

Verdant Environmental Technologies Hardware

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VERDANT ENVIRONMENTAL TECHNOLOGIES

HARDWARE

Provider: Verdant Environmental Technologies

Hardware Name: Verdant Online Connection Kit and Verdant Antenna Module

Connection purpose: Enable wireless connectivity for smart thermostats by generating a mesh network at proprietary 900MHz frequency.

What is the Verdant Online connection kit:

Simple-to-install Online Connection Kit enables remote management of Verdant energy management thermostats from any computer, tablet or smart-phone connected to the internet.

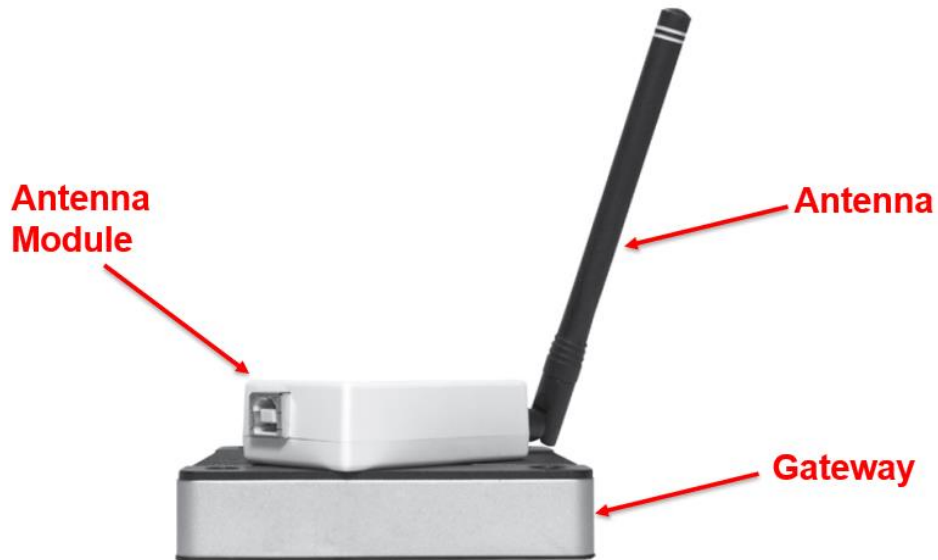
The Verdant Gateway operates on Linux operating system and can get updates from the cloud for latest software releases.

The Verdant Gateway acts as a bridge between the cloud and the thermostats by:

1. Transferring data from the thermostats to the cloud and enables our software portal to display real time thermostat behavior, active alerts, and other important information.
2. Enabling remote management of the thermostats by transferring the commands like change in energy settings from cloud to the thermostats.

How does the gateway communicate with thermostats?

The Verdant Gateway's antenna module communicates with Verdant Thermostats wirelessly with our proprietary mesh network which operates at open ISM band in The Americas, at 902-928 MHz (meaning that we **do not** depend on or interfere with Wi-Fi). The mesh network can connect about 1,024 thermostats wirelessly. For best signal quality, it is recommended that the distance between thermostats does not exceed 150 feet. This wireless mesh network allows thermostat to communicate with the server without the need for any additional networking equipment.



CONTENTS

- Server (OL-SR)
- Antenna Module (OL-WR)
- Antenna (OL-AN)
- Network Programmer (OL-PR) (only for WX-OL-KT)
- Power Supply (OL-PS)
- Ethernet Cable
- USB Cable for the Antenna Module
- USB Cable for the Power Supply

Technical Details of Verdant Gateway:

The Verdant Gateway needs WIRED ethernet connection through an open internet port at the property. It has one wired port located at the back of the gateway. Typical configuration of the device IP is through the Dynamic Host Configuration (DHCP) protocol. The gateway communicates using outbound traffic to the thermostats using TCP ports 80, 443 and

22(OPTIONAL). The gateway does not require any inbound ports to be opened for communication.

Connecting Verdant Online connection Kit to the network:

1. This device must not be redirected by a captive portal (login or splash page for connecting to the internet). This is often done by putting the MAC address on whitelist for the networked devices of the property.

Please note that the MAC address of each Gateway is imprinted on a white bar code sticker located on the bottom of the Gateway.

2. Typical configuration of the device IP is through the Dynamic Host Configuration (DHCP) protocol.
3. **Firewall configuration:** This device communicates over TCP on outbound ports 443 10191-10291 and 22 (Optional).
4. You can verify the configuration by checking whether the Verdant Gateway is reporting.

Verdant devices typically report on the network with hostname Verdant_XXXXX, where XXXXX is the network id of the property.

