CONNECTION TECHNOLOGY SYSTEMS

CTS-iCPE

Gateway Controller

User's Manual

Version: Revision B1

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your local distributors or an experienced radio/TV technician for help.
- Shielded interface cables must be used in order to comply with emission limits.

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Revision History

Version	Date	Description
Rev A1	20160711	First release
Rev A2	20160721	Second release
Rev B1	20160725	Market Release

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1. PRODUCT OVERVIEW

Thank you for choosing the CTS-iCPE Gateway Controller. It is a managed layer-2 switch with full Z-Wave controller functionality. As such it is unique at launch.

The CTS-iCPE is an open, professional, secure and high quality product.
It is meant to be used as a professional and operationally secure gateway for carrier class IoT services.

This CTS-iCPE is ideally positioned to support open multi-service networks and providers.

Typical services address eHealth/Homecare, Real estate, Individual metering, Sustainability/Eco systems, Security as well as Home automation and Smart home solutions.

1.1 Multi-service Solutions

The CTS-iCPE operates with any and all Z-Wave sensors and actuators available. But this will not be enough for creating a winning value proposition.

The true value will be delivered to the market based on so-called open service platforms. Service Mediators using such open platforms have started to enter the market with scalable delivery of innovative applications and services.

A summary of the necessary layers towards full market solutions:

- Gateway: Professional and secure CTS-iCPE
- Secure Z-Wave sensors and actuators
- Open multi-service solution platforms
- Independent Communication operators
- Easy integration for delivery from service specific operational market players (i.e. Security companies; eHealth solutions, Utility Co's etc.)

1.2 CTS-iCPE operation in Z-Wave networks

Since the CTS-iCPE is a Z-Wave static controller, it can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers that are part of the Z-Wave Alliance. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

As a controller, this CTS-iCPE can communicate in a secure environment if the other Z-Wave device has the same secure environment. If the other device does not support it, the controller will automatically fall back to the normal communication mode.

Controllers in Z-Wave networks need to be kept synchronous with regard to their knowledge of the network configuration in case there would be more than one controller in the network, which is called Replication.

The controller ignores any basic command class from devices.

The CTS-iCPE does support Association Command Class. It has one association group, which is a Lifeline group with the grouping identifier equal to 1. The maximum number of devices that can be added to the group is 1. When the device is reset, this group returns a Device Reset Locally notification.

1.3 SDK for Service platform suppliers

This User Manual addresses all basic functions for proper use of the CTS-iCPE.

More in-depth instructions for service platform owners and service mediators can be obtained at: sdkrequest@cts-icpe.com

2. TECHNICAL OVERVIEW

The CTS-iCPE technical details are listed below.

2.1 Specification

Interface:

- USB Port (Type):
  3 x USB 2.0 (Type A)
- Network Port (Type):
  2 x Ethernet (RJ-45)

H/W Specification

CPU: ATMEL ARM Cortex A5
RAM (Byte): 128M
FLASH (Byte): 256M, NAND
System Platform: Open WRT

Physical Characteristics

Battery Backup Module
Battery Type: Li-On
Battery Capacity: 3.7V, 5800mAH
Wireless Module: Z-Wave

Power Requirement

Power Source: AC-to-DC Adaptor
Power Consumption (empty load): 1W

Software Specification examples

- Home Security (Motion Detection, Door/Lighting Control, Illumination levels etc.)
- Fire Detection
- Leak Detection
- Energy Management
- Solar Panel Monitoring and Control
- Temperature Monitoring, HVAC Control
- Automated Meter Reading
- Automated/secure Door Operations

