

express yourself through light



# BACnet™ Client User Guide

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## INTRODUCTION

The Fresco Touchscreen has long had BACnet capabilities—as a *BACnet Server*. That meant a Building Automation System (BAS) could query the Fresco system and read/write points and subscribe to Change of Value. The BAS is a *BACnet Client* in this case, Fresco a Server.

Adding BACnet Client to Fresco reverses that, and gives Fresco the ability to:

- View list of points on remote BACnet server on the Touchscreen.
- Read/write/COV points on remote BACnet server; setup on Touchscreen.
- Control Fresco objects based on point values.

Most importantly, Fresco can now query a nLight Eclipse and see its **Profiles**. This adds the following capabilities:

Fresco can trigger nLight Profile execution on Eclipse:

- Fresco scene can trigger nLight Profile.
- Fresco schedule can trigger nLight Profile.

Fresco can track nLight profile state on Eclipse:

- nLight Profile can trigger Fresco Scene.
- nLight Profile can trigger Fresco to change Occupancy Timeouts.
- nLight schedule can trigger Fresco Scene.

This guide will take you through the steps to use **BACnet Client** for the Fresco system.

## CONNECTION

To connect a Fresco Touchscreen to an Eclipse, only an Ethernet connection between the two devices is needed. However, additional Ethernet connections may be desired, so a switch can be used—we will describe that process below.

For Fresco, connect an ethernet cable to an empty port in the switch, then connect the other side to the port labeled as “Ethernet” on the Fresco Touchscreen.

For Eclipse, plug in one side of ethernet cable to unit’s port labeled as “Ethernet Switch -> PRI (primary)” and the other side to switch’s empty port.



This is an example diagram for setting up an Eclipse with nLight Air, nLight Wired and Fresco devices. Each of these nLight devices will show up in Sensorview, Yabe, or a BACnet Client as BACnet points. These points are automatically created and have certain properties and settings associated with each.

When setting up nLight Wired devices, keep in mind that each device needs about 3-4 mAmps of power. Knowing that the nPP16 supplies about 40mA, you can connect up to 10 nLight wired devices per nPP16.

## CONNECTING FRESKO WITH ECLYPSE

Go to the Wi-Fi utility on your computer and connect to test Eclipse (ECLYPSE-MAC Address). Launch a browser and navigate to <https://192.168.0.1>. Login as admin/Admin1234 then click on Log In. Click on Network from left panel then select Ethernet. Get IP Address of Eclipse from under Ethernet Primary section. Also make sure if DHCP is checked in or not. Click on BACnet from left panel options, get "Device Id". Turn on Fresco Unit. Tap on Menu -> Setup -> Controller. Setup the device so they're both in the same subnet.

Tap on Menu -> Setup, scroll down to the last item "BACnet Client" tap on it. Tap on <Tap to add a BACnet Device>, Enter BACnet ID displayed on the Eclipse.

## CONFIGURING BACNET OBJECT/NLIGHT DEVICES

Expand the newly added Eclipse (ECY-SXXXX-MAC) by tapping on it. From here you can add either "Write Remote Property Objects" or "Read Remote Property Objects". "Write Remote Property Objects" are used to write to properties on the BACnet server while "Read Remote Property Objects" are used to subscribe to COVs or poll the BACnet server's properties. For example, Tap on <Tap to add Write Remote Property Obj>. A list of devices (BACnet Object per Fresco) connected with Eclipse will be available for user to add as BACnet objects to be controlled by Fresco. Select desired objects from the list one at a time then tap on OK to add it.

## MAPPED OBJECT TYPE

To configure the mapped object type for an Object/nLight device, Tap on Menu -> Setup -> BACnet Client. Expand ECY-SXXXX-MAC then expand Write Remote Property Objects. Expand BACnet object that's configuration needs to be changed. Tap on "Mapped Object Type" from attributes list. Select "Intensity" from Object Type list then tap OK. Mapped Object Type = Intensity and Mapped Object = None will be added to attribute list.

## ADDING ZONE TO AN OBJECT

Tap on Mapped Object = None. Select Zone for Control Type then tap on OK. Use one of the existing Zone or tap on <Enter New Zone> then OK to create one. Enter Zone ID then tap on OK to create and assign it to Mapped Object.

