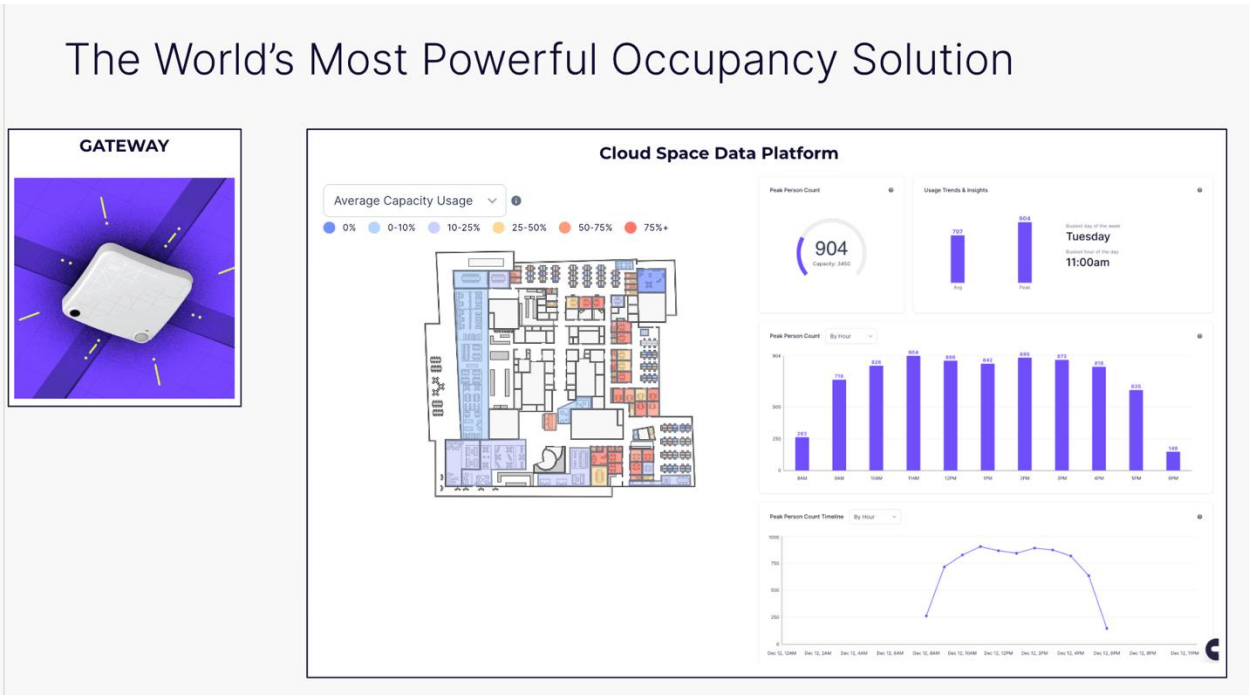
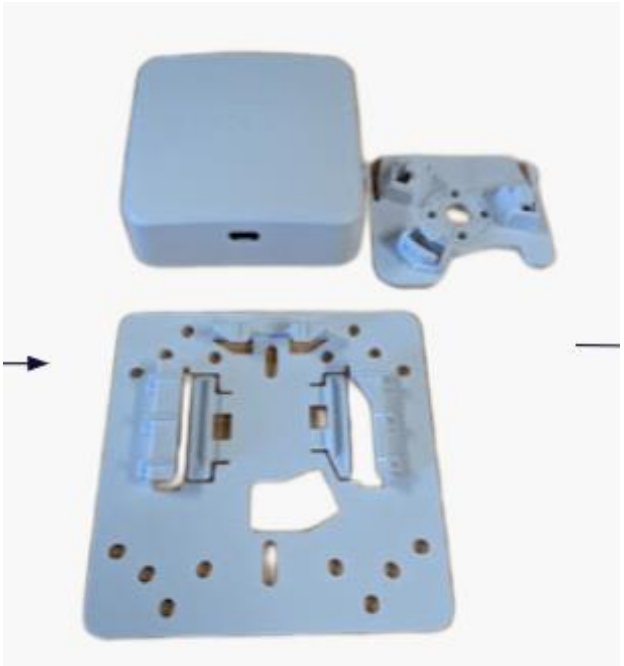
Installing G400C, Cellular Gateway

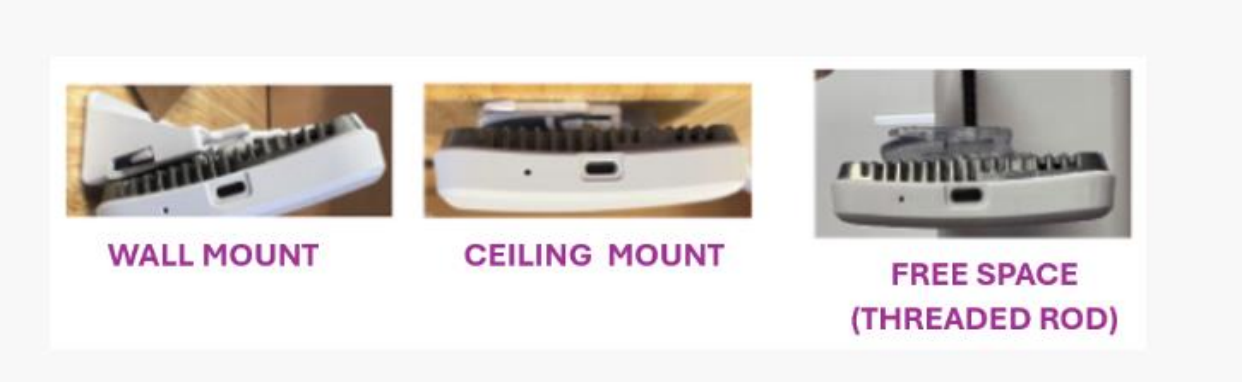
The VergeSense G400C Gateway is a device that communicates with the local network of VergeSense sensors to aggregate local occupancy data.

In a typical office environment, we suggest using one gateway per 50 devices. The sensors form a wireless mesh network with the gateway being the transfer point from the mesh network to the cloud. The maximum distance from the gateway to the nearest sensor in the wireless mesh should not exceed 40 feet.
Ideally, several sensors in the wireless mesh will be in close proximity to the gateway to ensure a reliable path back to the gateway across the wireless sensor mesh.



MOUNTING OPTIONS





GATEWAY INSTALLATION

VergeSense will grant access to the installer tool prior to the start of installation. Access the tool at cloud.vergesense.com on mobile or desktop.

