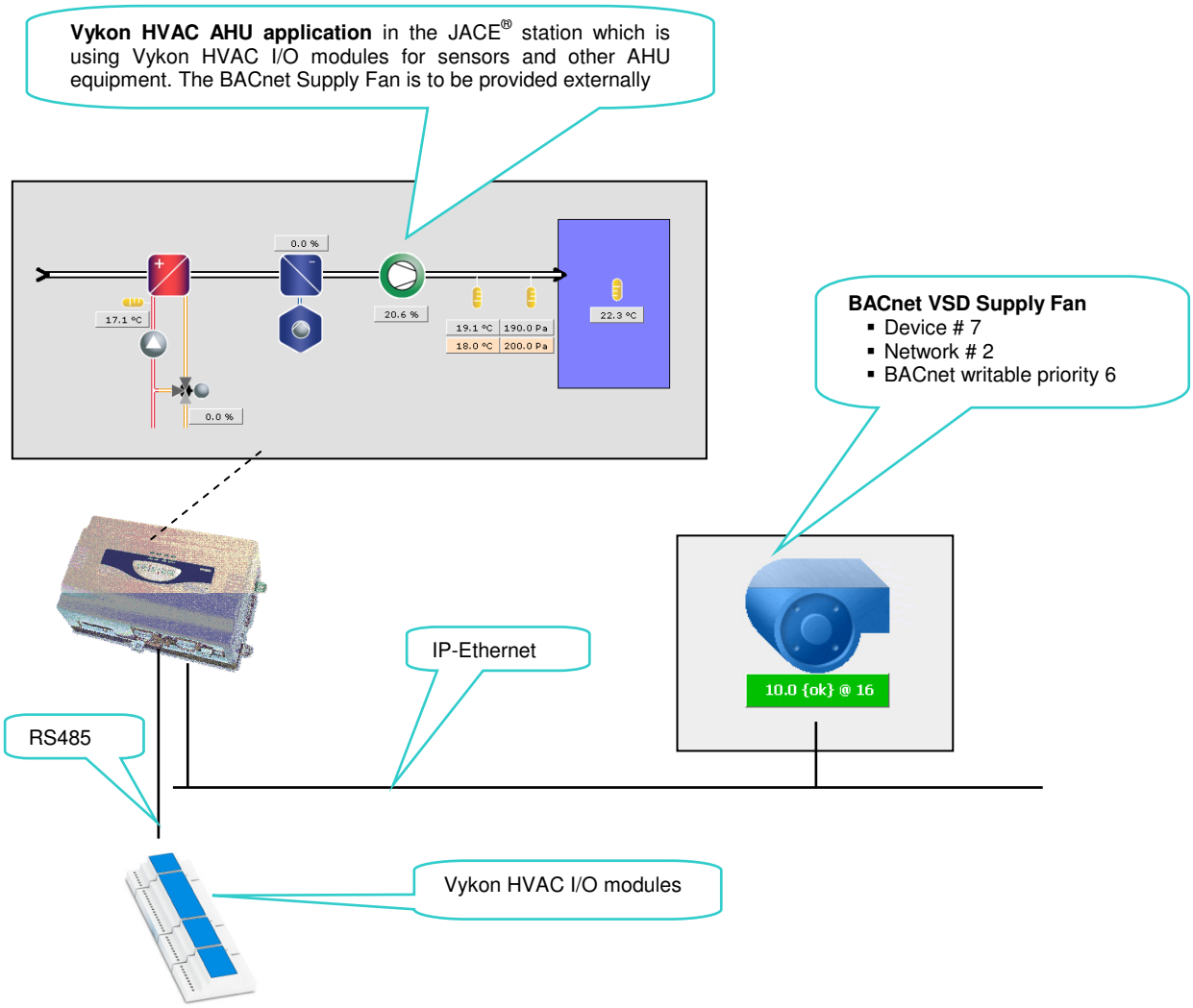
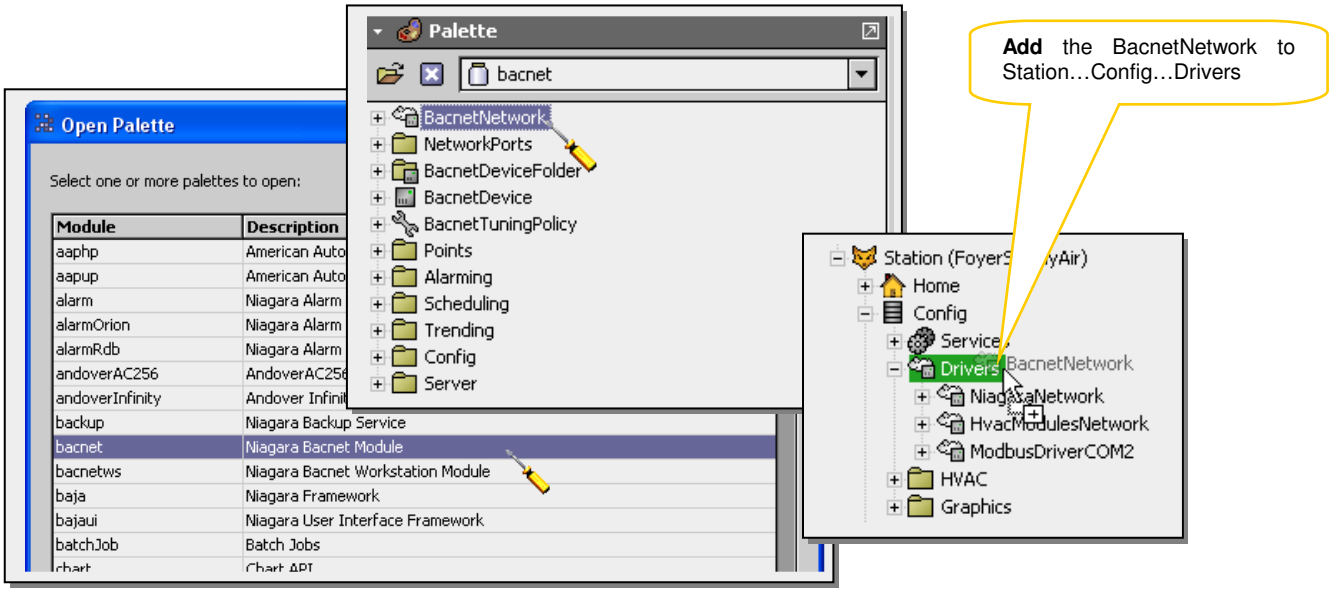
