

Daintree Controls Software (DCS) BACnet® integration guide

About this guide

Daintree Control Software (DCS) is for networked controls projects and serves as the interface for commissioning and start-up, management of controls strategies, visualization of energy and space usage, as well as troubleshooting and diagnostics of the networked controls system.

DCS can control a building's lighting as well as collecting data from sensors. Using DCS, you can

- commission and configure a building's operation, including defining schedules, through the DCS web-based interface
- allow third-party applications to set schedules and retrieve historical events (e.g. occupancy and light change states) through RESTful web APIs
- integrate with third-party Building Management Systems (BMS) by configuring BACnet settings through DCS

This document describes BACnet capabilities available through DCS and provides the information you need to integrate the two systems.

Before you begin

This guide assumes that technical personnel performing the integration are familiar with BACnet and building automation control systems.



You can find our contact details at Daintree.Support@curentlighting.com if you need help with your BACnet integration.

BACnet configuration done through the DCS interface can be done in advance (before arriving at the site and installing WACs and other hardware). It can also be done at the site as part of the commissioning process.

Configuring BACnet integration through DCS


For more detailed information about how BACnet integration is handled through the Daintree Controls Software, please refer to the [BACnet model](#) description that follows these instructions.

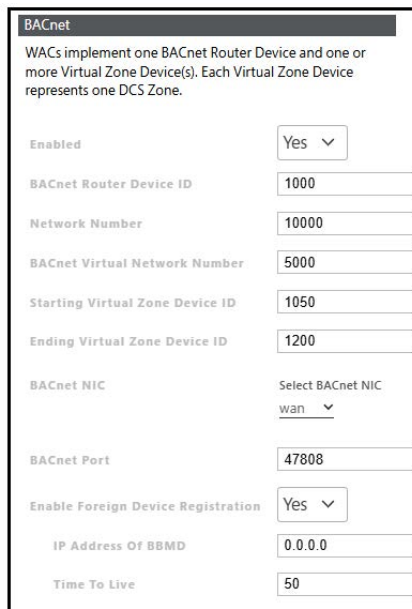
Adding a BACnet-enabled WAC (gateway) to a site

The following provides a high-level overview of these steps. For more detail, please refer to the *Daintree Controls Software Commissioning Quick Start Guide*.

1. From the DCS menu, select **Configure > Sites**.
2. Select **(All Sites)** from the sites drop-down list at the top of the page.
3. Click the **ADD SITE** button and enter the details for your site.
4. From the menu, select **Configure > Gateway**.
5. Click the **ADD GATEWAY** button and type a name for the gateway.
6. Click the **SAVE** button to add the gateway to your site.

Configuring BACnet integration

1. Click the  **Edit** icon.
2. Add other gateway details as required. Then scroll down to the **BACnet** settings, to integrate DCS with your existing Building Management System (BMS).



BACnet	
WACs implement one BACnet Router Device and one or more Virtual Zone Device(s). Each Virtual Zone Device represents one DCS Zone.	
Enabled	Yes
BACnet Router Device ID	1000
Network Number	10000
BACnet Virtual Network Number	5000
Starting Virtual Zone Device ID	1050
Ending Virtual Zone Device ID	1200
BACnet NIC	Select BACnet NIC wan
BACnet Port	47808
Enable Foreign Device Registration	Yes
IP Address Of BBMD	0.0.0.0
Time To Live	50

3. Select **Yes** to enable BACnet integration.

4. Enter the following values to configure your integration:

BACnet Router Device ID	BACnet Router Device ID represents the WAC BACnet server itself. This has to be a unique BACnet ID
Network Number	The network number for the physical BACnet server. BACnet devices on the same subnet shall have same network number. If WACs are on the same BACnet subnet they will share same Network Number.
BACnet Virtual Network Number	BACnet Virtual Network Number shall be unique in the system. The local virtual Zone devices are placed on this Virtual Network.
Starting Virtual Zone Device ID	This is the starting BACnet instance ID for the virtual devices (Zones) defined on the corresponding WAC. Subsequent numbers are used for zones exposed by this server. Note: The range from start to end cannot overlap any other BACnet device ID in the BACnet network.
Ending Virtual Zone Device ID	Ending Number for the Virtual devices (Zones) hosted by this WAC. Note: The ending number for the virtual devices shall take in consideration possibility of system expansions by adding new zones to this WAC.
BACnet NIC	This is the network interface card used to connect to the local BACnet system. - wan - using the RJ45 ports on the WAC - building - via the USB-to-Ethernet adapter connected to the USB port. Note: The two ports cannot be on same Ethernet subnet.
BACnet port	The BACnet Port shall match the existing BMS BACnet port. Most of the time the BACnet port used is 47808.
Enable Foreign Device registration	Enable the Foreign Device Registration if the WAC NIC is not on the same LAN as the BMS BACnet system.
IP Address of BBMD	The IP address for the BBMD device will be provided by the BMS System integrator.
Time to Live	Time to re-register with the BBMD.