Physical Installation:

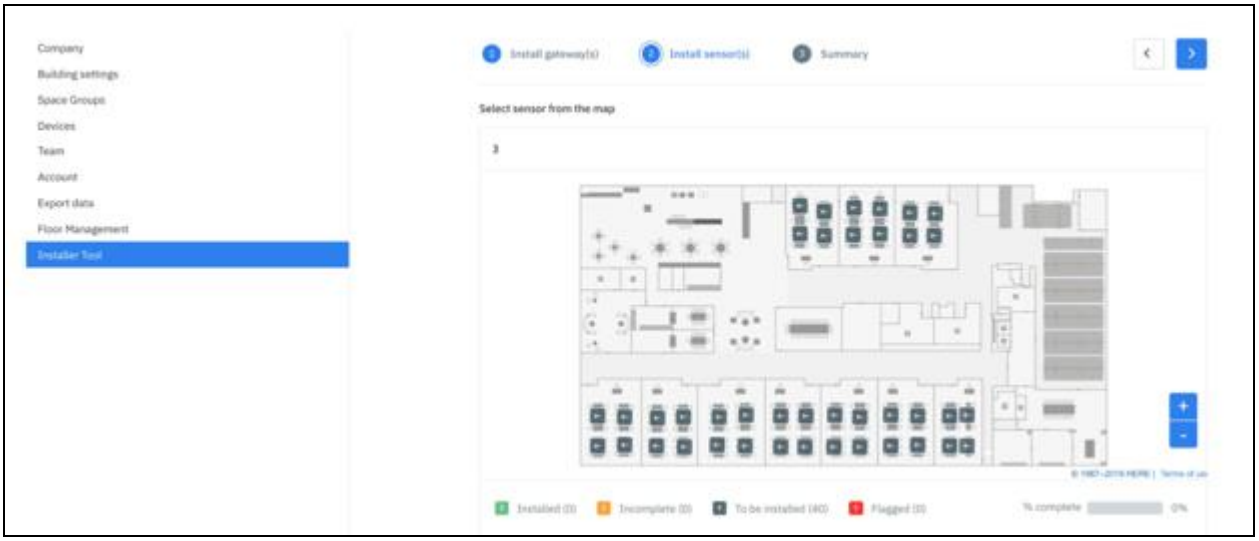
- Locate gateway on map
- Match orientation to map
- Connect device

Use Installer Tool to:

- Enter gateway ID
- Check connectivity
- Confirm coverage
- Publish

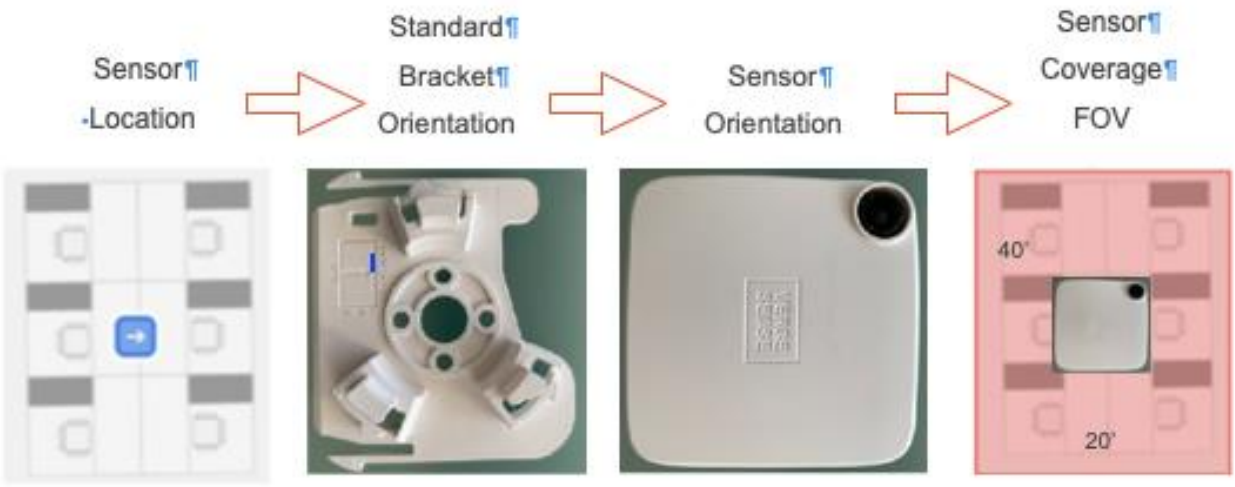
LOCATE GATEWAY MAPS

Use the Installer Tool to navigate the map. Note: the plan is to scale, zoom in to view exact GATEWAY location (usually centered above a group of desks, center of a room).



MATCH ORIENTATION ON MAP

It is important to match the orientation for proper coverage and data capture



MOUNT GATEWAYS

The recommended mounting option for wired GATEWAYs is to mount to the center of the tile. Select the mounting solution that best fits your needs. Mounting options can be found here.

Standard bracket

Junction plate

Screws

Installer Tool Requirements

Rod drop install:
Installer provides mounting nuts and washers; depend on rod diameter.

Rod drop install:
For the junction bracket attach, mounting screws provided by installers.

Wall bracket attach:
Mounting screws are included

THE ETHERNET CABLE AND POE SWITCH AS WELL AS ITEMS BELOW PROCURED AND PROVIDED BY INSTALLER				
 12' Ladder	 Drill with Phillips bit	 Tape measure	 1/2" Hole saw	 Industrial vacuum
 Wrench set	 Level	 Safety goggles	 Wipes to clean wall/tiles	 Plastic sheeting to prevent dust on furniture

Ceiling

Drop + Drywall

ITEMS NEEDED FOR INSTALL

Included:

- ☐ Standard bracket
- ☐ Two #8 screws

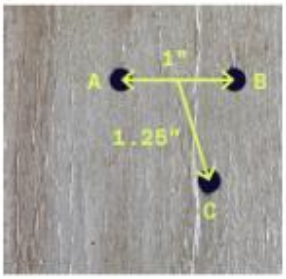
Required:

- ☐ Power drill with Phillips bit
- ☐ 29 Gauge drill bit
- ☐ 1/2" Hole saw

Step One

Prepping ceiling surface

1. Mark location for two screws A and B
2. Mark location for ethernet cable entrance C
3. Use standard bracket as a template for screw and cable locations
4. Ensure location does not exceed 9' from the ground



Step One

Prepping ceiling surface

1. Mark location for two screws A and B
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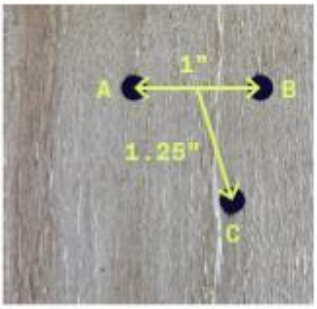
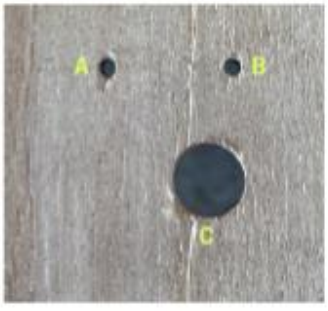


Step Two

Drilling holes

1. Use 29 gauge drill for holes for #8 screws (Locations A and B)
2. Use 1/2" hole saw to access hole for ethernet cable access (Location C)
3. Ensure the wi-fi strengths at this location minimum 3 bars
4. In some drywall or plaster installation, anchors or toggle bolts will be required, similar to McMaster 66615A4 and 66625A65 respectively



Step Three

Attaching standard bracket

1. Ensure bracket is pointing in to correct direction (Direction is shown in yellow rectangle)

Step Four

Prepping ceiling surface

1. Pass Internet cable through the 1/2" opening
2. Make sure there is ~3" of cable available to successfully attach sensor
3. Make sure cable can move freely through opening
4. Connect cable to the sensor

