

N30 Supervisory Controller Integration with the NAE

Application Note

Code No. LIT-1201801
Release 1.2
Issued January 10, 2005

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N30 Supervisory Controller Integration with the NAE

Application Note

Document Introduction

This document describes how to connect N30 Supervisory Controllers as BACnet® devices with the Network Automation Engine (NAE) in the Metasys® system extended architecture. This document contains information on preparing the N30s and NAEs to facilitate integration. This document does not include information on installing, configuring, or updating the NAE.

This document assumes that you have knowledge of N30 databases and Project Builder application.

Related Documentation

Table 1 lists documents related to N30 integration.

Table 1: Related Documentation

For Information On	Refer To	LIT/Part No.
BACnet System Integration with an NAE	<i>BACnet System Integration with NAE Technical Bulletin</i>	LIT-1201531
N30 databases and Broadcast Management objects (BBMDs)	<i>N30 Supervisory Controller Networking Technical Bulletin</i>	LIT-6891300
Using and Navigating the Interface of an N30 through a VT100	<i>N30 Supervisory Controller User's Manual</i>	LIT-6892010
Limitations of the Metasys System Extended Architecture	<i>Metasys System Extended Architecture Overview Technical Bulletin</i>	LIT-1201527
Project Builder	<i>Project Builder User's Guide</i>	LIT-693205

N30 Supervisory Controller Integration Overview

The N30s are integrated as BACnet devices in the Metasys system extended architecture.

Requirements

The N30 must have firmware Version 5.4 or later. Use a VT100 terminal or VT100 terminal emulator to view the firmware version number. (See Figure 1.)

Interlocks

Since you cannot see the results of an Interlock object with this integration method, enter a dummy variable to verify the status of the Interlock in the NAE. See [Changing the Interlock Object](#).

```
MD-N30: JCLP                               Fri 19 Mar 2004 09:11 CST
=====
MD-N30                                     Operational
=====
Object
Description          CFB Medical and Dental Office
Object Type          N30
Object Category      HVAC
State
Local Time           09:11:27
Local Date           19 Mar 2004
Julian Date          79 days
UTC Offset           360 minutes
Daylight Savings
DST Enabled          True
DST Status           False
Standard Time Units  CST
Daylight Time Units  CDT
Engineering Values
Firmware Version     5.4
Archive Date         19 Mar 2004
Reset Date           17 Mar 2004
Reset Time           17:26:30
Battery Condition     Ok
Default Base Units    SI Can Units
Hardware
Model                N30-1

F2-Command F3-Edit F4-Cancel Del-Delete []-Page
```

Figure 1: VT100 Terminal - Firmware Version

Broadcast Management Object (BBMD)

Formerly called the BACnet Broadcast Management Device (BBMD) object, a Broadcast Management object is added to N30s on different network segments to allow communication where broadcasts cannot be sent, for example, when using an Internet Protocol (IP) router. Always attempt to discover an N30 before adding BBMDs. Multiple problems may occur if a BBMD is unnecessarily added.

Detailed Procedures

Preparing the N30 Controller

When integrating N30s with existing NAEs, it is important to prepare all N30s by coordinating point names **before** you use Auto Discovery with the NAE. Each N30 should have a unique device object identifier (OID). The OID is downloaded using Project Builder.

Prepare the N30s by coordinating point names with the NAE to create a naming convention **before** you integrate the N30s with the NAE to avoid naming conflicts. Use Project Builder offline (preferred method), or use a VT100 terminal online.

Note: Enumeration sets must have the same number of states as the object. Project Builder does not check that the number of states matches, and it downloads even if there is a discrepancy.

Only standard object types are viewable on the NAE.

IMPORTANT: To avoid naming conflicts, prepare the N30s in Project Builder by coordinating point names with the NAE to create a naming convention **before** you integrate the N30s with the NAE. Each device must have a unique name.

Reassigning Point Types of Existing N30 Objects

To reassign point types of existing N30 objects:

Note: The NAE does not support write command to Analog Inputs (AIs) or Binary Inputs (BIs) N2 AIs and N2 BIs are not commandable objects in the NAE.

1. Reassign point types of existing N30 objects to make them commandable in the NAE.

In this example, in the two highlighted rows, 35 is a set point from an **ACO** ADF(1) Hmk-dx1-OATLO-SP and 38 is a **DCO** BD(1) Hmk-dx1-P1-LEAD, from a DX9100 program. When integrating the N30 with the NAE, the point under Object Type becomes the BACnet object, which is the AI for ADF(1), and BI for BD(1) (Figure 2). These are **not** commandable from the NAE.

	Object	Object Name	Object Type	Device Name	Description	Full Ref
1	N30	N30				N30
2	Applications		Container	N30		N30 Appli
3	Energy		Container	N30		N30 Ener
4	Group		Container	N30		N30 Grou
5	N2		Container	N30		N30 N2
6	Container	HMK-Alarm Container	Container	N30		N30 N2.C
7	DX-9100	HMK-Boiler Systems	Controller	N30	HMK Boiler Sys	N30 N2.D
8	Container		Container	N30		N30 N2.D
34	Container(1)		Container	N30		N30 N2.D
35	ADF(1)	Hmk-dx1-OATLO-SP	N2 AI	N30	Heating OAT Lo	N30 N2.D
36	N2 AO	Hmk-dx1-OAT	N2 AO	N30	OAT ADSF Poin	N30 N2.D
37	LRS(8)	Hmk-dx1-P1-ALM	N2 BI	N30	Boiler Pump 1 al	N30 N2.D
38	BD(1)	Hmk-dx1-P1-LEAD	N2 BI	N30	Pump 1 Lead	N30 N2.D
39	LRS(6)	Hmk-dx1-P1P2-ALM	N2 BI	N30	Boiler Lead Pu	N30 N2.D
40	LRS(9)	Hmk-dx1-P2-ALM	N2 BI	N30	Boiler Pump 2 A	N30 N2.D
41	LRS(10)	Hmk-dx1-P3-ALM	N2 BI	N30	Radiation Pump	N30 N2.D
42	LRS(11)	Hmk-dx1-P4-ALM	N2 BI	N30	Radiation Pump	N30 N2.D
43	BD(2)	Hmk-dx1-P5-LEAD	N2 BI	N30	Pump 5 Lead	N30 N2.D
44	LRS(7)	Hmk-dx1-P5P6-ALM	N2 BI	N30	Glycol Lead Pu	N30 N2.D
45	Container(2)		Container	N30		N30 N2.D
46	PMK(73)	Hmk-dx1-Gly OAT HI SP	N2 AI	N30	Glycol HWS OA	N30 N2.D
47	PMK(71)	Hmk-dx1-Gly OAT LO SP	N2 AI	N30	Glycol HWS OA	N30 N2.D
48	PMK(72)	Hmk-dx1-Gly Rst HI SP	N2 AI	N30	Glycol HWS Re	N30 N2.D
49	PMK(74)	Hmk-dx1-Gly Rst LO SP	N2 AI	N30	Glycol HWS Re	N30 N2.D
50	PMK(69)	Hmk-dx1-Gly Rst X0 LL	N2 AI	N30		N30 N2.D
51	PMK(75)	Hmk-dx1-Gly Rst X3 HL	N2 AI	N30		N30 N2.D
52	PMK(70)	Hmk-dx1-Gly Rst Y0 HL	N2 AI	N30		N30 N2.D
53	PMK(76)	Hmk-dx1-Gly Rst Y3 LL	N2 AI	N30		N30 N2.D
54	PMO(26)	Hmk-dx1-GLY-HWSP	N2 AI	N30	Calc Glycol HW	N30 N2.D
55	LRS(14)	Hmk-dx1-HT-OA-EN	N2 BI	N30	Heating OA Ena	N30 N2.D

Figure 2: Project Builder - N30 Database

2. Modify the current database of the N30, and change the Object Type from AI to Analog Output (AO) and BI to Binary Output (BO), if commands are required.
3. Before you add the new points, write down the original object names. In this example, the original names are ADF(1) and BD(1).
4. Delete the original points.

5. Create new points. In this example, the points are N2 AO(1)- Hmk-dx1-OATLO-SP - N2 AO, and N2 BO - Hmk-dx1-P1-LEAD - N2 BO (Figure 3).

