

express yourself through light



BACnet™ User Guide

Based on Firmware 111

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BACNET™ SETUP

FRESCO™ FIRMWARE

Fresco uses a BACnet/IP interface, so at least one station on each Fresco network must be connected to the same Ethernet network as the BAS system. Only one station on each set of stations which are connected via RS485 can be connected to Ethernet, and the station connected to Ethernet is referred to as the “master” station for that RS485 network.

- The BACnet configuration is done at the master station.
- The network master will always be Controller ID # 1 for each Fresco RS485 network segment.
- Up to 255 Fresco RS485 network segments can be connected via Ethernet; each network segment must be assigned a unique Network ID number.
- The network master must have an Ethernet connection in order for the BACnet interface to function using BACnet/IP.
- Any network master station can be used as a BACnet interface for the entire system, but more than one can be used to act as the interface for different rooms or points if it makes sense for the project.
- The option to configure BACnet from the menu will only appear on the master Fresco and with appropriate user privileges (“Configuration” or “Administrator” privileges).

ETHERNET NETWORK SETTINGS

The Fresco IP network settings must be configured per the project requirements. The Network type should be set as DHCP or Static IP. All BACnet/IP devices must be on the same subnet to communicate, or a BBMD (BACnet Broadcast Management Device) must be used on each subnet. Note that the Fresco control network does not function across multiple subnets either, so while it is possible to have a BAS controller on one subnet control Fresco stations on another through the use of BBMDs, we do not recommend configuring the Fresco stations themselves on more than one subnet.

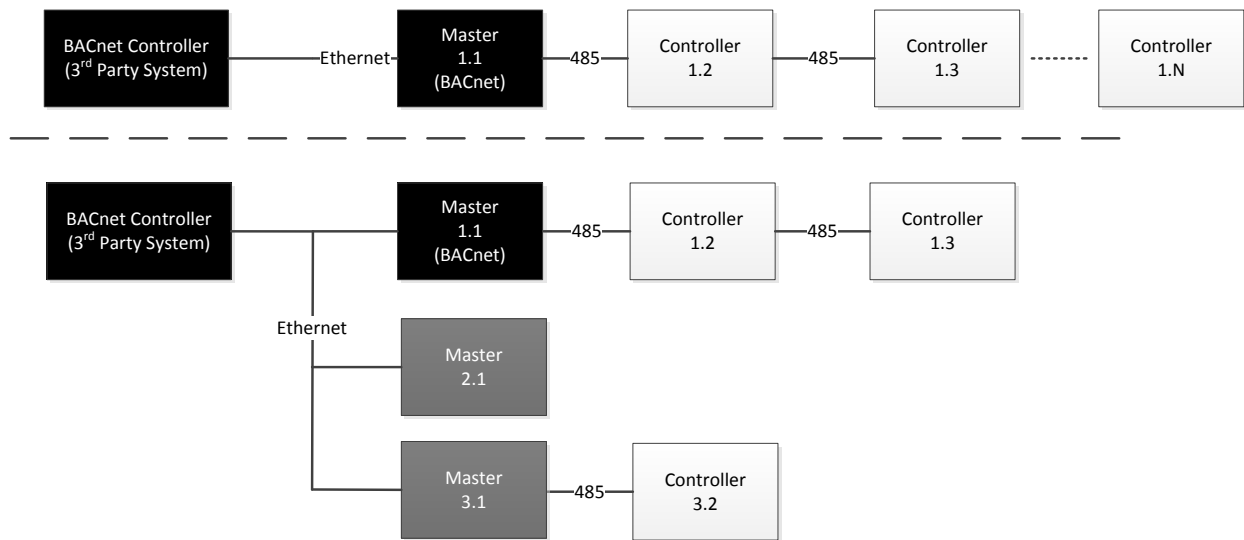
If a BACnet/IP network spanning multiple subnets is required and the BBMDs are to be furnished as part of the lighting controls package, then nECY controllers support BBMD functionality (one is needed on each subnet).