## ADDING GROUP TO AN OBJECT

Tap on Menu -> Setup -> Groups. Use one of the existing Group or tap on <Tap to add Group> then OK to create a new one. Enter Group ID then tap on OK to create it. Expand Group (Group 1 as an example). Tap on Name = Group x to change/update group name. Expand Zones then tap on <Tap to add Zones>. Use one of the existing Zone or tap on <Enter New Zone> then OK to create one. Tap on the desired zone to assign it to the Group. Go back to Menu -> Setup -> BACnet Client. Expand ECY-SXXXX-MAC then expand Write Remote Property Objects. Tap on Mapped Object = None. Select Group for Control Type then tap on OK. Use one of the existing Group then OK to assign it to Mapped Object.

## ADDING ROOM TO AN OBJECT

Tap on Mapped Object = None. Select Room for Control Type then tap on OK. To assign a room or many rooms, tap on the check box then select OK.

## ASSIGNING CHANNEL TO CONTROL GROUP OR ZONE

Tap on Menu -> Setup -> Channels. Expand one of the Channels that you would like to control your zone or group with. Tap on Control. Select either Group or Zone for Control Type then tap on OK to assign it. At this point Fresco unit should be able to control Group or Zone assigned to a channel.

## CONNECTING TO SYNERGY BACNET POINTS

### Trigger Output on Synergy with Fresco

1. Put the Synergy panel and Fresco on the same subnet.
2. The Synergy BACnet Id shows on the home screen. Use this Id to add the Synergy as a BACnet device in the BACnet Client tab of the Fresco.
3. Add a write remote object property and add a BACnet point.
4. Assign control of a zone, channel, group, etc.
5. Use Yabe to subscribe to that BACnet point.
6. Change the input device or channel slider and the present value of the BACnet point should change in Yabe.

## CONNECTING TO NLIGHT ECLYPSE PROFILES

Profiles are configurations of nLight device settings. These can be configured by the user in any combination limited by the capabilities of the device in SensorView when connected to an Eclipse. Profiles can be scheduled to activate or deactivate at a certain time of the day or their present state value can be changed by a BACnet Client or a BACnet Editor (Yabe). Profiles show up as Binary Value (BV) BACnet points because the present value can only be 1 for activated and 0 for deactivated.

### Trigger Output on Fresco Using a Profile

1. Create a profile in SensorView.
2. Add the Eclipse as a BACnet device in the BACnet Client tab in the Fresco (Eclipse BACnet Id is in the Eclipse GUI page).
3. Click add a read remote object property and add the profile.
4. Assign control to a zone, channel, group, etc. linked to an output device.
5. Select profile in SensorView and press the "Run" and "Stop" buttons or create a schedule to trigger the output on Fresco.
6. Verify output device changes.

### Trigger Output on Fresco Using a Profile

1. Create a profile in SensorView
2. Add the Eclipse as a BACnet device in the BACnet Client tab in the Fresco (Eclipse BACnet Id is in the Eclipse GUI page).
3. Click add a write remote object property and add the profile.
4. Assign control of a zone, channel, group, etc. linked to an input device.
5. Open Yabe and click "Add device". Use the computer's IP address for the local end point and use the BACnet IP UDP Port of the Eclipse (in Eclipse GUI) . Default port is BAC0. Click "Add".
6. Select each BACnet point in the column in the left will show the name of the point.
7. Select and drag the profile created into the top middle section. This creates a COV subscription to that profile, meaning it will update the present value of the point in time intervals.
8. Move the channel slider to 100%/0% or input button to ON/OFF and the present value should change in Yabe.

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### **Control Profile with Schedule on Fresco**

1. Complete the "Trigger Profile Using Fresco Input" steps 1-7.
2. Create a schedule in Fresco to trigger the zone, channel, group, etc. that is linked to the profile.

### **Control Scene on Fresco with Schedule on Eclipse**

1. Create a scene on Fresco.
2. Complete the "Trigger Output on Fresco Using a Profile" steps but assign control to the scene and create a schedule for the profile

### **Control Fresco Zone/Scene on Only Active/Inactive Profile State**

1. Create a profile in SensorView.
2. Add the Eclipse as a BACnet device in the BACnet Client tab in the Fresco (Eclipse BACnet Id is in the Eclipse GUI page).
3. Click add a read remote object property and add the profile.
4. Assign control of a zone or scene
5. Select "Type" and change the BACnet Input Type to Ignore Offs.
6. Repeat steps 3-4 with a different control output.
7. Select "Type" and change the BACnet Input Type to Ignore Ons.
8. Open ADJUST page on Fresco.
9. Select profile in SensorView and press the "Run" and "Stop" buttons or create a schedule to trigger the outputs on Fresco.