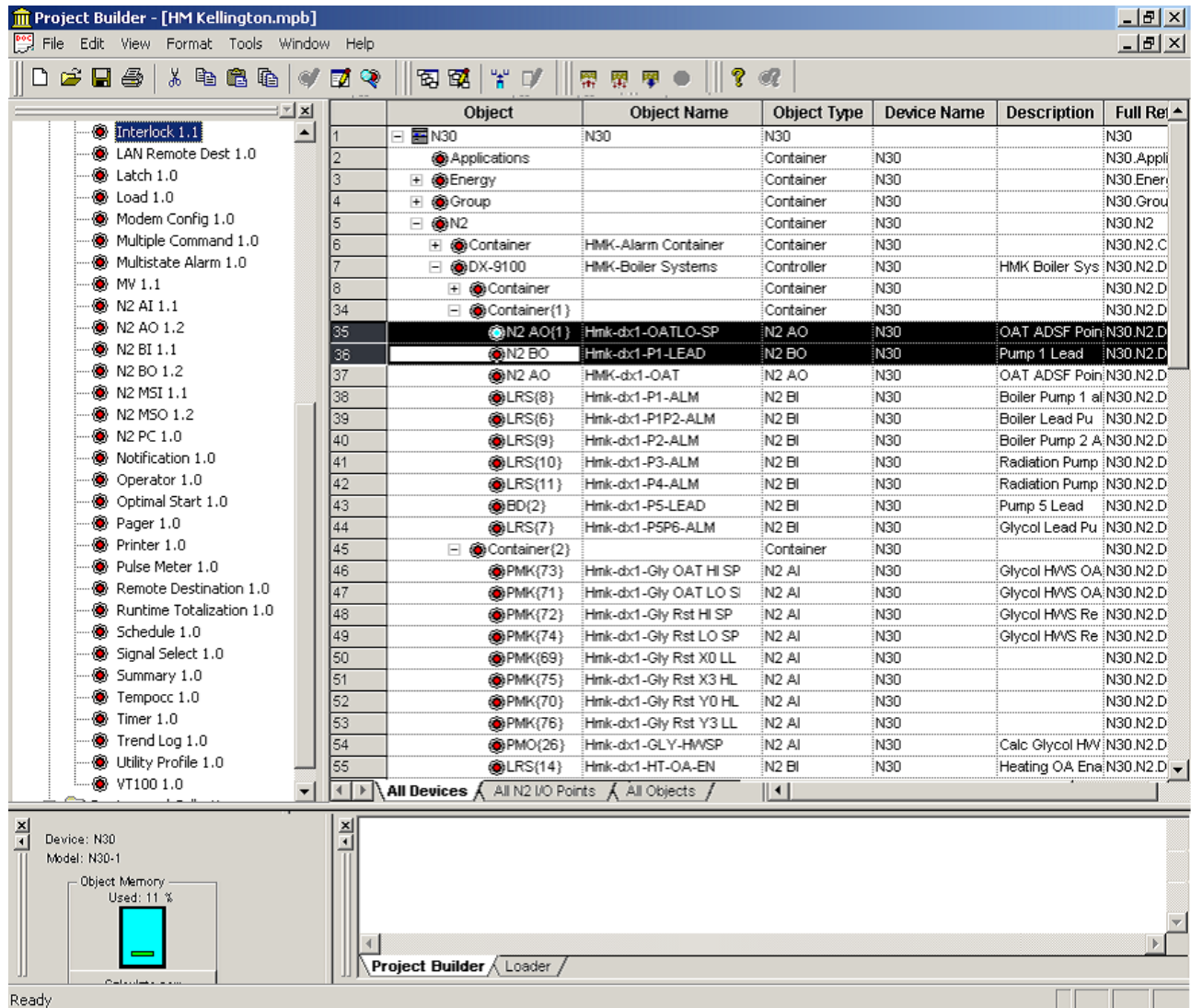


Figure 3: Project Builder - Creating New Points

- Open each point and change the Net Point Type and Net Point Addr for all points that you need to command from the NAE. In this example, the Net Point type is changed to ADF and 1 (Figure 4).

Figure 4: Project Builder - Edit Attributes

- After you update all necessary points, download to the N30.

Reassigning N30 Object Types in the DMO File

To reassign N30 object types in the DMO file:

- If this is a new N30 database, modify the DMO file for the DX9100. In this example, the following was changed from “DCO1”,N,N,” to “DCO1”,Y,Y,” (Figure 5).

Note: When you import the file into the N30, the objects change from BI to BO or AI to AO. This does not apply to Hardware points.

```
MODULE DCO 1
CSMODEL "DCO", "DX9100"
ADTITLE "Analog Data"
BDTITLE "Binary Data"
CSBD "DCO1", N, N, "OCCD-C", "UNOCC", "OCC"
```

Figure 5: DX9100 DMO File Example

Note: For ASC devices, you do not have to make significant changes to points. In Figure 6, Item 217 is ADF(177) and has the Object type of N2AO.

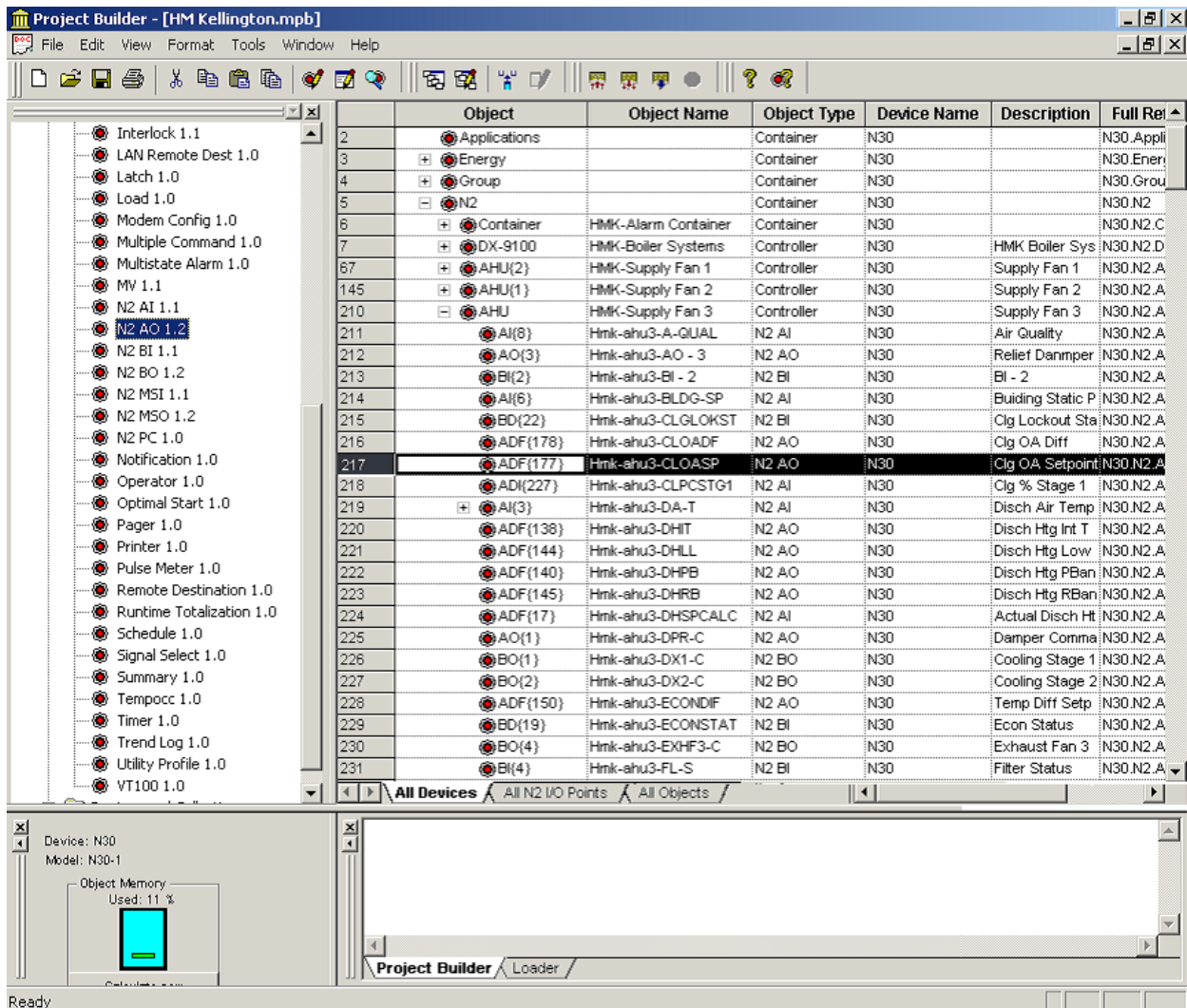


Figure 6: Project Builder - ASC Example

Changing the Interlock Object

Change the Interlock object in Project Builder to identify the interlock condition in the NAE. Refer to *Working with Interlock Objects* in the *N30 User's Manual*.

To change the Interlock object:

1. For any interlocks in the N30, create a dummy BV object that is commanded when the Interlock is enabled. Interlocks do not get passed to the NAE, so you cannot see if the Interlock is enabled (Figure 7). By adding a BV, this object maps back to the NAE, and you receive the status of the interlock (Figure 8).

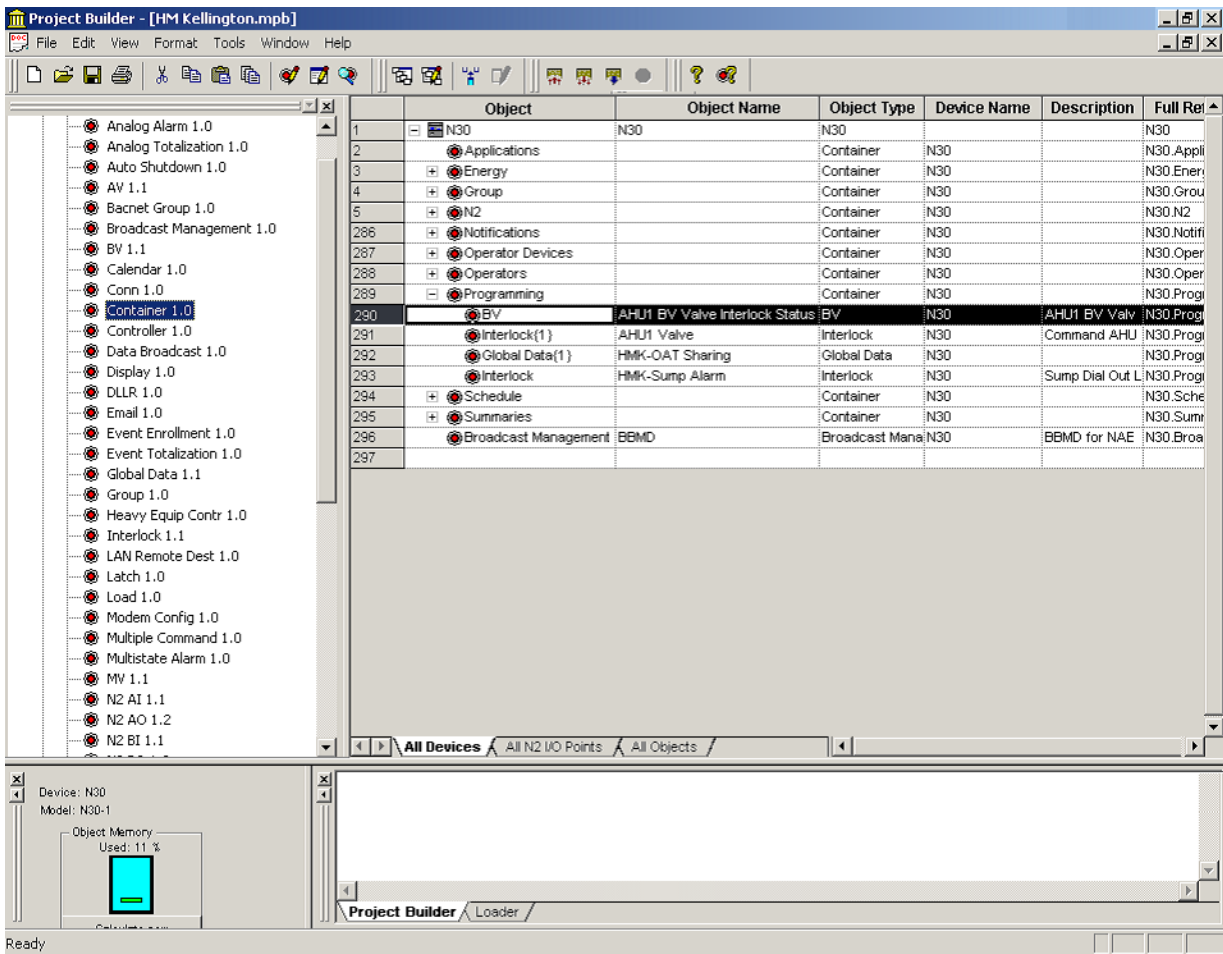


Figure 7: Project Builder - Interlock (No Status)

