

# BACnet Device Simulator User's Manual



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# Introduction

The SCADA Engine BACnet Device Simulator is a client that provides creating and simulating BACnet Devices and Objects to test the functionality of the BACnet network.

The BACnet Device Simulator allows creating a new network or opening an existing network. Then it allows adding, removing devices, objects in to the network according to the user requirements. In addition, it supports user to save the network or export it in to a file.

Also, BACnet Device Simulator acts as a global simulator which simulates all the devices. All the devices and all the object types of a device are simulated while the BACnet Device Simulator is running.



# Installation

This chapter describes how to install the SCADA BACnet Device Simulator onto your PC. It is important that you check the System Requirements section before following the installation section for a step by step guide to the installation process.

# **System Requirements**

The minimum hardware requirements for the BACnet Device Simulator are:

- Intel<sup>®</sup> Pentium<sup>®</sup> 4 Processor
- 512 MB RAM
- 20 GB hard drive

The SCADA Engine BACnet Device Simulator can be used with the following operating systems:

- Microsoft Windows XP
- Microsoft Windows 2003 Server
- Microsoft Windows 2000
- Microsoft Windows Vista

#### Install

Log onto the system as Administrator before running the installation program, it cannot be installed under a limited user account.

- 1. Place the SCADA Engine BACnet Device Simulator CD into the CD drive, or double click on the **BACnetDeviceSimulator.msi** program.
- 2. The Windows Installer will start and you should see the following screen.



记 BACnet Device Simulator Setup			
Engine	Welcome to the BACnet Device Simulator Setup Wizard The Setup Wizard will install BACnet Device Simulator on your computer. Click "Next" to continue or "Cancel" to exit the Setup Wizard.		
	< Back Next > Cancel		

3. Click the Next Button to select the installation folder.

BACnet Device Simulator Setup	$\mathbf{X}$
Select Installation Folder This is the folder where BACnet Device Simulator will be installed.	i ne
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".	
Eolder: C:\Program Files\SCADA Engine\BACnet Device Simulator\ Browse	
Advanced Installer Cancel	



Browse for a new Installation folder or keep the default location.

4. Click next Button. You will be displayed the "Ready to Install" dialog.

🕏 BACnet Device Simulator Setup 🛛 🔀
Ready to Install The Setup Wizard is ready to begin the BACnet Device Simulator installation
Click "Install" to begin the installation.If you want to review or change any of your installation settings, click "Back".Click "Cancel" to exit the wizard.
Advanced Installer
< Back Install Cancel

5. Click the Install button and it will display the progress of the installation.



BACnet Device Simulator Setup	
Installing BACnet Device Simulator	Engine
Please wait while the Setup Wizard installs BACnet Device Simulator. T several minutes.	This may take
Status:	
(**************************************	
Advanced Installer	
<back next=""></back>	Cancel

6. Once the installation is completed you will be displayed the following dialog. Click Finish Button to exit the wizard.





# **Installed Files**

The program files are installed by default into the C:\Program Files\SCADA Engine\BACnet Device Simulator directory on the hard drive. The list below lists all of the files installed into this location.

- BACnAPI.dll
- BACnCSharp.dll
- BACnCSWrap.dll
- BACnetPropertyGrid.dll
- scada\_engine.lic
- simulator.exe

# **Application Data**

Application data is stored onto the hard drive into the C:\Documents and Settings\All Users\Application Data\SCADA Engine\BACnet Device Simulator directory for Windows 2000, 2003 and XP. It is stored into C:\ProgramData\SCADA Engine\BACnet Device Simulator for Vista.

#### Uninstall

To remove the BACnet Device Simulator, go to the Control Panel and select Add/Remove programs. Locate the entry for the BACnet Device Simulator and remove it.



# **Getting Started**

This section contains a tutorial with a step by step walk through all the functionalities of the BACnet Device Simulator.

# **Start the BACnet Device Simulator**

#### From the Start Menu select "SCADA Engine -> BACnet Device Simulator -> BACnet Device

*Simulator*" to start the SCADA BACnet Device Simulator. You will see the following screen when you start it for the first time.



After you started the BACnet Device Simulator you can create a new network using the *File -> New* Menu.



BACnet Explorer					
File	Edit	Project	Help		
	New	Ctrl+N			
2	Open	Ctrl+O			
	Import		•		
	Export		•		
	Save	Ctrl+S			
	Save As				
	Exit				
_			_		

# **Add BACnet device**

You can add devices to your network using the *Project -> Add BACnet Device* menu or Add *BACnet Device* Menu in the popup menu appears, when you click on the network explorer panel.