NETWORK TOPOLOGY

Figure 1 shows two different examples of typical Fresco™ networks being used for BACnet™ integration:

- A single Fresco 485 network connected by Ethernet to the BAS controller and serving as the BACnet device for the Fresco system.
- Multiple Fresco units connected by Ethernet (with additional units connected by 485) and one of the Fresco master units serving as the BACnet device for the Fresco system. Note that any of the Ethernet-connected master stations could be configured to be the BACnet device.

Figure 1. Fresco BACnet Instance Network.



MINIMUM VERSION REQUIREMENTS

FRESCO FIRMWARE

Fresco FCS7 Firmware version 110+ is required to support BACnet configuration.

FRESCO SOFTWARE

Fresco Studio software version 1.12+ is required to support BACnet configuration.

BACNET SETTINGS

BACNET ID

The BACnet ID is a unique identifier representing each BACnet device on a network. The BACnet ID is configurable but must be unique for all devices on the network, including those of other trades and manufacturers. Each manufacturer also has a unique manufacturer identification number (Acuity's manufacturer ID is 42), so it's common practice to start all BACnet IDs with the manufacturer ID number to help prevent duplicates.

The default BACnet ID is assigned based on the Fresco Network number, specifically it is $42000 + \text{Network ID}$ (i.e. a Fresco with Network ID of 4 is $42000 + 4 = 42004$). A custom BACnet ID can be programmed via the BACnet menu if desired.

BACNET™ PORT

The BACnet Port is a network configuration option for network traffic and device communication. The default BACnet Port is the decimal 47808 (or 0xBAC0 in hexadecimal notation).

The BACnet port can be assigned any custom value within a range (see [List of TCP and UDP port numbers](#) for recommended or commonly used values). Commonly 47808 - 47816 is used (or 0xBAC0 through 0xBAC8 in hexadecimal notation).

You may have to verify with site IT or network administrators to ensure the port is available and broadcast traffic is not blocked, otherwise the BACnet service may not be discoverable or may appear inoperable.

CONFIGURE MAPPING

The mapping process allows for a BACnet object to be dynamically created and assigned for the purposes of controlling or monitoring a Fresco system object whether it be a Zone, Group, Scene, Room Linking, Occupancy Status, and Photocell Status.

Once the mapped object is created, a BACnet Object and Object ID is associated with the control or status point and the ID and BACnet Present Value can be used to control or otherwise view the status of the control point.

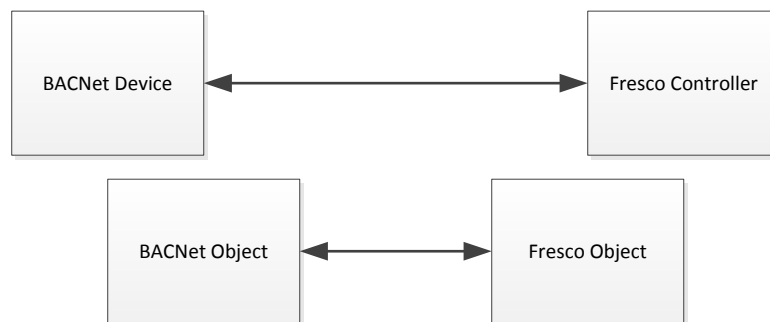


Table. Fresco™ to BACnet Object Mapping

Fresco Object Type	BACnet Object type	Present Value	Object ID
Zone Intensity	Analog Value	Read/Write	Zone # = Object ID #
Group Intensity	Analog Value	Read/Write	Group # + 100,000 = Object ID #
Scene Activation	Binary Value	Read/Write	Enumerated sequentially when added
Room Link	Binary Value	Read/Write	Enumerated sequentially when added
Occupancy Status	Binary Input	Read Only	Enumerated sequentially when added
Photocell Status	Analog Input	Read Only	Enumerated sequentially when added

Other control and status options may be made available in future versions of Fresco firmware.

MAPPING ZONES

Zones are mapped as BACnet™ Analog Value objects.

The BACnet object name will be the zone id, name, and attribute (i.e. 'Zone 1 - Overhead - Intensity').

Only the Intensity attribute is currently supported for mapping to a zone (control of color, color temperature, and shades can be accomplished through use of a scene).