Outbound and Inbound Traffic:

The ebox uploads the information to the online portal (www.thermostatsolutions.com) or (<https://ebox.thermostatsolutions.com>) which enables the clients to check thermostat behavior, check alerts and manage the thermostats remotely. The ebox uses a static IP <https://34.197.76.129>, port **443** to upload the information to the online portal.

Type	Managed by	IP	Protocol	Port
Static	Verdant	34.230.199.117	TCP	22, 443
Static	Verdant	34.197.76.129	TCP	443
Static	Verdant	34.231.123.255	TCP	10191-10291
Static	Verdant	54.235.201.244	TCP	10191-10291

Inbound ports:

Specific section on inbound ports – typically disabled, maybe enabled for specific integrations like PMS, Door lock integrations (443), BMS (BACnet) - UDP (47808 to 47817)

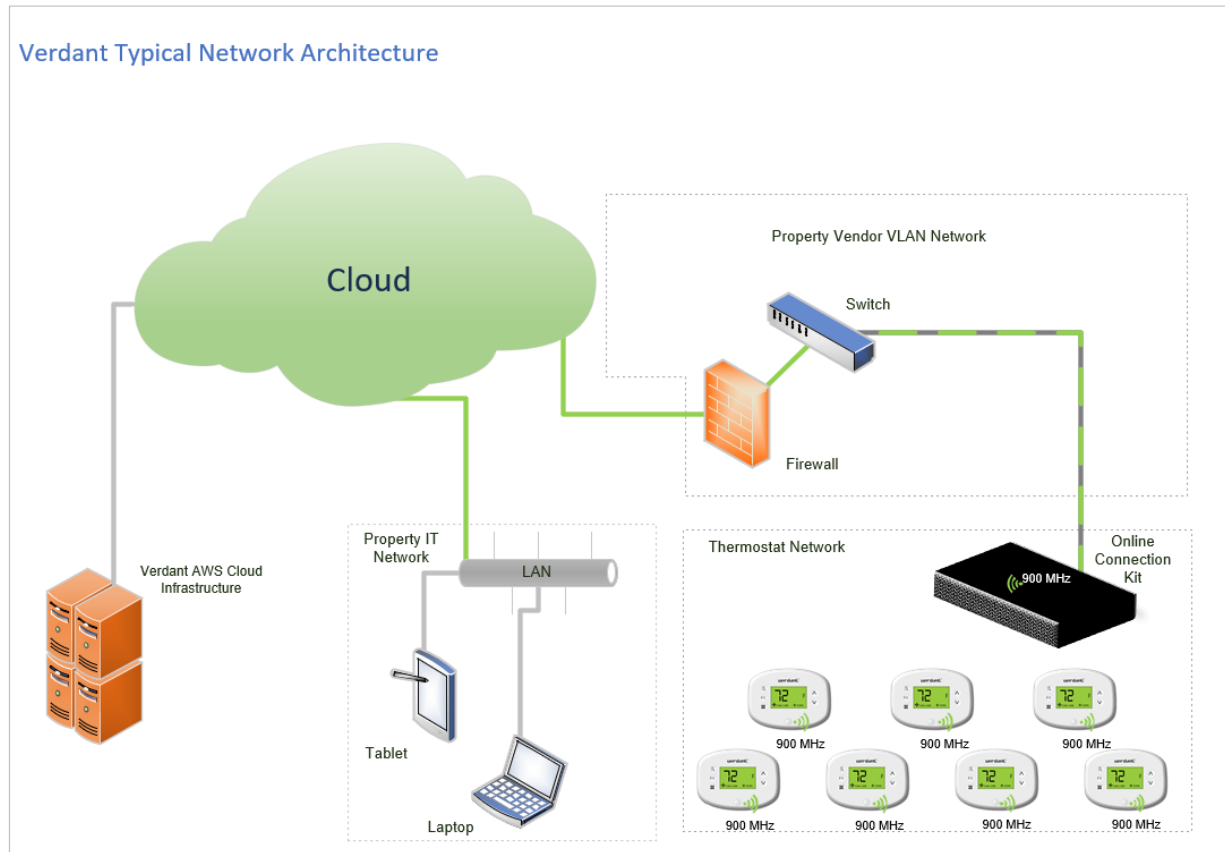
Device specifications for OL KIT:



Product Type	Gateway	Root Node
SKU(s)	ZX-OL-U	ZX-RN
Wireless Frequency	N/A	902-928MHz (NA)
Case Dimensions (Imperial)	4.72" x 3.15" x 1.18"	2.4" x 1.54" x 0.78"
Case Dimensions (Metric)	120mm x 80mm x 30mm	46mm x 61mm x 19mm
Operating Voltage	12VDC 1.5A	+5VDC (nom.)
Temperature Accuracy	N/A	±1°F
Enclosure Material	Extruded Aluminum	ABS (AF312C(LG CHEM))
Ambient Operating Temp	32°F -105°F 0 - 41°C	32°F -105°F 0 - 41°C
Internet Connectivity	100M/1000M Base-T Ethernet	N/A
FCC ID		XEY-ZX-RN
IC		8410A-ZXRN

Verdant Network Architecture

Verdant Typical Network Architecture



Typical location for installing the online connection kit in the building:

Install the server in a room adjacent to rooms in which verdant thermostats will be installed. The maximum distance will vary depending on the type of the building construction.

NOTE: Do not install the server in the basement.

Start by first installing a thermostat in the room closest to the server. Continue by installing adjacent rooms only after confirming that installed thermostat(s) have connected to the wireless network. The rooms furthest away from the server should be installed last.

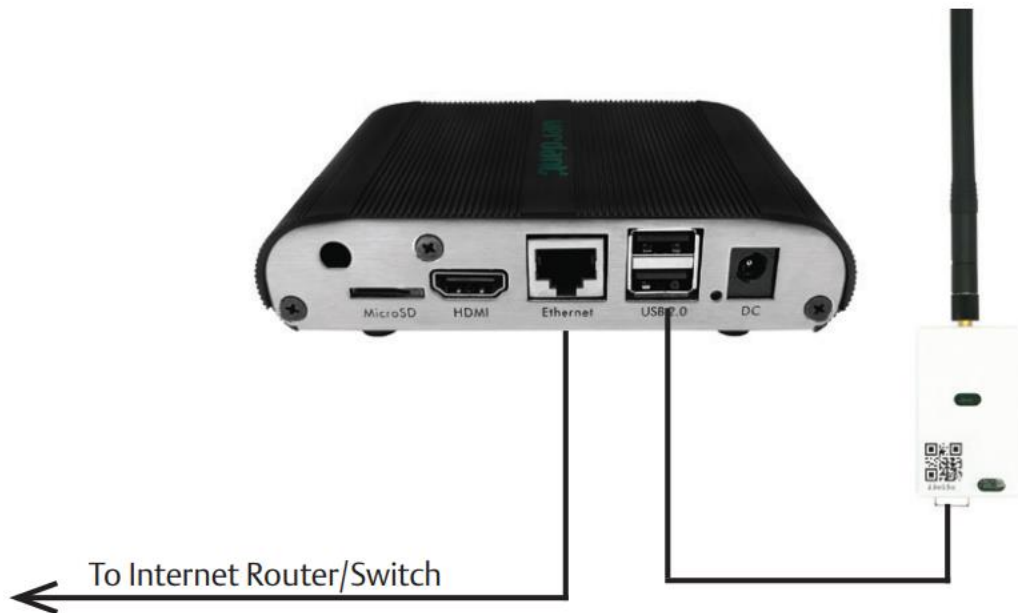
How to Install the Verdant Gateway: Network Installation:



- Screw the Antenna onto the Wireless Receiver;
- Connect the Wireless Receiver to the Server using the supplied USB cable;
- Affix the Wireless Receiver to the wall with double sided adhesive tape;
- Orient the antenna to be parallel to the closest room in which a Verdant thermostat will be installed.

