



Operator Manual

Version 1.1

BACnet OPC-Client



1. Contents

| | |
|--|----|
| 1. Contents | 2 |
| 2. Document revision | 4 |
| 3. Foreword | 5 |
| 3.1. Supported operating system versions | 5 |
| 3.2. Required hardware | 5 |
| 3.3. Recommended literature | 5 |
| 3.4. Interesting links concerning BACnet in the World Wide Web | 6 |
| 3.5. Registered trademarks | 6 |
| 3.6. Copyright | 8 |
| 4. Block diagram of the BACnet OPC-Client | 9 |
| 5. Mode of operation of the BACnet OPC-Client | 10 |
| 6. Operation of the BACnet OPC-Client | 11 |
| 6.1. The operating surface | 11 |
| 6.2. The standby display | 13 |
| 6.3. The tool-bar | 13 |
| 7. The menus of the BACnet OPC-Server | 15 |
| 7.1. The menu "File" | 15 |
| 7.1.1 New | 15 |
| 7.1.2 Open | 15 |
| 7.1.3 Save | 15 |
| 7.1.4 Save As | 15 |
| 7.1.5 Import text file | 15 |
| 7.1.6 Export text file | 15 |
| 7.1.7 Settings | 16 |
| 7.1.8 Load last configuration automatically | 16 |
| 7.1.9 Display welcome window | 16 |
| 7.1.10 Display tool bar | 16 |
| 7.1.11 Display status bar | 17 |
| 7.1.12 Standard BACnet server name | 17 |
| 7.1.13 Standard BACnet server instance number | 17 |
| 7.1.14 Save permanently | 18 |
| 7.1.15 Determine standard names | 18 |
| 7.1.16 Stop | 18 |
| 7.2. Menu "OPC" | 19 |
| 7.2.1 Connect | 19 |
| 7.2.2 Stop connection | 19 |
| 7.2.3 Server status | 20 |
| 7.2.4 Group parameter | 20 |
| 7.2.5 Data point parameters | 21 |

| | |
|--|----|
| 7.2.6 Write data point..... | 21 |
| 7.2.7 Read data point | 21 |
| 7.3. Menu "Link"..... | 22 |
| 7.3.1 Add link..... | 22 |
| 7.3.2 Delete link..... | 23 |
| 7.3.3 Refresh..... | 23 |
| 7.4. Menu "BACnet"..... | 24 |
| 7.4.1 Start server..... | 24 |
| 7.4.2 Stop server..... | 24 |
| 7.5. Menu "View"..... | 25 |
| 7.5.1 Tool bar..... | 25 |
| 7.5.2 Status bar..... | 25 |
| 7.5.3 Grid..... | 25 |
| 7.6. Menu "?"..... | 26 |
| 7.6.1 Info concerning BACnet OPC-client..... | 26 |
| 8. Abbreviations and important terms..... | 27 |

2. Document revision

| Rev-No. | Date | Author | Remarks |
|---------|------------|--------|---|
| 1.0 | 20.08.2001 | FRS | Initial version |
| 1.1 | 21.08.2001 | FRS | Document revision added, tdb-files changed into boc-files |

3. Foreword

Thank you very much for using the BACnet OPC-Client. By means of this easy-to-operate software the connection of OPC-servers or OPC-based visualization systems to BACnet-networks will be a child's play.

3.1. Supported operating system versions

As operating system platform, Microsoft Windows is supported.

3.2. Required hardware

As hardware you require an IBM-compatible Personal Computer. As minimum requirements we recommend a processor type Pentium, min. 133 MHz and 32 MB RAM memory capacity as well as a CD-ROM drive. For the installation approx. 15 MB free memory on the hard disk is required. For supporting certain BACnet Data-Link-Layers you require e.g. an Ethernet-, ARCnet or LonTalk network card. For using the dongle a parallel printer interface is required, a printer may be connected to the output of the dongle.

3.3. Recommended literature

ANSI/ASHRAE Standard 135-1995 BACnet A Data Communication Protocol for Building Automation and Control Networks:

This is the official ASHRAE standard work with regard to BACnet. It deals with the complete ASHRAE-Standard 135-1995 (BACnet). There are several amendments and extensions to this work which may be downloaded from the BAC-net homepage (<http://www.bacnet.org>).

This literature may be purchased from
Promotor-Verlag, Postfach 211053, D-76160 Karlsruhe, <http://www.cci-promotor.de>

or

Direct purchase from the ASHRAE-Online-bookstore:
<http://xp10.ashrae.org/bookstore/bookstore.html>



Telefon: +49/2151/7294-0
Telefax: +49/2151/7294-50
Römerstraße 15 email: info@mbs-software.de
D-47809 Krefeld Internet: <http://www.mbs-software.de>

3.4. Interesting links concerning BACnet in the World Wide Web

- www.bacnet.org
Official ASHRAE homepage concerning BACnet.
This is presumably the most important source of information for technical information on BACnet.
- www.bacnet.de
Homepage of the European BACnet Interest Group with information on activities and events of the BACnet Interest Group e.V.
- www.cimetrics.com
Homepage of Cimetrics Technology, Inc. with information on BACnet-products, BACnet-Protocolstacks and BACnet-Softwaretools.
- www.mbs-software.de
Homepage of MBS GmbH with information on BACnet-products, Fieldbus-Gateway-products and software developments.