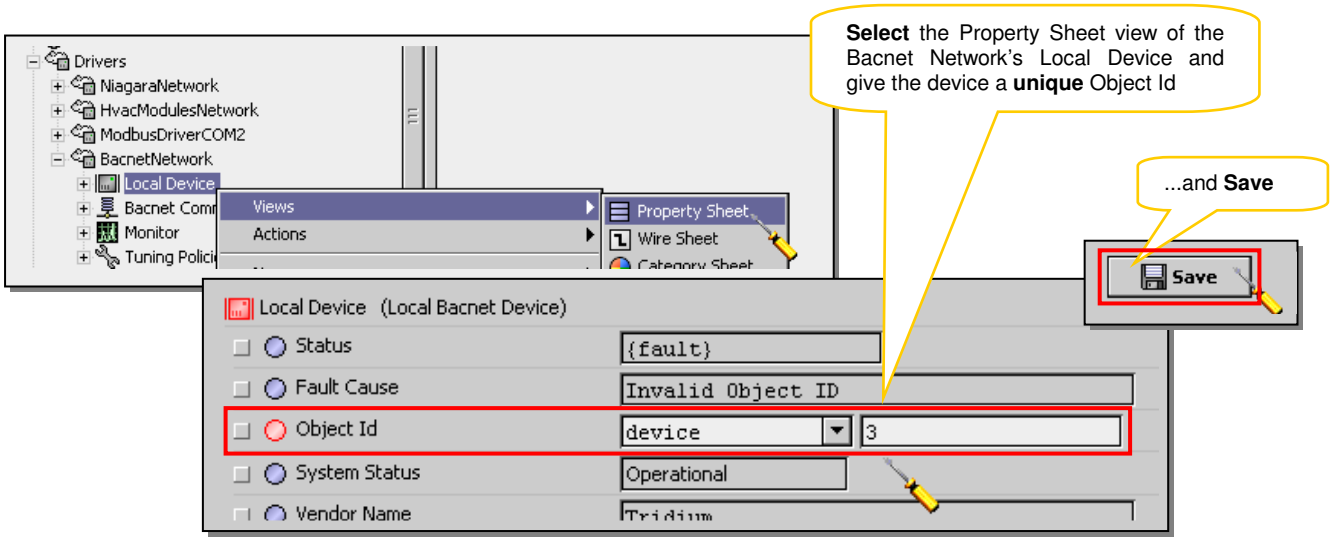
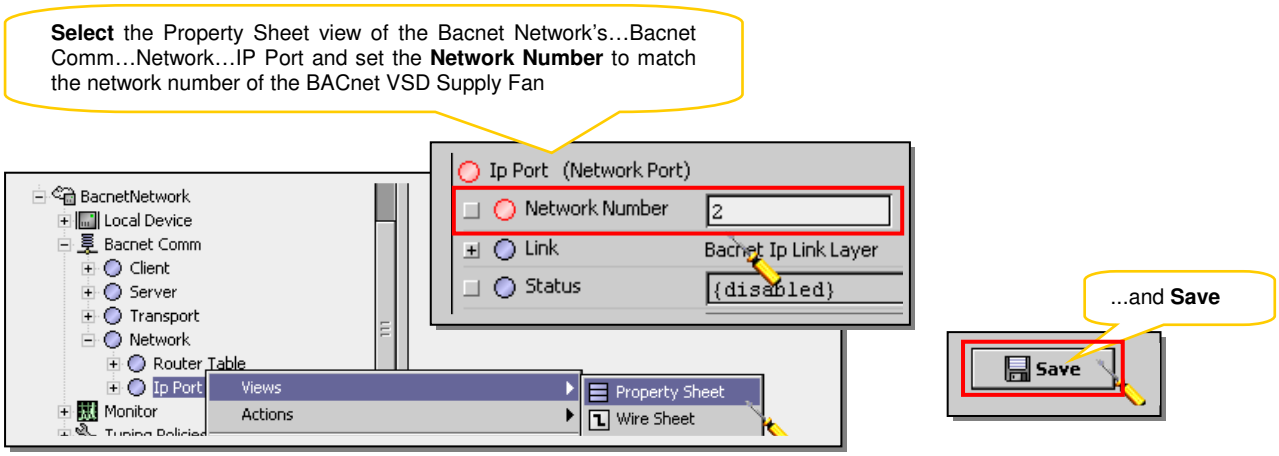
EN-32: Integration of BACnet equipment