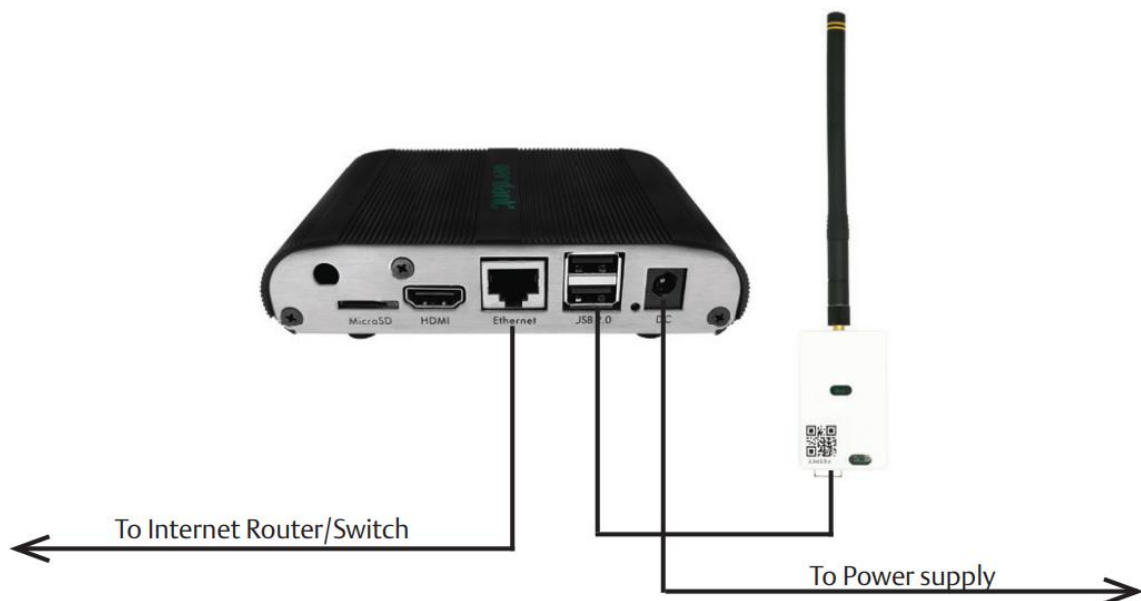
Please note that the wireless receiver and the antenna must not be installed near metal structures or surfaces. Metal structures and surfaces significantly reduce the range of the wireless signal.

Connecting the ethernet cable:



- Connect the Server to the LAN port with the supplied RJ-45 cable

Powering the server:



- Plug the Server into an electrical outlet with the supplied power cord.
- NOTE: To prevent power related issues, plug the server into a ups (uninterrupted power supply) unit.

Verdant Cybersecurity:

Verdant was acquired by Emerson in 2021 and then by Blackstone in 2023. Verdant Environmental Technologies now operate as a standalone business under the umbrella brand of 'Copeland' since June 2023. Both Emerson and Copeland's Chief Information Security Officer (CISO) oversees the cybersecurity of all business under the corporate brand.

Our cybersecurity program handles all aspects of cybersecurity which include Awareness and training, cloud and third-party assessments, data privacy and protection, Governance and compliance, identity and access management, incident response and management, insider threat and investigative support, threat, and vulnerability management & connected products. The information security program is informed by several industry-standard guidelines and best practices including ISO27001, NIST CSF, and DFARS.

Patches and Vulnerability management:

Our Risk management program monitors for possible threats and vulnerabilities to information technology assets annually and when there are significant changes to technology, infrastructure, or other factors.

Today, all our Global Data center and regional data centers are ISO 270001 certified. This certification specifies the requirements for establishing, implementing, maintaining, and continually improving Emerson's information security program.

An independent external entity assesses the maturity of our cybersecurity program on an annual basis and measures program maturity against industry peers and industry standards such as NIST Cybersecurity Framework and other common frameworks. The security team discusses recommendations with executive leadership and the board of directors.

Penetration Tests:

We perform penetration tests of internal and external network infrastructure as well as connected products on ad hoc basis using dedicated internal staff specially trained and experienced in industry standard penetration test scopes and methods. In addition to the continuous efforts of our vulnerability management team conducting penetration testing, we engage in annual external penetration exercises using an industry-leading third-party. Results are reviewed by the Information Security organization and action is taken based on risk.

Frequently Asked Questions

1. **Does Verdant system need any type of WiFi to connect the gateway or thermostats?**
No, Verdant System does not depend on any type of WiFi connectivity to connect either the online kit or thermostats.

The gateway connects with internet through a wired ethernet connection. The thermostats communicate with the gateway using a proprietary mesh network at 900 MHz frequency.

2. **How does Verdant server communicate with the thermostats?**

The Verdant Gateway's antenna module communicates with Verdant Thermostats wirelessly with our proprietary mesh network which operates at open ISM band in The Americas, at 900-920 MHz (meaning that we **do not** depend on or interfere with Wi-Fi).

3. **Which VLAN should we be using?**

Typically, we are configured to a guest or vendor VLAN. This information is typically determined by the IT administrator at the property.

4. **List the specific outbound IPs used by Verdant Gateway for communication.**

Type	Managed by	IP	Protocol	Port
Static	Verdant	34.230.199.117	TCP	22, 2<XXXX>
Static	Verdant	34.197.76.129	TCP	443

5. **How much networking bandwidth is required for Verdant Gateway?**

Verdant online connection kit does not require high internet bandwidth to communicate with the thermostats. Bandwidth may vary depending on building size, but typical consumption for 100 units is less than 200 Megabytes per month.