Environmental Condition

Operation: 0°C~ 50°C
Storage: -20°C ~ 60°C
Humidity: 5% ~ 90%, Non-condensing

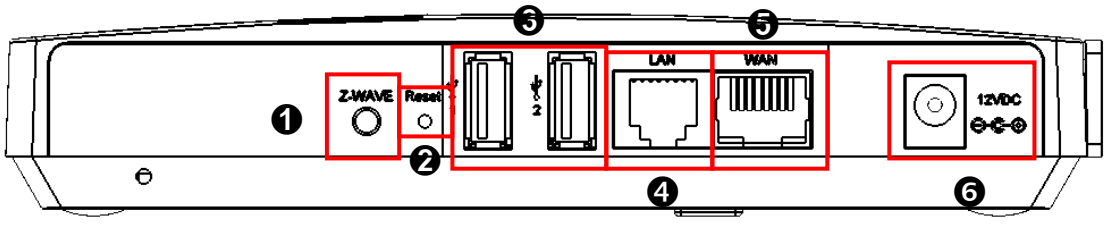
Cable Specifications

The following table contains various cable specifications for the Gateway Controller. Please make sure that you use the proper cable when connecting the Gateway Controller.

Cable Type	Description
10BASE-T	UTP Category 3, 4, 5 (100 meters max.) EIA/TIA- 568 150-ohm STP (100 meters max.)
100BASE-TX	UTP Cat. 5 (100 meters max.) EIA/TIA-568 150-ohm STP (100 meters max.)
1000BASE-T	UTP Cat. 5e (100 meters max.) UTP Cat. 5 (100 meters max.) EIA/TIA-568B 150-ohm STP (100 meters max.)
100BASE-FX	Multi-mode fiber module(2km) / Single-mode fiber module
1000BASE-SX	Multi-mode fiber module (550m)
1000BASE-LX	Single-mode fiber module (10km)
1000BASE-LH	Single-mode fiber module (30km/50km)
1000BASE-ZX	Single-mode fiber module (80km)
Mini-GBIC	SFP Transceiver for 1000BASE-SX Multi-mode fiber module (550m) SFP Transceiver for 1000BASE-LX Single-mode fiber module (10km) SFP Transceiver for 1000BASE-LH Single-mode fiber module (30km/50km) SFP Transceiver for 1000BASE-ZX Single-mode fiber module (80km)

1.2 Panel Layout

Front Panel



❶ **Z-Wave Button (for more information, please see section 3.2)**

❷ **Reset Button**

- Insert a pin or paper clip to press the Reset Button for 5 ~ 10 seconds to restart the system.
- Insert a pin or paper clip to press the Reset Button for more than 10 seconds to reset the device back to factory defaults.

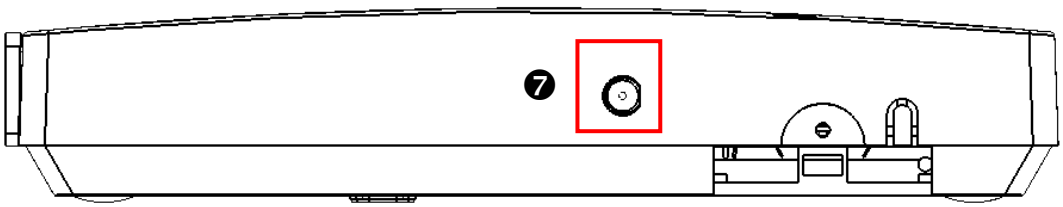
❸ **USB host 1&2 (for more information, please see section 4.3)**

