

# BACeye

# MANUAL

Visualisation and analysis of BACnet networks

BACeye v1.1.5.3

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# 1. Foreword

Thank you for using BACeye for visualisation and analysis of BACnet networks

#### This manual describes the BACeye software

# BACEYE

BACeye allows easy access to BACnet devices and their objects and properties. In addition, it offers the possibility of generating EDE files ('BACnet data point lists') and reading graphically displaying and exporting trend log data, among other things. Schedulers can also be clearly represented and modified. Typical BACeye applications include commissioning BACnet installations, analysis of observed problems and monitoring and operating BACnet devices.

**BACnet networks:** Using the BACnet Who-Is/I-Am services, devices in the network can be identified simply and a copy of the device properties and objects can be imported. A detailed display of all objects allows access to the object properties.

**Schedulers:** With BACeye, BACnet Calendar and Schedule objects can be comfortably displayed and modified. The weekly schedule and the exception schedule can be modified separately. The combined display provides an overview of the actual effective value.

**EDE files:** It is very easy to generate EDE files. An EDE file (Engineering Data Exchange) is a format for a BACnet data point list, specified by the BACnet Interest Group Europe (BIG-EU).

Alarms: Receive and display BACnet event notifications (error and operating messages). Confirm BACnet event notifications.

**Monitoring list:** The monitoring list shows the most important properties of selected objects. Objects can be compiled from the same device or from different devices.

Trend data: Read trend data. Display trend data as a curve or as a list.

### Additional features/supported functions

- Modify values in the BACnet properties
- Zoom: Individual object properties are displayed in large type in a separate window (full screen) and are dynamically updated. This allows changes in the properties to be observed on the screen from great distances.
- Backup/restore: BACeye can perform BACnet backup and restore. This allows data to be backed up and restored on BACnet devices.
- BACnet interface: The BACnet network connection is provided by TCP/IP. This requires a LAN or WLAN connection between the network and the BACnet devices. The BACnet UDP port settings can be changed. BACeye supports the
- "ForeignDevice" (FD) function for coupling to an existing BBMD.

More information on BACeye is available at: http://www.baceye.com

# 2. COPYRIGHT & Contact Information

# COPYRIGHT

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# 3. After starting

After starting BACeye the primary BACnet Explorer user interface appears.



The left part of the window contains the device list, the right section the object list of any device selected.

The network is not automatically scanned when BACeye is started. This prevents any unintended loads in the network. However, if an automatic scan is desired when the program starts, the default behaviour of BACeye can be defined in "Settings".



Pressing the "Refresh" button starts the network scan and BACnet communication.

# 4. Navigation

The BACeye user interface is divided up into two primary subsections.

- 1. Navigation window
- 2. Detail window



Both of these working areas can display different contents when working with BACeye, allowing convenient navigation through the data found.

The left area of the user interface shows the present top level entries. For example, after starting a network scan, these are the devices found. The entries in the left section can be marked to view the associated details in the detail window.

ceye. Professional device control 1:174.5 - Mibs dimbit - St	and Project				
Bearbeiten Datentransfer Fenster Ansicht Hilfe					
Alle Netzwerke >> Gerät 9/533 Geräte Netz Inst-Nr. Gerätename Beschreibur	P Geräte gefunden Geräte defunden Geräte defunden Device 97533 Da BACnet ID: 975 Device Name: BTF BACnet MAC: 040	ten geladen4/17. 133 FBACnetServer 100116BAC0 =	/2015 10:50:49 AM 💽 r CKL 97533 -> 10.0.1.22:47808	Beschreibung For CKL Testing BACnet Exploder Manufacturer: MBS GmbH	
0 97533 BTF BACnetServer CKL 97533 For CKL Tes	5 BACnet Exploder Stather				Filter
	1 5 × 8 Obi Typ	pe Inst-Nr F	Present Value	Object Name	Description
	TV	2 1	2-24-56 77	Time Value 2 writeble	Some Description
	TV	1 1	2/34/56 77	Time Value 1	Some Description
	TPV	2 1	2007	Time Pattern Value 2 writable	Some Description
	TPV	1 1	2011	Time Pattern Value 1	Some Description
	PTV	2 1	23456789	Positive Integer Value 2 writable	Some Description
	PTV	1 1	23456789	Positive Integer Value 1	Some Description
	OSV	2 16	5] 0x011b310589	Octetstring Value 2	Some Description
	OSV	1 1	51 0x011b310589	Octetstring Value 1	Some Description
	LAV	2 1	23456.79	Large Analog Value 2	Some Description
	LAV	1 1	23456.79	Large Analog Value 1	Some Description
	IV	2 -	1238	Integer Value 2 writable	Some Description
	IV	1 -	1238	Integer Value 1	Some Description
	DTV	2 1	1.11.2011 Friday / 11:11:	Datetime Value 2	Some Description
	DTV	1 1	1.11.2011 Friday / 11:11:	Datetime Value 1	Some Description
	DTPV	2 2	9.21 * / 12:255:255.255	Datetime Pattern Value 2 writable	Some Description
	DTPV	1 2	9.21 * / 12:255:255.255	Datetime Pattern Value 1	Some Description
	DV.	2 1	2.12.2012 Mittwoch	Date Value 2 writable	Some Description
	DV	1 1	2.12.2012 Mittwork	Date Value 1	Some Description
	DPV	2 2	303**	Date Pattern Value 2	Some Description
	DPV	1 2	303**	Date Pattern Value 1	Some Description
	CSV	2 5	ome String Value	Characterstring Value 2 writable	Some Description with ma
	CSV	1 5	ome String Value	Characterstring Value 1	Some Description
	BSV	2 E	TF	Bitstring Value 2	Some Description
	BSV	1 F	TE	Bitstring Value 1	Some Description
	NS	1		Network Security 1	Some Description
	CD	2 (1	acility16-card32.89.0x00	Credential Data Input 2 writable	Main entrance south build
	CD	1 0	acility16-card32.89.0x00	Credential Data Input 1	Main entrance south build
	AZ	2	,	Access Zone 2 writable	Office Second Floor
	AZ	1		Access Zone 1	Office Main Floor
	AU	2		Access User 2 writable	Dorothy P. Miller, CTO
	AU	1		Access User 1	Dorothy H. Miller, CEO
	AB	2		Access Rights 2 writable	Access Rights for main pro
	AR	1		Access Rights 1	Access Rights for main pro
aren				11	-