- The configuration of Vykon HVAC applications is very flexible which enables them to operate with field equipment that is connected to the JACE® with a variety of field-bus standards. This engineering note describes how an Variable Speed Drive (VSD) Supply Fan, using the BACnet protocol and connected to the JACE® via IP, can be simply configured to be used by the Vykon HVAC 'Air Handling Unit application'
- BACnet (Building Automation and Control NETworking protocol - ANSI/ASHRAE Standard 135-2004) is an open communication protocol standard conceived by a consortium of manufacturers and system users under the auspices of ASHRAE. Data is modelled as a common set of "objects" using a standard set of "services"
- Please note that the description of the NiagaraAX Framework® Bacnet Driver set up in this engineering note is not exhaustive and for a fuller explanation you should consult the "NiagaraAX-3.x BACnet Guide" document
- Firstly – what does our example system diagram look like…?

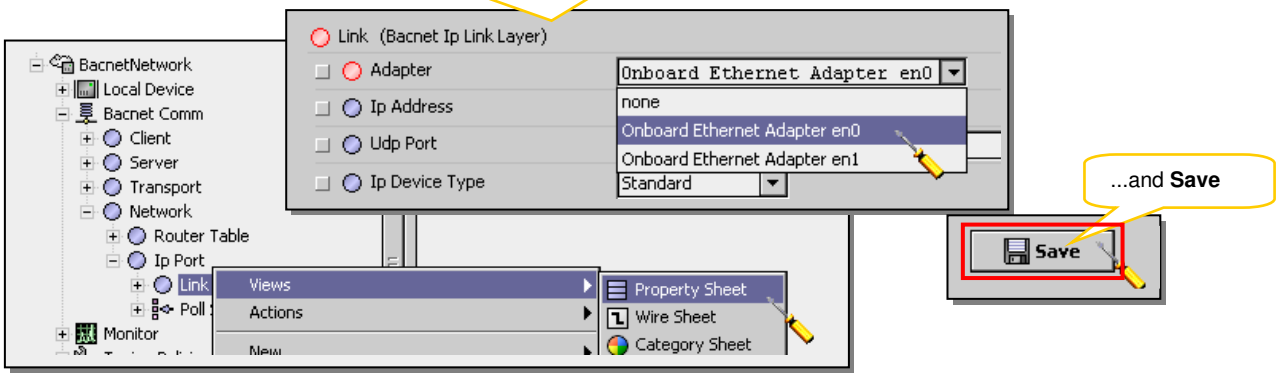


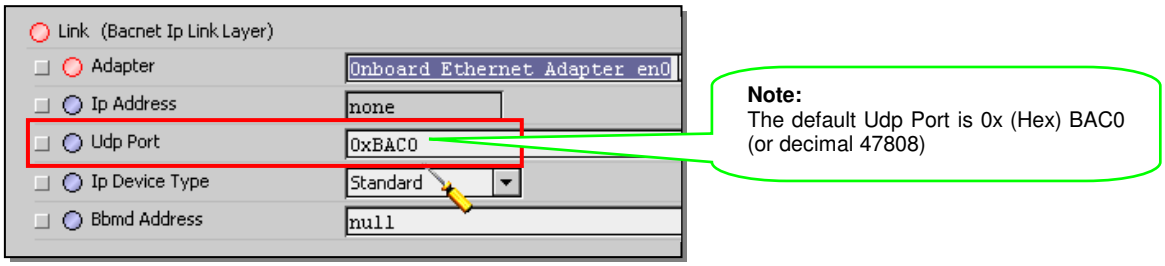

Palette
bacnet
BacnetNetwork
NetworkPorts
BacnetDeviceFolder
BacnetDevice
BacnetTuningPolicy
Points
Alarming
Scheduling
Trending
Config
Server
Open Palette
Select one or more palettes to open:
Module
Description
aaphp
aapup
alarm
alarmOrion
alarmRdb
andoverAC256
andoverInfinity
backup
Niagara Backup Service
bacnet
Niagara Bacnet Module
bacnetws
Niagara Bacnet Workstation Module
baja
Niagara Framework
bajaui
Niagara User Interface Framework
batchJob
Batch Jobs
Add the BacnetNetwork to Station…Config…Drivers
Station (FoyerS yAir)
Home
Config
Service
Drivers
BacnetNetwork
HvacModulesNetwork
ModbusDriverCOM2
HVAC
Graphics

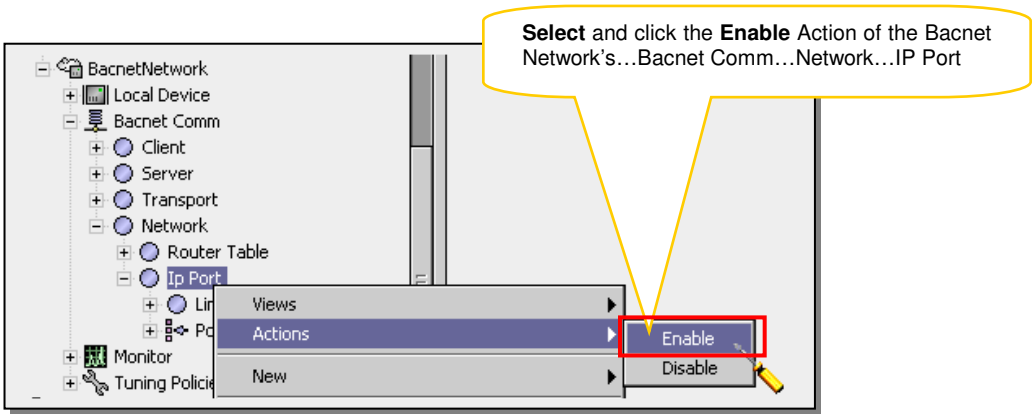

Drivers
NiagaraNetwork
HvacModulesNetwork
ModbusDriverCOM2
BacnetNetwork
Local Device
Monitor
Views
Actions
Property Sheet
Wire Sheet
Select the Property Sheet view of the Bacnet Network's Local Device and give the device a unique Object Id
...and Save
Save
Local Device (Local Bacnet Device)
Status
{fault}
Fault Cause
Invalid Object ID
Object Id
device
3
System Status
Operational
Vendor Name

