

Wireless Area Controller (WAC50)

i. Installation Instructions

Daintree's WAC50 Wireless Area Controller (WAC) is at the heart of Current's energy management solution. It provides intelligent control across a large area. Using open and interoperable ZigBee® standards-based technology, the WAC50 communicates with wireless standards-compliant sensors, switches, lighting and HVAC control devices that are part of the ControlScope Manager (CSM), the Daintree management app.

The WAC provides commissioning, control and management functions. It creates the mesh network, manages it, and applies the lighting controls defined from CSM. After commissioning the system, all the schedules & control strategies are pushed to each WAC. WACs continue to execute the control strategies assigned to zones, and they run schedules even if they lose communication with CSM. CSM initiates device commissioning, and is located either on-premise on the system controller, or hosted in the cloud.

The WAC is a low voltage DC powered device. It can be powered using the provided plug-in transformer, or using PoE (Power over Ethernet) supplied by a PoE adapter (not provided). The WAC communicates with the CSM over Ethernet. An Ethernet hub or switch is required (not provided).

Installation Process

The WAC must be installed in accordance with all local, state, and national electrical codes and requirements. Before mounting the WAC in its final location:

1. Install and test lighting, control devices and wireless adapters per the instructions provided with the units.
2. Review the **Where to Install the WAC50** section on the next page. Determine the location for the WAC. If power will be supplied by the plug-in transformer, be sure there is a receptacle nearby. The Cat 5e Ethernet cable run from the Ethernet hub or PoE switch to the WAC location must be less than 300 feet.
3. Once the location of the WAC50 has been determined, note its location and its IEEE address on the facility floor plan.
4. Make sure the WAC has been configured with appropriate network options as described in the facility's Commissioning Guide.



Mounting and Connections

1. Remove the cover from the WAC to expose the wiring connectors.
2. Plug the Ethernet cable into to the  ① port on the WAC.
3. Plug the power cable from either the plug-in adapter or the PoE adapter into the  barrel connector on the WAC. When power is applied, the Status Indicator illuminates.
4. Secure the power cable using the strain relief feature on the WAC base.
5. Mount the WAC, using the four screw mounting holes on the WAC base.
6. Secure the Ethernet cable and the 5VDC power plug wire to a stationary point using a tie-wrap.
7. Reattach the cover to the WAC.
8. Use the CSM application to configure zones and devices communicating with the WAC.



Wireless Area Controller (WAC50)

Where to Install the WAC

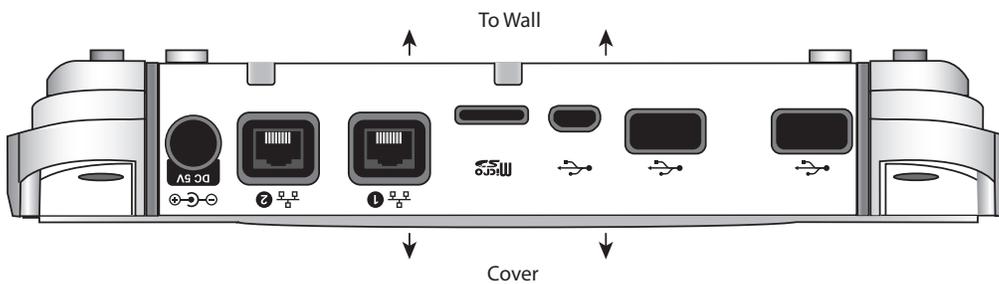
Typically, the WAC is mounted high on a wall near the ceiling.

Ideally the WAC is located in an area with good line-of-sight to nearby wireless devices in the Daintree wireless network.

- Do not locate the WAC inside a metal enclosure or where a large metal object completely obstructs the line of sight to all of the wireless network devices.
- Locate the WAC so that less than 300' of Ethernet cable is required to connect it to the Daintree system controller or Ethernet switch.
- Try to maintain at least 8'-10' distance from wi-fi access points.
- The WAC50 must be able to communicate with at least one other wireless device in the network.
- If the plug-in power adapter will be used to power the WAC, make sure a power outlet is within each of the plug-in adapter cord.
- If no power outlet is available, consider powering the WAC using a PoE adapter (not provided).
- For outdoor installations, install in a non-metallic waterproof enclosure.