🕑 BACnet Explorer				
File	Edit	Project	Help	
= 📕	BACne	Ac	ld BACnet Device	
<b>.</b>	问 De	Ac	ld BACnet Object	
	i	Sir	nulator	
		Pri	operties	
		_		





When you click on the Add Network Device, you will get the following dialog.

🕖 Add Device			
Az↓			
New Device Properties			
Device ID	0		
Device Name	New Virtual Device		
<b>Device ID</b> The Device ID of the new simulator device. (A value between 0 and 4194302)			
	OK Cancel		

You have to specify the Device ID and a name for the device. The device ID displayed is the next possible device ID. Users can change it as they need.

Device ID must be between 0 and 4194302. If user specifies an invalid ID it will display the following error message.

	Add Device	×	
	Az↓		
	New Device Properties	240045745	
	Device Name	New Virtual Device	
Invalio	d Input		×
♪	You have selected an device id.	(Please select a number between 0 and	i 4194302)
		ОК	
	4194302)		
		OK Cancel	

If user enters an existing device ID, it will display the following error.



0	Add Devic	:e	X	
•	<u></u> ≹↓			
ΞI	New Devic	e Properties		
[	Device ID		0	
[	Device Name	e	New Virtual Device	
Invalid Input           A BACnet device with this device ID already exists.				
De OK The 419 <del>4</del> 302J				
			OK Cancel	

# **Add BACnet Object**

Users can add BACnet objects to the selected device using the *Project -> Add BACnet Object* or *Add BACnet Object* in the popup menu which appears when you right click on the left tree panel.





When you click on the Add BACnet Object it will display the following dialog.

0	Add Object			
•	₹↓			
	New Object Properties			
	Device ID	0		
	Object Instance	0		
	Object Name	My New Object		
	Object Type	BACnetObjectTypeAnalogInput		
<b>Device ID</b> The Device ID of the simulator device. (A value between 0 and 4194302)				
		OK Cancel		

User has to specify the Device ID, Object Instance, Object Name and Object Type. Next possible Device ID, next Object Instance ID, Default object name and the selected object type will be displayed as the default values in the dialog. Users can change these values as they require.

Device ID and the Instance ID should be between 0 and 4194302. Object Type can be any of the available BACnet object types except the BACnetObjectTypeDevice.

If user selects the BACnetObjectTypeDevice, it will display the following error message.

🕑 A c	ld Object		×
● ■ ■ Z	1 I		
🗆 Ne	w Object Properties		
De	vice ID	0	
ОЫ	ect Instance	0	
ОЫ	ect Name	My New Object	
ОЫ	ect Type	BACnetObjectTypeDevice	
	Invalid Input		
	You can't add i	nstances of the Device type.	
Obje The B		ок	
OK Cancel			



5A Hartnett Close Mulgrave 3170, Australia

If you are creating a new object of an existing object type, new object instance will be added under the existing object type folder. If it is a new object type, folder corresponds to the new object type will be created and an instance will be created under the newly created folder.

The devices, object types and instances hierarchy will be displayed like below.

🕑 BAG	Cnet E	xplorer		
File	Edit	Project	Help	
	BACnee	t Network vice 0 Device AnalogInj AnalogOu AnalogOu AnalogOu Instar Instar Instar Device 1 Device 1 Device 1 AnalogInj AnalogInj Instar Instar Instar Instar Instar Instar Instar Instar Instar Instar Instar	nce 0 but nce 0 ltput nce 1 nce 2 nce 1 nce 1 nce 0 nce 1	

When you select a device, object type or an instance, details of the particular item will be displayed on the right hand pane.

If user selects the BACnet Network (root level) on the left hand tree, all the devices belongs to the network will be displayed on the right hand pane. If the selected item is a device, object types of that devices and if it is an object type, the instances of that object type will be displayed on the right had side. Also users can navigate further down by clicking the particular item in the right hand pane.



BACnet Explorer			
File Edit Project Help			
BACnet Network  BACnet Network  Device 302  Device 301  SinaryOutput  Instance 101  Instance 104  Instance 102  Device 300	Name	Value	
			>
			:

If you select an instance on the left hand tree panel or click on the instance name on the right hand panel, details of that instance will be displayed in the right hand panel.



BACnet Explorer		
<u> E</u> ile <u>E</u> dit Project <u>H</u> elp		
BACnet Network	2↓ □	
BACnet Network     Device 0     AnalogInput     AnalogInput     Instance 1     Instance 2     BinaryInput     Instance 1     Device     Instance 1     Device     Instance 1     Device     Instance 1     Device     Instance 1     Instance 1	2↓     2↓     2↓     2 → Contract Contrect Contecont Contract Contrect Contrect Contrect Contrect Contre	()         0.1         1         Gamma ()         False         BACnetE ventStateNormal         (((2,(*/*/*,*.*.*))),((2,(*/*/*,*.*.*))))         False         1000         ()         0         1000         ()         0         100         0         100         0         100         0         100         0         100         0         100         0         100         0         100         0         100         0         100         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0      <
	acked I ransitions Device 0 Analog0utput 1 - ackedTrans	itions

# **Update Object Properties**

Users can update the object property values by clicking on the particular property value in the property grid. The value can have different value formats such as simple value, selection from a collection of values, array, choices, etc. The method of displaying and updating the value depends on the value format.