❹ **10/100/1000Mbps RJ-45 LAN Port**

❺ **10/100/1000Mbps RJ-45 WAN Port**

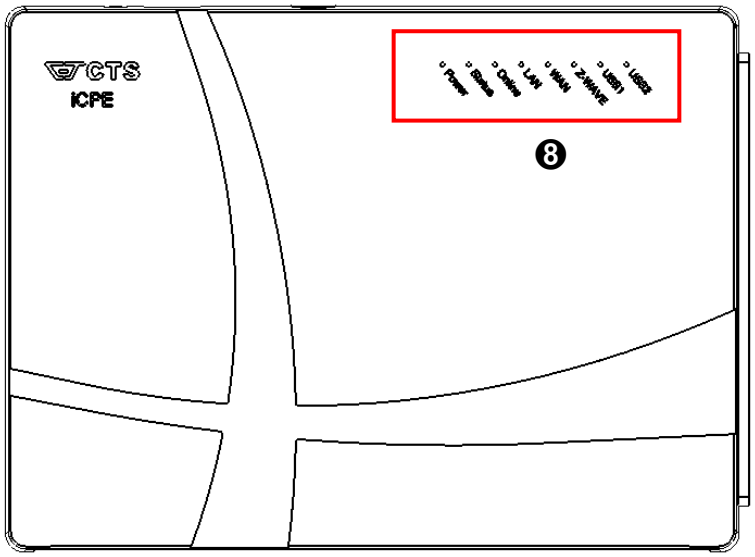
❻ **DC Power Jack**

Rear Panel



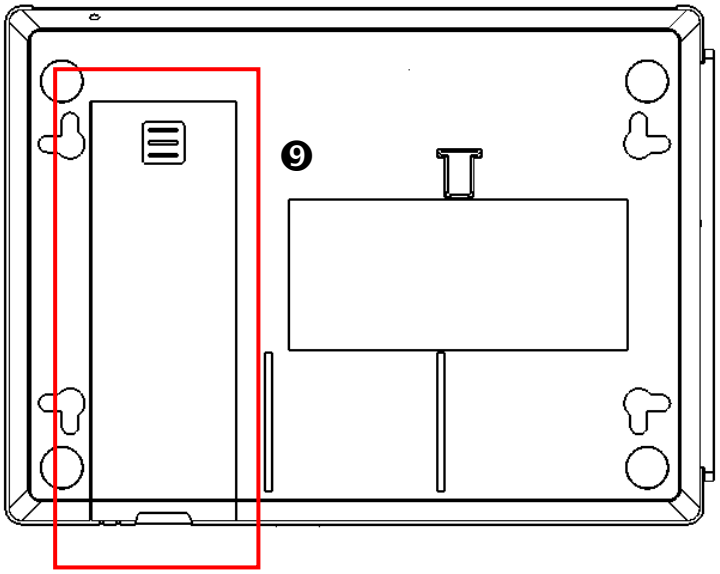
❼ **Antenna Connector**

Top Panel

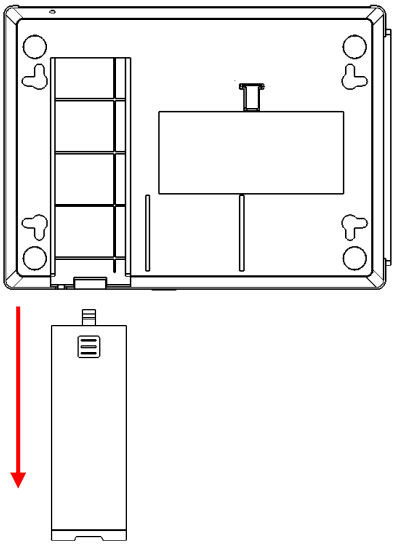


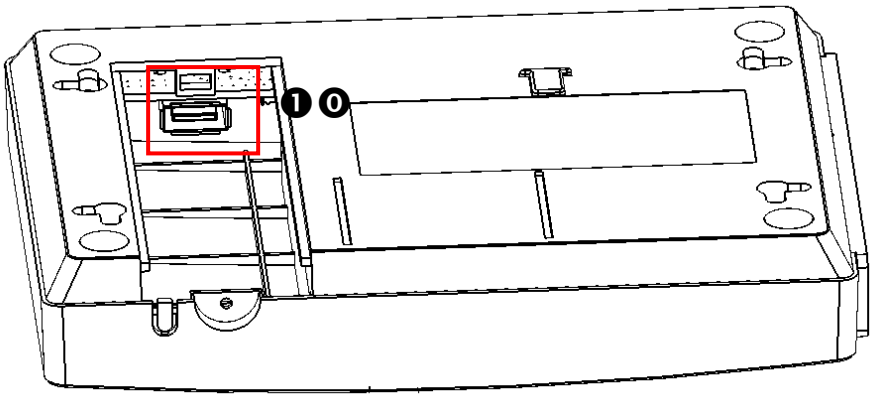
❽**LED Indicators (for more information, please see section 3.1)**