BACnet model

DCS provides controls and sensing capabilities through **Wireless Area Controllers (WACs)**, wireless devices and Modbus devices.

Each WAC can control individual devices and also groups of devices (zones) that need to be managed and controlled together. Each WAC also runs its own BACnet server. It has one main routing entity referred to as the **WAC Root Device**, and one or more virtual BACnet devices to represent each zone that has been configured through DCS.

WAC Root Device

The WAC Root Device comprises all properties that relate to the entire WAC.

	Type	Instance	Write?	Command?	COV?	Units	Range
<WAC Name>	Device		No	No	No		
	Text name if configured in Daintree Controls Software; otherwise the WAC's MAC address.						
Server Connection Status	Multi-state Value	1	No	No	Yes		1-2
	Is the connection between the WAC and the configuration sever working properly? 1 = Connection Down 2 = Connection Up						
ZigBee Network Status	Multi-state Value	2	No	No	Yes		1-2
	Is the WAC's ZigBee Network running? 1 = ZigBee Network Down 2 = ZigBee Network Up						

Lighting Zone Device

Lighting zone devices comprise all (virtual) devices that are assigned to lighting zones through the Daintree Controls Software (DCS) commissioning tool.

Note that DCS light zones can contain both luminaires and control devices (e.g. switches and sensors).

	Type	Instance	Write?	Command?	COV?	Units	Range
<Zone Name>	Device		No	No	No		
	Text name as configured through the DCS application.						
Light Level CMD	Analog Value	1	Yes	Yes	Yes	%	0-100
	Point that a supervisory controller can use to control the light level of this zone. Internal controls write to this point at priority 7. To affect the light level a priority of six or higher should be used.						
Minimum Level	Analog Value	2	Yes	No	Yes	%	0-100
	Minimum dimming level that lights controlled by this zone can be set to. Other control parameters cannot set the Light Level to a value less than this. Default value = 0. Note: A non-zero setting does not prevent the lights from being turned off.						
Maximum Level	Analog Value	3	Yes	No	Yes	%	0-100
	Maximum dimming level that lights controlled by this zone can be set to. Other control parameters cannot set the Light Level to a value higher than this. Default value = 100.						
Occupied Level	Analog Value	4	Yes	No	Yes	%	0=100
	Light Level set when the space is being controlled by occupancy (e.g. Auto On) and an unoccupied to occupied transition is detected. Default value = 100.						
Unoccupied Level	Analog Value	5	Yes	No	Yes	%	0-100
	Light Level set when the space is being controlled by vacancy (e.g. Auto Off) and an occupied to unoccupied transition has been detected. Default value = 10.						
Off Delay	Analog Value	6	Yes	No	Yes	seconds	0-1800
	The time delay from when all occupancy sensors associated with the zone report unoccupied until the zone's occupancy state transitions to unoccupied. Default value of 900 (i.e. 15 minutes).						
On Transition Time	Analog Value	7	Yes	No	Yes	seconds	0-6000
	Time it takes for the light level to transition from the current level when lights are turned on or space becomes occupied. With the default value of 0 the lights will change level as quickly as possible.						