Wiring Connections

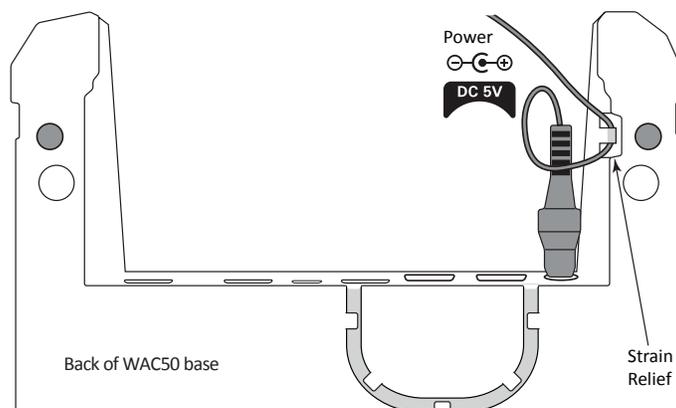
Top view of WAC wiring connection area.



Strain Relief

Secure the 5VDC power plug wire to the strain relief tab on the side of the connector area near the barrel connector or in the wire channel on the back of the base.

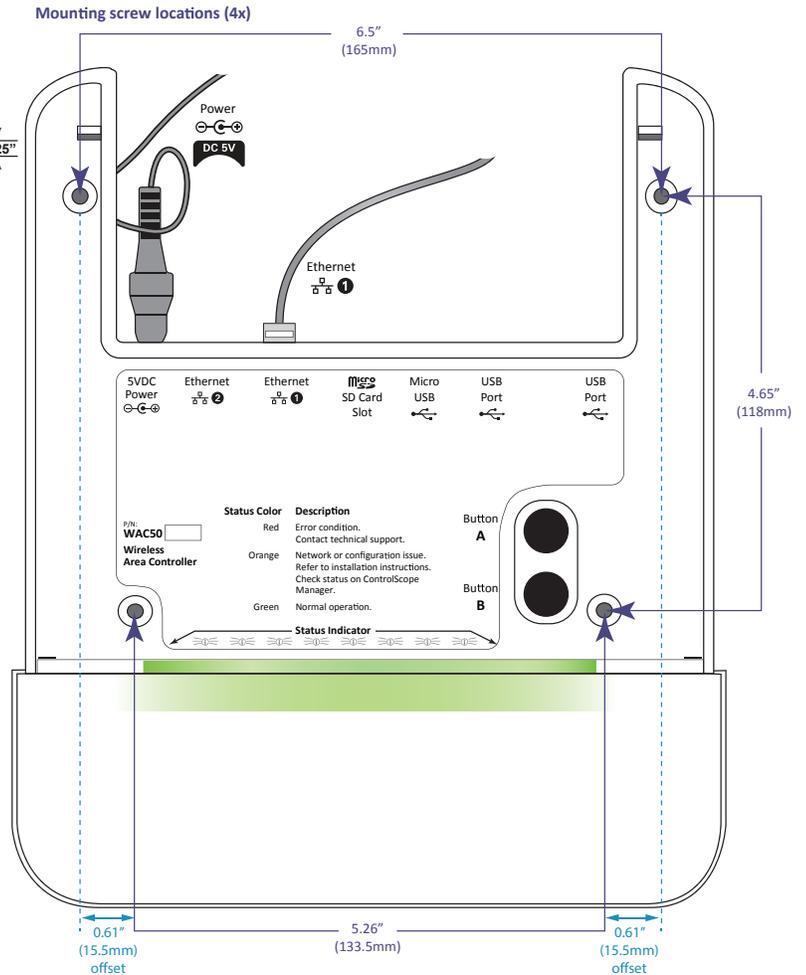
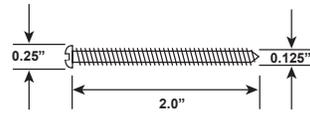
After mounting the WAC, provide external strain relief for the Cat 5e Ethernet cable and the 5VDC power plug wire by securing it to a stationary point using a tie-wrap.



Wireless Area Controller (WAC50)

Mounting the WAC

Mount the WAC using the four (4) screws provided.