Bottom Panel



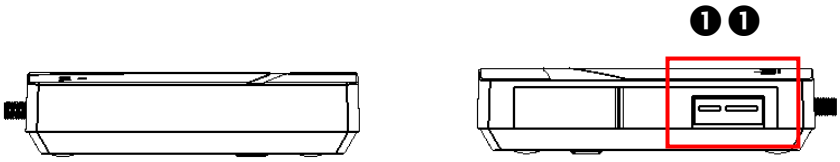
❾ USB Host 3 Cover (for more information, please see section 4.3)





10 USB Host 3 (for more information, please see section 4.3)

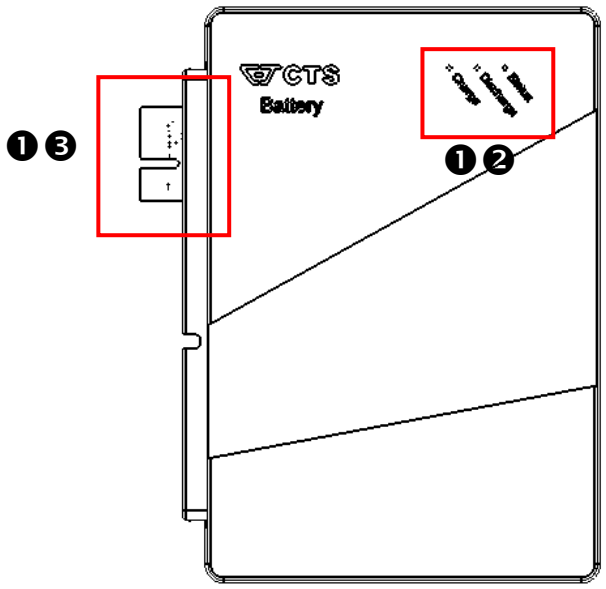
Side Panel



Left Side Right Side

11 Battery Slot (for more information, please see chapter 2.4.1)

Battery Panel (Optional)



❶❷ **Battery LED (for more information, please see section 2.4.1)**
❶❸ **Battery Insert**

2. INSTALLATION

To properly install the Gateway Controller, please follow the procedures listed below. Procedures covered in this chapter are described below in separate sections.

- Installation Requirements
- Unpacking the Gateway Controller
- Installing the Gateway Controller
- Powering on the Gateway Controller
- Connecting the Gateway Controller to the Network

2.1 Installation Requirements

ATTENTION

Be sure to power off before installing or wiring your Gateway Controller.

Be sure to calculate the maximum possible current in each power wire and common wire. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Be sure to read and follow the following important guidelines:

- Do not run signal or communications wiring and power wiring through the same wire conduit. Wires with different signal characteristics should be routed separately to avoid interference.
- It is recommended that wiring which shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate and label the wiring to all devices in the system if necessary.

2.2 Checking the Package Contents

Unpack the package carefully and check the package contents. The package should contain the following items:

- Items included in standard package:
  - 1 Gateway Controller
  - 1 Documentation CD
  - 1 Antenna
  - 1 Power Adaptor

If any of the above items is found missing or damaged, please contact your local sales representative for support or replacement.