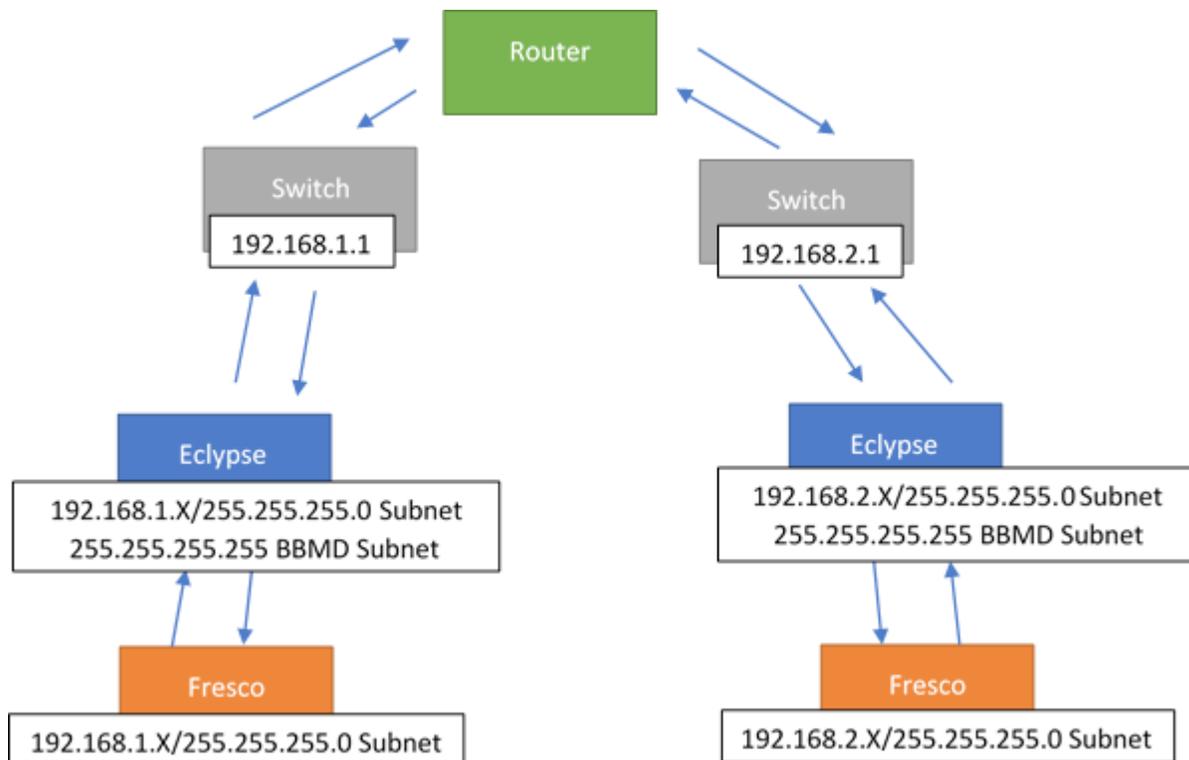
### BBMD NETWORKING

BACnet Broadcast Management Devices (BBMD) are used to broadcast BACnet messages across different subnetworks. The nLight Eclipse has the BBMD feature and can be enabled in its GUI page. This is an example BBMD setup.

#### What You'll Need Before Setup

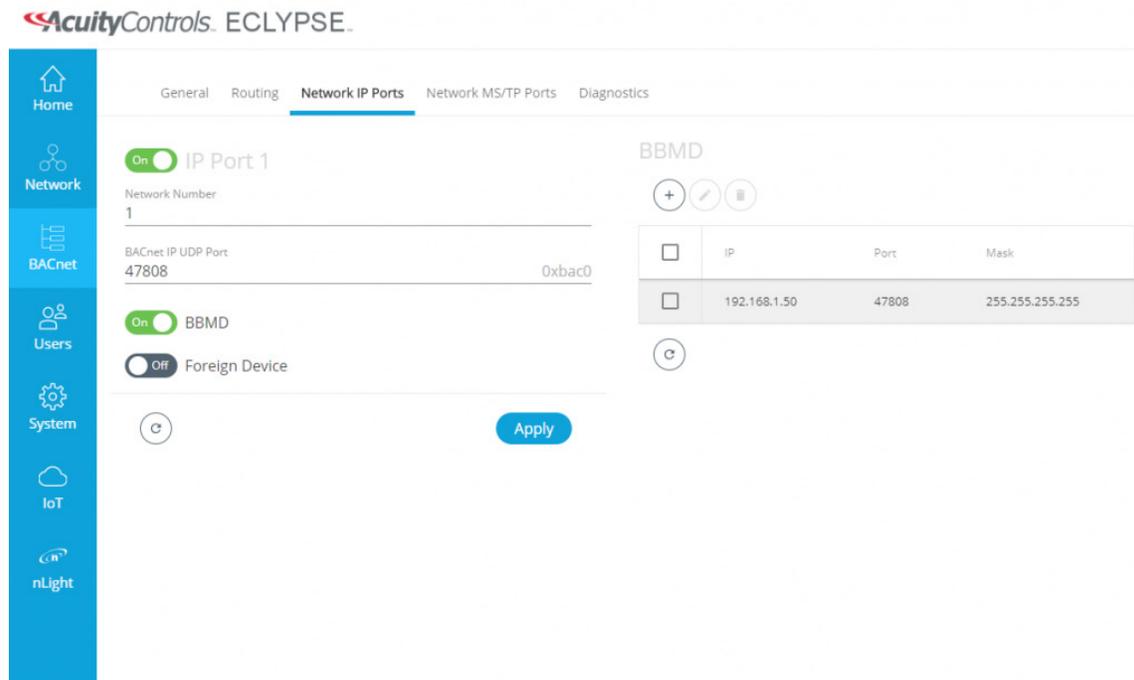
- 1 router
- 2 switches
- 2 nLight Eclipses (BBMD)

#### Configuration



The image above, shows an example test environment for using BBMD. Notice how the BBMD has a subnet mask of 255.255.255.255. This is the broadcast address and makes it possible for BACnet messages to be sent to other subnets.

## Enabling BBMD on nLight Eclipse and adding other BBMD in BBMD table



In the nLight Eclipse GUI from connecting through Wi-fi or ethernet, there is a BACnet tab, where you can enable the BBMD (shown above). Here you will need to turn on BBMD and add the other Eclipse's IP, BACnet IP UDP Port, and subnet mask (255.255.255.255) to the BBMD table. You will also have to make sure the network number is different from the other BBMD. In the Network tab, configure the IP and subnet mask. For more info about the Eclipse features [click here](#).

### Using BACnet Client Feature

1. Download Fresco Studio software supporting BACnet Client feature (2.3)
2. Download Fresco Touchscreen firmware supporting BACnet Client feature (201+).
3. Upgrade all networked Fresco units to the supported firmware.
4. Add the BACnet devices in the BACnet Client tab. You can find an Eclipse's BACnet Id in the Eclipse GUI. You can find a Fresco BACnet Id in the MENU -> BACNET tab. Note: This can also be done by using a Synergy panel as a BACnet server or other BACnet enabled server.
5. Control inputs/outputs using the read and write properties.

### SAMPLE TEST SCENARIOS

Adding Fresco to an existing network with Eclipse, nLight Air and Wired devices

Verify BACnet Objects are discovered via Fresco in the BACnet Client screen.

Add BACnet Objects to Fresco.

Configure Group/Zone for BACnet Objects in BACnet Client screen. Verify Fresco can control the zone, group, or other object.

Setup a Profile on the Eclipse using SensorView.

Configure Scene for BACnet Object in BACnet Client screen.

Run Profile via Fresco by assigning to a scene.

Activate Scene via Eclipse by starting a profile.

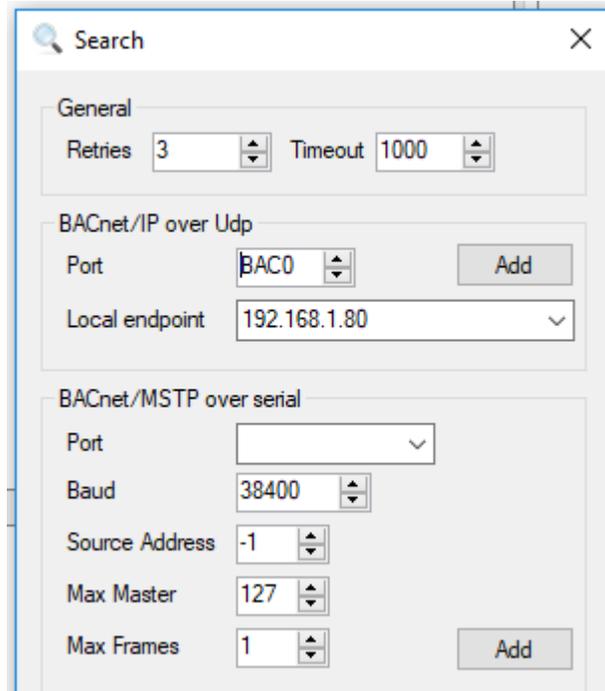
TROUBLESHOOTING

**Yabe**

Yabe is a BACnet tool that can read and write BACnet point present values and to view BACnet point properties.