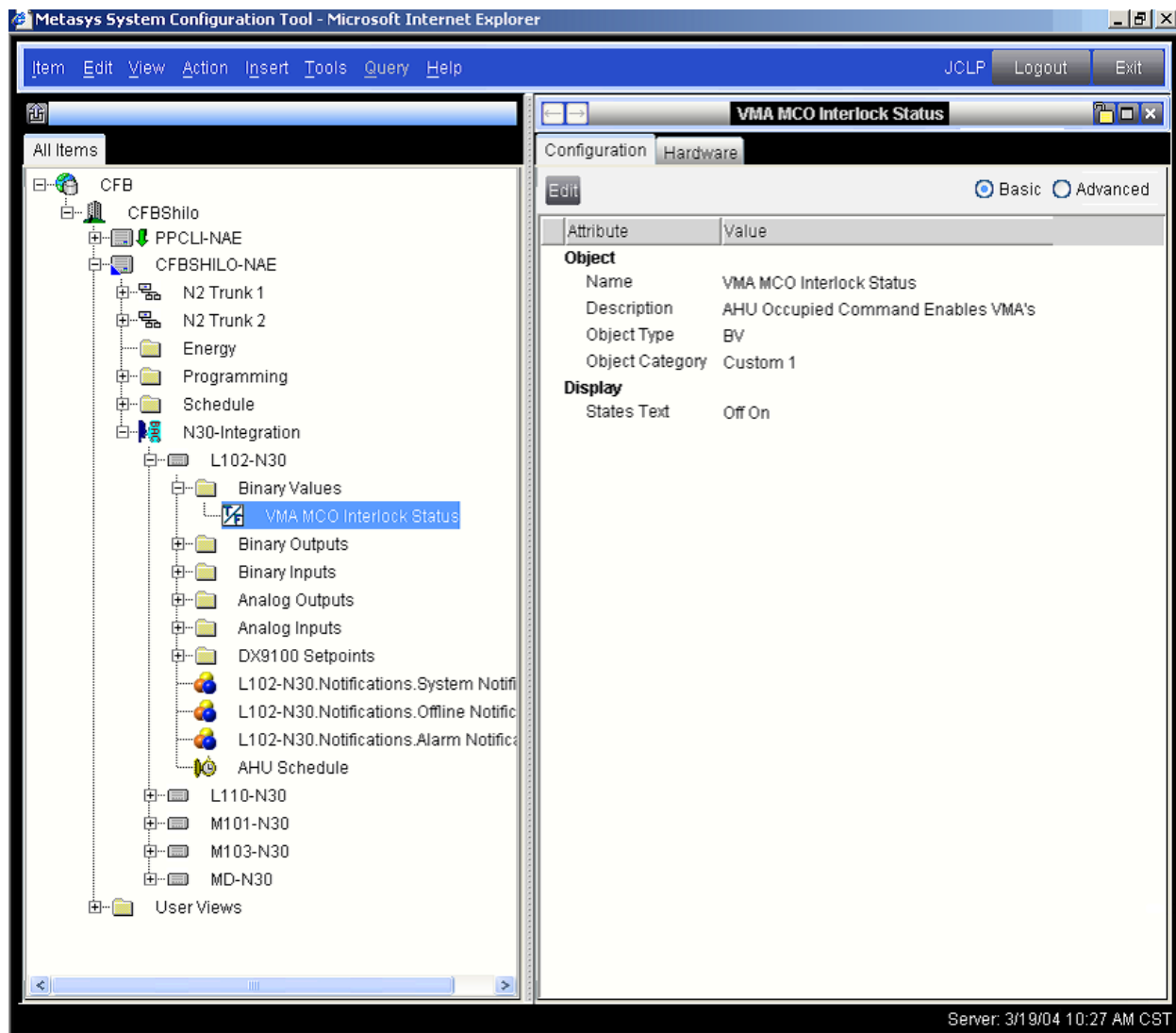


Figure 8: NAE - Status from BV Object

2. Complete all description fields on each interlock you change. These fields also import to the NAE.

Setting Up Communication for the N30

To set up communication for the N30:

1. Add the IP Address, IP Mask, and IP Router Address of the N30. (This example contains static IPs.) You can do this online using a VT100 or offline using Project Builder. Refer to *Changing an IP Address* in Chapter 3: *Getting Started* in the *N30 Supervisory Control User's Manual (LIT-6892010)*.

Note: If the BACnet settings of the NAE are different from the setting in the N30, you must coordinate these settings. The default UDP setting is 47808 and must match in the NAE and the N30. The standard network address is 1001. The network addresses can be different if a BBMD is defined for that device.

2. If the N30 is on a separate segment from the NAE, add the Broadcast Management object (formerly the BACnet Broadcast Management Device [BBMD]) to the N30 [Figure 9]). You can only add a BBMD from Project Builder; however, you can modify it online using VT100 (Figure 10).