Off Transition Time	Analog Value	8	Yes	No	Yes	seconds	0-6000
	Time it takes for the light level to transition from the current level when lights are turned off or the space becomes unoccupied. With the default value of 0 the lights will change level as quickly as possible.						
People Count	Analog Value	10	No	No	Yes		
	Reports to the total (sum) of the value returned by all people counters associated with the zone.						
Ambient Light Level	Analog Value	11	No	No	Yes	lux	
	Average value reported by photo sensors associated with the zone.						
Fault	Multi-state Value	1	No	No	Yes		1-3
	Faults codes associated with this zone: 1 - Normal operation 2 - Communication failure with associated device 3 - Invalid configuration						
Control Strategy	Multi-state Value	2	Yes	No	Yes		1-5
	Mode of operation: 1 - Manual control 2 - Auto On / Auto Off 3 - Manual On / Auto Off 4 - Auto On / Manual Off 5 - Timed On						
Occupied	Binary Value	1	No	No	Yes		
	Reports as 'occupied' if any of the occupancy sensors associated with the zone report occupied. False – unoccupied True - occupied						

Sensor Zone Device

Sensor zone devices comprise all (virtual) devices that are assigned to sensor zones through the Daintree Controls Software (DCS) commissioning tool.

Note that DCS sensor zones can contain only control devices (e.g. switches and sensors).

The points available within any given sensor zone device instance depend on what wireless devices have been mapped to that zone. For example, in a zone that contains nothing but occupancy sensors, only the Occupied point will be present in the virtual device.

	Type	Instance	Write?	Command?	COV?	Units	Range
<Zone Name>	Device		No	No	No		
	Text name as configured through the DCS application.						
People Count	Analog Value	1	No	No	Yes		
	Reports to the total (sum) of the value returned by all people counters associated with the zone.						
Ambient Light Level	Analog Value	2	No	No	Yes	lux	
	Average value reported by photo sensors associated with the zone.						
Temperature	Analog Value	3	No	No	Yes	degree C	
	Average value reported by temperature sensors associated with the zone.						
Fault	Multi-state Value	1	No	No	Yes		1-3
	This point is always present. Faults codes associated with this zone: 1 - Normal operation 2 - Communication failure with associated device 3 - Invalid configuration						
Occupied	Binary Value	1	No	No	Yes		
	Reports as 'occupied' if any of the occupancy sensors associated with the zone report occupied. False – unoccupied True - occupied						

BACnet interoperability

The WAC BACnet server supports the following BACnet standard interoperability features:

Property	Details
BACnet version	ANSI/ASHRAE 135-2016 specifically revision 19 and all relevant errata
Data Link Layer Options	BACnet/IP (IPv4); supporting BBMD and foreign device registration. Uses the default BACnet/IP UDP port of 47808 (0xBAC0).
Segmentation	Supported
Routing	The WAC BACnet server routes between a physical BACnet/IP (IPv4) network and a virtual network. The address lengths of the virtual devices are 3-bytes.
BACnet Device Profile	The WAC BACnet server will behave as a B-GW router supporting GW-VN-B to a virtual network of B-ASC type profile server devices.
BACnet BIBBs	<p>The following specific BIBBs shall be supported per their relevant definitions in BACnet for both the router and virtual devices:</p> <ul style="list-style-type: none"> • DS-RP-B, DS-RPM-B, DS-WP-B, DS-WPM-B Act as a server that can execute Read/Write single or Read/Write multiple properties • DM-DDB-B, DM-DOB-B Dynamic device and object binding. Initiate I-Am in response to Who-Is, and I-Have in response to Who-Has • DM-DCC-B, DM-RD-B DeviceCommunicationControl and Reinit Device server • DS-COV-B Act as a server that accepts COV subscriptions and can initiate COVNotifications • AE-N-I-B, AE-ACK-B, AE-INFO-B Act as a server that can detect various alarm conditions and can report them using Confirmed and UnconfirmedEventNotifications

Interactions with controls from other DCS subsystems

The following DCS subsystems can modify the lighting zone state and configuration settings:

Subsystem	Modifiable properties
WAC's scheduler (as configured via UI or API)	Any properties in this document listed as being Write? (writeable) or Command? (commandable)
Manual override from user interface	Light Level CMD
Manual override from RESTful API	Light Level CMD
BACnet supervisory controller	Any properties in this document listed as being Write? (writeable) or Command? (commandable)

- For any writeable property that is not commandable, the value used by the WAC is taken from whichever sub-system last wrote to the property.
- For properties that are both writeable and commandable, the value of the property is taken from whichever subsystem wrote with the highest priority.
- All WAC subsystems write with a priority level of 7. To affect changes a priority of six or higher should be used.