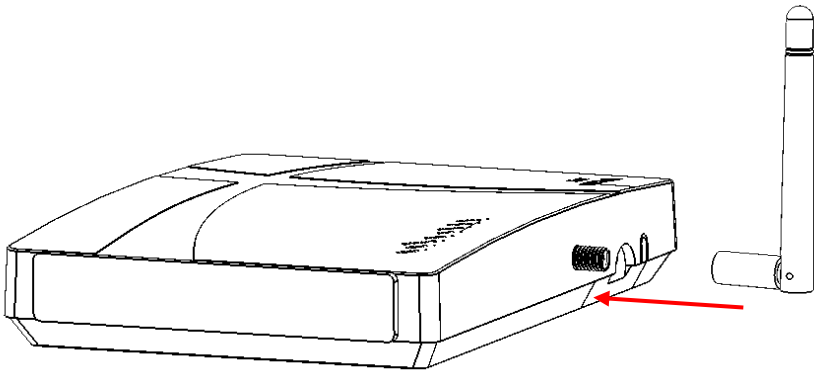
2.3 Installing the Gateway Controller

ATTENTION

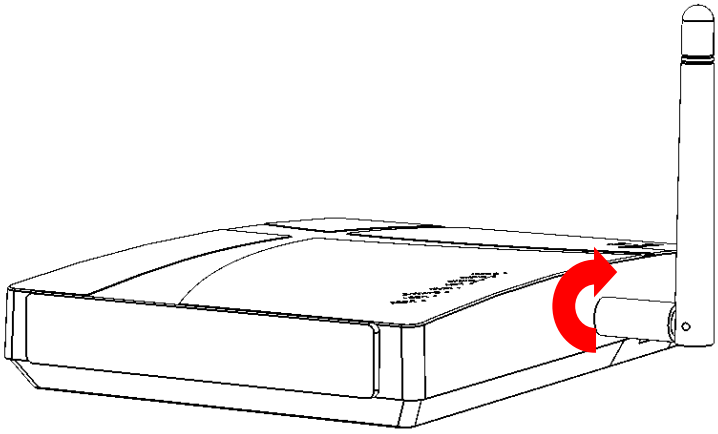
This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

Antenna attaching

STEP 1: Align with the Antenna Connector.



STEP 2: Turn it clockwise until tight using appropriate manual force.



2.4 Powering the Gateway Controller

The Gateway Controller can be used with a DC power 12 VDC power adaptor. The power jack is located on the front panel of the Gateway Controller. Before powering the Gateway Controller, please make sure that network cables and power cables are securely connected.

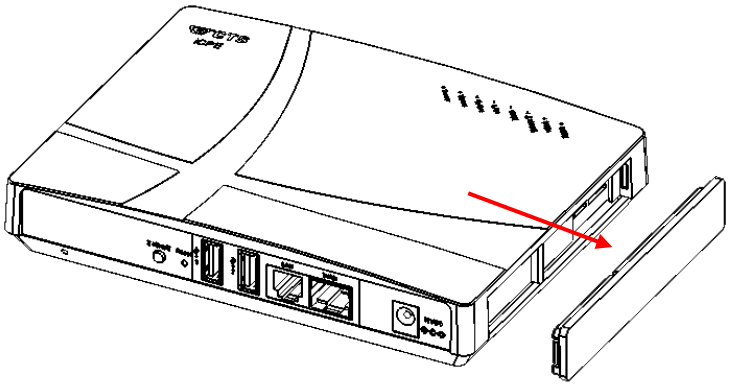
ATTENTION

Before connecting the Gateway Controller to the DC power inputs, make sure the DC power source voltage is stable.