# 5. Navigation window

After starting the network scan, the device list shows all devices found in the navigation window. The network, instance number, device name and description are shown for each device. The device list can be sorted using the column heading.



### NAVIGATION

The BACeye navigation bar is located in the upper section of the navigation window. The actual navigation control with navigation indicator is located on the navigation bar.

Corrito	P		
Gerate	1 Geräte gefunden		



The navigation control has two cursors for navigation as well as a navigation indicator to mark the present position.

BACeye uses a three-stage navigation hierarchy:

- 1. Networks
- 2. Devices
- 3. Objects

When BACeye is started the navigation is set to the "Device" level and displays all devices in the present BACnet networks.

Clicking the "Back" button navigates to the "Network" view.

<u>(</u>	BACeye. Professio	onal device control 1.1.4.3 - MBS Gm	nbH - Standard Project
Dat	ei Bearbeiten	Datentransfer Fenster Ansicht	Hilfe
-	Alle Netzwer	ke	<b>#</b>
letzwer	<⊐ ••• ⊏>	Netzwerke	P 1 Netzwerke gefunden
<b>~</b>	Netz		
z	Alle Netzwerke		
otiz	0		
ß			
Eigenschaften			

In the network window all BACnet networks found are displayed together with the additional entry "All networks". When an entry is double-clicked BACeye navigates to the "Device" hierarchy level - using the desired selection. Here all devices matching the selection are then displayed.

	💽 BACeye. Professional device control 1.1.4.3 - MBS GmbH - Standard Project									
Da	Datei Bearbeiten Datentransfer Fenster Ansicht Hilfe									
	Alle Netzwerke >> Gerät 97533 >> Device97533									
letzy		白	00		c	bjekte	10001111	2		
ÌŔ		N_		~		·	106 Objekte gefundel	n		
		! 4	×®	Obj. Type	InstNr.	Object Name				
l z				TV	2	Time Value 2 writable		*		
Ĭ				TV	1	Time Value 1				
5				TPV	2	Time Pattern Value 2 wr	itable			
				TPV	1	Time Pattern Value 1				
Eig				PIV	2	Positive Integer Value 2	writable			
enso				PIV	1	Positive Integer Value 1				
haf				OSV	2	Octetstring Value 2				
Ē				OSV	1	Octetstring Value 1		Ξ		
		!		LAV	2	Large Analog Value 2				
				LAV	1	Large Analog Value 1				
				TV.	2	Integer Value 2 writable				

When "Device" is double-clicked, BACeye navigates to the "Object" hierarchy level. BACeye displays all objects found in the selected device in the object list.

The object list displays:

- Alarm
- Fault

.

- OutOfService
- Overridden
- Object Type
- Instance Number
- Object Name

# DETAIL WINDOW

If an entry in the navigation window is clicked once, a detail window containing associated details appears in BACeye. Various details are shown depending on the hierarchy level selected in the navigation window. Doubleclicking navigates to the next level in the hierarchy.

Navigation window	Detail window
Networks	Devices
Devices	Objects
Objects	Properties

# 6. Detail window

The detail window in BACeye shows the details on the specific entry selected in the navigation window.

Navigation window	Detail window
Networks	Devices
Devices	Objects
Objects	Properties

### **NETWORKS**

When the navigation window is set to the "Network" hierarchy level, the devices found in the network selected are listed in the detail window.

Ge	Geräte								
	Netz	InstNr.	Gerätename	Beschreibung					
0	)	97533	BTF BACnetServer CKL 97533	For CKL Testing BACnet Exploder					

# DEVICES

When the navigation window is set to the "Device" hierarchy level, the objects found in the device selected are listed in the detail window. The object list can be sorted, searched and filtered by the user.

)ev	vice 97	533 Dater	n geladen4/3	17/2015 10:50:49 AM 💽				
BA	ACnet ID	97533	1		Beschreibung For CKL Testing BACnet Exploder			
De	evice Na	me: BTF B	ACnetServ	er CKL 97533	Manufacturer: MBS GmbH			
BA	ACnet M	AC: 0A000	0116BAC0	=> 10.0.1.22:47808				
Ob	ojekte							
Suc	the:					_		
						$\sim$	Filter	
!	4×8	Obj. Type	InstNr	Present Value	Object Name		Description	
		NC	1		Notification Class 1		Notification Class	*
!		MO	2	Above_All	Multi State Output 2 writable		Multi State Output with ma	
		MO	1	Off	Multi State Output 1		Multi State Output	
		PR	2		Program 2 writable		Average of Somethings	
		PR	1		Program 1		Average of Somethings	
		NC	2		Notification Class 2 writable		Notification Class	Ξ
!		LP	1	0,00	Loop 1		LOOP	
		GRP	2	(((analog-output,1),((85,-,[	Group 2 writable		Group with many propertie	
		GRP	1	(((analog-output,3),((85,-,[	Group 1		Group	
		MI	2	Off	Multi State Input 2 writable		Multi State Input	

#### Sorting

Sorting is possible by "Clicking" on the specific column heading.