Step Four

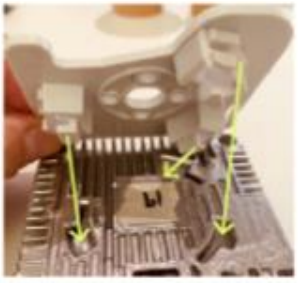
Prepping ceiling surface

1. Pass Internet cable through the 1/2" opening
2. Make sure there is ~3" of cable available to successfully attach sensor
3. Make sure cable can move freely through opening
4. Connect cable to the sensor

Step Five

Mounting Sensor

To mount the sensor align bracket prongs with housing slots and twist sensor clockwise until it locks



Open Ceiling

Rod (Recommended)

ITEMS NEEDED FOR INSTALL

Included:

- ☐ Standard bracket

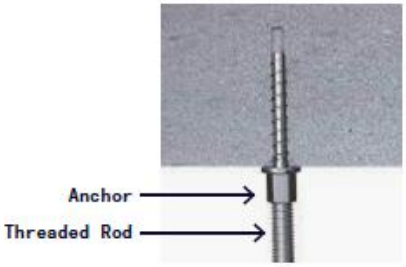
Recommended:

- ☐ 3/8-16 nuts *McMaster 95462A031*
- ☐ 3/8-18 washer *McMaster 90107A127*
- ☐ 3/8-16 threaded rod *McMaster 90322A100 or equivalent, based on the lengths needed*
- ☐ Ceiling mount, threaded rod anchor *McMaster 97085A510 or equivalent*

Step One

Attaching to the ceiling

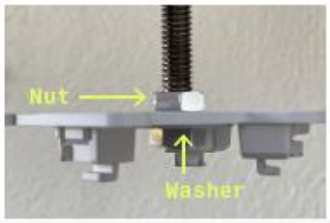
1. Use 3/8-16 diameter rod
2. Rod lengths should be long enough so that sensor is maximum 9' from the ground.
3. Use rod anchor based on ceiling type (concrete, wood or steel)



Step Two

Mounting standard bracket

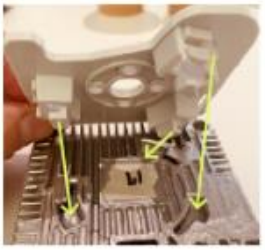
1. On the end where sensor mounts, place nut 1/2" from the edge
2. Place washer and nut above and below standard bracket
3. Make sure sensor orientation is correct, refer to FOV diagram on the bracket
4. Ensure the wi-fi strengths where sensor is attached minimum 3 bars



Step Three

Attaching sensor to standard bracket

1. Align mounting bracket prongs with slots on the sensor.
2. Twist sensor clockwise until you hear locking sound
3. Insert ethernet cable
4. Use tie wrap to secure ethernet cable to the rod



Open Ceiling

Junction Box

Only if junction box is preinstalled or junction box required to connect to ceiling or by customer

ITEMS NEEDED FOR INSTALL

Included:

- ☐ Standard bracket

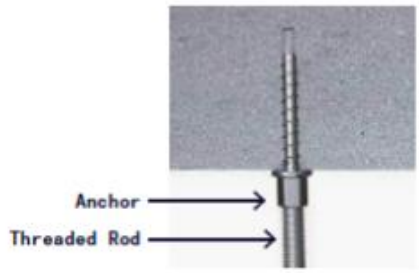
Recommended:

- ☐ 3/8-16 nuts
  McMaster 95462A031
- ☐ 3/8-18 washer
  McMaster 90107A127
- ☐ 3/8-16 threaded rod
  McMaster 90322A100 or equivalent, based on the lengths needed
- ☐ Ceiling mount, threaded rod anchor
  McMaster 97085A510 or equivalent
- ☐ Outlet box, 4 1/16" x 4 1/16"
  McMaster 71695K16

Step One

Attaching rod to the ceiling

1. Use 3/8-16 diameter rod
2. Use rod anchor based on ceiling type (concrete, wood or steel)



Step Two

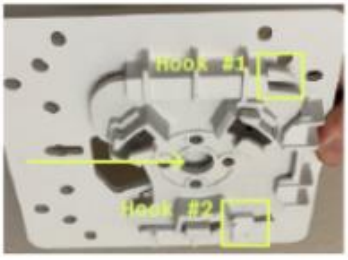
Attaching outlet box to the rod

1. Attach outlet box to the rod
2. Rod lengths should be long enough so that sensor is maximum 9' from the ground.
3. Ensure the wi-fi strengths where sensor is attached minimum 3 bars

Step Three

Assemble standard bracket with junction plate

1. Slide standard bracket in to junction plate until locks
   Note: Hooks will snap in to wall bracket
2. Refer to FOV diagram on the standard bracket for sensor orientation
3. No tools required