Setting a present value of 0 to 100 will control the zone intensity level as 0% - 100%.

Subscribing to the Change of Value of the Zone Analog Value will cause updates to be sent to the subscriber whenever the present value of the Zone intensity changes.

MAPPING GROUPS

Groups are mapped as BACnet Analog Value objects.

The BACnet object name will be named with the group id, name, and attribute (i.e. 'Group 1 - Office - Intensity').

Only the Intensity attribute is currently supported for mapping to a group (control of color, color temperature, and shades can be accomplished through use of a scene).

Setting a present value of 0 to 100 will control the group intensity level as 0% - 100%.

Subscribing to the Change of Value if the Group Analog Value will cause updates to be sent to the subscriber whenever the present value of the Group intensity changes. If any of the zone members of a group are not identical (normally displayed on Fresco™ channel as '---'), the group itself is not at a specific level and therefore the BACnet value reported will be 0%.

MAPPING SCENES

Scenes are mapped as BACnet Binary Value objects.

BACnet object name will be named with the room and scene name (i.e. 'Room T Scene 1 - Lights On - Scene Activation').

Setting the present value of the Binary Value to 1 will activate the scene.

Setting the present value of the Binary Value to 0 will set all included scene channels to 0% intensity (i.e. 'turn the scene off').

Subscribing to Binary Value object changes mapped to a Scene will update the present value as 'Active' or 'Inactive': 1 or 0 respectively.

MAPPING ROOM LINKING

Room Links are mapped as BACnet Binary Value objects.

BACnet object name will be named with the link name and room name (i.e. 'Link AB - AB - Room Link').

Setting present value of 1 will link the rooms.

Setting present value of 0 will unlink the rooms.

Subscribing to Binary Value object changes mapped to a Room Link will update the present value as 'Linked' or 'Not Linked': 1 or 0 respectively.

MAPPING OCCUPANCY STATUS

Occupancy Status is mapped as a BACnet™ Binary Input objects.

The occupancy state can be monitored for a zone, group, or room.

When monitoring occupancy status for a room, the state is updated only if an occupancy sensor is controlling a channel or a scene for the specified room.

When monitoring occupancy status for a zone, the state is updated only if an occupancy sensor is controlling a zone or a group containing the zone.

When monitoring occupancy status for a group, the state is updated only if an occupancy sensor is controlling a group.

Note: Because a scene or channel indirectly affects a zone, it does not update the status for occupancy monitoring a zone or group, instead the mapping would need to be assigned to the room.

BACnet object name will be named with the object monitored and a label indicating it is the occupancy being tracked (i.e. 'Zone 1 - Overhead - Occupied Status').

MAPPING PHOTOCELL STATUS

Photocell Status is mapped as a BACnet Analog Input objects.

The photocell state can be monitored for a specific zone or group.

The photocell state is the dimming level commanded from the photocell device for automatic dimming controlled loads to adjust their level to.

BACnet object name will be named with the object monitored and a label indicating it is the photocell being tracked (i.e. 'Group 1 - Office - Photocell Status').

When monitoring photocell status for a zone, the photocell must also be assigned to control a zone.

When monitoring photocell status for a group, the photocell must also be assigned to control a group.

Note: The daylighting input mapped for photocell status monitoring must be assigned to control a zone or group, the photocell status will not be reported until configured. In other words, only a zone or group which is being controlled by a photocell will have status reported.

BACNET APPLICATION GUIDELINES

COLOR AND COLOR TEMPERATURE CONTROL

In order to control the color of a zone or the color temperature a zone or group BACnet mapping cannot directly be used. Instead, a Scene should be configured with the specified color or color temperature and a BACnet mapping point created to activate the scene.

SHADE OR WINDOW COVERING CONTROL

In order to control a shade (connected by an FCS AVI configured for one of the supporting shade controller types, see FCS AVI documentation for details) a zone or group BACnet™ mapping cannot directly be used. Instead, a Scene should be configured with the specified shade position and a BACnet mapping point created to activate the scene.

BACNET CONTROLLER SUBSCRIPTIONS

BACnet controller subscriptions are not preserved between the BACnet controller and Fresco™ controller power down / resets. The subscriptions will need to be re-created from BACnet controller software to enable monitoring changes again.