[Download Yabe here.](#)

Specify the IP address of the network interface running Yabe. Specify the port, it is in hexadecimal format in Yabe.



Once a BACnet Server is discovered with available points, writing to the Present Value can help verify the endpoint is responding before trying to configure the Fresco BACnet Client to use that object.

Object Type	5 : Object Binary Value
Out Of Service	False
Present Value	0
Reliability	12 : Communication Failure
Status Flags	0100
Time Delay	0
Time Delay Normal	0
Time Of Active Time Reset	

## Wireshark

Wireshark is a helpful tool to sniff packets being sent and received from devices. To properly use the tool, make sure to be connected to a port on a switch that mirrors the other ports. You can set this in the switch's settings.

[Download Wireshark here.](#)

There are many protocols when connecting to BACnet devices using Wireshark, so using filters are helpful in showing specific messages. Specify "BACnet" as a filter.

21	0.104507	192.168.1.20	192.168.1.70	BACnet...	68 Confirmed-REQ	writeProperty[ 39]	analog-value,100311 present-value
22	0.111853	192.168.1.70	192.168.1.20	BACnet...	60 Simple-ACK	writeProperty[ 39]	
23	0.129944	192.168.1.20	192.168.1.255	FCN	61 Unknown command		
24	0.130018	192.168.1.20	192.168.1.255	FCN	61 Unknown command		
25	0.130224	192.168.1.20	192.168.1.70	BACnet...	68 Confirmed-REQ	writeProperty[ 40]	analog-value,100311 present-value
26	0.140643	192.168.1.70	192.168.1.20	BACnet...	60 Simple-ACK	writeProperty[ 40]	
27	0.156126	192.168.1.20	192.168.1.255	FCN	61 Unknown command		
28	0.156147	192.168.1.20	192.168.1.255	FCN	61 Unknown command		

```

<
> User Datagram Protocol, Src Port: 47808, Dst Port: 47808
> BACnet Virtual Link Control
> Building Automation and Control Network NPDU
v Building Automation and Control Network APDU
  0000 .... = APDU Type: Confirmed-REQ (0)
  > ... 0000 = PDU Flags: 0x0
  .000 .... = Max Response Segments accepted: Unspecified (0)
  .... 0101 = Size of Maximum ADPU accepted: Up to 1476 octets (fits in an ISO 8802-3 frame) (5)
  Invoke ID: 40
  Service Choice: writeProperty (15)
  > ObjectIdentifier: analog-value, 100311
  > Property Identifier: present-value (85)
  > {[3]
  > present-value: 77.000000 (Real)
  > }[3]
  > Priority: (Unsigned) 16
  
```

## Troubleshooting Network Setup

- Test network connectivity using ping to the Fresco unit and the BACnet server, ensuring they can both be reached.
- Check the BACnet port being used. The Fresco uses the configured BACnet Port for the client communications (as well as for BACnet Server points it provides).
- Verify BACnet Server (Eclipse, Synergy, other third-party system) is on same subnet and correct subnet mask.

## Troubleshooting Scheduled BACnet Actions

When using Fresco to schedule a profile or other mapped BACnet update:

- The BACnet client which has a schedule setup to control an endpoint by BACnet must be a master controller.

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### Troubleshooting Profile Activation

When using Fresco to control a profile on an Eclipse:

- Use Yabe to view profile on Eclipse
- Set the present value to 100 to start the profile
- Set the present value to 0 to stop the profile

### Troubleshooting BBMD Setup

When using Fresco to control a profile on an Eclipse:

- Adding an Eclipse's IP in its own BBDM table can cause a storm, meaning there is an excess of messages being sent. This can render the network unable to transport normal traffic.
- Make sure you can ping across the networks. If there's an error, the network path may be trying to go through computer's wi-fi, so disabling wi-fi will solve this.
- BBMD subnet mask needs to be 255.255.255.255 to broadcast across to other subnets.
- Make you set the default gateway on the Fresco controllers (ex: 192.168.2.1).

## VERSION HISTORY

Date	Version	Changes
03/04/2019	1	Initial document creation.