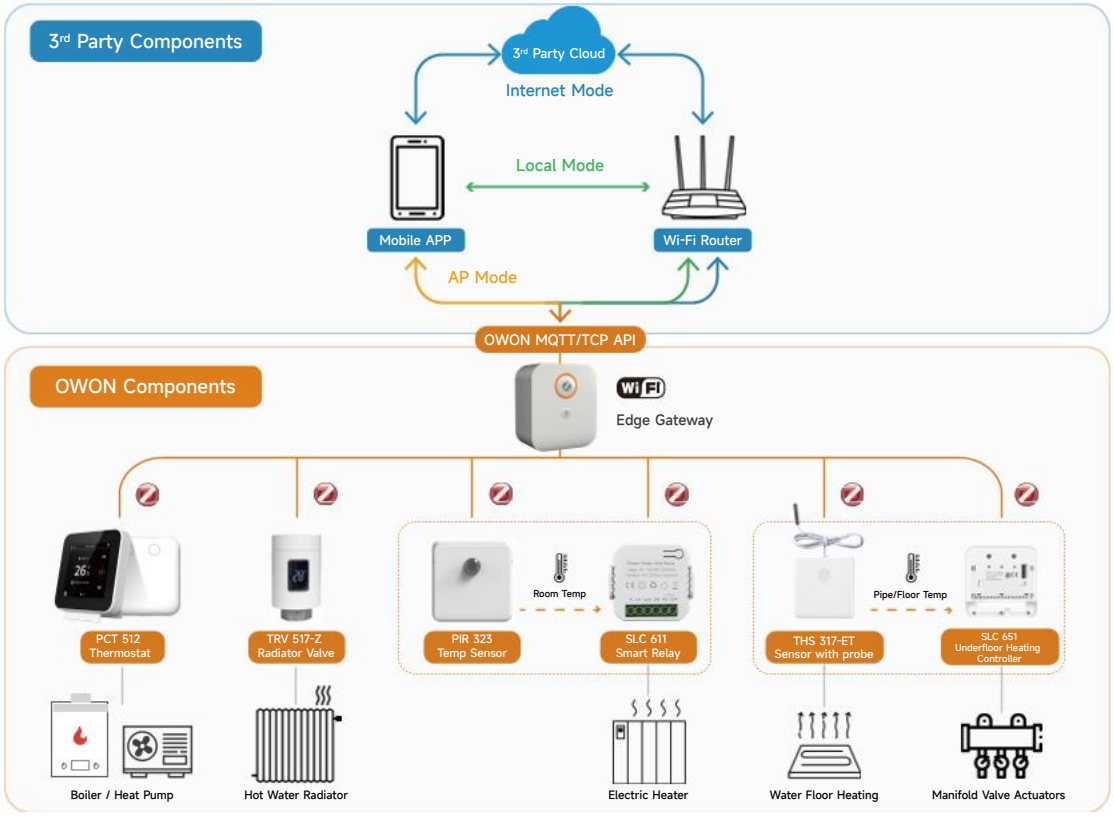
Solution: OWON provides both standard products and ODM services to meet the project requirements.

- Provides an IoT gateway equipped with ZigBee connectivity to aggregate all smart devices. The gateway has a full set of device-level MQTT APIs and connects to the client's server through Wi-Fi, Ethernet, or 4G.
- In offline mode, the gateway is capable of not only controlling each ZigBee device, but also supporting logical interaction between devices.
- The gateway is compatible with the ZigBee 3.0 standard and can work with any third-party devices following the same standard.
- Provides a full line of standard hotel room management devices including lighting wall switches, relay switches, wall sockets, power meters, fan coil thermostats, curtain control modules, door/windows sensors, temperature/humidity sensors, occupancy sensors, etc.
- Customizes a few devices for specific projects' requirements, such as relay switches, fan-coil thermostats, and door sensors.
- Converts some regular devices to smart devices by embedding communication modules into the designated hardware, such as DND buttons and door signage.
- Thanks to OWON's 20-year experience in designing and manufacturing industrial tablets, we provide the project with various sizes of Android touchscreen control panels.

Residential Heating Management

Case Study 2

Client: A European System Integrator
Project: A Government-Driven Heating Energy Saving System



Project Requirements: In order to reduce the energy consumption for residential heating, the government calls for a complete heating management system that manages all mainstream heating equipment in European homes.