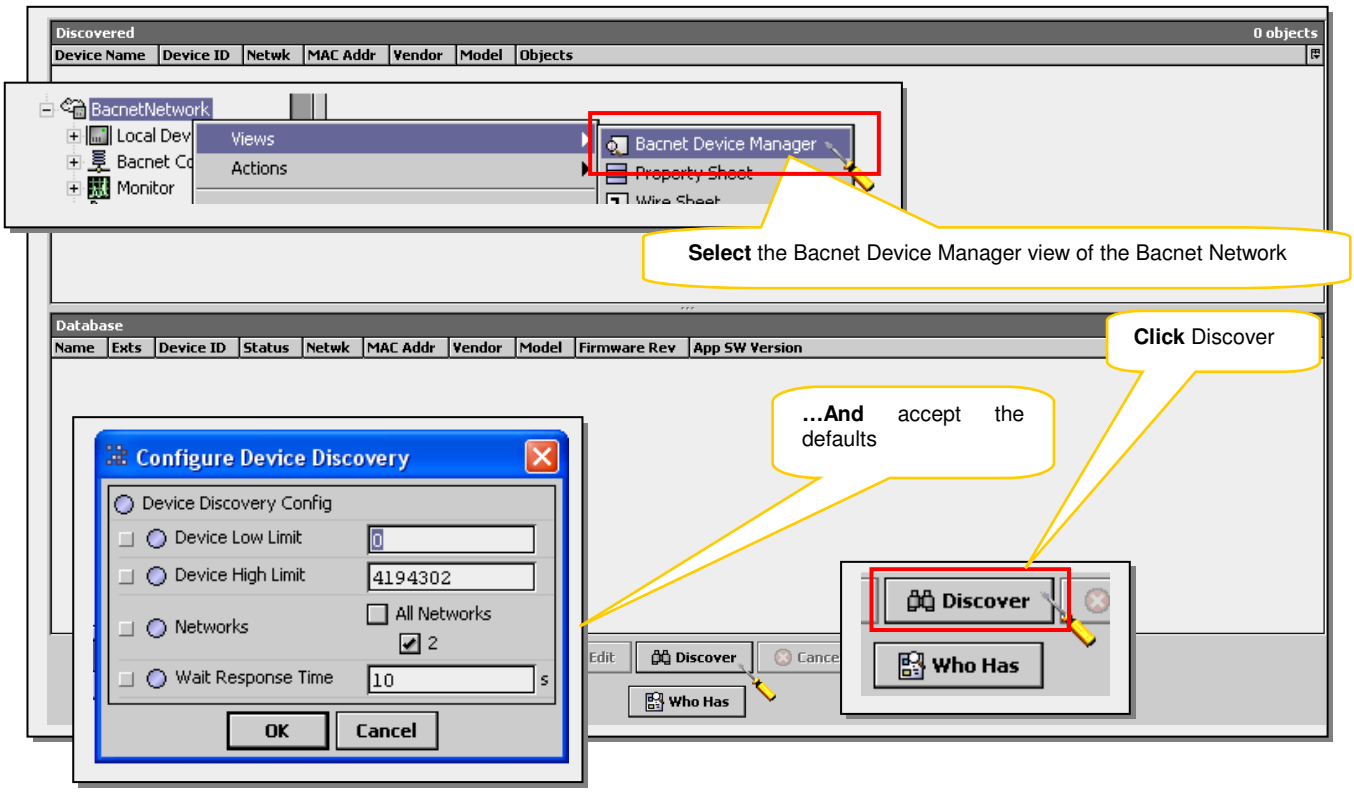

Select the Property Sheet view of the Bacnet Network's…Bacnet Comm…Network…IP Port and set the Network Number to match the network number of the BACnet VSD Supply Fan
BacnetNetwork
Local Device
Bacnet Comm
Client
Server
Transport
Network
Router Table
Ip Port
Monitor
Views
Actions
Property Sheet
Wire Sheet
Ip Port (Network Port)
Network Number
2
Link
Bacnet Ip Link Layer
Status
{disabled}
...and Save
Save

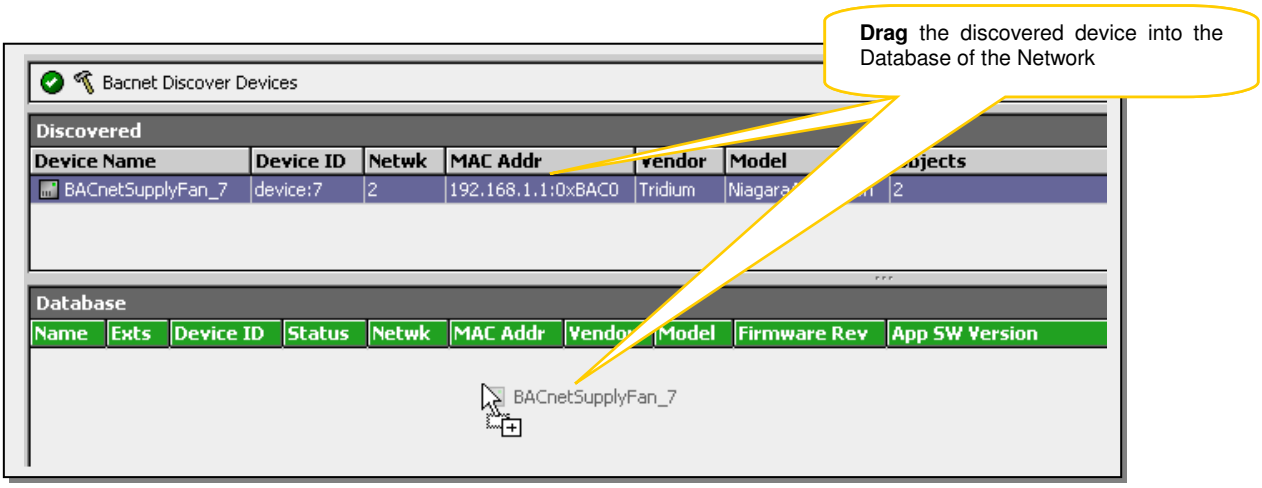
Select the Property Sheet view of the Bacnet Network's…Bacnet Comm…Network…IP Port…Link and set the **Adapter** to the appropriate IP adapter of the JACE®