It is generally recommended to not configure change of value subscriptions for an indefinite timeout.

OBJECT NAME CHANGES

From the BACnet controller an object name may appear incorrect. Most object names are automatically assigned upon startup and not updated dynamically if they are changed afterwards. A Fresco scene mapped as a Binary Value object for example won't update the scene name as it appears to the BACnet controller until after Fresco is restarted and the property queried again.

BACNET INSTANCE PERFORMANCE

A specific Fresco master controller can be configured to manage: scene activation for any room; zone and group control for the network; occupancy and photocell monitoring for any room. In larger network applications this may result in many BACnet mappings to Fresco system objects. The Fresco BACnet instance can handle a relatively large number of subscriptions to objects. However, it may be useful to partition a larger network appropriately. In larger networks the Fresco may encounter performance issues if it is the only BACnet instance responsible for handling all of the BACnet to Fresco system mappings.

In situations where a larger network involves multiple Fresco master controllers connected by Ethernet, each Fresco master controller can have the BACnet instance configured for managing Fresco components which reside strictly on their network segment. For instance, A Fresco network assigned to control Room A, B, and C should only have BACnet scene mappings assigned to those specific rooms. Likewise, Photocell and Occupancy mappings to rooms where by those sensory devices are on a specific Fresco network should only be configured in the BACnet setup screen of the respective Fresco master controller.

TOOLS

YABE

Yabe or 'Yet Another BACnet Explorer' is a tool which can be downloaded for exploring BACnet services and objects. It can be downloaded from here: [Yet Another BACnet Explorer](#).

Setup a Device (Functions -> Add Device).

Specify BACnet/IP over UDP

Select the port configured as the Fresco BACnet Port.

Select the local endpoint as the network address on your computer.

A network device icon should be displayed

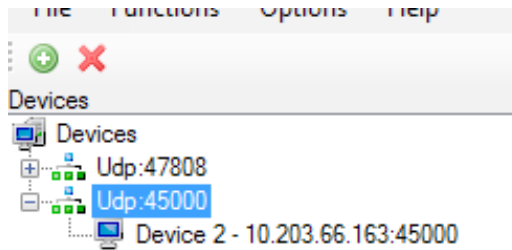


Figure. YABE Device Listing.

Select the network icon and then discover BACnet™ objects by selecting Functions -> Send Whols.

The Address Space window is populated with the mapped BACnet to Fresco™ objects.

Selecting the particular object and setting present value can be used to verify the mapping and its operation.

To subscribe to value changes or otherwise be updated when a mapped object changes, right-click on the object mapping and select Subscribe.

Figure. YABE Address Space Window.

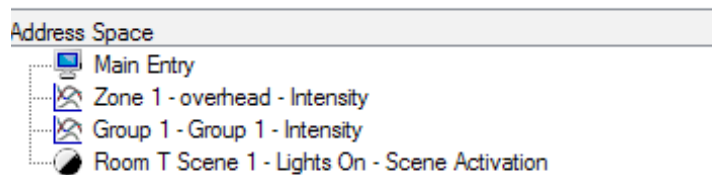


Figure. YABE Subscriptions Window.

Subscriptions, Periodic Polling, Events/Alarms					
Device	ObjectId	Name	Value	Time	Status
10.203.6...	OBJEC...	Main Entry			Not started
10.203.6...	OBJEC...	Zone 1 - overhead - Intensity	55	07:29:40	OK

The subscription can be removed by selecting it in the 'Subscriptions, Periodic Polling, Events/Alarms' window and pressing the delete key.

Note: When using Yabe, you may have to wait a few seconds or click on the BACnet device and back on the mapped objects before the information is reloaded in the Address Space / Devices window.

WIRESHARK®

Wireshark is an in-depth network protocol analysis tool used for troubleshooting and detailed analysis of network traffic. Wireshark can be used to examine BACnet™ network traffic and provide more detailed troubleshooting information in certain cases. However, the tool usage is outside the scope of this document.

[Click here](#) to download Wireshark.