Joining the Zigbee Lighting Control Network

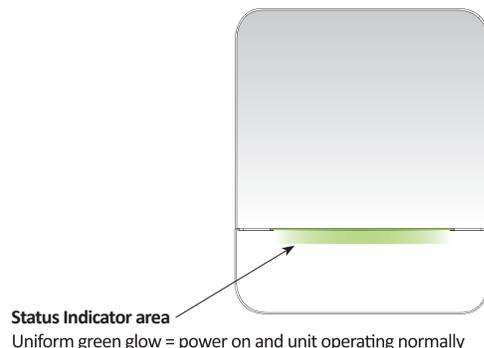
After the installation is complete, the WAC50 is ready to communicate with the Daintree CSM web-based lighting management user interface.

For more information about configuring the lighting control network, see the instructions and on-line help provided with the CSM application.

Status Indicator

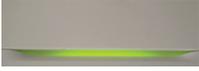
The status of the WAC displays through an opening in the cover. A green glow across the width of the opening indicates the unit is operating normally.

See the table in the **Troubleshooting** section if there are any other colors or patterns in the status indicator area.



Wireless Area Controller (WAC50)

Troubleshooting

Status Indicator	Action Required	Description
Off	Apply power.	The WAC is not powered. Make sure the power adapter is plugged into the appropriate power source and inserted firmly into the SVDC input on the WAC. Check to be sure plug adapters are connected properly and that circuit power is on.
Solid Green across entire light bar. 	None. WAC is functioning.	Normal function. The device is powered and operating as expected.
Pulsing Green across entire light bar.    	If you are configuring the WAC using "link local" this is normal. When you are finished configuring the WAC web page, power cycle the WAC. If after the WAC restarts the light bar continues to pulse, the WAC cover may be inadvertently pressing either Button A or B. <ol style="list-style-type: none"> 1) Remove the WAC cover and loosen the mounting screws. 2) Power cycle the WAC. 3) When the WAC finishes starting up (2-5 minutes) the light bar should be solid green all the way across. <ul style="list-style-type: none"> • If the light bar starts pulsing green, contact technical support. • If the light bar is solid green: <ol style="list-style-type: none"> 1) Put the cover on the WAC. If the light bar begins pulsing again, take the cover off and loosen the screws more. 2) Power cycle the WAC. 3) When the WAC finishes starting up (2-5 minutes) the light bar should be solid green all the way across. If so, attach the cover. If the light bar starts pulsing again, remove the cover, loosen the screws more and repeat the power cycle and cover replacement procedure. 4) When the light bar is solid green with the cover attached the problem is solved. If you are unable to stop the pulsing, contact technical support. 	The WAC is in "link local" mode, meaning that Button A or Button B on the WAC has been pressed. This is typically done during the WAC configuration process, to provide local access to the WAC web page.
Green (solid) on both ends of the light bar. Center of the light bar is dark. 	Wait. If a firmware upgrade is NOT in progress and the WAC remains in the mode for more than 10 minutes, power cycle the WAC. If this doesn't clear the problem, contact technical support.	The applications on the WAC are starting, or a firmware upgrade is in progress. If the WAC is starting up, it should be in this mode for less than 2 minutes. If a firmware upgrade is in progress it may be in this mode for 15-25 minutes, depending on the speed of the connection to the SC.
Green pulsing on both ends of the light bar. Center of the light bar is Orange 	Check CSM's web page.	The WAC50 is not communicating with the SC. This could be because of the following reasons: <ul style="list-style-type: none"> • The System Controller is not running. • The WAC50 doesn't have Ethernet link. • The WAC50 is not configured with the correct address for the System Controller.
Solid Red in center of the light bar. 	Contact technical support.	The WAC has had a hardware failure and must be replaced.

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ii. Installation Advisory - Building Ethernet Patch Cables

Building Ethernet Patch Cables

Standard Ethernet Cat 5e straight-through cables are used to connect Wireless Area Controllers (WACs) to each other and to the network where CSM resides in an on-premise deployment. For a cloud CSM deployments, the cables will connect to your Internet service provider connection. This Advisory is provided in the event that you elect to build the Ethernet cables for your installation, rather than purchasing pre-fabricated cables.

Many helpful videos on the Internet provide instruction in cable-building techniques and tool use. Following are some examples available at the time this advisory was published:

<http://www.youtube.com/watch?v=k4B4Sep3Qpg> (7.5 minutes) How to terminate cables with regular RJ-45 connectors for EIA/TIA 568A and 568B, keystone jack, crossover cable, patch cable

<http://www.youtube.com/watch?v=-Rxu07WkGew> (2.5 minutes) How to crimp RJ45 connector to Ethernet cable (EIA/TIA 568B)

What you need

UTP or STP Cable:

Ethernet Cat 5e or Cat 6 plenum-rated, 4-pair. Conductors may be solid or stranded. Limit cable length to 300' or less.