Step Four

WALL MOUNTING

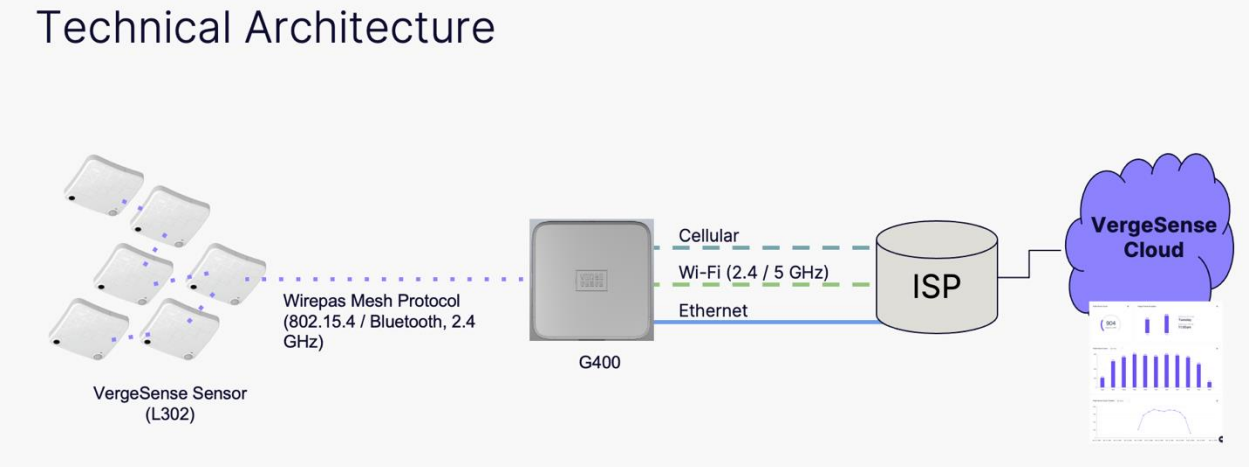
SET-UP: LED

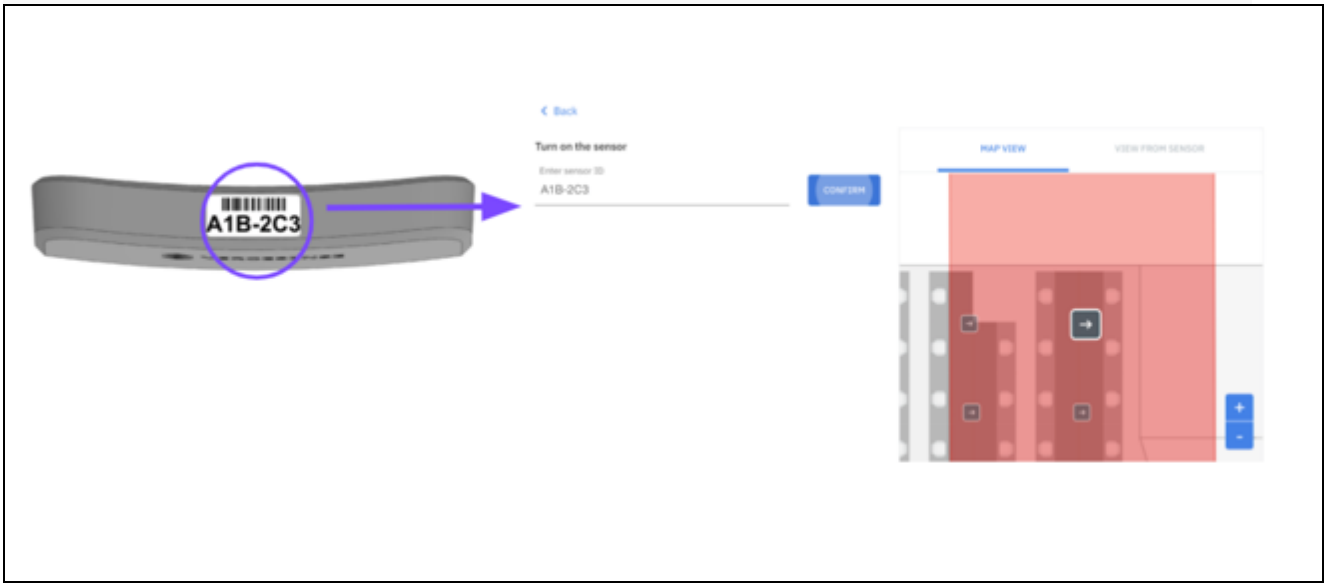
Once the new GATEWAY is installed, a front facing LED light will indicate the device's status. See table below for reference:

State	Time	Device Status	LED State
Off	0	No power to the device	All off
Power On	0 - 10s	Bootloader starts, linux kernel loaded	All off
Kernel Initialization	10s-15s	Linux kernel initialization	All on solid (white/yellow color)
Userspace Initialization	15s-20s	Userspace initialization	Red and blue on solid (purple color)
POST	20s -30s	Power on self test	Green on solid (green color)
POST Failure	30s+	Hardware failure detected	Red 500msec on-off cadence
Network Manager Start	30s+	Devices tries to connect to the local network	Green 500msec on-off cadence
MQTT Connection	30s+	Device is connected to the local network and attempting to connect to VS cloud	Blue 500 msec on-off cadence
Normal Operation	30s+	Indicate normal operation	All Off
Reset		Factory Reset	Blue on solid for 5-30s after release of reset button, then all off when reset is complete
USB Flash Drive		USB stick inserted	Blue on solid for 5-60s after insertion of USB stick, then all off when it's safe to remove the USB stick

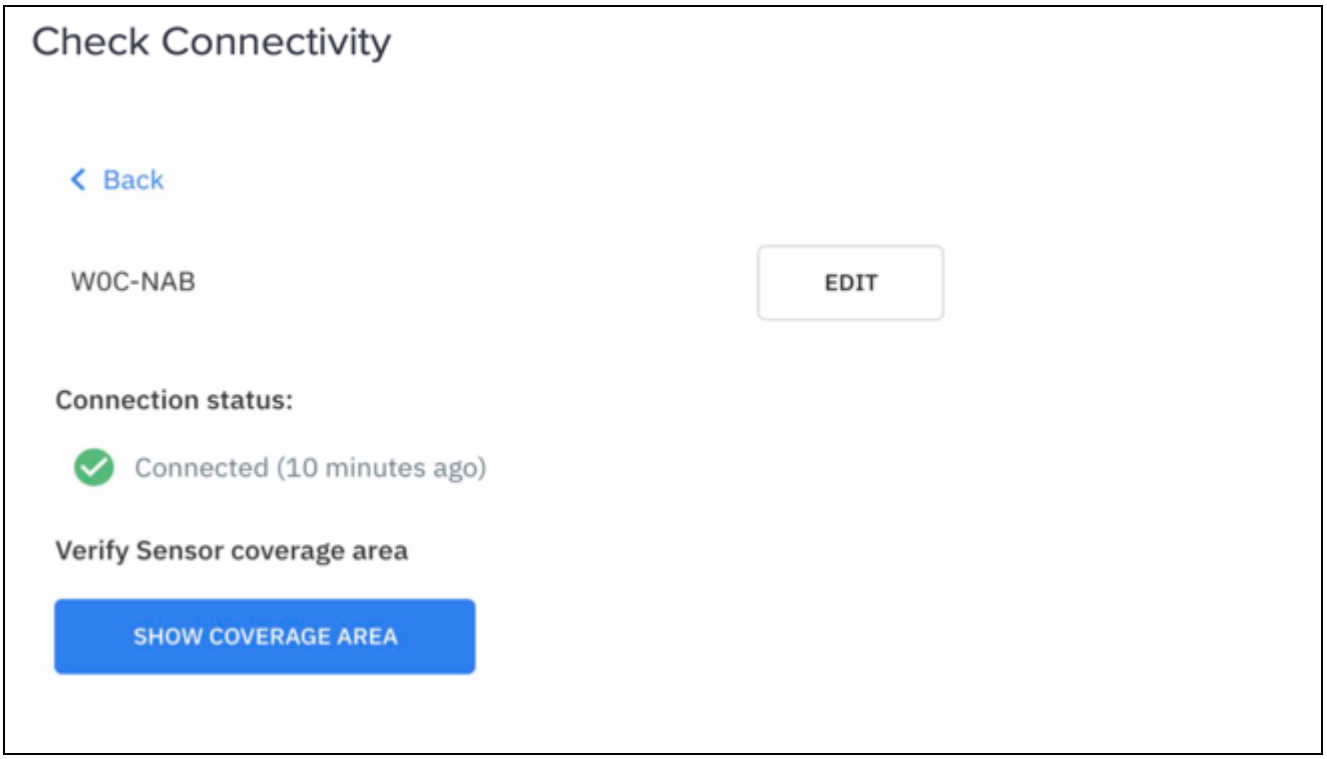
SET-UP: GATEWAY ID

Every GATEWAY has a unique ID that needs to be entered in the Installer Tool during installation. The GATEWAY ID is located on the back of the GATEWAY in the format "XXX-XXX". See example below.