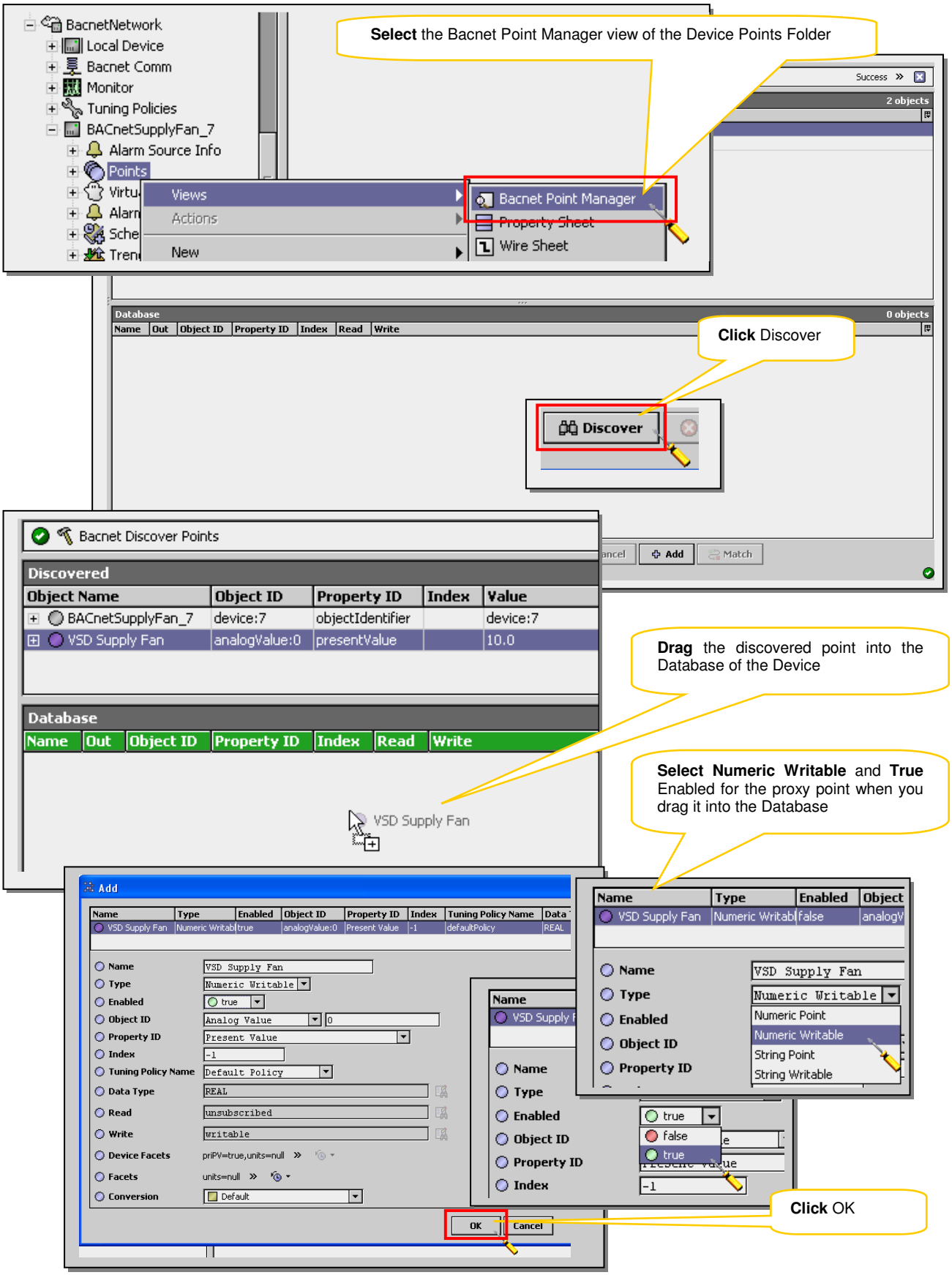


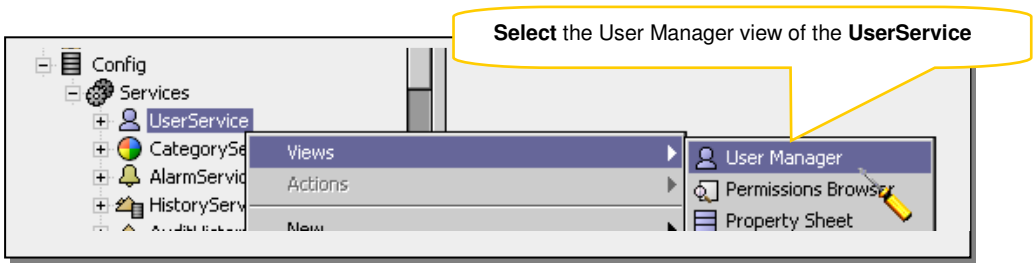


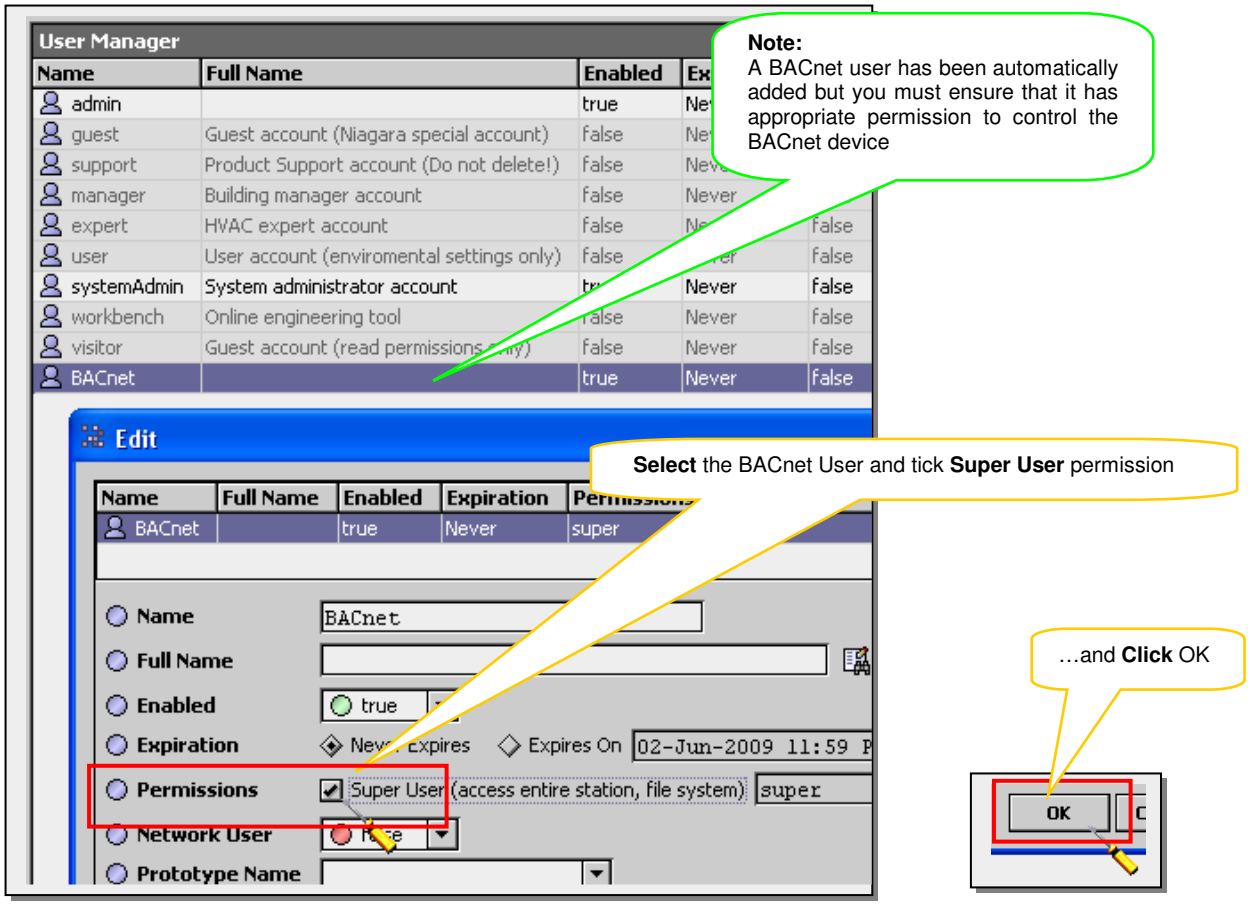


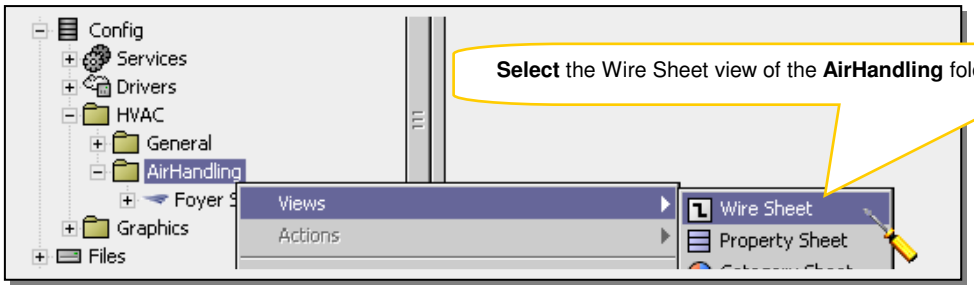

Discovered
0 objects
Device Name
Device ID
Netwk
MAC Addr
Vendor
Model
Objects
BacnetNetwork
Local Dev
Bacnet Co
Monitor
Views
Actions
Bacnet Device Manager
Property Sheet
Wire Sheet
Select the Bacnet Device Manager view of the Bacnet Network
Database
Name
Exts
Device ID
Status
Netwk
MAC Addr
Vendor
Model
Firmware Rev
App SW Version
Click Discover
...And accept the defaults
Configure Device Discovery
Device Discovery Config
Device Low Limit
0
Device High Limit
4194302
Networks
All Networks
2
Wait Response Time
10
s
OK
Cancel
Edit
Discover
Cance
Who Has
Discover
Who Has

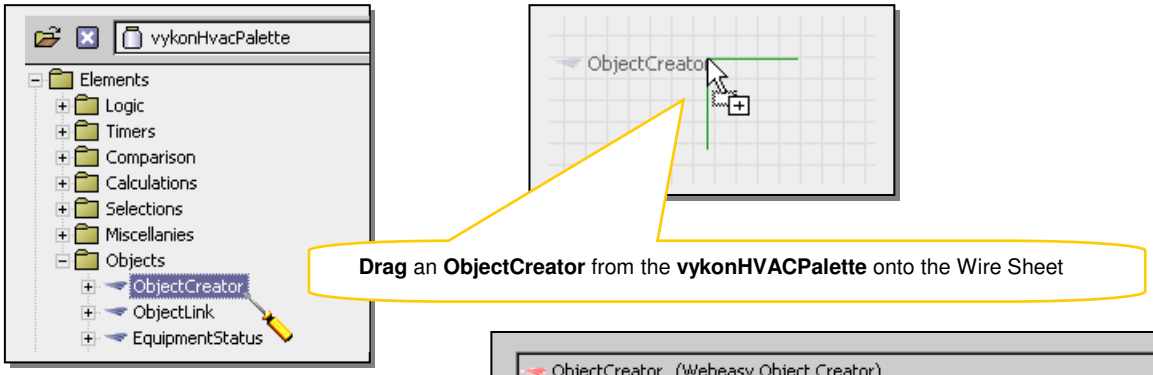

Drag the discovered device into the Database of the Network
Bacnet Discover Devices
Discovered
Device Name
Device ID
Netwk
MAC Addr
Vendor
Model
Objects
BACnetSupplyFan_7
device:7
2
192.168.1.1:0xBAC0
Tridium
2
Database
Name
Exts
Device ID
Status
Netwk
MAC Addr
Vendor
Model
Firmware Rev
App SW Version
BACnetSupplyFan_7

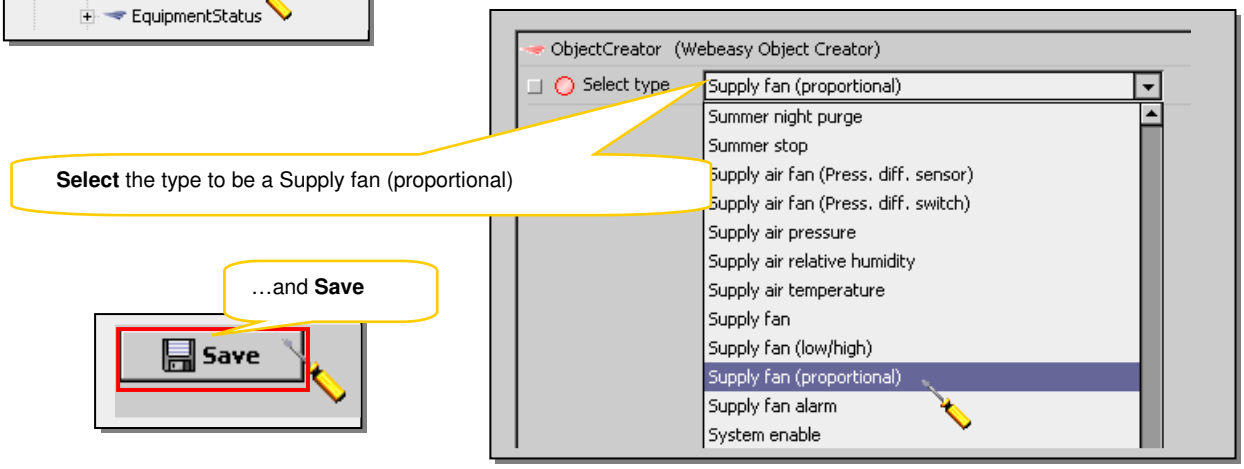

BacnetNetwork
Local Device
Bacnet Comm
Monitor
Tuning Policies
BACnetSupplyFan_7
Alarm Source Info
Points