Modular Connectors 8P8C (aka: RJ45 plugs):

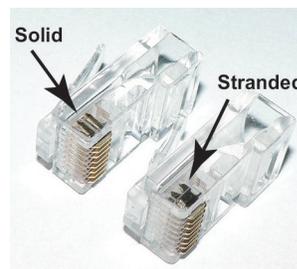
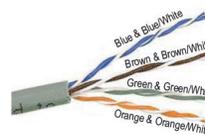
Connector plugs are designed for either solid or stranded wire; be sure to use connectors that match the type of wire in use, because a plug for one wire type might not make reliable contact when crimped to a cable with wires of the other type.

Cable Tester:

Cable Testers are available with a variety of features and in a wide price range (\$2 to \$100 with commonly desired features found in the \$30 to \$40 range). Select a tester with Cable Tester the ability to test Ethernet cables and connectors for continuity and shorts.

Crimper (crimp/cut/strip tool):

This tool is essential for attaching the cable ends to the modular connectors. Most models include wire cutting and insulation-stripping functionality.



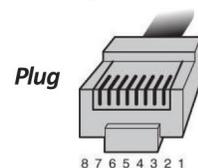
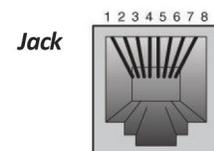
RJ45 pinout diagram

The contact positions are numbered sequentially starting from 1. When viewed head-on with the retention mechanism on the bottom:

Jacks: contact position #1 is on the left.

Plugs: contact position #1 is on the right.

When you turn the plug around to insert it into the jack, pin 1 on the plug aligns with pin 1 on the jack.

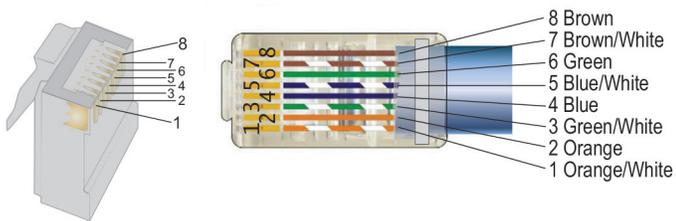
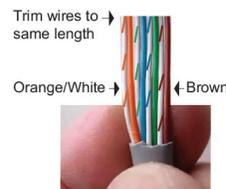


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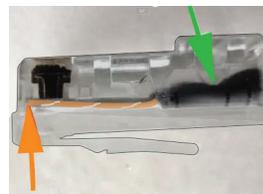
Process

The wire color arrangement shown in this process is EIA/TIA 568B. Either EIA/TIA 568B or 568A can be used to make the cables, but all cables should be of the same type.

1. Strip off about 2 inches of the ethernet cable sheath.
2. Untwist the exposed part of the wire pairs.
3. Align the colored wires according to their position in the connector. (EIA/TIA 568B arrangement shown.) Straighten and flatten them as much as possible.
4. Trim all the wires to the same length, about 1/2" to 3/4" exposed from the sheath.



5. Insert the wires into the RJ45 plug.
 - A. Make sure each wire is fully inserted to the front of the RJ45 plug (see orange arrow).
 - B. Make sure wires are in the correct order.
 - C. Make sure the sheath of the ethernet cable extends into the plug by about 1/2" and will be held in place by the crimp (see green arrow).
6. Crimp the plug onto the cable using the crimper tool.
7. Verify the wires ended up in the correct order and that the wires extend to the front of the plug to make a good connection with the metal contacts in the plug
8. Cut the ethernet cable to length. Make sure it is more than long enough for your needs.
9. Repeat the above steps for the other end of the cable.



Test the Cable

When you finish crimping both cable ends, test the cable using a Cable Tester according to the instructions provided with the unit.

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FCC warning message

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 radiates 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 encourage to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- 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 the dealer or an experienced radio/TV technician for help.