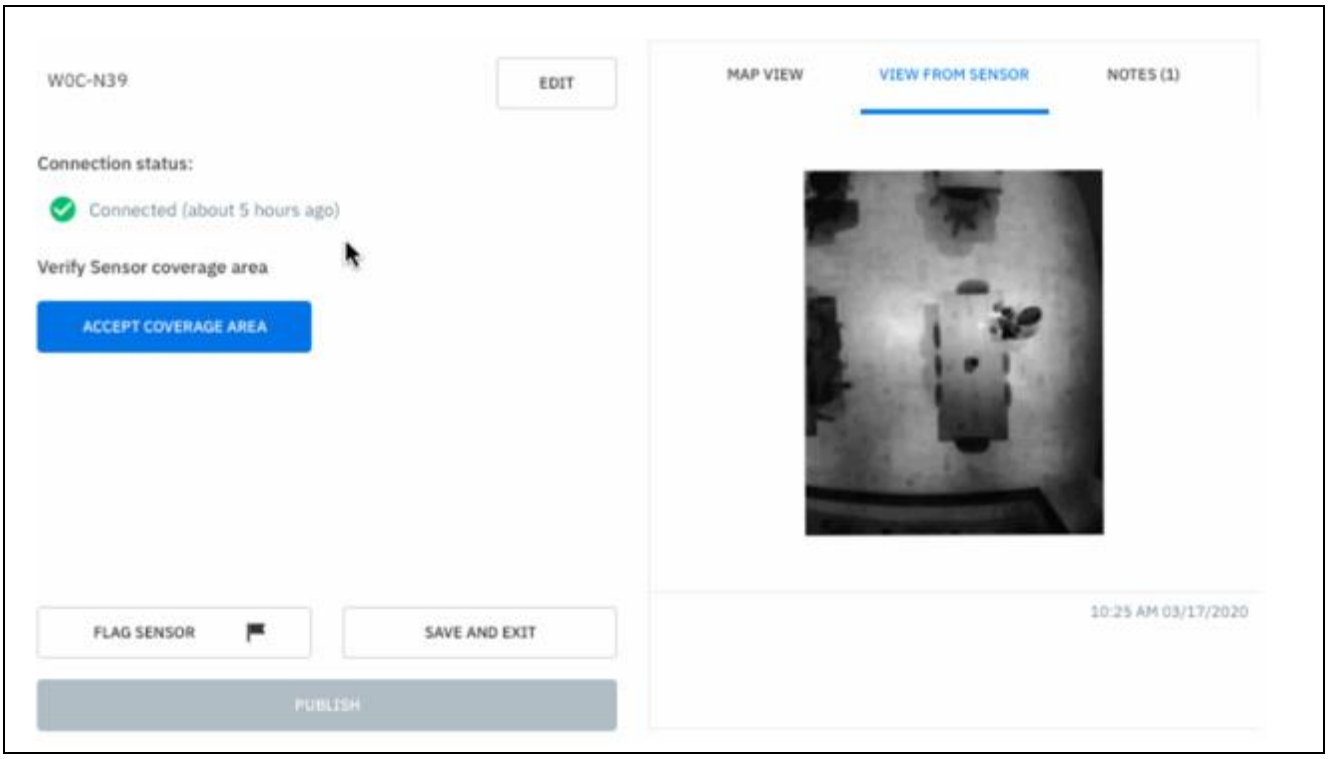
SET-UP: GATEWAY ID

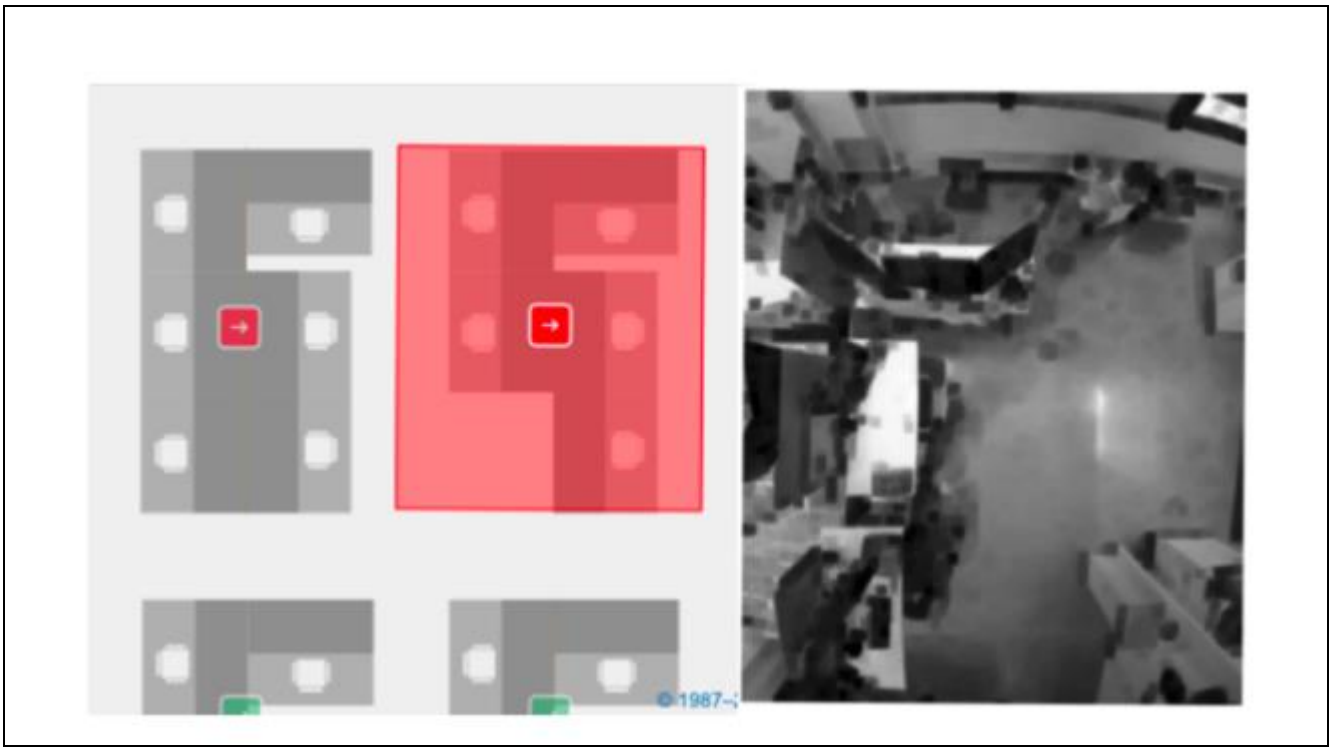


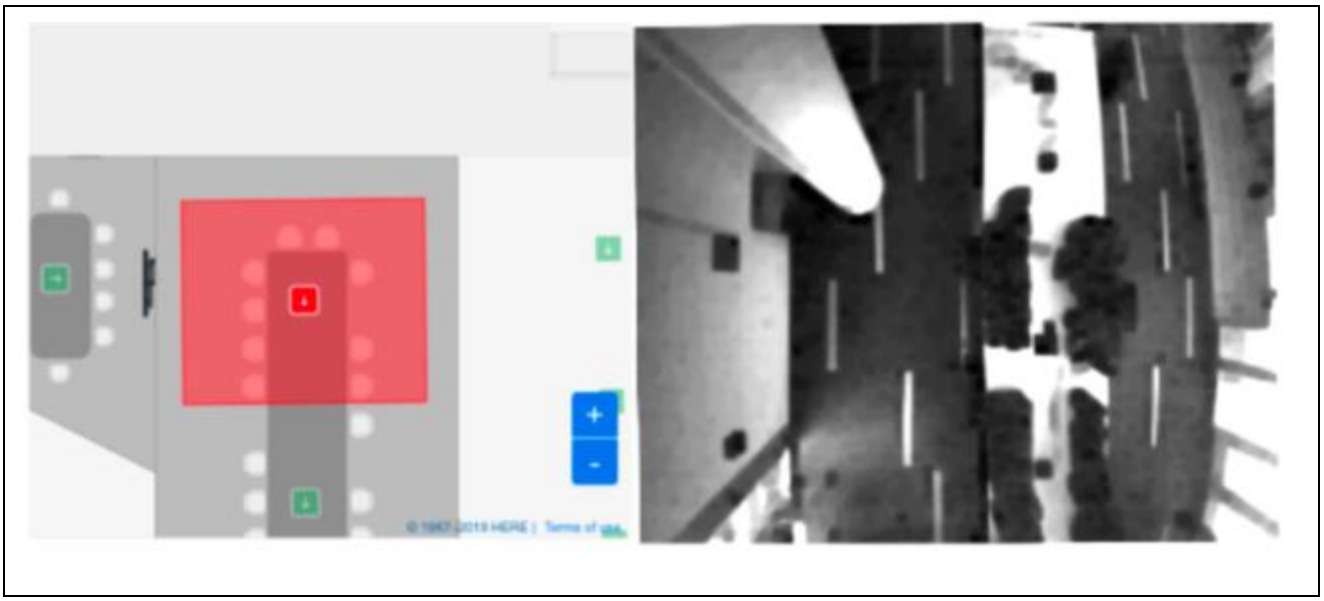
CONFIRM COVERAGE
Once GATEWAY is connected, check the coverage area to verify the desired space is being captured. The "Map View" shows the intended covered space as highlighted by the GATEWAY's field of view (red rectangle).

If the space is properly captured, select "Accept Coverage Area"