#### Updating a property with a simple value format

Select the corresponding value field in the right column of the property grid and simply edit the value to the required value and press enter. The changes will be displayed below the grid. Also, the "Commit Changes" button will appear at the top.



Then click on the "Commit Changes" button, which will update the server with the updated property value. The status of the updating is displayed at the bottom panel and "Commit Changes" button get disabled.



BACnet Device Simulator		
File Edit Droject Help		
BACnet Device Simulator      File Edit Project Help      BACnet Network      Device 0      Curveter      Accumulator      LifeSafetyZone      LifeSafetyZone      Curvetien      Schedule      Porgram      MultistateValue      NotificationClass      MultistateInput      Coop      Group      File      Device      Curvetien      AnalofValue      AnalofValue      AnalofValue      AnalofValue      AnalofValue      AnalofValue      AnalofValue      AnalofValue      AnalofValue      Device      Curvetien      AnalofValue      Curvetien      AnalofValue      Device      Corvetien      Command      Curvetien      Device      Curvetien      Curvetie	Image: Start Updates         Device 0 AnalogOutput 1         ackedTransitions         alarmMessage         covIncrement         deadband         description         device Type         eventEnable         eventEnable         eventState         ImitEnable         lowLimit         maxPresValue         mitFresValue         notificationClass	() 0.2 2 () True BACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) True DACnetE ventStateFault (((2,(**/*,****))),((2,(**/*,****)))) (((2,(**/*,****)))) (((((2,(**/*,****))))) (((((((((((((((((((((((((((((
G C AnalogOutput G Instance 1 G AnalogInput AnalogInput	notifyType covIncrement Device 0 Analog0utput 1 - covIncrement Success writing to property Property_covIncrement	NotifyTypeE.vent

#### Updating a property value with a selection

Click on the property value that you want to update. If it is a selection property, the cell will become a selection box and it will display an arrow at the end.



BAC net Device Simulator		
Eaic Project Heip     BACnet Network     G Device 0	2↓ Start Updates	
Device 0     Device 0     Device 0     Device 1     Device 1	Device 0 AnalogOutput 1     ackedTransitions     alarmMessage     covIncrement     deadband     description     deviceType     eventReportingDisabled     eventReportingDisabled     eventState     eventWritePresentValusDisabled     highLimit     limitEnable     lowLimit     maxPresValue     motificationClass     notifuType     eventState     Device 0 AnalogOutput 1 - eventState	() 0.2 2 ) True BACnetE ventStateFault (((2,('/','))),((2,('/',')))) True 2000 () 2 1000 10 0 NotifyTypeE vent ✓
		.:

When you click on the array it will display a list of available options. You have to select one of them and commit changes similar to the way that mentioned under updating a property with a simple value.



#### Updating a property with a value collection

If the property is a collection of values, it will display an expandable button (+) at the beginning of the property name. Users can expand and see the values of the sub properties and update them.



🕑 BACnet Device Simulator		
<u>File E</u> dit Project <u>H</u> elp		
BACnet Network	👔 🧕 🗐 Start Updates 🔒 Comr	nit Changes
PulseConverter	alarm∀alues	{{1}}
🛓 🛅 Accumulator	description	des123
🗄 🛅 LifeSafetyZone	deviceType	type123
🗉 🧰 LifeSafetyPoint	eventEnable	
ia	eventReportingDisabled	False
🗉 🧰 MultistateValue	eventState	BACnetEventStateFault
🛓 🦳 Averaging		{{{2,{*/*/*,**}}}},{{2,{08/18/2009,12:07 53.42}}},{{2,{*/*/*,*.*.*}}
🗄 🧰 Schedule		{{0},{1},{2}}
Program	notificationClass	1
Instance 1	notifyType	NotifyTypeAlarm
On Dification Class	numberOfStates	3
Instance 4	objectIdentifier	MultistateInput, 1
Instance 3	instance	1
Instance 2	objectType	BACnetObjectTypeMultistateInput
	objectName	My New Object 123
	objectType	BACnetObjectTypeMultistateInput
🖂 MultistateOutout	outOfService	True
	overridden	False
	presentValue	1
	profileName	123-MI123fer
	reliability	8
	stateText	
	statusFlags	[]
Previce     Device     Command     AnalogValue     AnalogValue     AnalogUtput     AnalogOutput     AnalogOutput     AnalogOutput     AnalogOutput     AnalogInput	objecti dentifier Device 0 MultistateInput 1 - objectIdent Device 0 MultistateInput 1 - stateText - ii	ifier tem 0 - element: New Value: On; Previous Value:

If the sub properties are simple values or selection values you can update them in a similar manner to the previous two sections.

Sometimes, the collection can hold an array of elements. Users can specify the number of elements using the "count" property and it will add the specified number of sub items to the collection.



BACnet Device Simulator		
<u>Eile E</u> dit Project <u>H</u> elp		
🖃 🧏 BACnet Network	📰 🛃 🔚 Start Updates 🔚 Co	mmit Changes
Device u	eventState	BACnetE ventStateFault
	eventTimeStamps     ■	{{{2,{*/*/*,*.*.*}}}},{{2,{08/18/2009,12:07 53.42}}},{{2,{*/*/*,*.*.*}}
Accumulator	faultValues	{{0},{1},{2}}
LifeSafetyZono	notificationClass	1
	notifyType	NotifyTypeAlarm
in tenucog	numberOfStates	3
	🗉 objectIdentifier	MultistateInput, 1
🗄 🦳 Averaging	objectName	My New Object 123
	objectType	BACnetObjectTypeMultistateInput
Engram	outOfService	True
Instance I	overridden	False
	presentValue	1
Instance 4	profileName	123-MI123fer
Instance 3	reliability	8
Instance 2		
Instance 1	count	4
Instance 0	tern 0	
😑 🛄 MultistateOutput	E item 1	
linstance 1	E item 2	
🖨 🧰 MultistateInput		
🔤 Instance 1	H item 3	
🛓 🗋 Loop	E status-lags	[]
ia	timeDelay	20
🗄 🛅 File		
🗄 🛅 Device	count	
G Command	Device 0 MultistateInput 1 - stateText	t - count
Instance 1		
	Device 0 MultistateInput 1 - stateText	<ul> <li>item 0 - element: New Value: On; Previous Value:</li> </ul>
Instance 1		
Analogo upu		
🗄 🛄 Analoginput		

After that you can change the properties of sub items and click on the "Commit Changes" button to update the server.

#### Updating a property value with a choice

Some of the property values are choice values, which means that the displayed sub properties get changed based on the user's selection. The "choice" is a selection property from which you can select a value and based on that the other available sub properties get changed.



😍 BACnet Device Simulator		
<u>File E</u> dit Project <u>H</u> elp		
E SACnet Network	Start Undates	
🖻 🛅 Device 0	maxPresValue	20
PulseConverter	notificationClass	1
	notifuTune	NotifuTuneAlarm
Instance 1		Accumulator, 1
i ⊡ LireSarety∠one	objectName	My New Object123
	objectType	BACnetObjectTypeAccumulator
Hendbog	outOfService	True
	overridden	False
⊞	prescale	{4,2}
🗄 🛅 Program	presentValue	40
NotificationClass	profileName	123-ACC123
🗊 🛄 MultistateOutput	pulseHate	U
🖬 🛄 MultistateInput		5b (0.0.000000)
🖬 💼 Loop		ScalaTura Flast
🖻 🛄 Group	floatScale	2 101948E.43
		2.1013402.43
	timeDelay	5
	units	UNITS milliamperes
	valueBeforeChange	12
Analogyalue	talueChangeTime     talueChangeTime	{08/18/2009,13:43 20.70}
	valueSet	40
	Success writing to property Property_sca	le
BACnet Device Simulator     Elie Edit Project Help		
BACnet Network	🔋 🤶 🗐 Start Updates 🔚 Comn	nit Changes
🖃 🛄 Device 0	maxPresValue	20
· PulseConverter	notificationClass	1
Accumulator	notifyType	NotifvTvpeAlarm
Instance I	objectIdentifier	Accumulator, 1
	objectName	My New Object123
	objectType	BACnetObjectTypeAccumulator
	outOfService	True
🖬 🧰 Averaging	overridden	False
🗟 🛅 Schedule	prescale	{4,2}
🖬 💼 Program	presentValue	40
🖬 🛄 NotificationClass	promename pulseP =>=	123AUU123
🖮 🛄 MultistateOutput	puiserrate raliability	50
🖬 🛄 MultistateInput		
⊞… 🧰 Loop		CopleTune Integer
	Choice	150
🗉 🛄 Group	unterder Vienle	
⊞ Can Group ⊞ Can File	IntegerScale	
Group     Group     Group     Group     Group     File     Group     Gr	integerscale	[] [] 5
B - C Group B - C File B - C Device B - C Dommand	integerscale statusFlags timeDelay units	() 5 UNITS milliamperes
Group     G	integerscale	() 5 UNITS_milliamperes 12
B - Group B - C File B - C Command Command Instance 1 B - C AnalogValue	integerscale     statusFlags     timeDelay     units     valueBeforeChange     valueChangeTime	130 () 5 UNITS_milliamperes 12 (08/18/2009,13:43 20.70)
Group     Group     Group     Group     Group     Command     Group     Instance 1     Group     Instance 1     Group     Instance 1     Group     Grou	integerscale integerscale istatusFlags timeDelay units valueBeforeChange valueChangeTime valueSet	100 () 5 UNITS_milliamperes 12 {08/18/2009,13:43 20.70} 40
Group     Group     Group     Group     Group     Command     Group     Group     Command     Group     Instance 1     Group     Instance 1     Group     AnalogOutput     Group     AnalogOutput     Group     Group	integerScale ■ statusFlags timeDelay units valueBeforeChange ■ valueChangeTime valueSet	() 5 UNITS_milliamperes 12 (08/18/2009,13:43 20.70) 40
Group     Group     Group     Group     Group     Device     Command     Group     Instance 1     Group     Instance 1     AnalogValue     Group     AnalogValue     Group     AnalogNatue     AnalogNatue     AnalogNatue     AnalogNatue     AnalogNatue	integerscale     istatusFlags     timeDelay     units     valueBeforeChange     valueChangeTime     valueSet     Choice     Device 0 Accumulator 1 - scale - choice	() 5 UNITS_milliamperes 12 {08/18/2009,13:43 20.70} 40
Group     G	IntegerScale ItimeDelay Units ValueBeforeChange ValueChangeTime ValueSet Choice Device 0 Accumulator 1 - scale - choice Device 0 Accumulator 1 - scale - choice	130       []       5       UNITS_milliamperes       12       (08/18/2009,13:43 20.70)       40



#### Non updatable properties

Some properties are not allowed to be updated by the users. When a user tries to update such a property it will display an error message below the property grid and the value will be reverted back to the original value.

BACnet Device Simulator			
Eile Edit Project <u>H</u> elp			
🖃 🧝 BACnet Network	•	2↓   🔜 Start Updates 🔚	
	Ξ	Device O Accumulator 1	<u>^</u>
		ackedTransitions	()
		To Fault	True 💌
		T o Normal	True
		To Off Normal	True
E Trendlog		alarmMessage	ghgkh1
		description	fggf1
		deviceType	tyie1
	Ŧ	eventEnable	()
		eventReportingDisabled	True
NotificationClass		eventState	BACnetEventStateFault
	Ŧ	eventTimeStamps	{{{2,{*/*/*,*:*:*}}},{{2,{08/18/2009,13:41 56.01}}},{{2,{*/*/*,*:*:*}}
H MultistateInnut		highLimit	1
	Ŧ	limitEnable	()
		limitMonitoringInterval	1
File		maxPresValue	20
		notificationClass	1
Command		notifyType	NotifyTypeAlarm
Instance 1	Ŧ	objectIdentifier	Accumulator, 1
		objectName	My New Object123
Instance 1		objectType	BACnetObjectTypeAccumulator
analogOutout		outOfService	True
Instance 1		overridden	False
⊞- ີ AnalogInput	Er	o Fault evice 0 Accumulator 1 - ackedTransitions - To Fault for writing to : Property_ackedTransitions : Device - WriteAcc WriteAcc	tessDenied

#### **Saving the Network**

Users can save the network into a .dat file by clicking the *File->Save* menu or *File->Save As* menu.

C	) BA	Cnet Ex	plorer		
Γ	File	Edit	Project	Help	I
		New	Ctrl+N		
6	2	Open	Ctrl+O		
		Import		•	
		Export		•	
l	,	Save	Ctrl+S		
		Save As			
		Exit			



When you click on one of the above menus, File Save dialog will be appeared and users can specify the file name and the location for the new file. The network will be saved as a .dat file.

Save As						? 🗙
Save in:	🚞 Debug		*	G 👂	<del>ب</del>	
My Recent Documents	bacnet_objects Copy of modbus modbus.dat test.dat	.dat s.dat				
Desktop						
My Documents						
My Computer						
<b></b>	File name:	network.dat			~	Save
My Network	Save as type:	BACnet Objects data file (*.da	at)		~	Cancel

# **Project properties**

Users can set the project properties using the **Project -> Properties** menu.



When you click on the properties menu, the following dialog will be displayed.



0	🕑 Project Properties 🛛 🔀					
•						
⊡	<b>BACnet Device Simulator Prop</b>	perties				
	Local Network Number	1				
	Support Read Property Multiple	True				
	Support Segmentation	BACnetSegmentationSegmentedTransmit				
	UDP Port Number	47808				
	Virtual Network Number	20				
Local Network Number The network number for the BACnet/IP network. (A value between 1 and 65535)						
		OK Cancel				

You have to specify the Local Network Number, UDP Port Number, Virtual Network Number, Support Read Property Multiple, Support Segmentation and Press OK button. Then the network properties will be updated.

# **Opening an existing Network**

Users can open an already saved .dat file using the *File -> Open* menu.

(	BACnet Explorer					
	File	Edit	Project	Help		
Γ		New	Ctrl+N	Ī		
	Ê	Open	Ctrl+0			
		Import		•		
		Export		•		
		Save	Ctrl+S			
		Save As	;			
		Exit				
	_					

When you clicked on the Open button file open dialog will be displayed and user can select the file that needs to be opened.



Select a BACne	t Objects data f	file				? 🛛
Look in:	🚞 Debug		~	G 🦻	بي 🥙	
My Recent Documents	bacnet_objects Copy of modbus modbus.dat	s.dat us.dat				
Desktop						
My Documents						
My Computer						
<b></b>	File name:	bacnet_objects.dat			~	Open
My Network	Files of type:	BACnet Objects data file (*	*.dat)		~	Cancel

When the file is opened, the opened network will be displayed in the BACnet Device Simulator.

# **Copy / Paste network objects**

Users can copy and paste the network devices, object types or instances in the network.

Users can copy the corresponding object by using the *Edit->Copy* menu or *Copy* menu in the popup menu (Which appears when you right click on the left tree panel).





🕑 BA	BACnet Explorer				
File	Edit	Proje	ct Help		
•		t Netwo	ork		_
		Ľ.	Сору	Ctrl+C	
	÷ 🔁	62	Paste	Ctrl+V	
	• 🗄 • 🛄		Delete		
	÷- 🤶		Add BACr	net Device	L
	. ⊞… <mark></mark> . []ם De		Add BACr	net Object	L
	· · · ·		Simulator		L
			Propertie:	S	
÷.	De 🗋	vice 30	10		-

If user selects at the device level, all the object types and instances under the device will be copied. If user selects at the object type level all the instances under that device will be copied and if it is the instance level, only the instance details will be copied.

After user copying a network object, users can paste it to the network using the *Edit -> Paste* menu or *Paste* menu in the popup menu.





🕑 BACnet Explorer					
File	Edit	Proje	ct Help		
8	BACne	t Netwo vice 30	ork 2		
	± 💭	Ca -	Сору	Ctrl+C	
	±		Paste	Ctrl+V	
	÷	E	Delete		
		4	Add BACr	net Device	
<b>.</b>	De	vi	Add BACr	net Object	
		E	Simulator		
	<u> </u>	E	Propertie	s	
±	De De	Vi <del>ce oo</del>	U		

Pasting operation depends on where user needs to paste the copied item.

If user select to paste at the root level (by selecting the BACnet Network node), copied item will be pasted as a new device with the copied content. If user selects a particular device node, object type node or an instance node, copied item will be pasted under the selected device.

In detail, if the copied item is a device, then all the object types and instances are pasted under the selected device, if copied item is an object type or an instance, then all the copied instances or the copied instance will be pasted under the corresponding object type of the selected device.

# **Delete Network Object**

Users can delete network objects using the *Edit-> Delete* menu or *Delete* menu item in the popup menu.



BACnet Explorer				
File	Edit	Project	Help	
•		Сору С	trl+C	
	2	Paste C	itrl+V	
		Delete		
BinaryOutput     BinaryInput     AnalogOutput     AnalogInput     Device 301     Device     BinaryOutput     Instance 104     Instance 102     BinaryInput     Device 300				
🕑 BA	Cnet E	ixplorer		
File	Edit	Project	Help	
= 📕	BACn	et Network evice 302	<	
		] Noti 🗈	Сору	Ctrl+C
	· • · · · ·	]Dev 📸	Paste	Ctrl+V
		] Bina	Delete	
		] Ana	Add BAC	Inet Device
,	- 🛄 Di	evice :	Add BAC	Inet Object
		] Dev	Simulato	r
	±	] Bina	Properti	es
÷	- 🗋 Di	evice 300		

If user selects at the device level, all the objects and instances of that device will be deleted. If user selects at object level or instance level only the corresponding object type or the instances will be deleted.

# **Exporting the Network**

Users can export the network to an EDE file using the *File ->Export -> EDE File* menu.



(	BACnet Explorer						
	File	Edit	Project	Н	elp		
Γ		New	Ctrl+N				
	2	Open	Ctrl+O				
		Import		×			
		Export		×		EDE File	
		Save	Ctrl+S			XML File	
		Save A	s				
		Exit					

When you click on the menu, Save As dialog will be displayed and in that you can specify the file location and a file name for the new file. File will be saved as a .csv file.

Save As					? 🛛
Save in:	🗀 ExportedFiles		<u> </u>	) 🤣 📂 🖽-	
My Recent Documents					
Desktop					
My Documents					
My Computer					
<b></b>	File name:	exportedFile.csv		~	Save
My Network	Save as type:	BACnet Objects EDE fil	e (*.csv)	~	Cancel

#### **Importing a network**

You can import an EDE file using the File->Import->EDE File Menu.



<	🕑 B/	Cnet Explor	er			
	File	Edit Proje	ct H	elp		
		New Ctrl+M	J			
	2	Open Ctrl+C	>			
		Import	×		EDE File	
		Export	•		XML File	
		Save Ctrl+9	5	-		
		Save As				
		Exit				
	_					

When you click on the menu, imported network will be loaded in to the explorer and displayed.

If there is an error in loading or error in the file format, it will display the following error.

Application Error			
Error Loading the BACnet EDE File			
ОК			

#### **Closing the application**

When you press the windows close button you will be asked whether you need to save the existing changes (if there are any unsaved changes).



If user select the 'YES' option, file save dialog will be displayed and user can specify the location and the file name (similar to when user clicks the SAVE button).

If there are no changes made, BACnet Device Simulator will be directly closed.

#### **Simulator**

BACnet Device Simulator acts as a global simulator which runs all the time during the BACnet Device Simulator and which simulates all the instances of all the internal devices.



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Simulator will be stated automatically when the BACnet Device Simulator starts and will be stopped only when BACnet Device Simulator exits.

Users can change the simulator settings using the *Project -> Simulator* menu.

🔜 Simulator					
<b>₽</b>					
Simulation Properties					
Frequency	2				
Simulation Type	Incremental				
Value Interval	5				
Frequency Frequency of simulation. (A value between 1 and 3600 in seconds)					
	OK Cancel				

Then the user will be displayed the following simulation settings dialog.

🖶 Simulator	
<b>₽</b>	
Simulation Properties	
Frequency	2
Simulation Type	Incremental
Value Interval	5
Frequency Frequency of simulation. (A val seconds)	ue between 1 and 3600 in
	OK Cancel

Users can specify the simulation frequency, simulation type and the value interval for the simulation (value interval is needed only for the incremental simulation type).



Available simulation types are Incremental, Random, Sinusoidal and Ramp. Incremental simulation will gradually increase the value of the present value of all the instances by an amount equal to the value interval, in each time interval equal to the simulation frequency.

Random simulation will randomly set the value of the present value of all the instances. In Sinusoidal simulation present value of all the instances will be set according to the Sin function, and in Ramp simulation present value will be set according to the Ramp function.



# Troubleshooting

When you are starting the BACnet Device Simulator you might be displayed the following error message.

Application Error
Error Loading the BACnet Driver Only one usage of each socket address (protocol/network address/port) is normally permitted.
ОК

This error message indicates that there are some other BACnet application is running in the machine at that time.

To resolve this issue you need to shut down the other application and open the BACnet Device Simulator again.

# **Protocol Implementation Conformance Statement**

#### Products

Product	Model Number	Protocol Revision	Software Version	Firmware Version
BACnet Device Simulator	SE-SIM	135-1995b (4)	2.0.0	2.0.0
Data Tastad: 6 August 2000				

Date Tested: 6 August 2009

#### Vendor Information

SCADA Engine 4A Hartnett Close. Mulgrave 3170, Australia www.scadaengine.com

#### **Product Description**

The SCADA Engine BACnet Device Simulator is used to simulate 1 or more BACnet Devices.



#### **BACnet Standardized Device Profile**

Product	Device Profile	Tested
SE-SIM	BACnet Application Specific Controller (B-ASC)	



# Supported BIBBs

Product	Supported BIBBs	BIBB Name	
	DS-RP-A	Data Sharing-ReadProperty-A	
	DS-RP-B	Data Sharing-ReadProperty-B	
	DS-RPM-A	Data Sharing-ReadPropertyMultiple-A	
	DS-RPM-B	Data Sharing-ReadPropertyMultiple-B	
	DS-WP-A	Data Sharing-WriteProperty-A	
	DS-WP-B	Data Sharing-WriteProperty-B	
	DS-WPM-A	Data Sharing-WritePropertyMultiple-A	
	DS-WPM-B	Data Sharing-WritePropertyMultiple-B	
	DS-COV-A	Data Sharing-COV-A	
	DS-COV-B	Data Sharing-COV-B	
SE-SIM	DS-COVP-A	Data Sharing-COVP-A	
	DS-COVP-B	Data Sharing-COVP-B	
	DS-COVU-A	Data Sharing-COV-Unsolicited-A	
	DS-COVU-B	Data Sharing-COV-Unsolicited-B	
	SCHED-A	Scheduling-A	
	SCHED-I-B	Scheduling-Internal-B	
	SCHED-E-B	Scheduling-External-A	
	T-VMT-A	Trending-Viewing and Modifying Trends-A	
	T-VMT-I-B	Trending-Viewing and Modifying Trends-Internal-B	
	T-VMT-E-B	Trending-Viewing and Modifying Trends-External-B	
	T-ATR-A	Trending-Automated Trend Retrieval-A	



Product	Supported BIBBs	BIBB Name	
	T-ATR-B	Trending-Automated Trend Retrieval-B	
	NM-CE-A	Network Management-Connection Establishment-A	
	NM-CE-B	Network Management-Connection Establishment-B	
	AE-N-A	Alarm and Event-Notification-A	
	AE-N-I-B	Alarm and Event-Notification Internal-B	
	AE-N-E-B	Alarm and Event-Notification External-B	
	AE-ACK-A	Alarm and Event-ACK-A	
	AE-ACK-B	Alarm and Event-ACK-B	
	AE-ASUM-A	Alarm and Event-Alarm Summary-A	
	AE-ASUM-B	Alarm and Event-Alarm Summary-B	
	AE-ESUM-A	Alarm and Event-Enrollment Summary-A	
	AE-ESUM-B	Alarm and Event-Enrollment Summary-B	
	AE-INFO-A	Alarm and Event-Information-A	
	AE-INFO-B	Alarm and Event-Information-B	
	AE-LS-A	Alarm and Event-LifeSafety-A	
	AE-LS-B	Alarm and Event-LifeSafety-B	
	DM-RD-A	Device Management-ReinitializeDevice-A	
	DM-RD-B	Device Management-ReinitializeDevice-B	
	DM-DDB-A	Device Management-Dynamic Device Binding-A	
	DM-DDB-B	Device Management-Dynamic Device Binding-B	
	DM-DOB-A	Device Management-Dynamic Object Binding-A	



Product	Supported BIBBs	BIBB Name	
	DM-DOB-B	Device Management-Dynamic Object Binding-B	
	DM-DCC-A	Device Management-DeviceCommunicationControl-A	
	DM-DCC-B	Device Management-DeviceCommunicationControl-B	
	DM-PT-A	Device Management-Private Transfer-A	
	DM-PT-B	Device Management-Private Transfer-B	
	DM-TM-A	Device Management-Text Message-A	
	DM-TM-B	Device Management-Text Message-B	
	DM-TS-A	Device Management-TimeSynchronization-A	
	DM-TS-B	Device Management-TimeSynchronization-B	
	DM-UTC-A	Device Management-UTCTimeSynchronization-A	
	DM-UTC-B	Device Management-UTCTimeSynchronization-B	
	DM-LM-A	Device Management-List Manipulation-A	
	DM-LM-B	Device Management-List Manipulation-B	
	DM-OCD-A	Device Management-Object Creation and Deletion-A	
	DM-OCD-B	Device Management- Object Creation and Deletion -B	



#### Standard Object Types Supported

Product	Object Type	Creatable	Deletable	Tested
	Analog Input	Yes	Yes	
	Analog Output	Yes	Yes	
	Analog Value	Yes	Yes	
	Binary Input	Yes	Yes	
	Binary Output	Yes	Yes	
	Binary Value	Yes	Yes	
	Calendar	Yes	Yes	
	Device	No	No	
	Event Enrollment	Yes	Yes	
	File	Yes	Yes	
SE-SIM	Loop	Yes	Yes	
	Multi-state Value	Yes	Yes	
	Notification Class	Yes	Yes	
	Program	Yes	Yes	
	Schedule	Yes	Yes	
	Trend Log	Yes	Yes	
	LifeSafetyPoint	Yes	Yes	
	LifeSafetyZone	Yes	Yes	
	Accumulator	Yes	Yes	
	PulseConverter	Yes	Yes	

# **Data Link Layer Options**

Product	Data Link	Options	Tested
SE-SIM	BACnet/IP (Annex J)	Can communicate as a Direct BACnet/IP device. Can register as a Foreign BACnet/IP device.	

#### Segmentation Capability

Product	Segmentation Type	Supported	Window Size (MS/TP product limited to 1)	Tested
Able to transmit segmented messages		Yes	Configurable	
	Able to receive segmented messages	Yes	Configurable	



# **Device Address Binding**

Product	Static Binding Supported	Tested
SE-SIM	Yes	

# **Networking Options**

Product	Router Option	Options	Tested
SE-SIM			

#### **Character Sets**

Product	Character Sets supported	
SE-SIM	ANSI X3.4	
	IBM Microsoft DBCS	
	ISO 8859-1	