#### Search

When text is entered in the "Search" field, BACeye performs a full text search. All columns displayed are searched - individual search terms can be entered separated by spaces. If a number of terms are separated from one another in this manner, BACeye displays those lines with ALL search terms.

O	Dejekte						
Suc	che:						
Tir	me DTV						Filter
!	4×8	Obj. Type	InstNr	Present Value	Object Name		Description
		DTV	2	11.11.2011 Friday / 11:11:	Datetime Value 2		Some Description
		DTV	1	11.11.2011 Friday / 11:11:	Datetime Value 1		Some Description

#### Filter

The "Filter" button allows display of additional control elements and filtering with the result list.

Objekte					
Suche:				[	
					S Filter
Filter:	) bi Tuno II	ort Mr	Drocopt Value	Object Name	Description
<u>่งว่าว่ะ</u>	voj. type i 🗸	1	Present value	Object Name	Description
		7			
! 4 × 8 (	Obj. Type	InstNr	Present Value	Object Name	Description
! G	GGRP	1	(((analog-input,1),present-	Global Group 1	Some Description
! L	.Р	1	0,00	Loop 1	LOOP

A filter remains active until the control element is suppressed by actuating the button again.

Any column displayed can be filtered with the BACeye filter. Various methods are used depending on the type of column.

### Status flags



A checkbox allows the status flags "Alarm", "Fault", "OutOfService" and Overridden to be filtered for three states.

Each checkbox shows one of three possible symbols:

- Check Filter requires presence of attribute.
  - Only those lines are shown, for which the specific status flag is set.
- **Question mark** Filter considers attribute to be neutral. All lines are shown, regardless of whether the specific status flag is set.
- X Filter requires absence of attribute. Only those lines are shown, for which the specific status flag is NOT set.

**Object type** 

	Obj. Type	InstNr.	Present		
<b>√</b> ??×	[ · ·	• 1			
1140			<b>^</b>		
17 ~ 1	AnalogIn	AnalogInput			
1	AnalogO	utput	- B		
1	AnalogV	alue			
	BinaryInput				
	BinaryOu	itput			

The object type can be filtered using a selection list. The list includes all possible types of objects.

#### Inst No, Present Value, Object Name, Description

All other fields are filtered using a text entry. All lines are shown containing the text in full or in part.

# **OBJECTS**

If the navigation window is set to the "Object" hierarchy level, the properties of the selected object are displayed in the detail window.

BACeye displays all properties of an object possible according to BACnet standard in the detail window. The individual properties are consolidated to logical groups and always displayed. If an object does not implement all optional properties, those not implemented are displayed in grey with a line through them. This clearly shows the user that the object could use this property, even though it is not presently in use.

Analog Value						ρ
Standard Proprietary						
			_			
Object Identifier	AnalogValue	3		Present Value	0,00	×
Object Name	Analog Value 3 int	ternal writes		Units	[98, Percent]	€
Object Type	AnalogValue			Status Flags	JInAlarm Fault Overridden Out of Se	rvice
Description	Analog Value for i	internal writes		Event State	[4, LowLimit]	=
Profile Name	50-analog-value p	profile		Reliability	0 => NoFaultDetected	₹
				Out Of Service		
Notification Class	1			High Limit	80,00	
Time Delay	2			Low Limit	20,00	
Notify Type	[1, Event]		₹	Deadband	1,00	
	Off-Normal	Fault	Normal	Limit Enable	✓ Low Limit Enable ✓ High Limit Enable	
Event Time Stamps	((Friday,17-April	0	0			
Event Message Texts	TO_OFFNORMA	TO_FAULT	TO_NORMAL			
Acked Transitions	✓ Off-Normal	Fault 🔽 Norm	al			
Event Enable	✓ Off-Normal	Fault 🔽 Norm	al			
COV Increment	1,50			Priority Array	1 Element(e) in Verwendung	
				Relinquish Default	50,00	

#### Search for properties

BACeye also has a search feature for objects in the detail window. This search feature allows the user to find a certain property quickly in the detail window.

After entering a search term, BACeye marks all properties found containing the search term.

nalog Input				Limit	X
itandard Proprietary					
Object Identifier	AnalogInput	2	-	Present Value	47,30
Object Name	Analog Input 2 writab	le		Units	[98, Percent]
Object Type	AnalogInput			Status Flags	InAlarm Fault Overridden Out of Service
Description	Analog Input with many properties writable		Event State	[0, Normal]	
Profile Name	50-analog-input profile		Reliability	0 => NoFaultDetected	
				Out Of Service	
Notification Class	1			High Limit	80,00
Time Delay	2			Low Limit	20,00
Time Delay	~				
Notify Type	[0, Alarm]		<b>=</b>	Deadband	1,00
Notify Type	[0, Alarm] Off-Normal	Fault	▼ Normal	Deadband <mark>Limit</mark> Enable	1,00 ▼ Low Limit Enable ▼ High Limit Enable
Notify Type Event Time Stamps	[0, Alarm] Off-Normal 0 0	Fault	₹ Normal 0	Deadband <mark>Limit</mark> Enable	1,00 ▼ Low Limit Enable

#### **Tool tips**

If the user moves the mouse pointer over the name of a certain property, BACeye shows the associated tool tip text.

Present Value	47,30		
Units [Present_Val Status riags	I98 Percent1       Image: Constraint of the selected environment of the selected envinted environment of the selected environment		
Event State	[0, Normal]		

The tool tip consists of the name of the property, followed by the property ID and, where applicable, further information (e.g. associated units).