It is important to only "Accept Coverage Area" when the entire space is being captured. These are some examples of installed GATEWAYs that need to be adjusted.
In these cases the GATEWAYs were "Flagged" as they required an adjustment


W0C-N39
EDIT
MAP VIEW
VIEW FROM SENSOR
NOTES (1)
Connection status:
Connected (about 5 hours ago)
Verify Sensor coverage area
ACCEPT COVERAGE AREA
FLAG SENSOR
SAVE AND EXIT
PUBLISH
10:25 AM 03/17/2020





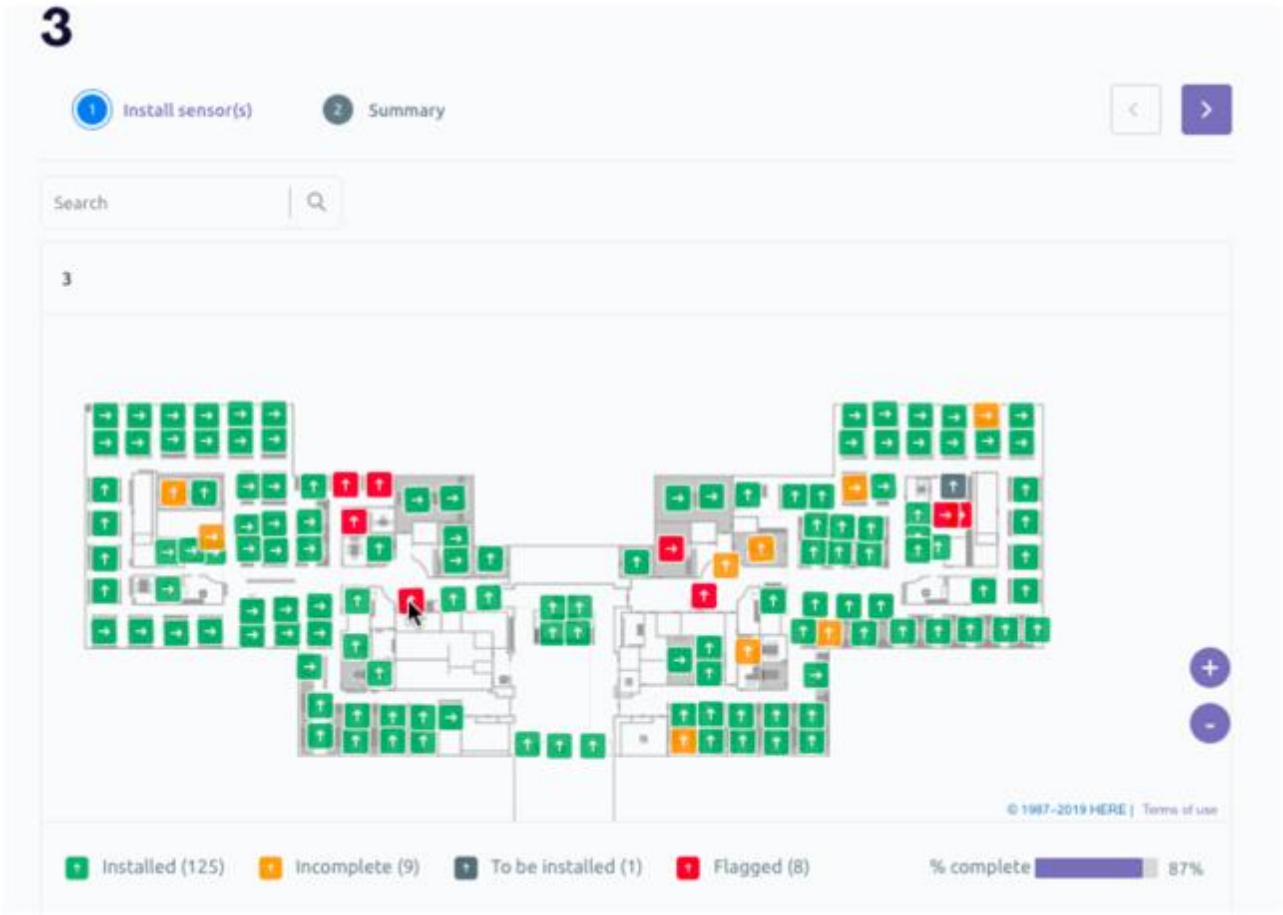
After the adjustment has been made, the GATEWAY must be "unflagged" before coverage can be accepted

ROTATING AND MOVING A GATEWAY ICON

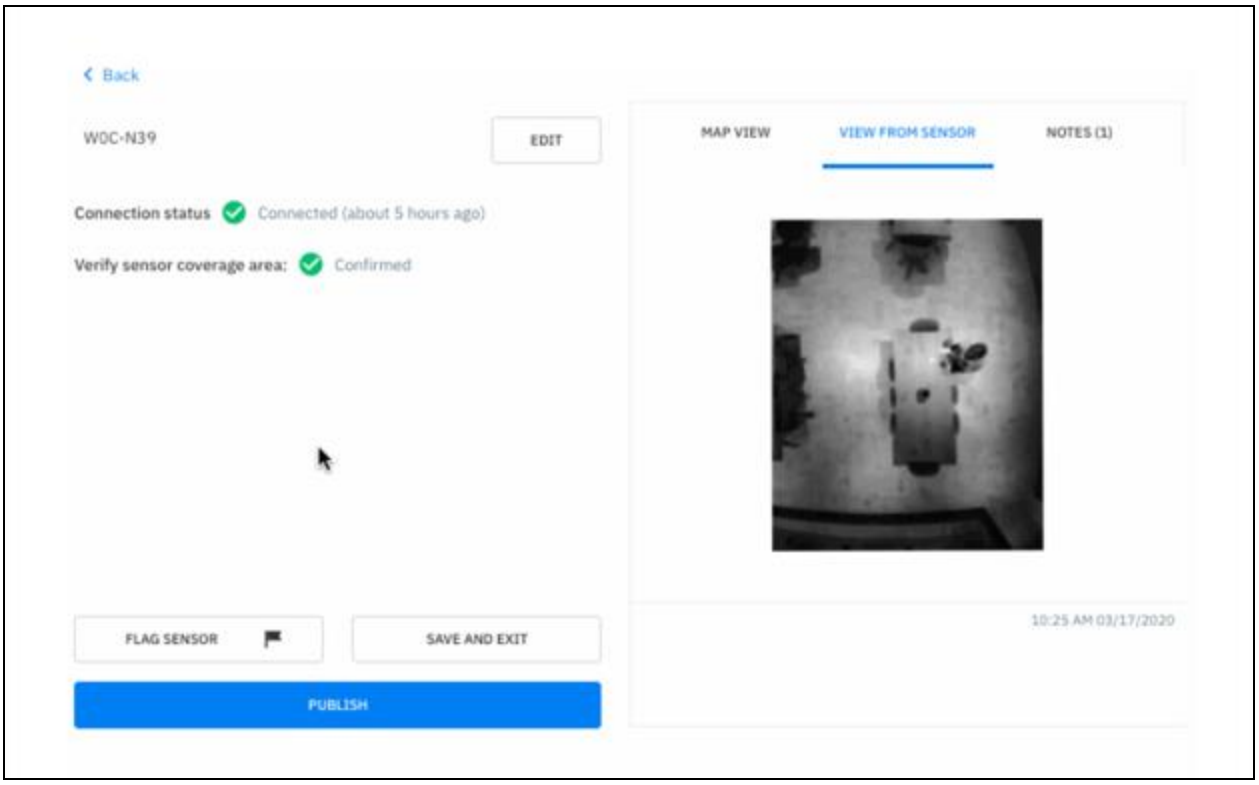
If the adjustments require the GATEWAY to be moved or rotated, the installer can update the GATEWAY icon to match the installed position.

Note: Cannot delete or add GATEWAY.

- Select a GATEWAY Select Edit
- Select GATEWAY icon
- Rotate or move as installed Confirm



PUBLISH
Publish the GATEWAY once it is successfully connected, and coverage is confirmed. The GATEWAY icon on the map will turn green indicating a successful installation.



For additional support, please review the Troubleshooting Section prior to contacting VergeSense (support@vergesense.com).

GENERAL SAFETY INFORMATION

- Do not immerse in water and do not spill or pour liquids of any kind onto or into any parts of it.
- Use an antistatic cloth. Please avoid water and liquid or solid cleaning products as they might damage the surface or internal electronics.
- Intended for indoor installation only, unless explicitly specified otherwise.
- Device and accessories may contain small parts. Keep them out of the reach of small children.
- Read the mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system.
- Use only attachments / accessories provided by VergeSense or explicitly recommended by VergeSense.
- Unauthorized opening, changing, or modifying the device will cause the warranty to lapse and may also result in the loss of CE / CFF conformity. In case of malfunction contact authorized service personnel.

WIRING GUIDELINES

These guidelines apply for any cable, supplied or not, used with a GATEWAY

- Cables must not pull or create a lateral stress on the connectors, i.e. they must be long enough.
- Cables must be installed in such a way not to present a trip hazard to personnel working in the vicinity of the equipment.
- Keep cables away from:
  - Sources of electrical noise such as radios, transmitters, and broadband amplifiers
  - Power lines
  - Fluorescent lighting fixtures
  - Liquids or moisture
  - Heat sources
- Always use standard telecommunication cables with a minimum of 26 AWG wire gauge.

INSTALLATION WARNINGS

- Compliance is required with respect to voltage, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
- When PoE is used as power source, it should be connected to a power-over-ethernet (PoE) IEEE 802.3af compliant power source or an IEC62368 compliant limited power source.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.
- Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals.
- Installation of the equipment must comply with local and national electrical codes.

FCC NOTICE:
This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Note: Changes or modifications to this unit not expressly approved by VergeSense could void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must be at least 20 cm from the user and must not be co-located or operating in conjunction with any other antenna or transmitter.

The end product must be labeled, in a visible area, with the following:
Contains FCC ID: 2BFSEG400B
Contains FCC ID: 2BFSEG400W
Contains FCC ID: XMR202212EG25GL

CANADA
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

This device complies with Innovation, Science and Economic Development Canada's licence-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux flux RSS exemptés de licence d'Innovation, Science et Développement économique Canada. L'opération est soumise aux deux conditions suivantes:
(1) Cet appareil ne doit pas provoquer d'interférence; et
(2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

This equipment complies with the IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Énoncé d'exposition aux rayonnements: Cet équipement est conforme aux limites d'exposition aux rayonnements ioniques RSS-102 Pour un environnement incontrôlé. Cet équipement doit être installé et utilisé avec un Distance minimale de 20 cm entre le radiateur et votre corps.

The end product must be labeled, in a visible area, with the following:
Contains IC: 32309-G400B
Contains IC: 32309-G400W
Contains IC: 10224A-2022EG25GL

⚠ CAUTION - ELECTRIC PRODUCT.
As with all electrical products, precautions should be observed during the handling and use to prevent electrical shock. FOR INDOOR, DRY-LOCATION USE ONLY.

⚠ WARNING – Top metal housing may get hot during normal opeations. Use caution when removing GATEWAY.

⚠ CAUTION Do not touch metal housing during operations, the surface maybe hot. Disconnect power and let unit cool down for 5 minutes before removing GATEWAY.

The transformer is not a product and should be connected to the wall outlet by an adult. It should be periodically examined for conditions that may result in the risk of fire, electrical shock or injury to persons, such as damage to the cord, plug, blades, housing or other parts, and in the event of such conditions, the transformer must not be used until the damage is repaired.

- The product must be used only with the recommended transformer.
- The product is not to be connected to more than the recommended number of power supplies.
- Products to be cleaned with a liquid are to be disconnected from the transformer before cleaning.
- To clean transformer, disconnect it from the wall and clean with a cloth dampened with water. Do not immerse in water or use soap or other chemicals. Allow to dry before reusing. Do not connect to the AC outlet if wet or damaged.

Electrincal Ratings:

- PoE/44-57Vdc
- Power Consumption: 5.5W

EUROPE:
VergeSense declares that Lighthouse comply with the essential requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU. A copy of the Declaration of Conformity is available on request. VergeSense, 4 Embarcadero, Suite 1500, San Francisco, CA, 94111

Environmental Phenomena
The unit may malfunction if subjected to radio-frequency interference. It should revert to normal operation when the interference stops. In the unlikely event of an electrostatic discharge, the unit may malfunction and lose memory, requiring the user to reset the device by removing and reinstalling the batteries.

Recycle Information
For information on how this product might be recycled, email to support@vergesense.com

Customer Service Contact
For customer service, email to support@vergesense.com

Limited Warranty
Product is subject to a limited 36-month warranty. Email our customer service at support@vergesense.com details of the warranty provided in your country. VergeSense shall not be liable for any incidental or consequential damages for the breach or any warranty on this product. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, or limitation on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you.