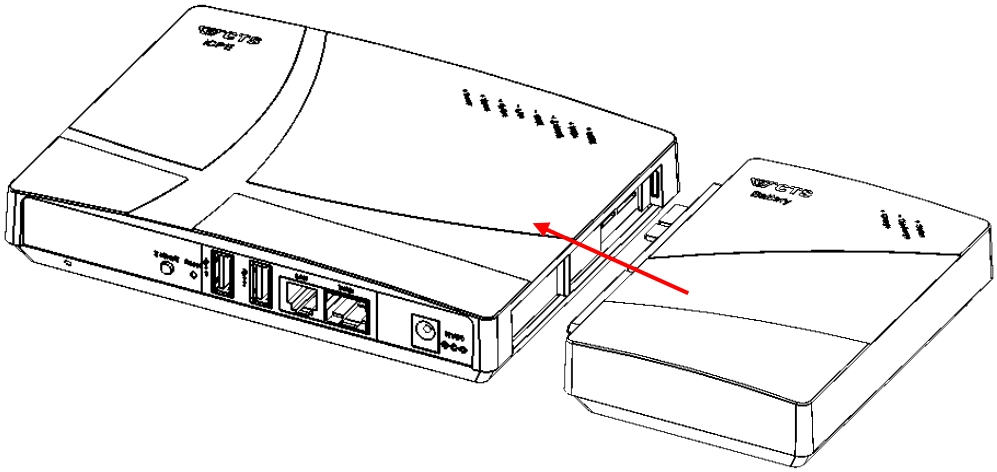
2.4.1 Connecting with Battery

The Gateway Controller can be connected with the optional battery to secure operation of basic functions in case of power outage. The battery installation is depicted below.

STEP 1: Remove the plastic battery cover from the side-panel.



STEP 2: Align with the battery slot on the CTS-iCPE and insert the battery.



2.5 Connecting the Controller to Network

Connect to Network

This Gateway Controller has 1 uplink port (RJ-45) and 1 downlink 10/100/1000Mbps RJ-45 port for implementation into the local environment. All RJ-45 ports can be inserted by 10/100/1000Base-T cables, connecting to the end-user devices.

Remember to connect the Tx port of device I to the Rx port of device II, and the Rx port of device I to the Tx port of device II. We recommend labeling the two sides of the same line with the same letter.

3. OPERATION

The Gateway Controller is Plug & Play compliant. The actual operational status can be monitored through a set of LED indicators located on the top panel of the CTS-iCPE. A built-in management module provides service providers with flexible interfaces to configure, control and monitor the complete system remotely.

3.1 LED Definitions

LED	Definition	Color	Operation
Power	Power	Off	Device is powered down or not installed.
		Green	Device is powered up.
Status	System Status	Solid Green	System is working normally.
		Solid Orange	System is booting up.
		Blinking Orange	When the system is set back to default factory setting, the Status LED indicator will blink 3 times in orange.
			When the system is restarted, the Status LED indicator will blink once in orange.
Online	Online Status	Off	A gateway or IP address specified is unreachable.
		Solid Green	A gateway or IP address specified is reachable.
LAN	LAN Port Status	Off	The port is link down.
		Solid Green	The link is up and operates at 10, 100Mbps or 1000Mbps.
		Blinking Green	The traffic is active.
WAN	WAN Port Status	Off	The port is link down.
		Solid Green	The link is up and operates at 10, 100Mbps or 1000Mbps.
		Blinking Green	The traffic is active.
Z-WAVE	Z-Wave Status	Off	Z-Wave functionality is disabled.
		Solid Green	Z-Wave is in operation. Only under this mode, the device is allowing data transmission.
		Normal Blinking Green	Z-Wave is in Include mode when the indicator is on and off for a 1 second alternation. Under this mode, the device is allowing for new sensors to be included.
		Slow Blinking Green	Z-Wave is in Exclude mode when the indicator is on and off for 2 seconds alternation. Under this mode, the device is allowed to disconnect with other sensors.

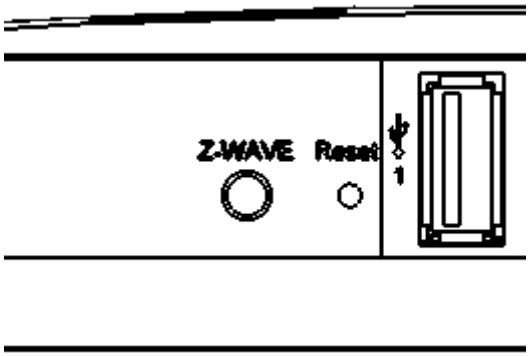
USB1	USB1 Port Status	Off	USB device is unplugged on USB1 port.
		Solid Green	USB device is plugged in on USB1 port.
USB2	USB2 Port Status	Off	USB device is unplugged on USB2 port.
		Solid Green	USB device is plugged in on USB2 port.
Battery LED (Optional)			
Status	Battery Box Status	Off	The battery is disconnected with the Gateway controller.
		Solid Green	The battery power is available for more than 50% of full capacity.
		Solid Orange	The battery power availability is below 50% of full capacity.
Charge	Battery Box Charge	Off	The battery is disconnected from the Gateway controller.
		Solid Green	The battery is fully charged.
		Normal Blinking Green	The battery is being charged.
		Fast Blinking Green	The battery or IC is in error.
Discharge	Battery Box Discharge	Off	The battery is disconnected from the Gateway Controller or not discharging at all.
		Blinking Orange	The battery is discharging properly.