Industry Canada (IC) Warning Message

Product 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. CAN ICES-005 B / NMB-005 B

Specifications

Input Voltage	5VDC 1.5A
Power Connector	2.1mm barrel connector
Input/Output Connections	10/100 Mbps Ethernet, 2 RJ45 ports USB (host): USB 2.0, 2 ports USB (device): USB 2.0 micro, 1 port Memory card: Micro SD card slot
Radio Properties	2.4 GHz ISM band, 100mW (+20dBm)
Operating Environment	Indoor, dry location (Outdoor: non-metallic waterproof enclosure required) -13o to 122oF (-25o to 50oC) WAC50 * 32°F to 104°F (0°C to 40°C) with provided power adapter*
Compliance	FCC Part 15, CAN IC
Mounting	Wall surface
Dimensions	9.37" L x 8.0" W x 1.18" H (238.1mm x 203.2mm x 30mm)
Distances, Maximum	300' between wireless devices (clear line-of-sight), typical indoor range 100' 300' of Ethernet cable between WAC and Ethernet switch or System Controller

* Temperature range limited to the most restrictive specification. If powered from an alternate source, such as PoE, the most restrictive specification applies to the WAC50/power adapter as a system. Power adapter must be UL listed.

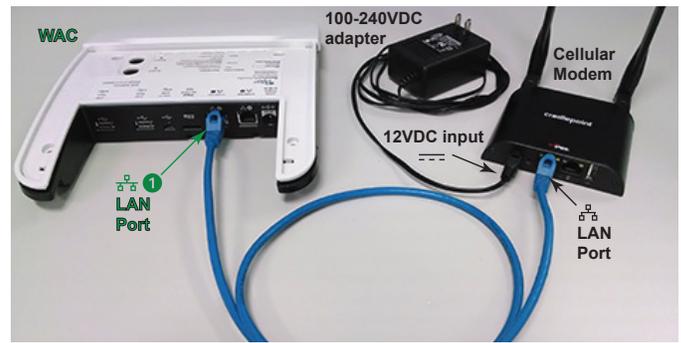


WAC → Cellular Modem

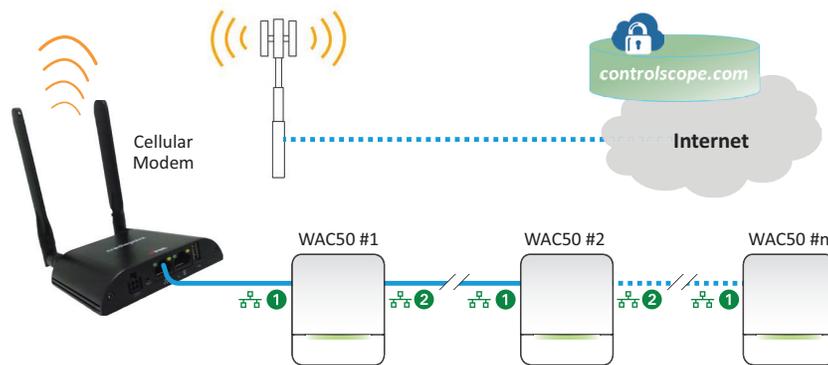
iii. Appendix 1: Installation Advisory - WAC--> Cellular Modem

This advisory explains how to configure a Wireless Area Controller (WAC) to use a CradlePoint Cellular Modem to access the Internet to connect the WAC to ControlScope Manager (CSM).

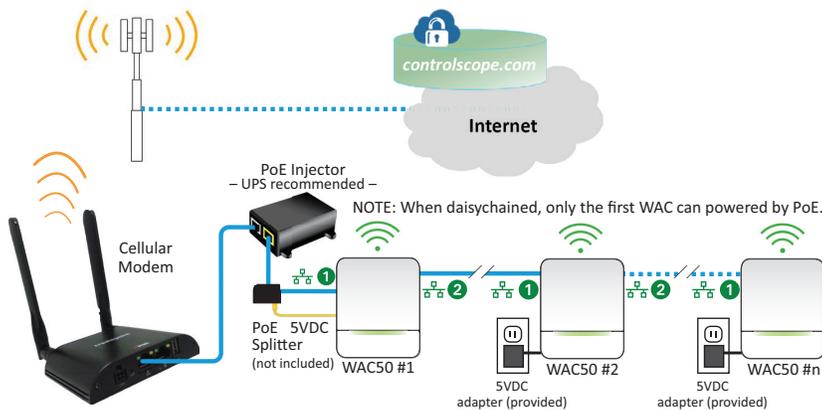
Single WAC



Multiple WACS daisychained



Multiple WACS daisychained, first one using PoE



WAC Network

The examples shown here are just a few of the possible WAC layout options that may be deployed in a facility. WACs can also connect to the cellular modem through an Ethernet switch or router.