#### **EPICS display**

The value of a property can be called in EPICS display. For this purpose it is only necessary for the user to move the mouse cursor to the desired value and select it in the "EPICS Display" context menu.

If the type of data displayed is a complex type, the EPICS string can be scrolled using the EPICS editor to obtain better depiction. When the editor is called the first level of a complex data type is opened.

BACeye - EPICS-Editor	
Epics Editor für: Event Time Stamps	
× = ■× > e   = =	
1  ☐ ( 2  [2] ((Friday,17-April-2015),09:38:30.00), 3  [1] 0,	^
	-
4	Schließen

Example:

ſ	BACeye - EPICS-Editor	
	Epics Editor für: Event Time Stamps	
l	X № <b>8</b> ×  э е <del>с</del>	
l	1 ([2] ((Friday,17-April-2015),09:38:30.00),[1] 0,[1] 0)	A

Level 0:

BACeye - EPICS-Editor	
Epics Editor für: Event Time Stamps	
।    x ि <b>द ×</b>   २ २   <del>व</del> व	
1 □ ( 2 [2] ((Friday,17-April-2015),09:38:30.00), 3 [1] 0, 4 [1] 0	*

Level 1:



Level 2:

#### Writing values

With BACeye it is possible to write as well as read values. A number of object properties can be changed simultaneously. If properties are changed, BACeye displays the name of the property in bold face. All properties displayed in bold face are written by BACeye in the order changed.

Object Identifier	AnalogValue	3	Present Valu	e 12,00	×
Object Name	Analog Value 3 internal		Unit	s [98, Percent]	₹
Object Type	AnalogValue		Status Flag	s 📝 InAlarm 🗌 Fault 🗌 Overridden 🗌	Out of Service
Description	Analog Value for internal	writes tests	Event Stat	e [4, LowLimit]	-
Profile Name	50-analog-value profile		Reliabilit	y 0 => NoFaultDetected	Ŧ
			Out Of Servic	e 🔲	

The write command can be actuated on the control bar at the bottom edge of the detail window. In the case of commandable objects, BACeye writes with a priority set by the user.

Write Priority	[8, ManualOperator (8)] 🔹
	[1, ManualLifeSafety (1)]
	[2, AutoLifeSafety (2)]
	[3, Available_03 (3)]
	[4, Available_04 (4)]
	[5, CriticalEquipCtrl (5)]
	[7, Available_07 (7)]
	[8, ManualOperator (8)]
	[9, Available_09 (9)]
	[10, Available_10 (10)]
	[11, Available_11 (11)]
	[12, Available_12 (12)]
	[13, Available_13 (13)]
	[14, Available_14 (14)]
	[15, Available_15 (15)]
	[16, Default (16)]

The standard priority is **"8 - ManualOperator"**. The priority can be changed in the "Write Priority" selection list. According to the BACnet standard, priority **"6**" is reserved and cannot be used for write commands.

The actual write operation can be initiated with the "**Send**" button With the default setting, BACeye opens another interactive window when the "Send" button is clicked.

🢽 _Se	nden	the Western	
	<b>_Sen</b> Folgende Properties sind fü	<b>den</b> ir das Senden vorgesehen	:
	Property	Alter Wert*	Neuer Wert
1	Present Value	0.00	12.00
	Description	Analog Value for interna	geänderte Description
1	Object Name	Analog Value 3 internal	geänderter Name
	* Stand vom:		Senden Schließen

In this interactive window all properties are displayed with the old and new value BACeye intends to write.

At this point it is possible for the user to deselect individual properties and not yet write them. If properties are deselected, the changes made are not lost; they remain available for a further write process.

#### Successful send process

If the send process was successful, each successfully sent property is marked accordingly. BACeye reads the changed values back in so that the detail view represents the current value status.

Senden		
Folgende Propert	_ <b>Senden</b> ies sind für das Senden vorg	esehen:
Property	Alter Wert*	Neuer Wert
Yresent Value	0.00	12.00
🖌 🖌 Description	Analog Value for	interna geänderte Description
Solution Object Name	Analog Value 3 in	nternal geänderter Name

#### Unsuccessful send process

If the send process for a property is not successful, BACeye identifies the property with a negative marking. An unsuccessful send operation for a property does not have any direct effect on the send process for other properties. It is possible to use the "Log" button to find out the reason why the send operation was not successful. The transmission log can be called with the "Log" button to obtain further information on the problem which has occurred.

BACeye - Log	100 000	
Present Value: Error in 'BACnetObject.Rece BACnetErrorReply	iveWritePropertyAnswer - PresentValue':	
BACnetError in ProcWritePropertyComplet Status: BACnetERROR	e:	
ErrorClass: Property ErrorCode: WriteAccessDe	nied	
		Schließen

#### Writing commandable objects

If object properties are written, which can have a PriorityArray, it is possible that a value with higher priority than that to be written is already effective.

Example:

nder Wert 15 Value
Value
NULL
15
9
NULL
0
ОК

The PriorityArray already contains a number of entries. The interactive value window for the PriorityArray indicates that three values are present in the PriorityArray:

- [7:15]
- [8:9]
- [16:0]

If the PresentValue is to be changed again, BACeye writes with a standard priority of 8. This would result in the new value being written into the PriorityArray, even though it would not be effective as the PresentValue, because a value of 15 is already effective with a higher priority of 7.

To draw attention to this situation, BACeye marks it with a red exclamation mark in the send list.



#### **Cancellation of effects - deleting PriorityArray entries**

The "Delete" button for the PresentValue field can be used to cancel an effect or delete a certain field in a PriorityArray.

Present Value	15,00	×
		_

A button with red "X" is present following the PresentValue field for objects with PriorityArray.

Actuating this button causes the value ZERO to be written for the set priority for the PresentValue during the next write operation.

Senden		
	_Senden	
Folgende Proper	rties sind für das Senden vorge	isehen:
Property	Alter Wert*	Neuer Wert
Present Value	15.00	NULL

#### **Configuring send properties**

With the default setting, the properties can be checked and deselected in the interactive "Send" window during each send operation.

- MBS GmbH - Standard Project					
Ansicht Hilfe					
Senden 🕨	$\checkmark$	Senden mit Dialog und Bestätigung			
anaiog 106 Obje		Senden ohne Bestätigung			
ame	_	Dialog nach Senden schließen			

You can change this by selecting other send properties in the "View" menu.

• **Send with interactive window and confirmation:** This is the default mode. The interactive send window opens before sending. In the interactive window the values can be checked again before selecting send. After sending, the interactive window remains open displaying the send results.

• **Send without confirmation:** The interactive send window opens and sends all changes without reconfirmation. After sending, the interactive window remains open.

• Interactive window closes after sending: The interactive window is opened, sends the values and is then closed automatically when all send operations were successful. If errors occurred during sending, the interactive window remains open.

#### Send with hotkey

Changed values can also be sent using the hotkey combination ALT+S This can save a great deal of time depending on the configuration of the interactive send window. This mode is particularly practical in combination with "Close window after sending".

# 7. BACKUP & RESTORE

The BACnet Backup&Restore procedure serves for backing up the data in one of the devices or loading an existing data backup into a device. BACeye can serve as a backup and restore client on BACnet devices. The procedure is defined in the BACnet standard. The content of the backup is, however, the sole responsibility of the device manufacturer. The precise scope of the restore is also the responsibility of the device manufacturer. BACeye simply relays the data, however cannot interpret or modify it.

Sector Secto	Backup Device(s) Bitte wählen Sie eines oder mehrere Geräte aus. Vergeton Sie nicht, die Sicherungsassworter einzugeben, falls notwendig- Danich klicken Sie auf den Backup Button. Passwörter werden in der B-Cnet Explorer Projektatei especiehers zu dass Sie sie nur einmal eingeben müssen.					
erite Lusahlen Inst-Nr. Gestename Beschrebung Status 2 200 UGW UGW-C Client/Server 2 104576 UGW-Test 4-Modulous-B&Cnet-Simulator 2000 UGW UGW-C Client/Server 2 2015 UGW-ACI UGW-C Client/Server						
Maraka Men Inst-Nr. Gerätenane Becktrebung Status 2 200 UGW UGW-C Client/Server 2 1048576 UGW-Test 4-Mdodus-BaCnet-Simulator 2 2015 UGW-ACI UGW-C Client/Server 2 2015 UGW-ACI UGW-C Client/Server						
200     UGW     UGW-C Client/Server       7     1048576     UGW-Test     4-Modulus #Bachet-Simulator       2000     UGW     UGW-C Client/Server       2015     UGW-ACI     UGW-C Client/Server	Passwort					
1048576         UGW-Test         4xModbus-BACnet-Simulator           2000         UGW         UGW-C.Client/Server           2015         UGW-ACI         UGW-C.Client/Server						
2000 UGW UGW-C Client/Server 2015 UGW-ACI UGW-C Client/Server						
] 2015 UGW-ACI UGW-C Clien/Server						
	Rackup erstellen Ahbrec					

The interactive backup window can be started with the menu point<*Data transfer><Backup>*. The BACnet devices recognised are then displayed in this interactive window. One line is displayed per device with the columns: Instance No., Device name and Description. When a large number of devices exist in one system, it may not be expedient to show all devices simultaneously. A text search field allows filtering of the devices to be shown. Moreover a special filter line can be folded down by clicking the symbol next to "Filter" at the top right. Filters can be entered selectively for each column in this line. The first column in the device list contains check boxes for selecting the devices to be backed up. The password required for backup of certain devices is given in the Password column. The backup process for the selected devices can be started with the *<Backup>* button. First it is necessary to select the name for the backup file to be created using an interactive file selection window. The resulting file is specifically for BACeye. BACnet backup does not have a general exchange format allowing general exchange of backup files between different clients. The file serves for restoring this data with BACeye. A brief description of the data structure is given below in the event that a user does need to review the contents of the file. This format may change in later versions of BACeye; this description is provided for information only. The backup file consists of a ZIP archive. The archive contains one directory for each device backed up. The directory for each device contains one file with data per file object, which is a part of the backup, as well as an xml file containing general information.

# 8. PROPERTIES

The properties of BACeye can be selected on the "Properties" tab next to the navigation window. The Properties tab provides access to all BACeye settings.

Da	tei	Bearbeiten	Datentransf	er Fe	enster	Ansicht	Hilfe	2		
z	L	Eigenschafte	n							<del></del>
etzwei		Netzwerkadap	oter							_
<del>*</del>		{10.0.1.26} LAN	N-Verbindung	(Intel	(R) PRO	/1000 MT	-Netz	werkverb	indung)	•
z		Netznummer		1						
otizei		UDP Port		47808	3					
Eig	L	Foreign Device	2							
ensc	L	BBMD Adresse	2							_
nafte	L	FD Port								_
		FD Time-to-liv	e							
		Netzwerkscan	von	*			bis	*		-1
		Netzwerkscan	Timeout	3						- 1
										- 1
		Nachkommast	tellen	2						-1
		ReadProperty aktivieren	Multiple							
		Starte Netzwe Programmstar	rkscan bei rt							
		Statische Gerä Adressen-Zuo verwenden	ite- rdnung		Stati	sche Gerät	te-Ad	ressen-Zu	Jordnung	
		COV verwende	en	✓						
		Polling-Interva (sec)	all Watchlist	60						
		Polling-Interva	all Zoom	60						- 1
		(sec)								
		Priorität Write	Property	Manu	alOper	ator (8)				•
		Device-Id in R verwenden	ecipientlist							
		Max. Anzahl Ei Event-Notifica	inträge tions	20000	)					
				BACey	ye – De	vice Objek	t			
									Speich	iern

### **NETWORK SETTINGS**

BACeye offers the possibility of selecting a certain network card in the network settings area, In combination with the network card, network numbers for the BACnet network as well as the UDP port for BACnet communication are specified

When BACnet communication is started, BACeye indicates whether the combination of network adapter + UDP port is already linked elsewhere (e.g. MBS BACnet OPC server). In this case it is necessary to terminate the second BACstack or select a different network adapter+port combination.

Eigenschaften		Ŧ
Netzwerkadapter		
{10.0.1.26} LAN-Verbindun	g (Intel(R) PRO/1000 MT-Netzwerkverbindung)	•
Netznummer	1	
UDP Port	47808	

### FOREIGN DEVICE

BACeye can be configured as FD in a BACnet network in the "Foreign Device" section. The configuration can be activated or deactivated in the "Foreign Device" checkbox.

Foreign Device	
BBMD Adresse	
FD Port	
FD Time-to-live	

For configuration give the address of the BBMD in the network as well as the FD port and time at which the FD is to be unregistered.

### **NETWORK SCAN**

The "Network scan" section allows entry of the BACeye range to be scanned. The range comprises the valid BACnet address range.

Netzwerkscan von	*	bis	*
Netzwerkscan Timeout	3		

Both ranges can be expanded to the maximum range with a wild card "\*". When entry of a range is required, BACeye outputs appropriate WHO\_IS queries. BACeye uses a multiple stage process to reach the maximum number of subscribers possible. After polling the entire range, BACeye waits a certain time and then polls specifically the ranges between the devices which have replied. This process is repeated a number of times.

# COMMUNICATION SETTINGS

Basic settings for BACeye can be made in the communication settings.

Nachkommastellen	2
ReadPropertyMultiple aktivieren	
Starte Netzwerkscan bei Programmstart	
Statische Geräte- Adressen-Zuordnung verwenden	Statische Geräte-Adressen-Zuordnung
COV verwenden	<b>V</b>
Polling-Intervall Watchlist (sec)	60
Polling-Intervall Zoom (sec)	60
Priorität WriteProperty	ManualOperator (8) 🔹
Device-Id in Recipientlist verwenden	
Max. Anzahl Einträge Event-Notifications	20000

#### Significant digits

This defines the number of significant digits with which BACeye is to operate. The default setting is two. All analogue values are represented in this form.

#### Activating ReadPropertyMultiple (RPM)

If the "Activate RPM" checkbox is marked, BACeye polls devices using RPM to the extent supported by the devices. This checkbox can be deactivated, if use RPM is not desired for analysis purposes. BACeye then polls the properties of all devices individually. BACeye also has a fallback process. If a device generally supports RPM and a call fails (e.g. data quantity too large), BACeye falls back to reading the individual properties for this device.

#### Start network scan on program start

BACnet communication is not accomplished initially when BACeye is started. BACnet communication starts only when the network scan is actuated by the user. This was implemented to prevent unintentional disruptions in slow networks - this operation can be overridden with the checkbox. When the checkbox is checked, BACeye starts BACnet communication automatically after starting and actuates a BACnet scan of the set range.

#### Static device address binding

The static device address binding can be activated here. Details are given in the Chapter "Static Device Address Binding"

#### Using COV

BACeye offers a number of possibilities for monitoring changes in the values of properties. Individual properties can be monitored with the zoom window (see Chapter "Zoom Window") or complete objects can be monitored in the watch list (See Chapter "Watch List") If supported, BACeye uses COV or COV-P for monitoring properties. If COV is not supported the values are polled by BACeye. The COV checkbox allows the user to set whether BACeye should attempt to receive value changes via COV or generally use the polling procedure.

#### Polling interval for watchlist

Here it is possible to set the interval values for polling when objects are added to the watchlist.

#### Polling interval for zoom window

Here it is possible to set the interval values for polling when they are observed in a zoom window. If the property to be observed is already on the watchlist, the watchlist interval is effective. The property is not polled multiply.

#### WriteProperty priority

Setting for standard BACeye priority for writing the PresentValue property for commandable objects. The default value is "8 - ManualOperator".

#### Using device ID in recipient list

BACeye usually enters itself in the recipient list for objects using the network number+BACnet MAC address. If this checkbox is activated, BACeye enters itself in the recipient list with the DeviceID instead.

#### Max number of event notifications

If BACeye is entered in the recipient list, event notifications are collected and buffered. This entry indicates the maximum number of notifications to be buffered before older events are deleted from the memory.

### STATIC DEVICE ADDRESS BINDING

Normally BACeye finds BACnet devices using so-called "dynamic device address binding". This means BACeye sends a "Who Is" telegram as broadcast and devices reply with an "I Am" telegram. These replies allow BACeye to recognise the devices present in the network and the addresses under which the devices can be reached. However there are some situations, where this mechanism is not sufficient. Some devices, particularly MS/TP slaves, do not support "I Am". Moreover transfer of broadcast telegrams can be disrupted. This happens particularly when BBMD devices are not completely installed in a BACnet IP network with different IP subnetworks. As an option BACeye also supports so-called "static device address binding" to successfully communicate with devices even in such special situations. In this case the devices are made identifiable for BACeye by means of manual configuration with their addresses. For further BACeye functions, the devices entered using static device address binding behave in the same manner as devices which have been found automatically by means of dynamic device address binding. Configuration for static device address binding is possible using the interactive "static device address binding" window, which can be called on the "Properties" tab.

atische Gerä	te-Adressen-Zuo	rdnung			
InstNr.	Netznummer	MAC	IP-Adresse	Kommentar	
4711	2	10250dac	16.37.13.172	Device XYZ	

Entries can be added or removed with the "+" and "-" buttons. Present entries can be edited by double-clicking on the line in question. After completing entries, they can be activated individually in the list. All activated entries become effective at the moment they are activated in the "Static device address binding" checkbox on the Settings tab. This means that it is not necessary to delete entries when not required temporarily; they can simply be deactivated.

Statische Geräte-	itatische Geräte-Adressen-Zuordnung				
Statische Gerät	te-Adressen-Zu	uordnung	1		
InstNr.	4711				
Netznummer	2				
MAC	10250dac				
IP-Adresse	16.37.13.172				
Kommentar	Device XYZ				
		ок	Abbrechen		
			)		

### **BACEYE DEVICE OBJECT**

The interactive "BACeye device object" window allows the settings to be edited for the device object with which BACeye identifies itself to other subscribers.

BACeye - Properties			
ACeye - Device Object			
Object Identifier	Device 0	Max APDU Length	1476
Object Name	BACeye	Segm. Supported	0 => both 🛛 🔻
Object Type	Device	Max Segm. Accepted	16
Description	BACeye MBS GmbH	APDU Segm. Timeout	20000
Profile Name		APDU Timeout	30000
Location		Num. Of APDU Retries	5
		Window Size	8
			OK Abbrechen

The most important settings for the device object can be made in the interactive window:

- **Object Identifier:** Instance number of own device object
- Object Name: Name of own device object
- Object Type: Type of own device object
- Description: Description of own device object

• **Profile Name:** Text field for setting profile name. This property is used to document that the device in question is set according to a defined pattern. This setting does not have any particular relevance for BACeye.

• Location: Location is a text property serving to document the installation location of the device. Other BACnet clients in the network can be informed where the BACeye device is located with the aid of this property.

• Max APDU Length: Maximum number of bytes, BACeye is to support in one telegram. Generally this is set to the maximum supported by all connected BACnet networks. Usually values of 1476 are used when only BACnet IP is used and 480 when the BACnet network also contains MS/TP devices.

• Segm. Supported: It is possible to set whether BACeye is to support segmented transfer.

• Max Segm. Accepted: The maximum number of segments is configured which BACeye is to support in the event of segmented transfer. Values between 1 and 255 are permissible. It is rarely necessary to change the default value of 16.

• **APDU Segm. Timeout:** Time BACeye is to wait for a segment before retrying. This value is expressed in milliseconds. The default value of 2000 therefore corresponds to 2 seconds. It may be necessary to increase this value if the BACnet network is very slow or contains overloaded subnetworks or very slow devices.

• Num. Of APDU Retries: Number of retries to be attempted by BACeye when the device does not reply to the poll.

• Window Size: Number of segments to be received during segmented transfer before sending a confirmation. Only in very rare cases is it necessary to change the default setting of 8.

# 9. ALARMING

BACnet has mechanisms which can evaluate and recognise the device alarm states automatically and transfer this information on to clients accordingly in the form of EventNotifications. BACeye supports this BACnet feature as client.

### ENTRY IN RECIPIENT LIST

NotificationClass objects serve for determining which client a server sends an EventNotification. Each of these NotificationClass objects has a property recipient list containing a list of target addresses and sending criteria. BACeye receives EventNotifications only from those NotificationClass objects for which the BACeye address or a matching broadcast address is projected in the property recipient list. This recipient list can be processed in BACeye on the one hand fully normally with the edit and send functions from the interactive windows for editing NotificationClass objects. However there are also special convenience features for which BACeye determines all NotificationClass objects in question and then enters its own address selectively in a number of recipient lists.

uche:							Filter
0	C Dev. InstNo	InstNo.	Name	Rec.	Description	Dev. Name	Dev. Description
	200	1	NOTIF1			UGW	UGW-C Client/Server
	1048576	1	NOTIF1			UGW-Test	4xModbus+BACnet+Simula
	2000	1	2000.NC 1		UG Notification Class Object	UGW	UGW-C Client/Server
	2015	4	2000.NC 4		neues Notification Class Ot	UGW-ACI	UGW-C Client/Server
	2015	3	2000.NC 3		neues Notification Class Ot	UGW-ACI	UGW-C Client/Server
	2015	2	2000.NC 2		neues Notification Class Ot	UGW-ACI	UGW-C Client/Server
	2015	1	2000.NC 1		neues Notification Class Ot	UGW-ACI	UGW-C Client/Server
	94	3317195	/92/000/00/00/SY		BACnetMeldeziel	DDC4000_#92	BACnet Device
	94	3317638	/92/000/00/00/SY		BACnetMeldeziel	DDC4000_#92	BACnet Device
	94	328532	/92/000/00/00/SY		BACnetMeldeziel	DDC4000_#92	BACnet Device
	94	1742536	/92/000/00/00/SY		BACnetMeldeziel	DDC4000_#92	BACnet Device
	1072	2002	1.2 Alarmklasse 3		Alarmklasse Anwendung	Vitogate-10-250-	Vitogate300
	1072	2001	1.2 Alarmklasse 2		Alarmklasse Einzelmeldung	Vitogate-10-250-	Vitogate300
	1072	2000	1.2 Alarmklasse 1		Alarmklasse historische Me	Vitogate-10-250-	Vitogate300
	1072	1002	1.1. Alexandriane 2	100	Alexandrase Associations	Vite 10 250	Wite
Alle	2						Eintragen Entfernen
Zielee	leases						
	iresse:						
🔍 eig	ene						
🔘 fre	mde						

The interactive window for this convenience feature can be started with the menu point *<Edit><Enter BACeye in Recipient Lists>*. When the interactive window is opened BACeye first reads all NotificationClass objects out of all identified devices and then displays the objects in one of its lists. Readout can require some time. This list is filled successively and a progress bar is shown at the bottom right as long as readout is not yet completed. Then objects can be selected for editing in the first column. After pressing the *<Enter>* button, BACeye adds an entry with its own address in the recipient list of all marked objects. On the other hand pressing the *<Delete>* button causes BACeye to delete an entry with its own address in all marked objects.

# DISPLAY OF MESSAGES RECEIVED

The menu *Window><Display Event Notifications>* allows an interactive window to be opened containing the list of all alarms and events received. Each line in this list represents one EventNotification.

💽 BACeye - Event-Notifica	tions											
Event-Notifications												
Suche:												
												Filter
Empfangen	Zeitstempel	Device-ID	ObjTyp	InstNr	NClass	Notify-Typ	Event-Typ	Von Status	Nach Status	Priorität	Ack.	Nachricht
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1000	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13:49:34.00	1048576	BI	1010	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13:49:34.00	1048576	BI	1020	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1030	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1040	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1050	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1060	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13: 49: 34.00	1048576	BI	1070	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13:49:34.00	1048576	BI	1080	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:53	(Wednesday, 29-April-2015), 13:49:34.00	1048576	BI	1090	1	Event	ChangeOfState	Normal	OffNormal	13		
29.04.2015 13:47:54	(Wednesday, 29-April-2015), 13:47:54.00	94	TLOG	234574	328532	Event	BufferReady	Normal	Normal	128	1	Trend Log - Daten bereit
29.04.2015 13:47:55	(Wednesday, 29-April-2015), 13:47:55.00	94	TLOG	235438	328532	Event	BufferReady	Normal	Normal	128	1	Trend Log - Daten bereit
29.04.2015 13:47:55	(Wednesday, 29-April-2015), 13:47:54.00	95	TLOG	1840869	328532	Event	BufferReady	Normal	Normal	128	V	Trend Log - Daten bereit
29.04.2015 13:47:56	(Wednesday, 29-April-2015), 13:47:57.00	93	TLOG	233258	328532	Event	BufferReady	Normal	Normal	128	1	Trend Log - Daten bereit
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13:47:58.00	93	TLOG	235522	328532	Event	BufferReady	Normal	Normal	128	V	Trend Log - Daten bereit
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13:49:39.00	1048576	BI	1000	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13:49:39.00	1048576	BI	1010	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13: 49: 39.00	1048576	BI	1020	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13:49:39.00	1048576	BI	1030	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13: 49: 39.00	1048576	BI	1040	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13: 49: 39.00	1048576	BI	1050	1	Event	ChangeOfState	OffNormal	Normal	13	<b>[</b> ]]	
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13:49:39.00	1048576	BI	1060	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13: 49: 39.00	1048576	BI	1070	1	Event	ChangeOfState	OffNormal	Normal	13		
29.04.2015 13:47:58	(Wednesday, 29-April-2015), 13: 49: 39.00	1048576	BI	1080	1	Event	ChangeOfState	OffNormal	Normal	13		
•					1							•
Alle Markierte Ele	mente aus der Liste entfernen	Aktualisieren	Speicher	n								Schließ

An optional feature allows the list to be updated dynamically. This option can be activated with the *<Update>* checkbox. It may be expedient to switch off the update feature when, for example, the user wants to find or review data already received. In such cases updating could be distracting if the events being reviewed are changed. This setting does not affect collecting Event Notifications received in the background. The list displayed can be filtered with a clear text search. If a text is entered in the text field under*Search>* only those lines are displayed containing this text in one of the notification fields. The list can also be filtered according to column content. When the *Filter>* symbol at the top right is clicked, an additional line appears in which a filter criterion can be selected for each column in the list. Only lines satisfying the filter criteria are displayed. Clicking the *Filter>* symbol again causes the filter line to fold back up. The filter is then no longer effective. However the criteria set are retained. Double-clicking on a line in the list view opens an interactive detail window for this specific EventNotification.

ent-Notification: 29.0	4.2015 13:47:53	
Device-ID	1048576	Zeitstempel (Wednesday,29-April-2015),13:49:34
Object Identifier	BI 1070	Von Status Normal Nach Status OffNormal
Object Type	BinaryInput	Priorität 13
Notification Class	1	Ack. required
Notify-Typ	Event	Nachricht
Event-Typ	ChangeOfState	Event-Values [1] [1] 1,(1,0,0,0)

The event notifications received can be saved for further processing externally or archived as files in xml format. The save function can be actuated with the<*Save>* button in the interactive window displaying the list of

event notifications. The interactive file selection window then allows the user to enter the destination for saving the data. The filter set is effective during the save operation.

### **CONFIRMATION OF MESSAGES**

BACnet offers the option of managing confirmations for alarm and event notifications - BACeye can send such confirmations. When the "AckRequired" flag is set, a confirmation can be sent to the device from the interactive detail window with the *Confirm>* button. Confirmation details are generated automatically by BACeye.

Marked messages can be deleted from the list in the BACeye memory with the button *<Delete marked elements from list>*. In this case the EventNotifications are deleted only from the list in the main BACeye memory. There is no retroactive effect on the system whatsoever. Normally it is not necessary to delete these entries; this feature serves only for removing messages which disturb an overview.