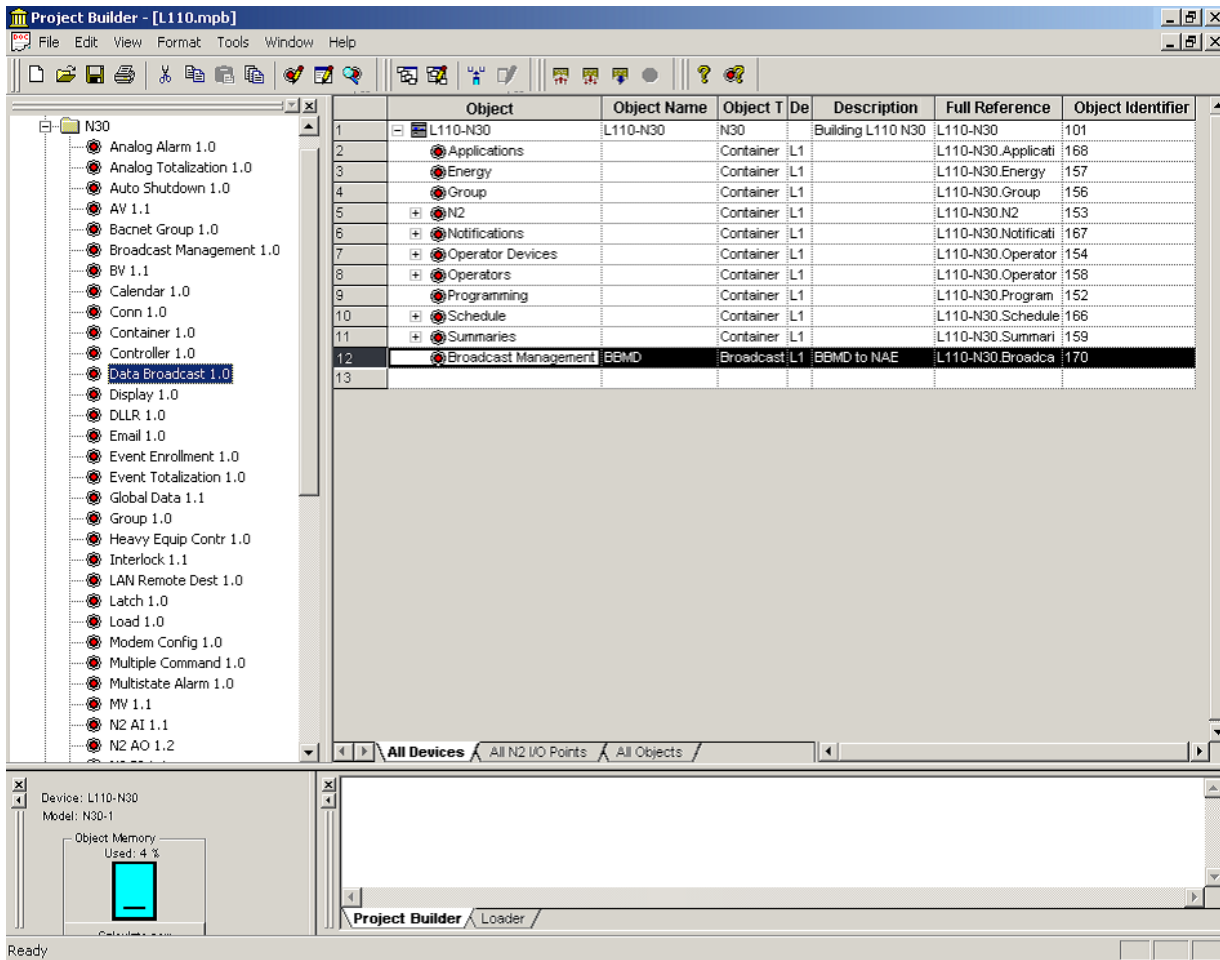


Figure 9: Project Builder - BBMD

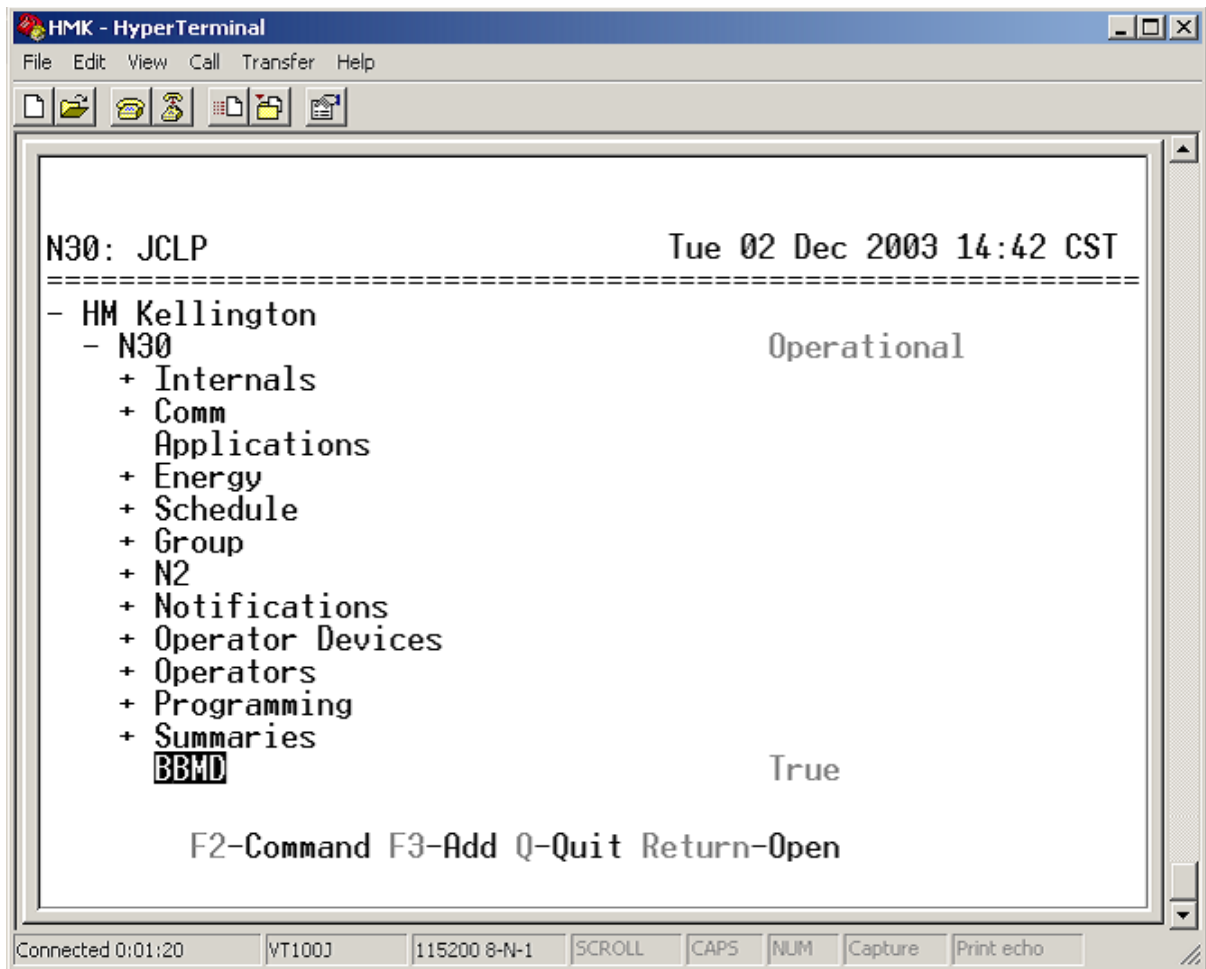


Figure 10: VT100 - BBMD

3. Click Edit, and configure the BBMD (Figure 9).
4. Add the IP Address of the NAE in BM Address List IP Address field. In the IP Broadcast Mask field, enter 255.255.255.255, not the current subnet mask. This is a requirement of the BBMD object.
5. If no other N30s exist on the segment, change the Broadcast Disable to True to prevent the BACnet device from sending out unnecessary broadcast messages.

Note: If your network does not require the BBMD, disable the object.

The N30 is now ready for BACnet Integration to the NAE.

Preparing the NAE

Setting Up Communication for the NAE

To set up communication for the NAE:

1. Log on to the NAE, and drag the NAE Device to the display frame.

2. Open the Networking Tab. We recommend using a static IP address (Figure 11).

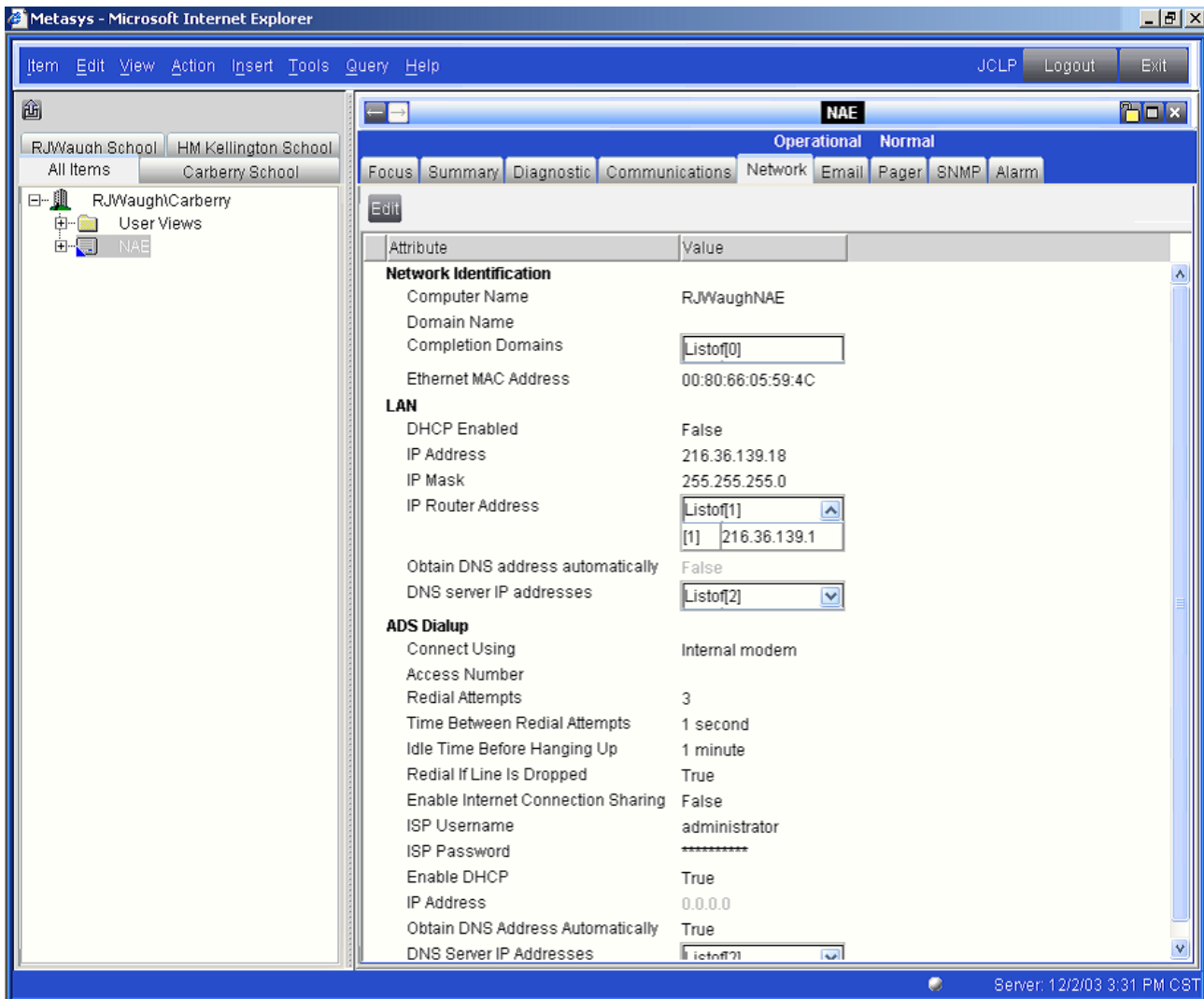


Figure 11: NAE - Networking Tab

3. Log onto the Site Director, and drag the Site Object over to the display frame.
4. Click Advanced to display the BACnet information.

5. Edit the object and change the BACnet Site to True and BACnet Encoding to ASCII.

Metasys - Microsoft Internet Explorer

Item Edit View Action Insert Tools Query Help JCLP Logout Exit

RJWaugh School HM Kellington School

All Items Carberry School

RJWaughCarberry

User Views

NAE

Site View

Save Cancel

Basic Advanced

Attribute	Value	Units
Object		
Name	RJWaughCarberry	
Description	Contract 3098-0012	
Object Type	Site	
Object Category	General	
Site Director	RJWaughNAE	
Engineering Values		
Default ADS Repository	0.0.0.0	
Default ADS Connection Type	LAN	
Default ADS Dial Priority Threshold	20	
Default ADS Delivery Time	12:15 AM	(HH:MM am/pm)
Dynamic Broadcast Management	True	
Max Missed Check-ins	2	
Time		
Time Zone	(GMT-06:00) Central Time (US & Canada)	
Site Time Servers	Listof[0]	
Device Time Servers	Listof[1]	
Time Sync Period	1 hour	
BACnet		
BACnet Site	True	
BACnet Encoding Type	ascii	
Third party BBMDs	Listof[1]	
	[1] 216.36.139.9	
DNS Refresh Period	20	minutes

Server: 12/2/03 3:29 PM CST

Figure 12: NAE - Site View

6. Open the Third party BBMDs.

- Click Advanced, and click Edit to view the Third party BBMD (Figure 13). If the N30 resides on a segment with no NAEs, add the IP address of the N30 online or with the SCT.