For more information about WAC layout and network connection options see the following application notes:

- ControlScope IT Networking Guide: BEMaaS or Hosted
- ControlScope IT Networking Guide: On-Premise

See the instructions on the next page.



WAC → Cellular Modem

Instructions

Use these instructions to install the CradlePoint (CP) cellular modem and to configure the WAC for communication with ControlScope Manager.

1. Configure the WAC to connect to the System Controller (SC) over the Internet. Either an IP address or host name can be used. Instructions to edit the WACs configuration are included with every WAC. See the “WAC Network Configuration Setup” Installation Advisory.

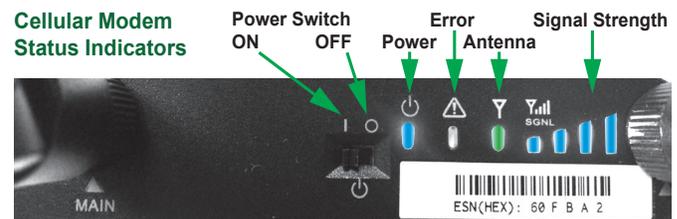
- Verify the “Yes” radio button is selected for “Obtain an IP Address Automatically”.
- Change the IP in the following fields:
System Controller: _____
Update Server: _____
NTP Server: _____

2. Connect an Ethernet cable from either Ethernet port on the CP to Ethernet port 1 on the WAC.

3. Screw on the two CP antennas and then adjust them so that they form a gentle “V” shape.

4. Connect power to the CP.

5. Turn on the CP power switch. Slide the switch to the “ | ” icon.



6. Wait at least 2 minutes for the CP to start up and connect to the internet. (The antenna LED will be solid green and the blue scale bars will show signal strength.)

IMPORTANT: The boot up process on the CradlePoint must be completed **before** the WAC is powered up.

7. Connect power to the WAC. The WAC could take up to 15 minutes or more to connect with the SC and be ready to add to your facility. Wait until the light bar on the WAC is solid green all the way across as shown in step 2 of the [WAC Firmware Upgrade Process](#) section.

WAC → Cellular Modem

WAC Firmware Upgrade Process

The firmware version on the WAC might be different from the version of the SC. If that is the case, the upgrade process happens automatically and takes up to 15 minutes with a full cellular signal. Less signal strength will take longer.

WAC LED States and Firmware Upgrades:

1. The WAC is not connected to the SC when the Middle LED is solid amber and the outside LEDs are flashing green, as shown.



2. The WAC connects to the SC within 2 minutes of establishing an internet connection. The LED state will be solid green, as shown.

Note: If the WAC is solid green for 10 minutes, it doesn't need to upgrade firmware and can be added to your facility.



3. The firmware upgrade process will start downloading and installing the firmware within 5 minutes of connecting to the SC. It could take up to 15 minutes with full cellular signal. Less signal strength will take longer.

4. While the WAC is installing firmware, the middle LED is Off and the outside LEDs are solid green, as shown.



(There is a subtle difference between "solid green" and the "middle LED off" especially in brightly lit areas.)

5. Once all LEDs are solid green for 10 minutes, the WAC is ready to add to your facility.

Optional: View Firmware Upgrade Process

1. Login to CSM, select your Facility and navigate to **Configuration>System>Wireless Area Controller**

2. Click on the blue '+' icon (Add WACs) at the top/right corner of CSM. (This page automatically refreshes.)

3. You will see when the WAC connects to CSM, if the firmware needs to be upgraded and when the upgrade has completed. The image below shows that the WAC needs a firmware upgrade. The process starts automatically, but can be triggered manually by clicking the 'Upgrade Firmware' web link.

Stage 1 2 3 4

Select Wireless Area Controller

One or more Wireless Area Controllers have incorrect firmware. Click on "Upgrade Firmware" to upgrade to the correct firmware.

	Wireless Area Controller	Location	Firmware Version
Upgrade Firmware	0022810104310000		3.1.0.142

One item found. Page size: 10, 30, 100, All

If the Wireless Area Controller is not yet connected, enter its IEEE address below.

IEEE address:

