
Pelican Wireless Systems

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Pelican Installation Planning

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1.1 Overview.

The Pelican EMS uses a wireless mesh network to establish communication across buildings, facilities, and/or campuses. This wireless network is then networked to a Pelican cloud server (the virtual EMS or Pelican App) through a Pelican gateway. There are three primary functions the network provides:

1. It allows changes of device configurations to be made at the web application, so devices match the mechanical equipment and control sequences needed.
2. It allows for virtual climate changes to be made for each Pelican device (temperature set-points, schedules, etc.).
3. It allows for virtual real-time information and historical data logging for each device back to the EMS.

Each of these three functions are important for a properly connected Pelican solution. This document provides best practice guidance on when, what, and where the focus should be during each stage of device installation for a new Pelican solution. The goal is to establish a proper wireless network to achieve the functions mentioned above.

1.2 Support.

This document recognizes that wireless networking can sometimes be challenging in certain environments. After following all the recommended best practices stated in this document, if the wireless network is still unable to fully connect, Pelican provides free technical support. We recommend scheduling a Pelican Technical Support specialist to be available to assist by emailing support@pelicanwireless.com or calling 888-512-0490.

2.0 Installation Best Practices.

In some situations the Pelican solution needs to be installed while minimizing the impact on tenant comfort. Because establishing wireless connectivity is not as simple as focusing on the distances between devices, but instead around hard to recognize or sometimes

invisible interferences, we advise installing and powering On all Pelican devices before focusing on the wireless network. Although this sounds counterintuitive in reducing tenant discomfort, if the below best practices are followed, the overall climate equipment should remain functional while the new Pelican devices are being implemented. Once all devices are mounted and powered On, device configuration adjustments can be made to meet each application, and the completion of any device wiring can be done.

Important: The installation sequence explained below details the order in which to install Pelican devices. This process is not focused on, nor does it mean every device will immediately connect to the wireless network. What is important is establishing the highest number of wireless points across the facility, so that devices can route around interferences and connect back to the gateway.

2.1 The Gateway (GW400).

The most critical device to plan is the Pelican Gateway. It should always be assumed that a single gateway will be used to bridge the entire Pelican solution to the Internet¹.

The ideal location for the gateway depends on the facility's layout. For a single building installation, this normally means as central inside that building as possible. For a campus, this normally means on the exterior wall inside the central building of the campus. The intent is to have as many Pelican devices establish a direct connection to the gateway to help increase the overall health of the network.

In a campus installation, it is also advisable to identify multiple installation locations for this gateway. Sometimes the initial location might not prove to be as ideal as first considered, and therefore the gateway will need to be moved. This is further addressed in Section 2.2

Never install the gateway in an electrical room or in a room with concrete walls. Always install the gateway away from other networking equipment, electrical equipment, network racks, metal objects, or metal structures, since all those can restrict or interfere with the gateway's wireless signal. Never install the gateway inside a metal enclosure, sitting or hanging on a network rack, placed on the floor, or left on a desk or other flat surface. It is advisable to not install the gateway on a wall or in a room that has a bathroom on one or multiple sides of it since mirrors block wireless. And we advise not to install the gateway near a stairwell since those are generally built with more dense structural material which can reduce wireless strength. The gateway should always be mounted high on a wall.

In many situations the gateway will need to be installed outside of the room that has the networking equipment or Ethernet port the gateway will be connected to. It is smart to

¹ Go to section 4.0 Step 2 Option 2 for more information on using a second Gateway for a single site and what to pay attention to.

plan this location well in advance and determine if an Ethernet cable will need to be run to the room where the gateway will be mounted.

If the client has an IT department, they should be consulted and directed towards the ideal gateway installation location. A plan should be in place on which Ethernet port(s) the gateway can be connected to for its out-bound Internet connection.

Once the gateway installation location is understood, the gateway should be installed and a new Pelican site should be set up well before the planned installation of any other Pelican devices. Planning the gateway's installation properly helps identify any Internet networking issues that might need to be addressed by the client's IT department.

Note: Networking rooms are not always situated in the building in an ideal location for the gateway. If there are no alternative secure locations for the gateway to be mounted in, it is okay to install the gateway in the networking room well away from the other networking equipment. The goal is to achieve the greatest number of direct device connections to the gateway as possible. If the gateway is unable to be located in an ideal location, it might require further evaluation after the rest of the Pelican devices are installed and powered On. This is further addressed in Section 2.2: Step 5: Evaluate the wireless network.

2.2 Installing all hardwire powered Pelican devices.

Most Pelican solutions consist of many different Pelican devices. The order that these devices get installed in can assist with bridging the wireless network across a facility or campus.

For installations with multiple buildings, start by installing all the Pelican devices in the building with the gateway. Make sure that every device in that building is connected to the wireless network before moving to the next building(s). This practice should continue for each building.

Note: It is not always critical that each device is immediately wired to control its equipment when first installed. It is more important that each device is mounted and powered On, so that it can begin acting as a wireless repeater.

We cannot state this enough: As you begin installing Pelican devices, do not worry about the wireless network until every Pelican device is installed and powered On. This is because wireless connectivity is not about the distances between devices, but instead about navigating the wireless around hard to recognize or sometimes invisible interferences. This navigational routing is accomplished through installing lots of Pelican devices. This is the beauty of a self-creating and self-healing wireless mesh network, it is

designed to intelligently bridge the wireless connections across large footprints and around obstacles. But, it does require patience and a proper installation plan that matches the wireless architecture to be successful in a timely fashion.

Step 1: Install all Pelican Thermostats which directly controller their own HVAC equipment.

We recommend starting by installing the thermostats, and their wired accessories, that have direct control of their own HVAC equipment. These thermostats will normally be provided 24 VAC power by their HVAC equipment. Once installed and powered On, every thermostat becomes a network repeater and will help bridge the wireless to more Pelican devices.

Thermostats are great wireless bridges because HVAC needs to heat and cool the entire building. This means that thermostats are normally well distributed around a facility, which is ideal for networking.

Always try to avoid installing a thermostat in a location where it is surrounded by metal, since metal blocks the wireless signal.

In many situations, the thermostat can immediately be used to control the HVAC equipment, even if it is unable to connect to the wireless network. The thermostat can be set to control a Conventional or Heat Pump HVAC unit directly through its local interface.

Note: When controlling a Conventional HVAC unit, the default Pelican thermostat configuration is for the thermostat to NOT enable the fan during a heat cycle. This is because many gas fired HVAC equipment have their own internal logic for when the fan is to be enabled during a heating cycle. If the thermostat must turn the fan On for a heating cycle and you are temporarily unable to configure the thermostat through the Pelican App, this is okay. In the meantime set the Fan to ON. This will force the fan to run and the thermostat will be able to heat the room while you continue to install the rest of your Pelican devices and build your wireless network.

Step 2: Pelican Zone Controllers (Z8 or Z24).

A Zone Controller is a combination of two devices: the air handler controller and its antenna. Many times the air handler controller is installed at the HVAC equipment it will be controlling, which is not always a great location for the wireless network to reach. Because the antenna can be installed in a separate location from the air handler controller, it is good to plan installing the antenna in a location where it is central to where the zone thermostats are to be installed. Many times this location is above a drop down ceiling or in a room that allows for good wireless communication (avoid electrical rooms

or networking rooms; if able). The antenna requires a 3-wire connection to its air handler controller.

We recommend mounting the zone controller and its antenna and then providing them power before wiring the zone controller to control the HVAC equipment. The reason to power-up the zone controller is because it needs to be connected to the Pelican App for zone thermostats to be properly configured. Once the zone controller and all its zone thermostats are installed and powered On, then you can complete the installation.

Remember, these steps are about getting devices installed and power on, but not necessarily immediately getting them connected to the wireless network or controlling their HVAC equipment. Do not worry about the wireless network or device connectivity until every hardwired Pelican device is installed and powered On.

Note: Never install the antenna on a metal surface or inside a metal enclosure. Wireless is unable to communicate through metal.

Step 3: Install all Pelican Thermostats that will control a zone damper.

This is similar to Step 1, but should be installed after the zone controller and its antenna have been installed and power On. This is because to properly configure these zone thermostats the zone controller will need to be part of the network.

If the zone thermostats are installed before the zone controller this is also okay and actually good practice as well. The important part is to make sure that the zone controller and its antenna are installed and powered On, so that once the wireless network is established everything can be configured.

Note: Zone damper thermostats will be unable to control their dampers until they are communicating with the wireless network and are properly configured through the Pelican App. Even though this can be a temporary inconvenience, continue to install all zone thermostats before worrying about the wireless network and the thermostat's configurations.

Each thermostat is a valuable asset to getting the wireless network across the facility. Because of this process, it is highly recommended that zone system installations are well planned out and allow for plenty of time to get all devices installed and powered On, so the wireless network can properly establish.

Step 4: Pelican Power Control Modules (PM5-120/240).

A Power Control Module is also a combination of two devices: a relay pack and its antenna. The relay pack is normally installed close to the equipment it will be turning On

and Off, while the antenna is able to be installed where it can easily connect to the Pelican wireless network. A 3-wire connection is required between the antenna and the relay pack.

Power Control Module antennas are valuable assets for the wireless network because its antenna is considerably stronger than a thermostats, and it can be installed in a location where it can assist in bridging the wireless over larger gaps.

We recommend mounting the relay pack and its antenna and then providing them power before wiring the relay pack to control its equipment. The reason to power-up the relay pack and its antenna is because its antenna is a valuable wireless repeater and should be utilized for proper wireless networking. Once all hardwired devices are installed and powered On, then you can complete the installation.

Note: Never install a power control module's antenna next to a Pelican repeater. These are both very powerful wireless devices and there are no networking reasons to install them close together.

Never install an antenna on a metal surface or inside a metal enclosure. Wireless is unable to communicate through metal.

Step 5: The wireless network.

At this step all Pelican devices with hardwired power should be installed² and power On. If there are still devices that need to be installed DO NOT worry about the wireless network until everything from Step 1 to Step 4 have been completed.

If everything was followed in the steps above, in the greater majority of installations the wireless network should be well established and devices can now be accessed through the Pelican App. Configuration of the devices can now be completed and any devices that need to be wired to control their equipment can be finished. Also, it is at this point that any battery powered devices should be installed.

If there are devices still unable to connect, follow the recommendations below in section 3.0.

3.0 Evaluating the wireless network.

3.1 Network Map.

² If this installation is for multiple buildings, then all Pelican devices with hardwired power, in the building with the gateway, should now be installed.

When evaluating the wireless network, the first step is to upload a Network Map into your Pelican App. This can be done by logging into the App > Admin > Network Map > Menu (in the upper right hand corner) > and then selecting Floor Plan.

The Floor Plan should represent the layout of the facility or campus (line drawings or a Google Map image work well). Any of the following files can be used as a network map: PNG, JPEG, GIF, or PDF.

With a network map added to your Pelican solution, you can place the individual Pelican devices on the map where they are installed and use this to evaluate the wireless network.

To move devices, select the Lock button in the upper right hand corner so it shows Unlocked. Select and drag the devices to the locations where they are installed.

3.2 An entire section of the building is not connected to the network.

If over 30 minutes has passed since all devices were installed and there is an entire section of the building that has still not connected to the network follow these steps:

Step 1: Confirm that the gateway is installed in an ideal location.

The network map should show a high number of direct blue connections from the gateway to other Pelican devices. If only one or two blue connections exist, relocate the gateway to a better location in the building.

If a gateway is relocated, allow at least 45 minutes to pass before re-evaluating the network.

Step 2: Install a repeater.

A repeater can be installed between where the devices are that cannot communicate and where the wireless network is established.

Never install a repeater next to another Pelican device. This will not assist the wireless network.