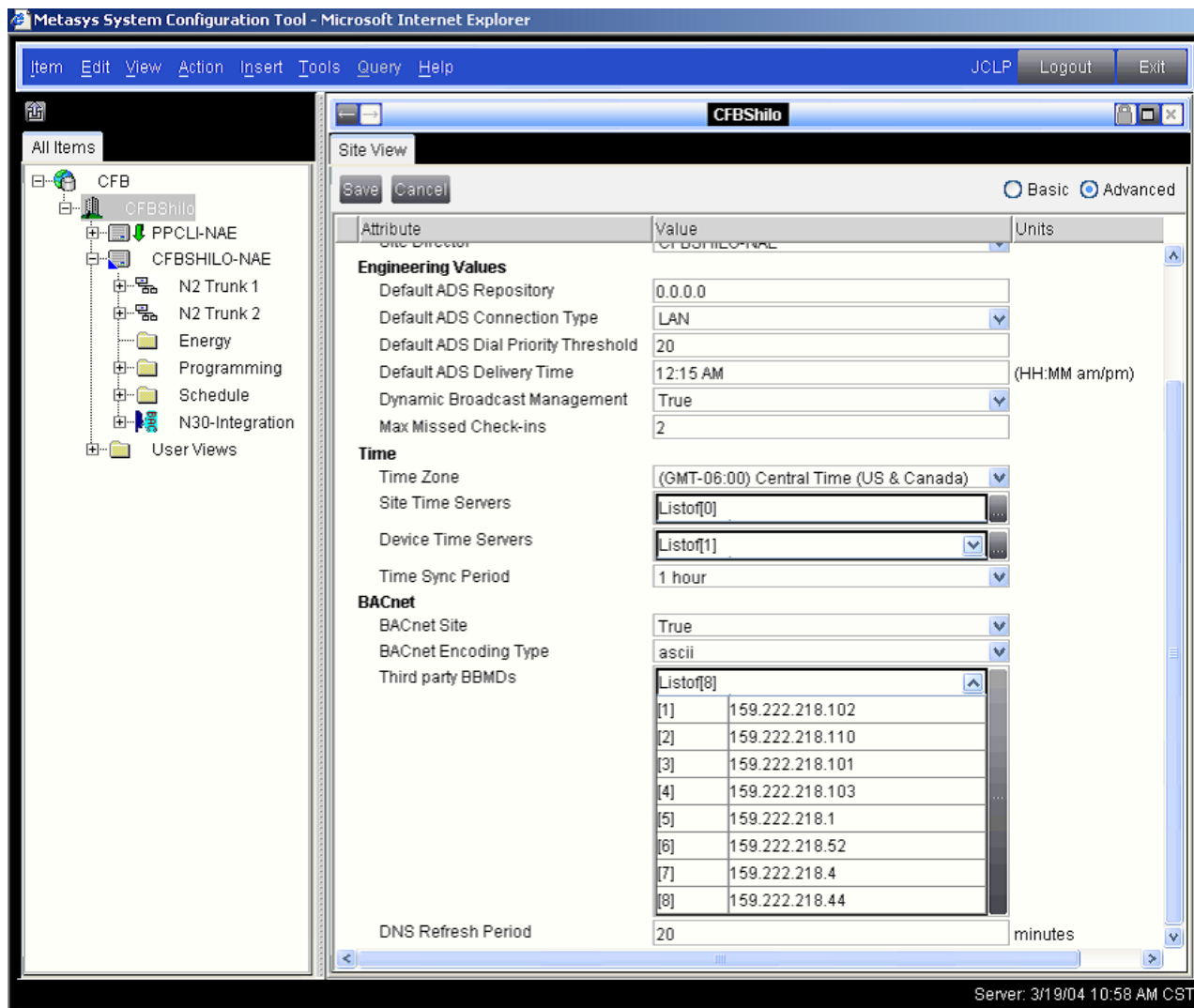


Figure 13: NAE - Advanced View

- Click Save. The NAE is now ready for N30 integration.

Integrating the N30 with the NAE

Adding the BACnet Integration Object to the NAE

To add the BACnet Integration Object to the NAE:

- Log on to the NAE. (Verify that the N30 and NAE are communicating.)
- Add the BACnet Integration Object by following the steps in the *BACnet System Integration with the NAE Technical Bulletin (LIT-1201531)*.

Adding an N30 to the BACnet Integration Object

To add an N30 to the BACnet Integration Object:

1. Highlight the BACnet Integration Object and select Insert > Field Devices (Figure 14).

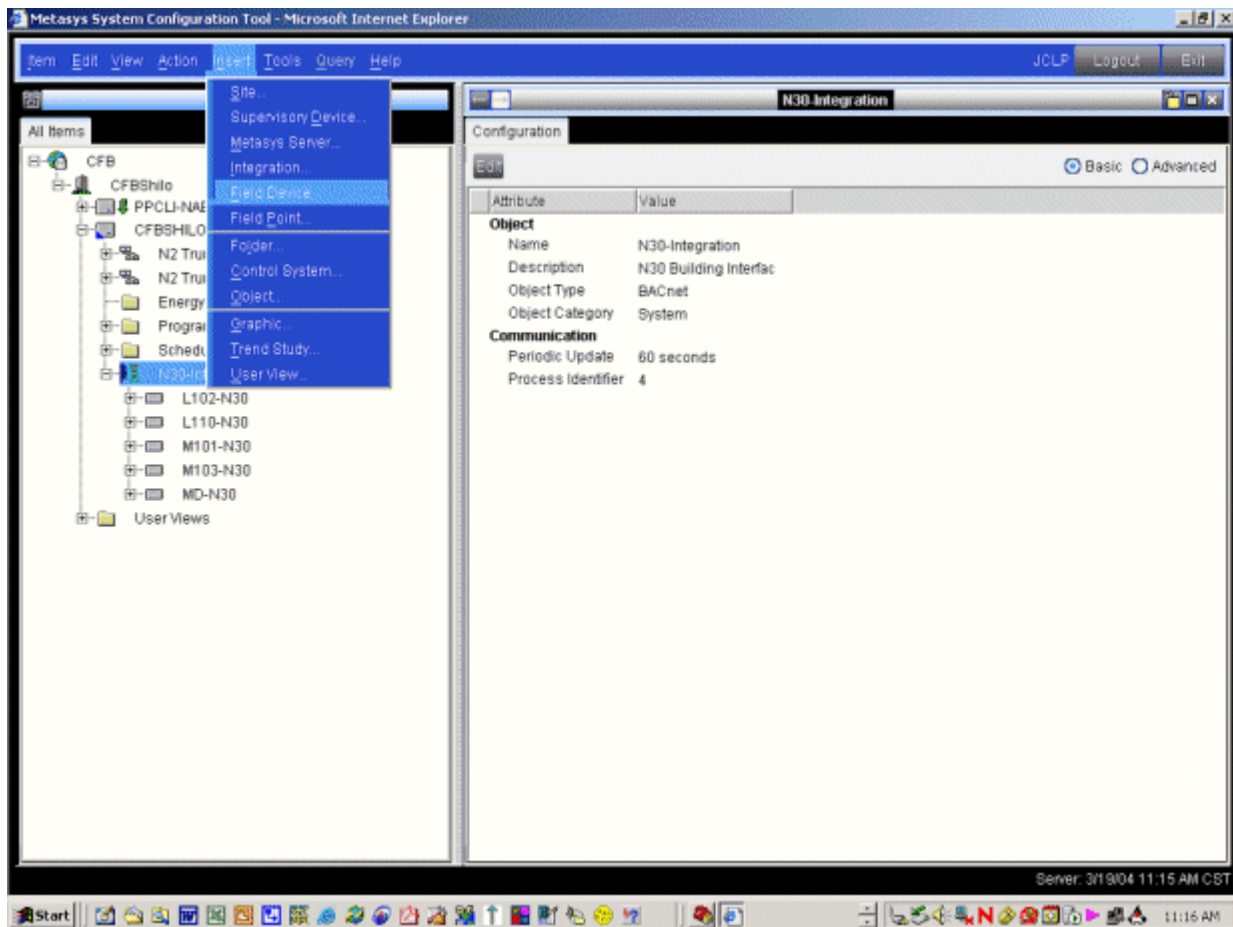


Figure 14: Insert Field Device

2. Click the Assisted radio button.
3. Click the **Invoke Auto Discovery...** bar.
4. In the Identifier screen, change the Unique Identifier to something familiar (for example, the name of the N30).

Note: The Unique Identifier is a BACnet number that you may not be able to easily identify. The Unique Identifier is viewable in Project Builder.

- When the N30 is found, the Wizard Auto Detect Utility screen appears (Figure 15). The first four items are on the network and already installed. The last row L110-N30 Device-101 is installed in this example. Write down the Instance Number for future use. Add the Instance Number to the name as shown.

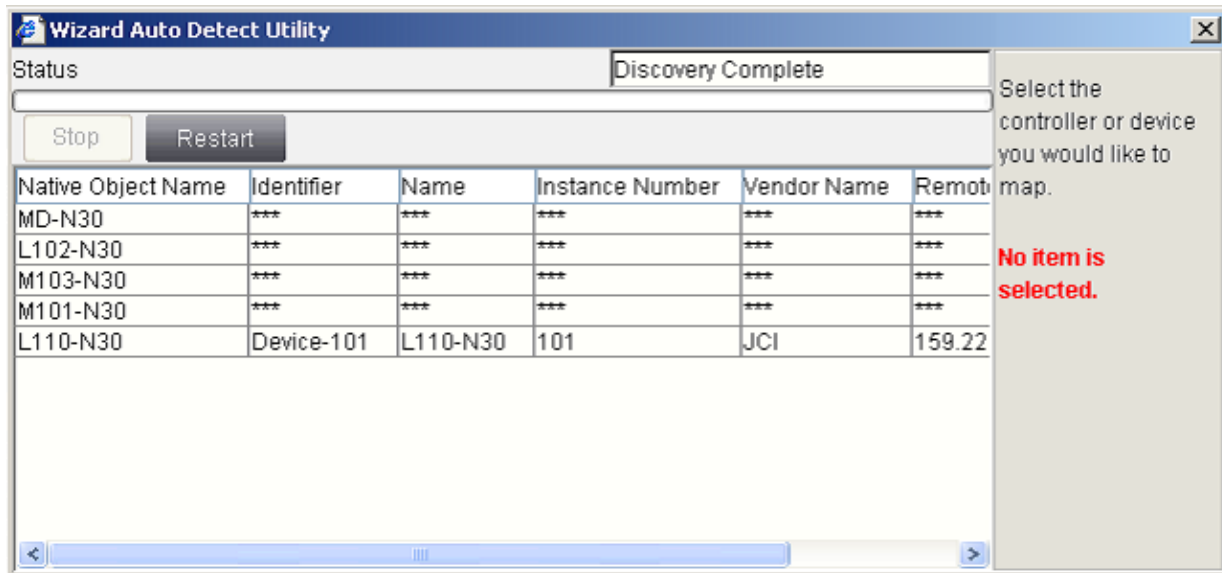


Figure 15: Wizard Auto Detect Utility

6. Near the end of the Field Device Wizard, in the Extension Wizard screen, click Done. The Field Points Wizard screen appears to import the N30 Objects (Figure 16).