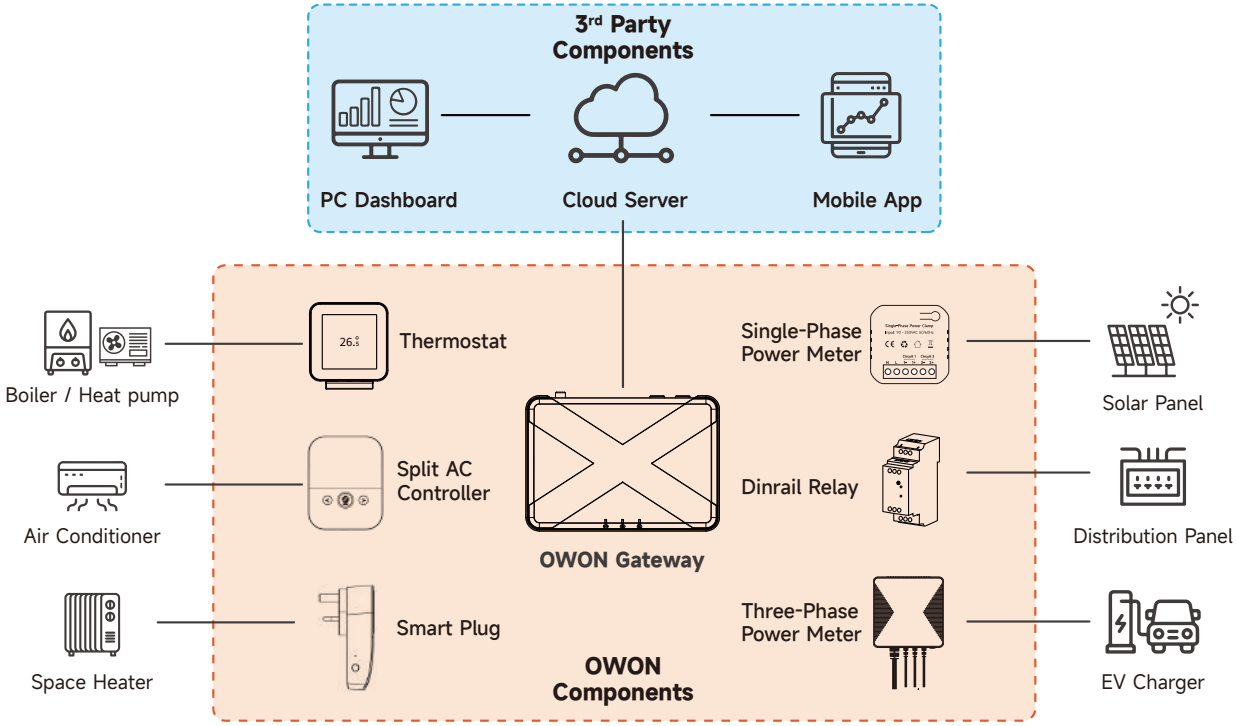
- Should monitor and control boilers, heat pumps, hot water, hydraulic radiators, electrical radiators, underfloor heating, etc.
- Should work normally under offline mode, without relying on an Internet connection.
- The mobile app should control the system with or without an Internet connection, even without a Wi-Fi router.
- Requires a complete set of "device-level local APIs" to develop a cloud server and mobile APP.

Solution: OWON provides a full set of ZigBee smart devices centralized through a ZigBee Edge Gateway, along with a ZigBee Gateway Local API. This allows the system integrator to develop a system that meets the project requirements.

- ***Provide various field devices to control HVAC equipment***
  - PCT512: Control the boiler or heat pump
  - TRV517: Control hydraulic radiators in each room
  - PIR323 + SLC621: Detect room temperature and control the electric heater using the Smart Relay.
  - THS317-ET + SLC651: Detect floor temperature and control the manifold using the Underfloor Heating Controller.
- ***Provide an Edge Gateway to support multiple system working modes***
  - Local mode: The mobile app can identify and access the OWON Edge Gateway under the same Wi-Fi router.
  - Internet mode: The mobile app can access the cloud server, and further control the HVAC system remotely.
  - AP Mode: The mobile app can access the Edge Gateway directly while the gateway works as a Wi-Fi hotspot.
- ***Provide APIs for System Integration***
  - OWON TCP/IP API: The TCP/IP API is provided to design the mobile APP in supporting Local Mode and AP Mode.
  - OWON MQTT API: The MQTT API is provided to design the cloud server and the mobile APP under the Internet Mode.

Case Study 3

Client: A European Telecommunication Company
Project: A Utility-Driven Home Energy Management System



Project Requirements: In order to manage the overall household energy consumption, the telecommunications company plans to develop a Home Energy Management System and deploy it to millions of homes.

- Monitors and controls the overall home energy consumption, solar power generation, EV chargers, etc.
- Controls and schedules the HVAC equipment, including gas boilers, electric heat pumps, and mini-split A/C units.
- Allows functional interaction between components within the system. For example, turn off split A/C when a window is opened, change the EV charging status according to the solar power generation mode, etc.
- Requires a complete set of "device-level local APIs" to directly connect to the Telco's backend cloud server.

Solution: OWON provides a full set of ZigBee smart devices centralized through a ZigBee hub, along with a ZigBee Hub Local API. This allows the telecommunication company to design an IoT HEMS with minimal effort and time.

- Energy management devices: Provides various ZigBee devices, such as clamp power meters, Din rail relays, and smart plugs for energy monitoring, controlling, and scheduling purposes.
- HVAC control devices: Provides ZigBee thermostat and IR blasters to interface with different HVAC equipment.
- Smart ZigBee Hub: Provides a ZigBee Hub with strong local networking features that allow flexible interaction between the local Smart Devices.
- Complete API interfaces: The ZigBee hub comes with a complete local API that allows the telecommunication company to access the full functionality of OWON's ZigBee system.