Views
Actions
New
Bacnet Point Manager
Property Sheet
Wire Sheet
Select the Bacnet Point Manager view of the Device Points Folder
Success
2 objects
Database
0 objects
Name Out Object ID Property ID Index Read Write
Click Discover
Discover
Bacnet Discover Points
Discovered
Object Name Object ID Property ID Index Value
BACnetSupplyFan_7 device:7 objectIdentifier device:7
VSD Supply Fan analogValue:0 presentValue 10.0
Add
Match
Database
Name Out Object ID Property ID Index Read Write
Drag the discovered point into the Database of the Device
VSD Supply Fan
Select Numeric Writable and True Enabled for the proxy point when you drag it into the Database
Add
Name Type Enabled Object ID Property ID Index Tuning Policy Name Data
VSD Supply Fan Numeric Writable true analogValue:0 Present Value -1 defaultPolicy REAL
Name VSD Supply Fan
Type Numeric Writable
Enabled true
Object ID Analog Value 0
Property ID Present Value
Index -1
Tuning Policy Name Default Policy
Data Type REAL
Read unsubscribed
Write writable
Device Facets priPV=true,units=null
Facets units=null
Conversion Default
OK
Cancel
Name Type Enabled Object
VSD Supply Fan Numeric Writable false analogV
Numeric Point
Numeric Writable
String Point
String Writable
true
false
true
-1
Click OK