Never install a repeater in a room with concrete walls. Always install the repeater away from other networking equipment, electrical equipment, network racks, metal objects, or metal structures, since all those can restrict or interfere with the repeater's wireless signal. Never install the repeater inside a metal enclosure, sitting or hanging on a network rack, placed on the floor, or left on a desk or other flat surface. It is advisable to not install the repeater on a wall or in a room that has a bathroom on one or multiple sides of it since

mirrors block wireless. And we advise not to install the repeater near a stairwell since those are generally built with more dense structural material which can reduce wireless strength. The repeater should always be mounted high on a wall.

Always provide the repeater 45 minutes before re-evaluating the wireless network. With a repeater installed the wireless routes between devices are going to be re-established, so some time is required for the network to situate itself.

It is always an advantage for repeaters to communicate directly with the gateway. If 45 minutes have passed and the repeater does not have a direct route to the gateway, then Pelican Technical Support can provide further assistance on confirming if it is in a good location or needs to be moved.

3.3 A Power Control Module or Zone Controller is not connecting to the network.

If over 30 minutes has passed since all devices were installed and there is a Power Control Module or Zone Controller that has still not connected to the network follow these steps:

Step 1: Confirm that the device's antenna is installed in an ideal location.

Always start by moving the antenna of the device to a better location before moving on to further steps.

1. It is important that these devices are able to communicate directly with the thermostat they are sequencing with.
2. The Power Control Module's antenna is considerably stronger than a thermostat, so it should be installed in a location where it can easily connect to multiple devices part of the wireless network.

Step 2: Install a repeater.

A repeater can be installed between where the device's antenna is and where the wireless network is established. Always provide the repeater 45 minutes before re-evaluating the wireless network. With a repeater installed the wireless routes between devices are going to be re-established, so some time is required for the network to situate itself.

Please read Section 3,2 Step 2 for more information on using a repeater.

4.0 Installing Additional Buildings.

Step 1: Install a repeater.

After the building with the gateway is fully installed and networked, the next building can be addressed. If there are multiple buildings, start with a building that is situated, as close to possible, across from the gateway.

In some cases, bridging additional buildings requires adding repeaters. Install a repeater on the exterior wall inside the second building that faces the gateway. It is always an advantage for repeaters to communicate directly with the gateway; when possible. The repeater should connect in about 5 minutes, with both its lights being solid green indicating that it has established a wireless connection. If this occurs, follow section 2.2 Step 1-4 and install all the Pelican devices in the new building. If the repeater does not connect to the primary building, then install a second repeater in the first building in a location that is across from the repeater, but not in the same location as the gateway.

If 5 minutes have passed and the repeaters do not connect, then move on to following Section 2.2 Steps 1-4 of this document and install all the other Pelican devices in the new building.

After all Pelican devices have been installed in the second building and 45 minutes have passed, and the two repeaters are unable to connect, move on to any additional buildings that need to be installed.

Follow the recommendation in this section for installing repeaters in the next building and then getting all the other Pelican devices installed and powered On.

Note: Always install a repeater inside the building, never install it on a roof or on an exterior wall exposed to outside elements.

Step 2: Evaluate the network.

As buildings connect to the network, you can follow the recommendations in section 3.0 of this document on how to evaluate the wireless network.

If all steps are taken in this guide, all Pelican devices, and repeaters have been installed as directed, and one or more buildings are not connecting to the network, then you can install a second gateway.

Install a second gateway.

When all methods of bridging the wireless between buildings are exhausted, a second gateway can be installed to bring an additional building or a section of a campus into the same Pelican App as the first building.

Follow Section 2.1 for gateway installation planning.

It is extremely important that all other options have been exhausted before taking this step. Although gateways can be allocated to a single Pelican App, their wireless networks are considerably different from each other. Because each gateway is building its own wireless network with the devices it can communicate with, it becomes a network challenge when one or multiple Pelican devices are able to cross connect to multiple gateways. If this is occurring, contact Pelican Technical Support so they can advise you on if the second gateway should remain, or if it should be replaced with a repeater.