Authorized Territories
The Lighthouse is authorized for use in the following countries:

Australia, Austria, Bangladesh, Belgium, Bulgaria, Canada, Comoros, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Japan, Georgia, Germany, Greece, Guadeloupe, Hong Kong, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Martinique, Myanmar, Netherlands, New Zealand, Norway, India, Poland, Portugal, Romania, Saint Barthelemy, Saint Martin, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turks and Caicos, United Kingdom, UAE USA.

Environmental Compliance:

RoHS Compliance
This product is in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and its amendments.

REACH
REACH (Registration, Evaluation, Authorization and Restriction of Chemicals, EC No 1907/2006) is the EU chemical substances regulatory framework. Google complies with all requirements of the regulation and we are committed to providing our customers with information about the presence of REACH Substances of Very High Concern (SVHCs).

EUROPE: CE

VergeSense declares this sensor with the essential requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU. A copy of the Declaration of Conformity is available on request. VergeSense, 4 Embarcadero, Suite 1500, San Francisco, CA, 94111

Environmental Phenomena

The unit may malfunction if subjected to radio-frequency interference. It should revert to normal operation when the interference stops. If not, it may become necessary to turn the power off and back on, or remove and reinstall the batteries. In the unlikely event of an electrostatic discharge, the unit may malfunction and lose memory, requiring the user to reset the device by removing and reinstalling the batteries.

This sensor is authorized for use in the following countries under EU:

Austria, Bangladesh, Belgium, Bulgaria, Comoros, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guadeloupe, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Martinique, Myanmar, Netherlands, Norway, Poland, Portugal, Romania, Saint Barthelemy, Saint Martin, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turks, and Caicos,

United Kingdom UKCA

The sensor complies to UK Conformity Assessed markings applicable requirements for products sold within Great Britain. UKCA marking became part of UK law on exit day, 31 January 2020, with the coming into force of The Product Safety and Metrology etc.

Australia: RCM

This sensor complies with the requirements of the relevant ACMA standards made under the radio communications Act 1992 and the Telecommunications Act 1997

Israel: MoC

The sensor complies with built-in wireless technologies regulations. This regulatory approval issued by the Israeli Ministry of Communications (MoC) and is valid for five years. The MoC certification is based on the requirements of the Radio Equipment Directive (RED) for market approval in Europe.

הוראות בטיחות VergeSense VS-E106

[illegible]

Malaysia: MCMC

This sensor complies to Malaysia new SRD Technical Standard, Technical Code MCMC MTSFB TC T007:2020.

Nigeria: NCC

This sensor complies to the Nigerian Communications Commission, the independent regulatory authority for the telecommunications industry in Nigeria. The NCC is responsibility of regulating the supply of telecommunications services and facilities, promoting competition, and setting performance standards for telephone services in Nigeria.

Philippines: NTC

This sensor complies with the NTC (Philippines' National Telecommunications Commission). The NTC is the government agency responsible for the supervision, adjudication, and control over telecommunications products and services all over the Philippines.

Brazil: Anatel

The sensor approved by the local authority Agência Nacional De Telecomunicações (Anatel). The certification is based on national specifications for the testing and certification process and is a condition for market approval in Brazil.

India: WPS

This sensor complies with the requirements of Generation of Equipment Type Approval (ETA) through self-declaration issued under O.M. No. ETA-WPC /Policy/2018-19 dated 26 February, 2019].

Costa Rica: SUTEL

This sensor complies with SUTEL certification, a basis for a radio technologies approval in a region

Hong Kong: OFCA

This sensor complies with Hong Kong Telecommunication equipment Evaluation and Certification (HKTEC) Scheme by the Office of the Communications Authority (OFCA) to carry out the testing and certification of telecommunication equipment to be used and sold in the Hong Kong market.

Certified for use in Hong Kong
經驗證可在香港使用
Certificate No. 證書號碼
US00125XXXXX
通訊事務管理局
COMMUNICATIONS AUTHORITY

Japan: VCCI Mark Certification

R 201-180720

This sensor complies to Voluntary Control Council for Interference by Information Technology Equipment (VCCI), in cooperation with related industries, the voluntary control of radio disturbances emitted from information technology equipment (ITE).

Qatar

This sensor has been granted certificate approval for RTTE Equipment by Communications Regulatory authority state of Qatar

Singapore: IMDA

Complies with
IMDA Standards
DB106057

This sensor complies with Inform Media Development Authority of Singapore (IMDA).

Vietnam

This sensor is exempted from regulatory type approval or energy certification

Taiwan: CCA

This sensor is certified with CCA Type Approval are mainly telecommunication devices that are using the mobile communication standards.

South Africa:ICASA

This sensor complies with independent communications authority of South Africa, ICASA. A certification by the South African authority ICASA (Independent Communications Authority of South Africa) provides **access to** the South African market for manufacturers of wireless technology products

UAE: TRA

This sensor is certified to Telecommunications Regulatory Authority TRA of UAE.

TDRA

هيئة تنظيم الاتصالات والحكومة الرقمية

TDRA - UNITED ARAB Emirates

Made Dealer ID Name: SM GLOBAL LLC
TARTTE: ER05101/22
Model Name: VS-E106
Product Type: Occupancy Sensor

Frequently Asked Questions

How many gateways do I need? The number of required gateways varies based on the distribution of sensor locations in a building. Each floor requires a minimum of 1 gateway and each gateway can support a mesh network of up to 50 sensors.Gateways must be within 40 ft of at least 10% of sensors, and sensors must be within 40 feet of each other. Because the sensors create a mesh network, not all sensors need to connect to the gateway directly.

What protocols are used to send data from sensors to the gateway and from the gateway to the cloud? VergeSense AI on the VergeSense sensors processes raw data into JSON and sends it to VergeSense Gateways over a proprietary wireless mesh network secured with AES-128 encryption. Processed data (anonymous personcounts) is then sent from the Gateway to the VergeSense cloud over MQTT.

How is data encrypted? Data-in-motion between sensors and gateway is encrypted using AES. Data-in-motion between gateways and the cloud is secured using TLS 1.2over MQTT. All cloud-hosted databases are encrypted using AES-256.

What is the volume of network traffic? Do the sensors cause network interference?Data is sent in small packets (350 bytes) asynchronously thus preventing spikes in network traffic.

Do the sensors cause network interference? In addition to very short radio transmissions, sensors use dynamic local channel selection, dynamic power output,and other techniques to ensure no interference with your networks and RF environment.

How do sensors receive firmware updates? The sensors automatically deploy device updates when available. As the gateways send data to the cloud, they also check for available device updates. If an update is available, it is downloaded and installed. For Security purposes, all communication is initiated outbound from the sensor or gateway to the cloud; there is no cloud-to-sensor-initiated communication inbound.

What type of data is collected? Where is data processed? The sensor wakes and captures a raw data point using its wide-angle (170 degrees) fisheye lens every 2 minutes. The raw data point is a 352x288 array of pixels which is processed by VergesSene AI on the VergeSense Sensor into anonymous JSON data (occupancy count). Processing occurs within seconds, and the raw sensor data is discarded (it is only temporarily stored in RAM). Processed data is transmitted to VergeSsenes cloud analytics portal over MQTT using TLS 1.2 encryption.

How long is raw sensor data stored? Raw sensor data is processed and discarded within seconds.