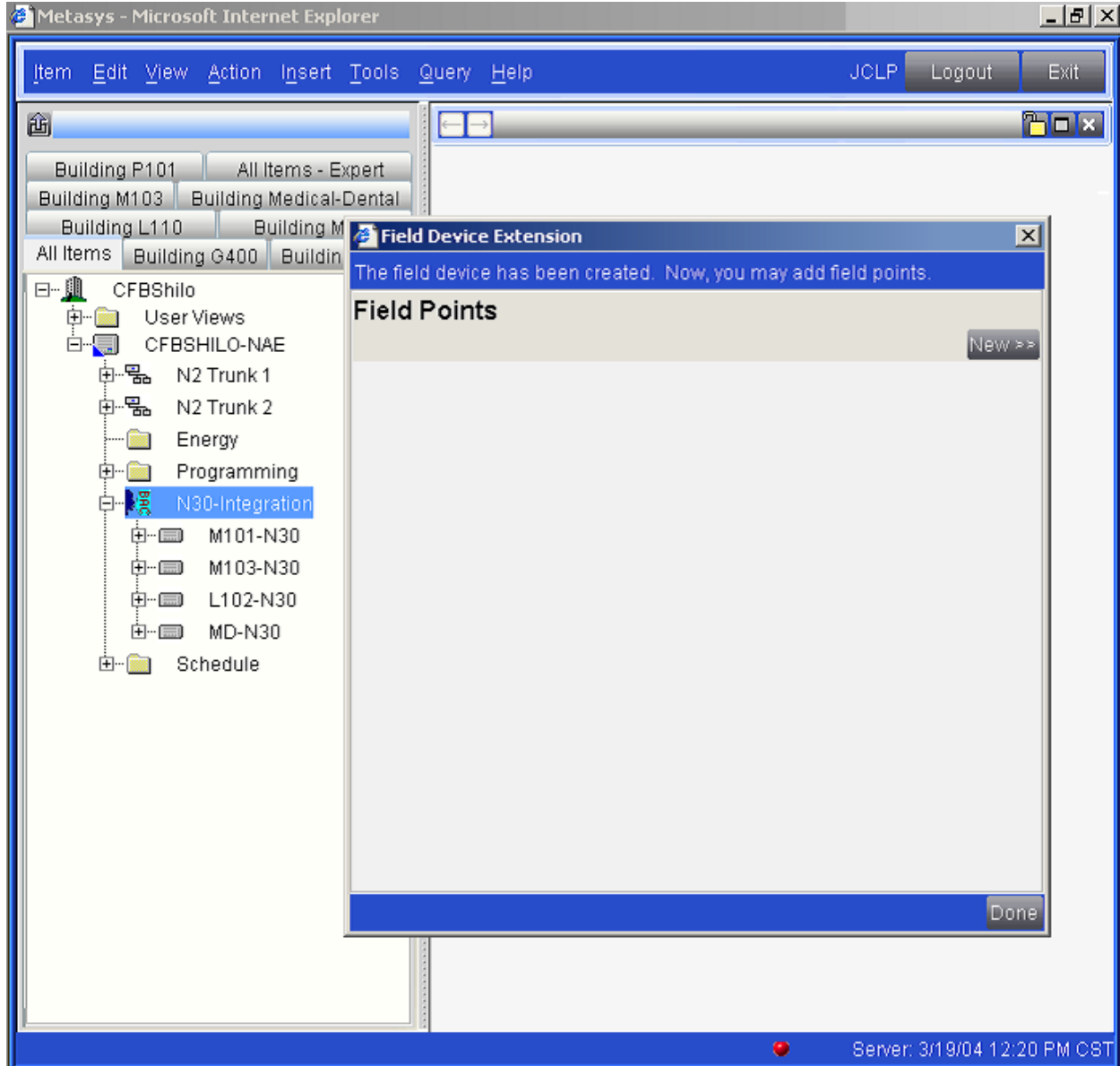


Figure 16: Field Points Wizard

- Click on New>>, then click on Assisted to locate the points. The Wizard Auto Detect Utility screen appears with all standard BACnet objects (Figure 17).
Point discovery may take several minutes.

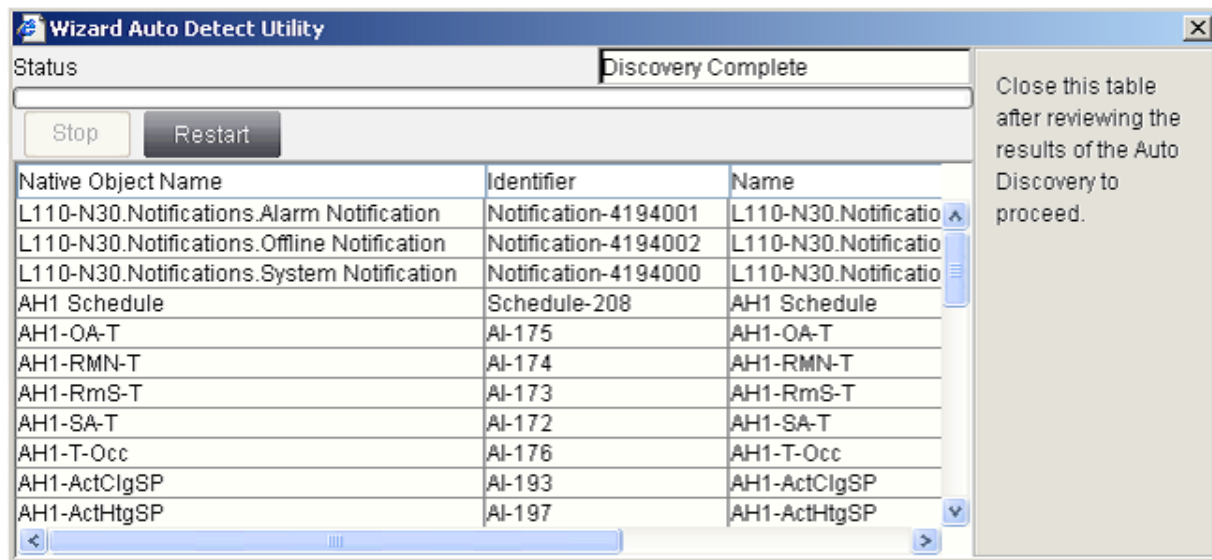


Figure 17: Auto Detect Utility Wizard

- Select points for the NAE using the Point Mapping Utility screen (Figure 18).

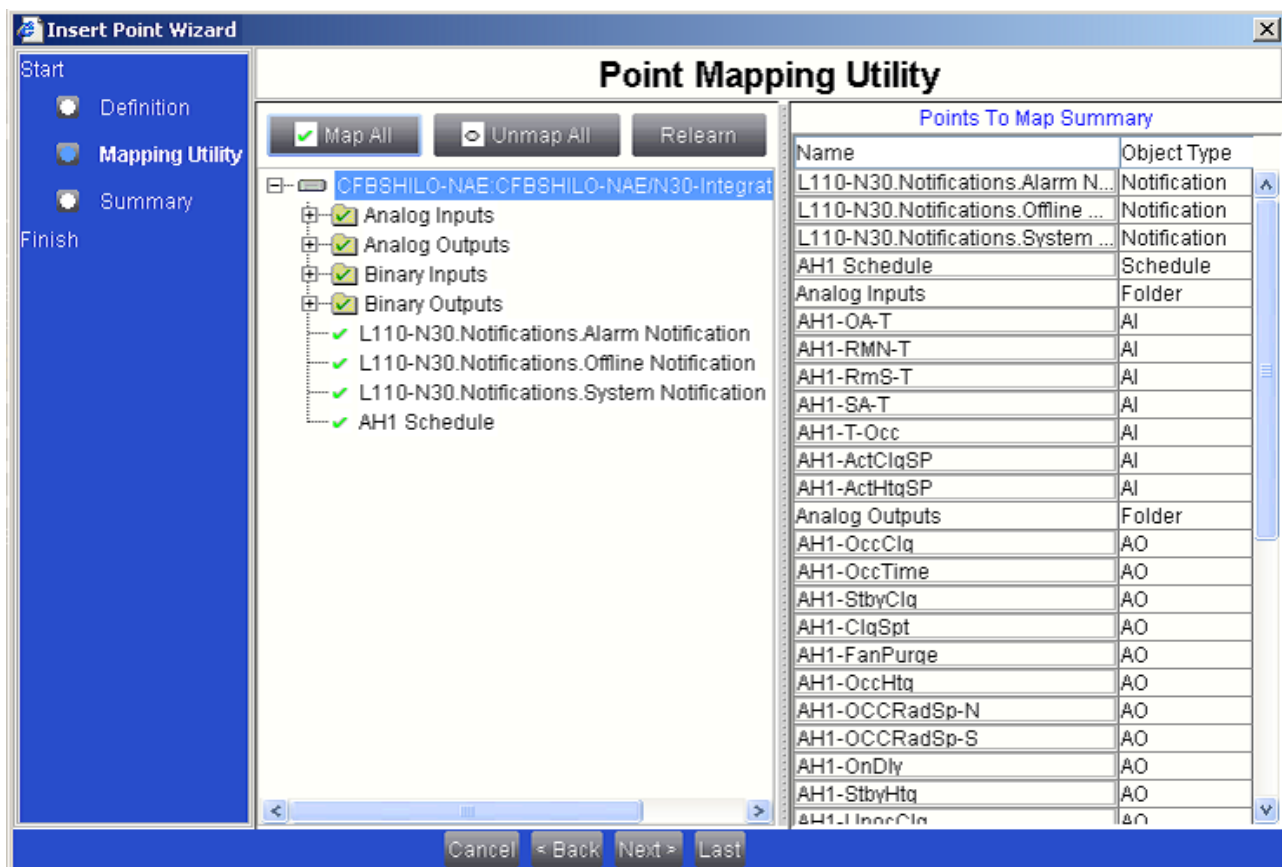


Figure 18: Point Mapping Utility

The following N30 device appears under the BACnet Integration (Figure 19).

Only the Schedule imports (no Interlocks import), due to the changes made in *Changing the Interlock Object*. A folder is created called Binary Values that contains the BV for the interlock.