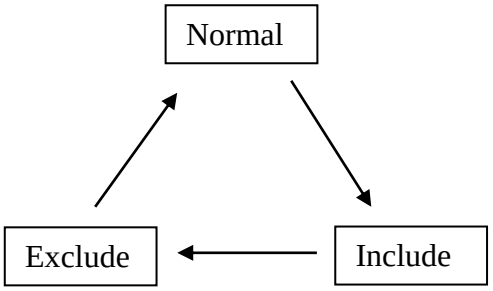
3.2 Z-Wave Mode Switching

The user can use the Z-Wave mode button on the front panel and to include or exclude Z-Wave sensors.

The default setting is in Normal mode.
The mode is switched by pressing the button.
When pressing the Z-Wave button once, it switches to the Include mode.
When pressed again, it switches to the Exclude mode.
Finally, during the Exclude mode, when the button is pressed again it will switch back to the Normal mode.

For more information, please refer to Network Management Manual (as available to the communications service supplier).





The Order of the Z-Wave Mode Switching

Note: *The Include and Exclude mode will last for a maximum of two minutes after manual pressing of the button. After that, it will automatically back to Normal mode.*

Controller Learn Mode Description

The user can click the "Initiate" button on the WEB page to accept inclusion, exclusion or replication requests from other controllers.

The controller turns into “Learn Mode”. The Learn Mode will time out after 60 seconds.

The Learn Mode stops when the controller is included, excluded or replicated successfully.

The process of Learn Mode can be manually stopped using the “Abort” button.

Pressing the “Abort” button during the communication process, will cause the Z-Wave system to restart, which approximately takes 150 seconds.

Product Reset Description

The user can click the "Reset" button on the WEB page to return the controller to factory settings.

Note: All connections with included devices and all configurations and settings will be lost. It takes approximately 90 seconds to finish the process.

Other Special Features

The Z-Wave network configuration incorporates functions for backup, restoration and save.

Z-Wave module firmware upgrade is supported.

4. MAINTENANCE

The Gateway Controller is easy to use and maintain. The below procedures are suggested for trouble shooting, when performing hardware replacement or firmware upgrading.

4.1 Fault Identification

Identifying faults can greatly reduce the time required to find and restore any problem. Users may perform local or remote checks to find the problems.

Local Check

Users can perform local checks by observing LED indicators status.

- When the whole system fails to function:
  - Check Power LED status
  - Check Power connection
  - Reset power

- When certain network link fails to function:
  - Locate the port of the Gateway controller
  - Check the Port Link Status LED
  - Check the cable connection between the port and the connected device
  - Reset power

4.2 Hardware Replacement Procedures

ATTENTION

The Gateway Controller contains no user-serviceable parts. DO NOT, UNDER ANY CIRCUMSTANCES, open and attempt to repair it.

Failure to observe this warning could result in personal injury or death from electrical shock.

Failure to observe the above warning will immediately void any Warranty.

5. CTS-iCPE Configuration

5.1 Service provider configuration

As noted, the CTS-iCPE will always be purchased and delivered as part of a total services package. It will be the Service provider and/or Communication operator holding the contract to be in control of the first set-up and configuration of the CTS-iCPE.

After connecting the CTS-iCPE using an internet Ethernet cable to the WAN port the “on-line” LED will become green. At this point the CTS-iCPE is successfully connected to the service provider server-based solutions.

Please follow the Service Provider Manual from this point onward.
Good luck with your CTS-iCPE and may all the good forces be with you.