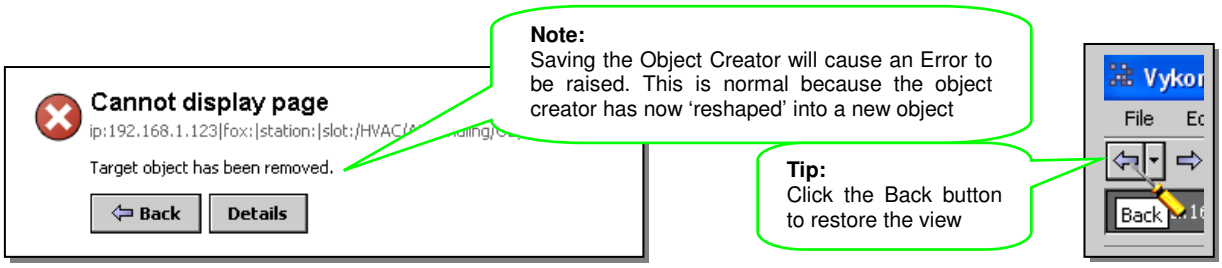

Select the User Manager view of the UserService
Config
Services
UserService
Views
Actions
New
User Manager
Permissions Browser
Property Sheet

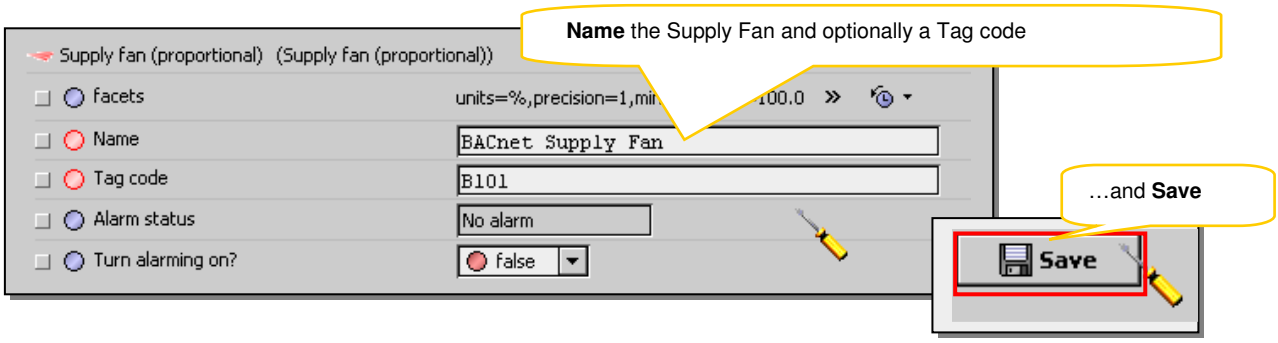

Note:
A BACnet user has been automatically added but you must ensure that it has appropriate permission to control the BACnet device
User Manager
Name
Full Name
Enabled
admin
guest
Guest account (Niagara special account)
support
Product Support account (Do not delete!)
manager
Building manager account
expert
HVAC expert account
user
User account (enviromental settings only)
systemAdmin
System administrator account
Never
workbench
Online engineering tool
visitor
Guest account (read permissions only)
BACnet
Edit
Expiration
super
Select the BACnet User and tick Super User permission
Name
BACnet
Full Name
Enabled
true
Expiration
Never expires
Expires On
02-Jun-2009 11:59
Permissions
Super User (access entire station, file system)
Network User
Prototype Name
…and Click OK
OK

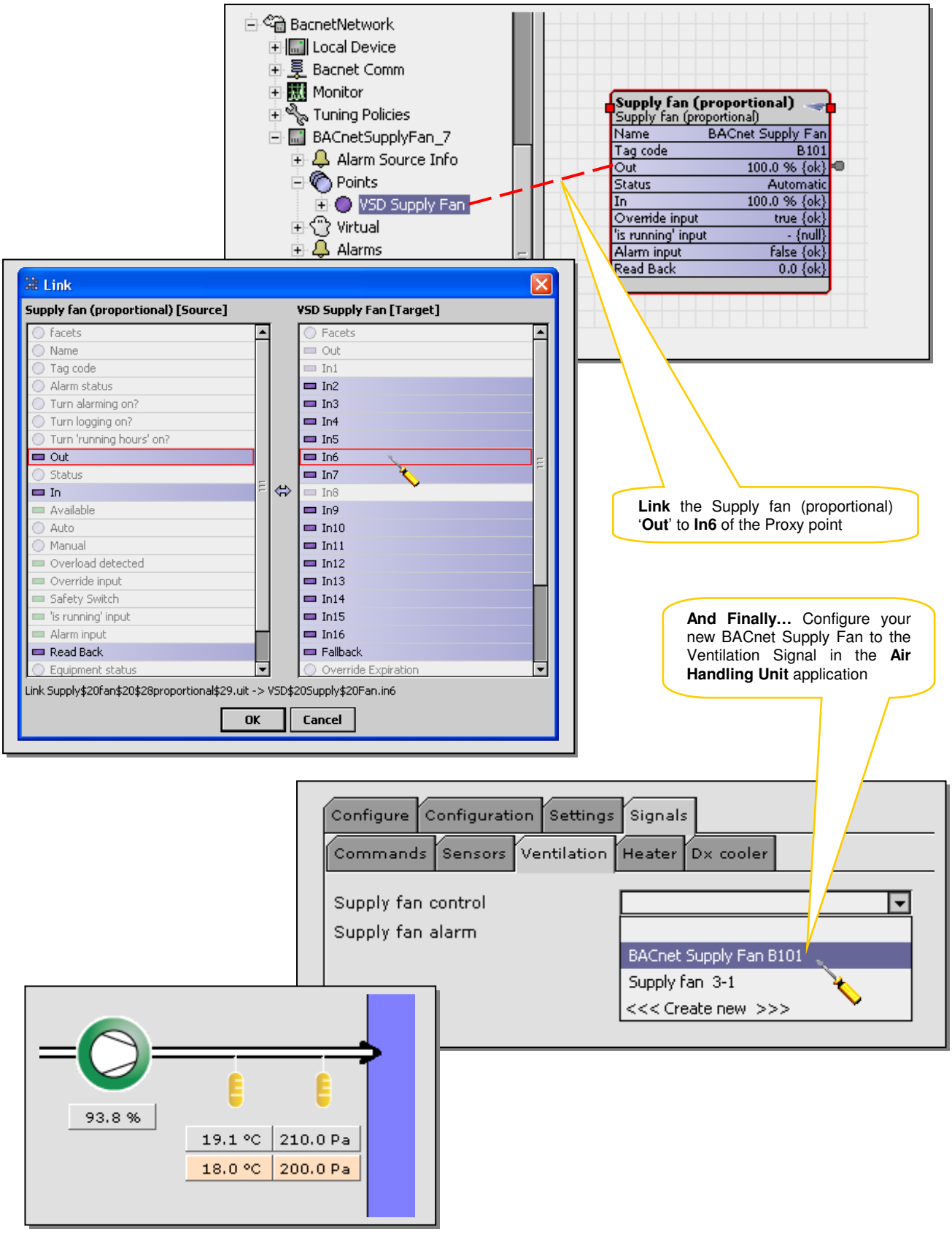

Config
Services
Drivers
HVAC
General
AirHandling
Graphics
Files
Views
Actions
Wire Sheet
Property Sheet
Select the Wire Sheet view of the AirHandling folder


vykonHvacPalette
Elements
Logic
Timers
Comparison
Calculations
Selections
Miscellanies
Objects
ObjectCreator
ObjectLink
EquipmentStatus
Drag an ObjectCreator from the vykonHVACPalette onto the Wire Sheet


ObjectCreator (Webeasy Object Creator)
Select type
Supply fan (proportional)
Summer night purge
Summer stop
Supply air fan (Press. diff. sensor)
Supply air fan (Press. diff. switch)
Supply air pressure
Supply air relative humidity
Supply air temperature
Supply fan
Supply fan (low/high)
Supply fan (proportional)
Supply fan alarm
System enable
Select the type to be a Supply fan (proportional)
…and Save
Save

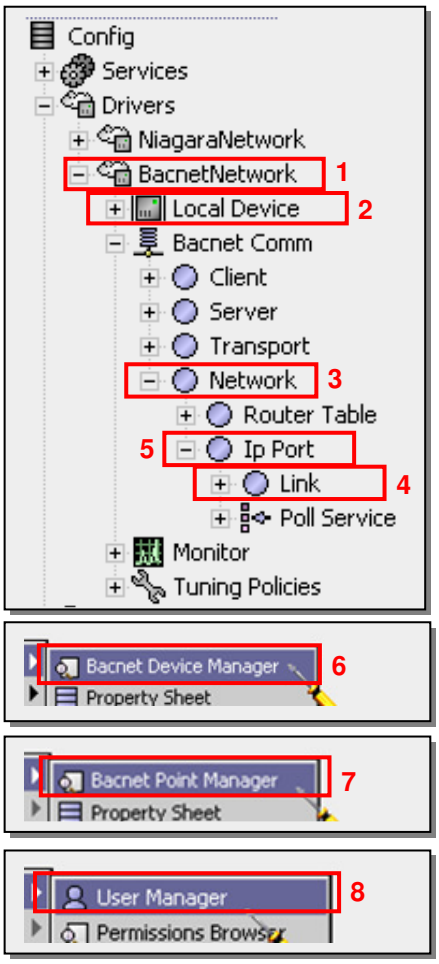

Cannot display page
Target object has been removed.
Back
Details
Note:
Saving the Object Creator will cause an Error to be raised. This is normal because the object creator has now 'reshaped' into a new object
Tip:
Click the Back button to restore the view
Back


Supply fan (proportional) (Supply fan (proportional))
facets
Name
BACnet Supply Fan
Tag code
B101
Alarm status
No alarm
Turn alarming on?
false
Name the Supply Fan and optionally a Tag code
…and Save
Save


BacnetNetwork
Local Device
Bacnet Comm
Monitor
Tuning Policies
BACnetSupplyFan_7
Alarm Source Info
Points
VSD Supply Fan
Virtual
Alarms
Supply fan (proportional)
Supply fan (proportional)
Name BACnet Supply Fan
Tag code B101
Out 100.0 % {ok}
Status Automatic
In 100.0 % {ok}
Override input true {ok}
'is running' input - {null}
Alarm input false {ok}
Read Back 0.0 {ok}
Link
Supply fan (proportional) [Source]
VSD Supply Fan [Target]
Facets
Name
Tag code
Alarm status
Turn alarming on?
Turn logging on?
Turn 'running hours' on?
Out
Status
In
Available
Auto
Manual
Overload detected
Override input
Safety Switch
'is running' input
Alarm input
Read Back
Equipment status
Out
In1
In2
In3
In4
In5
In6
In7
In8
In9
In10
In11
In12
In13
In14
In15
In16
Fallback
Override Expiration
Link Supply$20fan$20$28proportional$29.uit -> VSD$20Supply$20Fan.in6
OK
Cancel
Link the Supply fan (proportional) 'Out' to In6 of the Proxy point
And Finally... Configure your new BACnet Supply Fan to the Ventilation Signal in the Air Handling Unit application
Configure
Configuration
Settings
Signals
Commands
Sensors
Ventilation
Heater
Dx cooler
Supply fan control
Supply fan alarm
BACnet Supply Fan B101
Supply fan 3-1
<<< Create new >>>
93.8 %
19.1 °C
210.0 Pa
18.0 °C
200.0 Pa

BACnet quick start tips

Here is a short reminder of the most important things to do and to be aware of when configuring the NiagaraAX BACnet driver:



1. **Add** the BacnetNetwork from the palette to Station…Config…Drivers

2. **Select** the Property Sheet view of the Bacnet Network's Local Device and give the device a **unique** Object Id

3. **Select** the Property Sheet view of the Bacnet Network's…Bacnet Comm…Network…IP Port and set the **Network Number** to match the network number of the connected devices

4. **Select** the Property Sheet view of the Bacnet Network's…Bacnet Comm…Network…IP Port…Link and set the **Adapter** to the appropriate IP adapter of the JACE®

5. **Select** and click the **Enable** Action of the Bacnet Network's…Bacnet Comm…Network…IP Port

6. **Discover** the devices in the Bacnet Device Manager view of the Bacnet Network

7. **Discover** the points in the Bacnet Point Manager view of the Device Points Folder

8. **Select** the BACnet User and tick **Super User** permission

9. **Be aware** that you may need to create a Firewall 'Exception' for the BAC0 UDP (Port number 47808) to successfully communicate