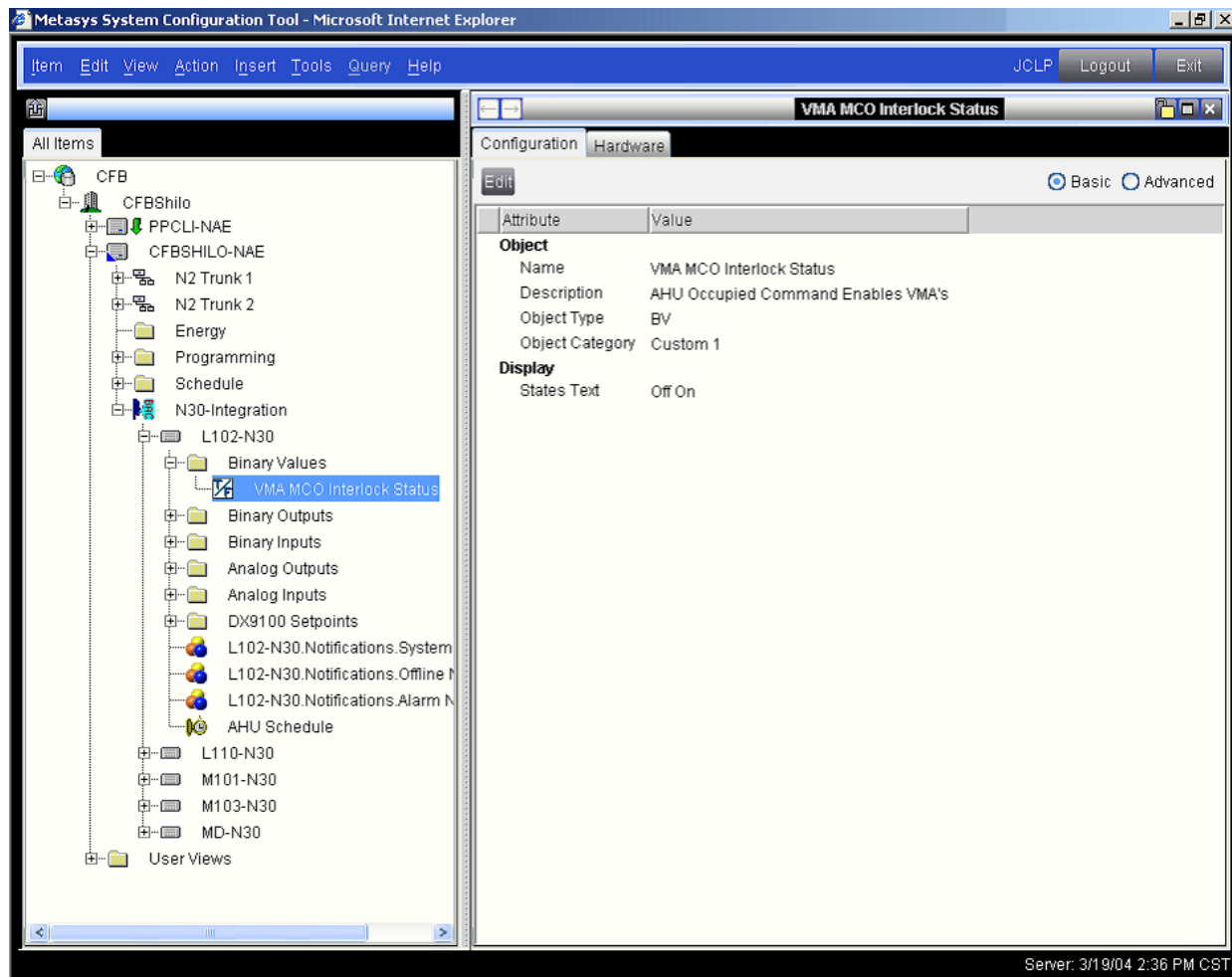


Figure 19: Binary Values Folder with Interlock Schedule

Note: Consider the total number of BACnet devices allowed per NAE and the total number of allowed objects. Using the Diagnostic tab in the NAE, look at the total number of objects (Object Count) to determine how many N30s you can have on your system (Figure 20). A maximum of 50 N30s and third-party devices is allowed. Refer to the *Performance Guidelines and Limitations* table in the *Metasys System Extended Architecture Overview Technical Bulletin (LIT-1201527)* for details.

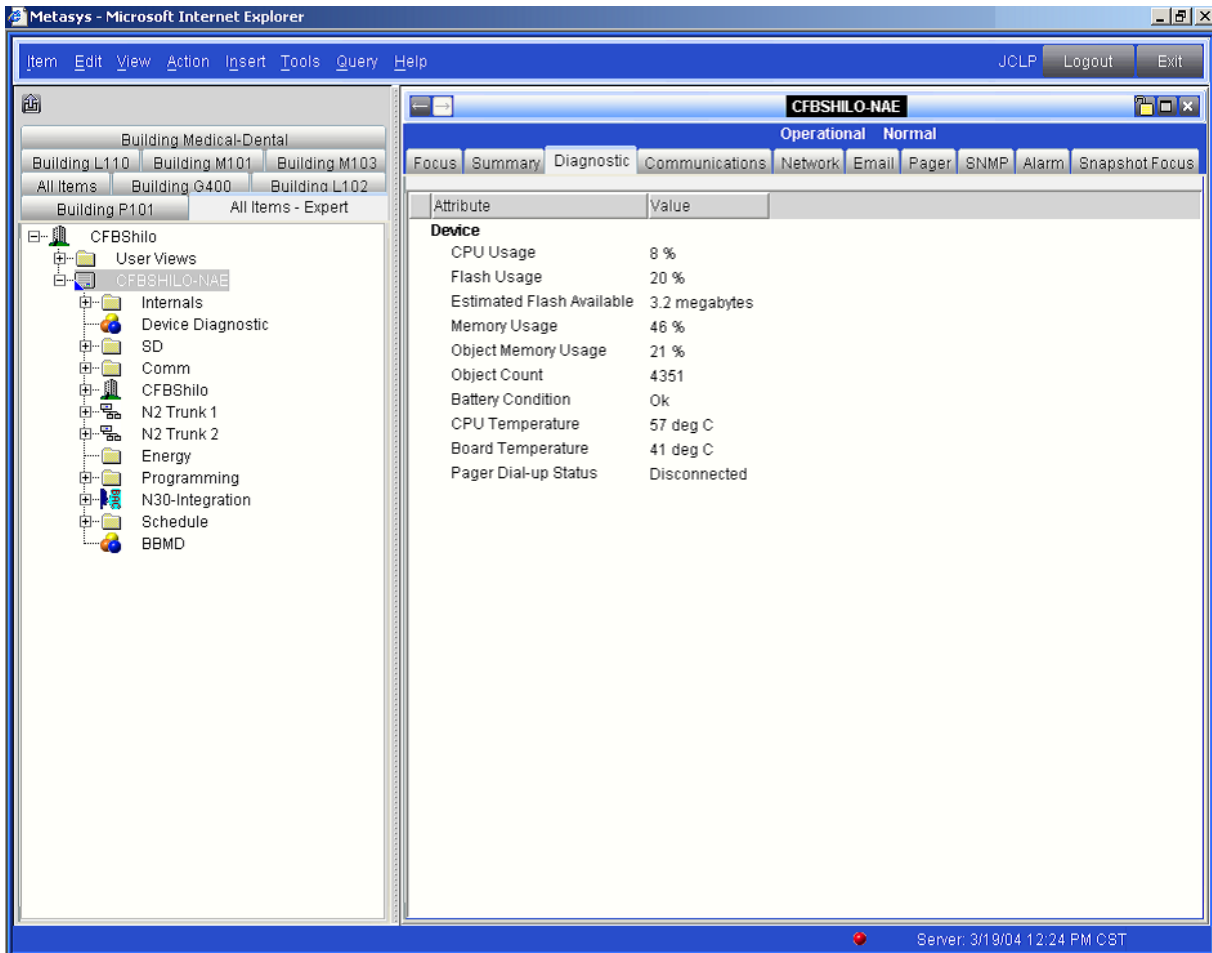


Figure 20: Diagnostic Tab - Object Count

Adding N30s from Different Sites to an NAE (or project files in Project Builder)

To add N30s from different sites to an NAE:

1. If you have different sites with N30s, change the Object Identifier for each N30 to a unique number.

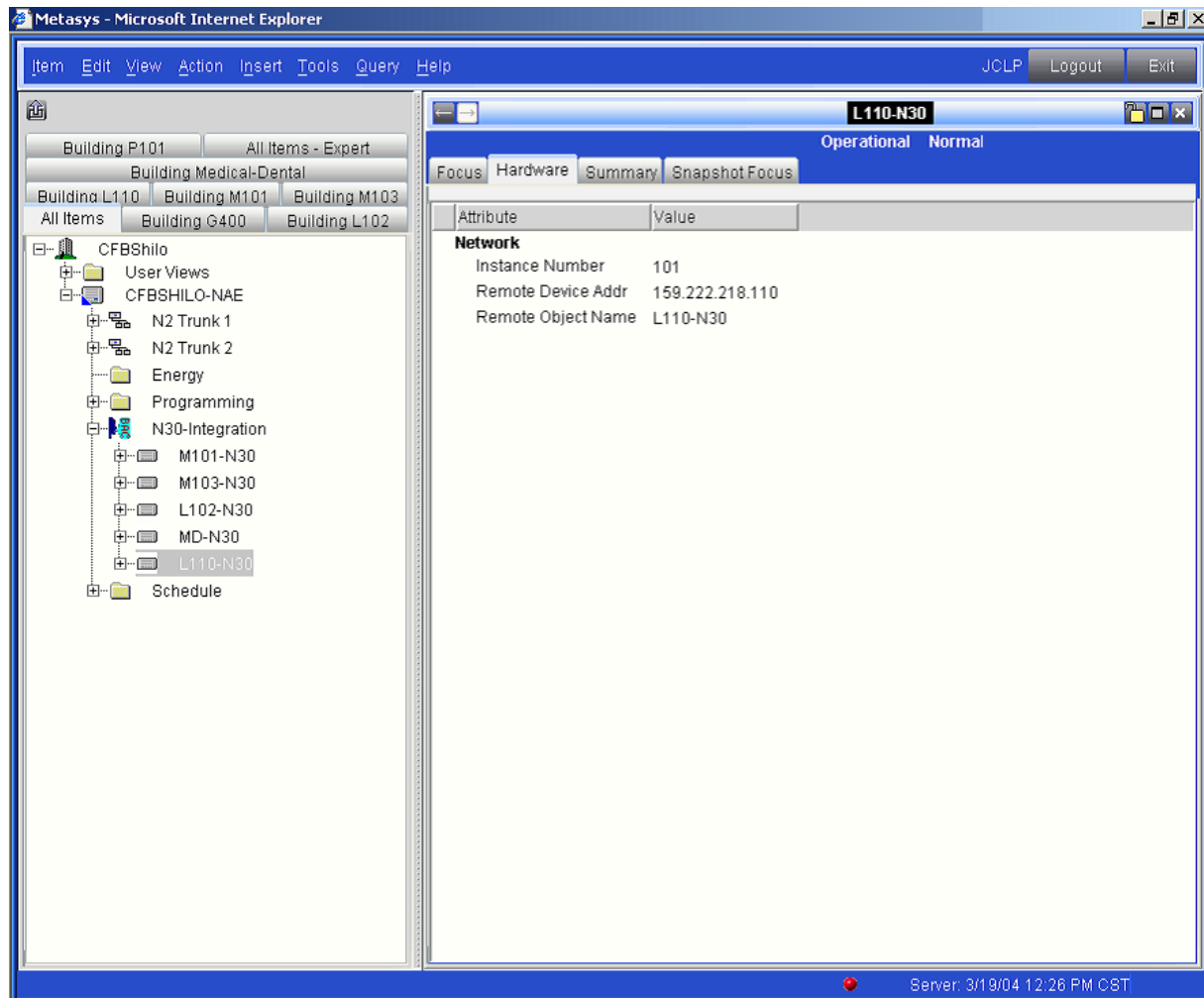


Figure 21: Selecting an N30 from a Different Site

2. Open Project Builder and enter the N30 information in the Edit Attributes screen (Figure 22).

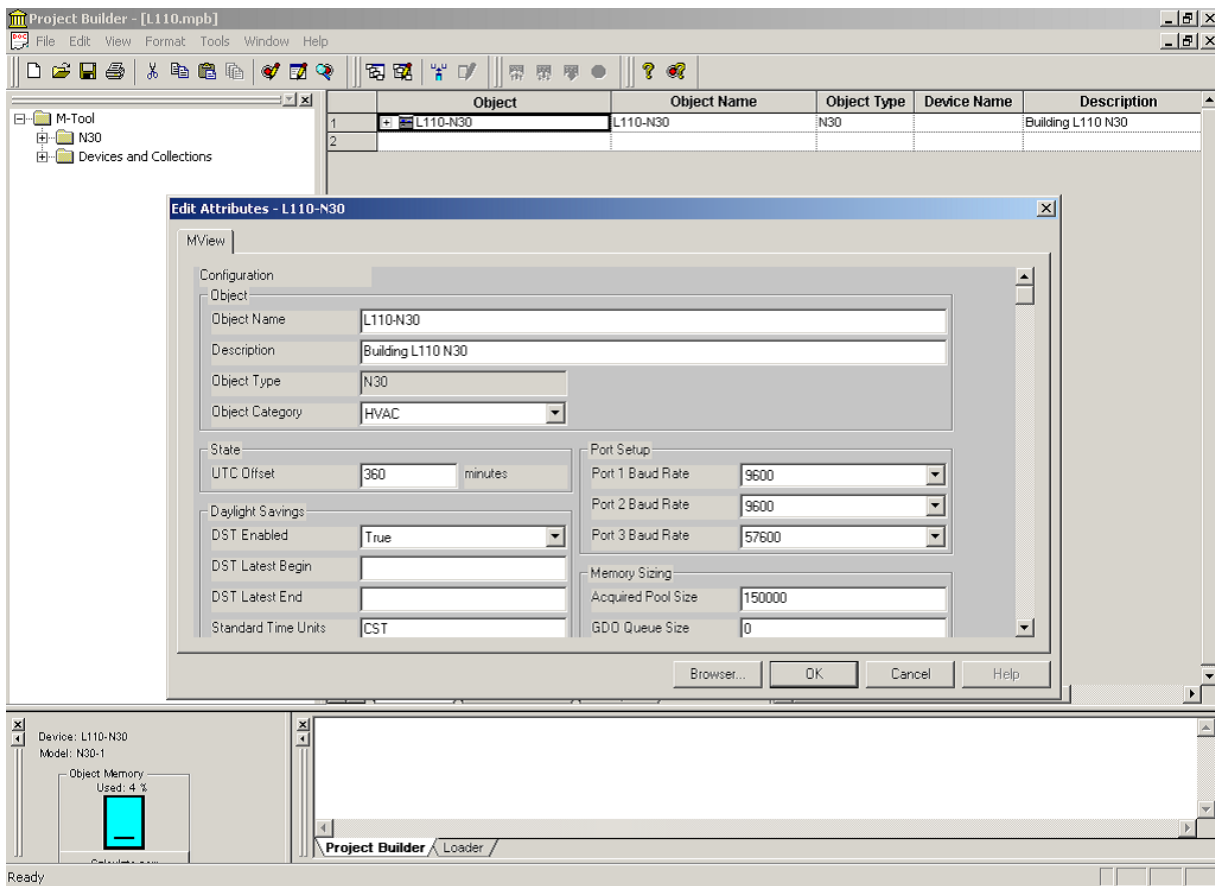


Figure 22: Project Builder - Edit Attributes

3. Right-click inside the box and select Snapshot Config. Change the Object Identifier (Figure 23). In this example, it is 101 for each N30 that does not reside in the same site. This Object Identifier matches the Instance Object of the NAE. The NAE takes this number from the N30. By default all N30s have 100 as the Object Identifier.

The screenshot shows a software window titled "Edit Attributes - L110-N30". Inside, there's a "Snapshot Config" section with several input fields. The "Object Identifier" field is circled in red and shows the value "101". Other fields include "Object Name" (L110-N30), "Description" (Building L110 N30), "Query String" (empty), "Enabled" (True), "Execution Priority" (Normal), "Object Category" (HVAC), "Preload Classes" (List Elements), "Appl SW Version" (empty), "Location" (empty), and "Next Available OID" (3000000). At the bottom are buttons for "Browser...", "OK", "Cancel", and "Help".

Field	Value
Object Name	L110-N30
Description	Building L110 N30
Query String	
Enabled	True
Execution Priority	Normal
Object Category	HVAC
Object Identifier	101
Preload Classes	List Elements
Appl SW Version	
Location	
Next Available OID	3000000

Figure 23: Edit Attributes - Object Identifier

4. Select Format > Add Column to display this value in Project Builder. The Add Column dialog box appears (Figure 24).

5. From the Attribute pull-down menu, select Object Identifier. An Object Identifier column appears in Project Builder.

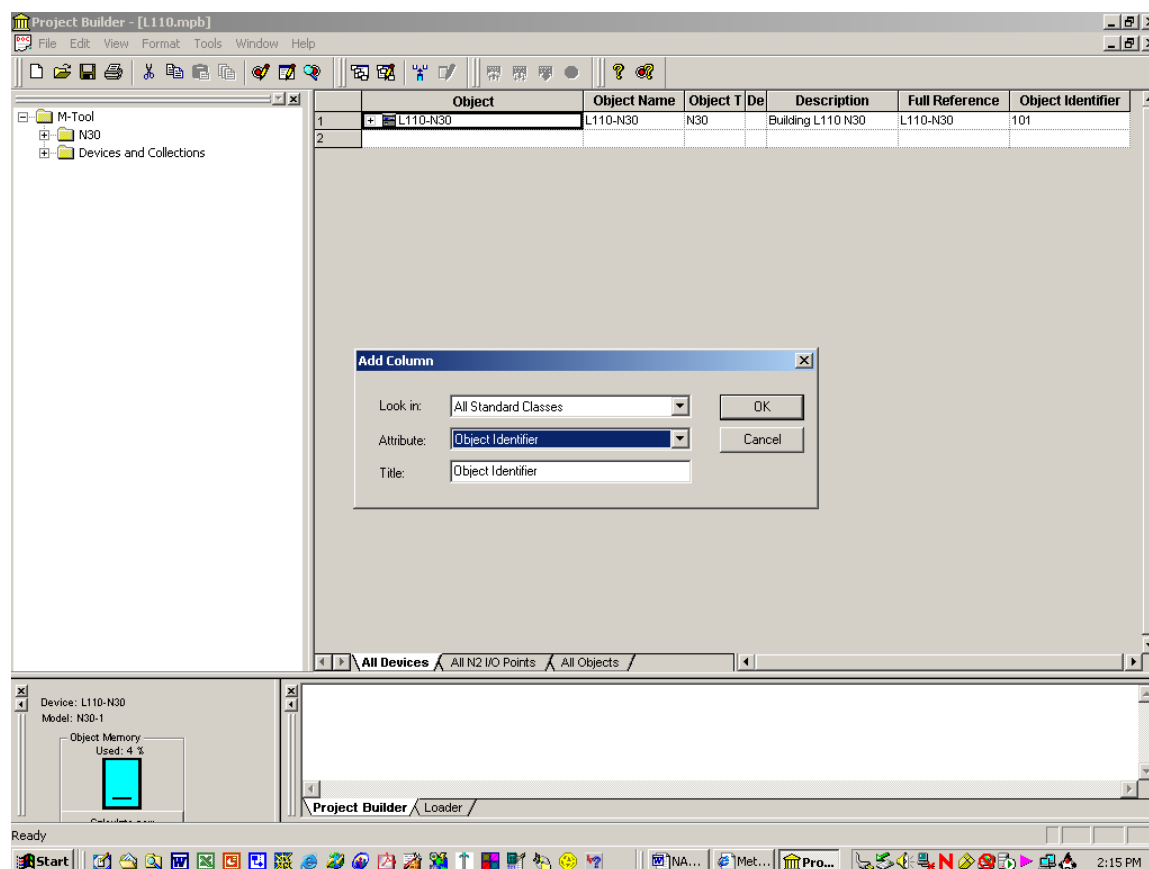


Figure 24: Project Builder - Add Column

6. If desired, when all of the N30s are integrated, rename and create User Views for each user.
7. If the IP address of an N30 changes:
 - a. Delete the N30 that had the old IP address in the NAE.
 - b. Reboot the NAE.
 - c. Add the N30 with the new IP address into the NAE.

The N30 supervisory controllers are integrated into the NAE.



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