3.5. Registered trademarks

In this book trademarks and product names of specific companies are used. The following terms are registered trademarks of the respective vendors and are not especially mentioned in this book:

- Microsoft, Windows and MS-DOS are registered trademarks of Microsoft Corporation
- BACnet and ASHRAE are registered trademarks of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, INC. (ASHRAE)
- Intel and Pentium are registered trademarks of the Intel Corporation
- BACstac is a registered trademark of Cimetrics, Inc.
- ARCnet is a registered trademark of the Datapoint Corporation

- IBM-PC and IBM-AT are registered trademarks of the International Business Machines Corporation (IBM)
- LONTalk is a registered trademark of the Echelon, Inc.



MBS GmbH
Römerstraße 15
D-47809 Krefeld

Telefon: +49/2151/7294-0
Telefax: +49/2151/7294-50
email: info@mbs-software.de
Internet: <http://www.mbs-software.de>

3.6. Copyright

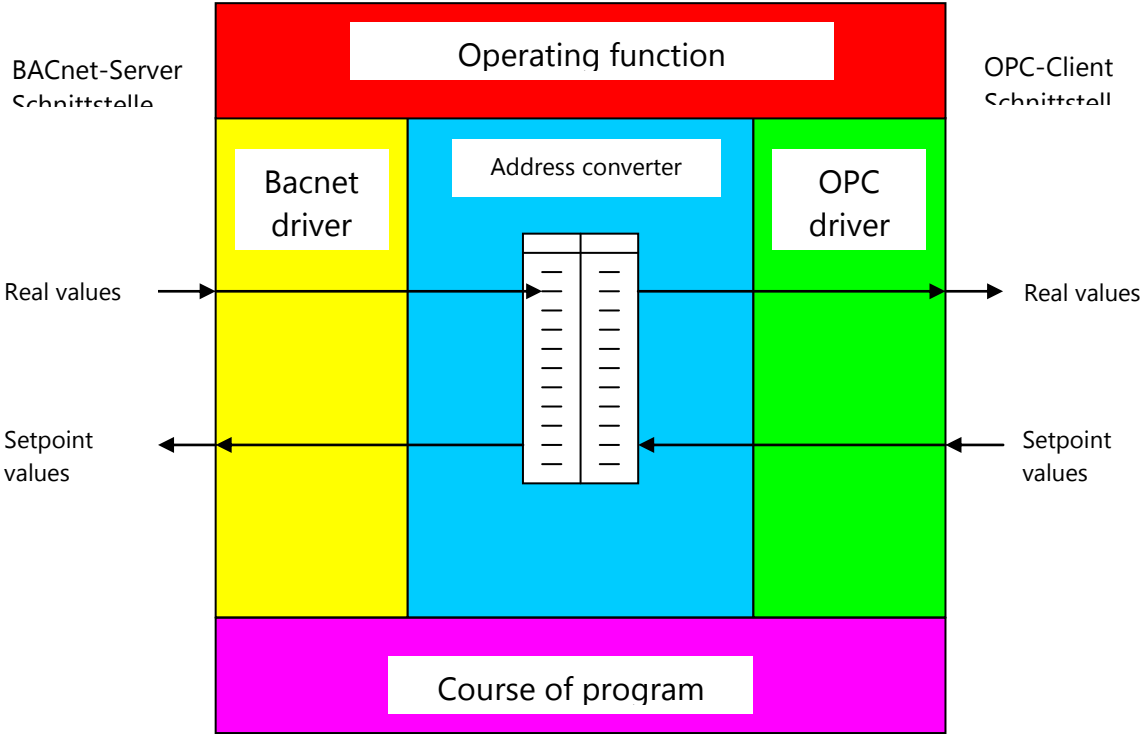
©2001 MBS GmbH
Römerstraße 15
D-47809 Krefeld

Phone: +49 / 21 51 / 72 94 - 0
Telefax: +49 / 21 51 / 72 94 - 50

E-Mail: info@mbs-software.de
Internet: <http://www.mbs-software.de>

All rights reserved. No part of this book may be reproduced in any form (printing, photocopy or any other technique) or processed, duplicated or circulated electronically without written permission of MBS GmbH.

4. Block diagram of the BACnet OPC-Client



5. Mode of operation of the BACnet OPC-Client

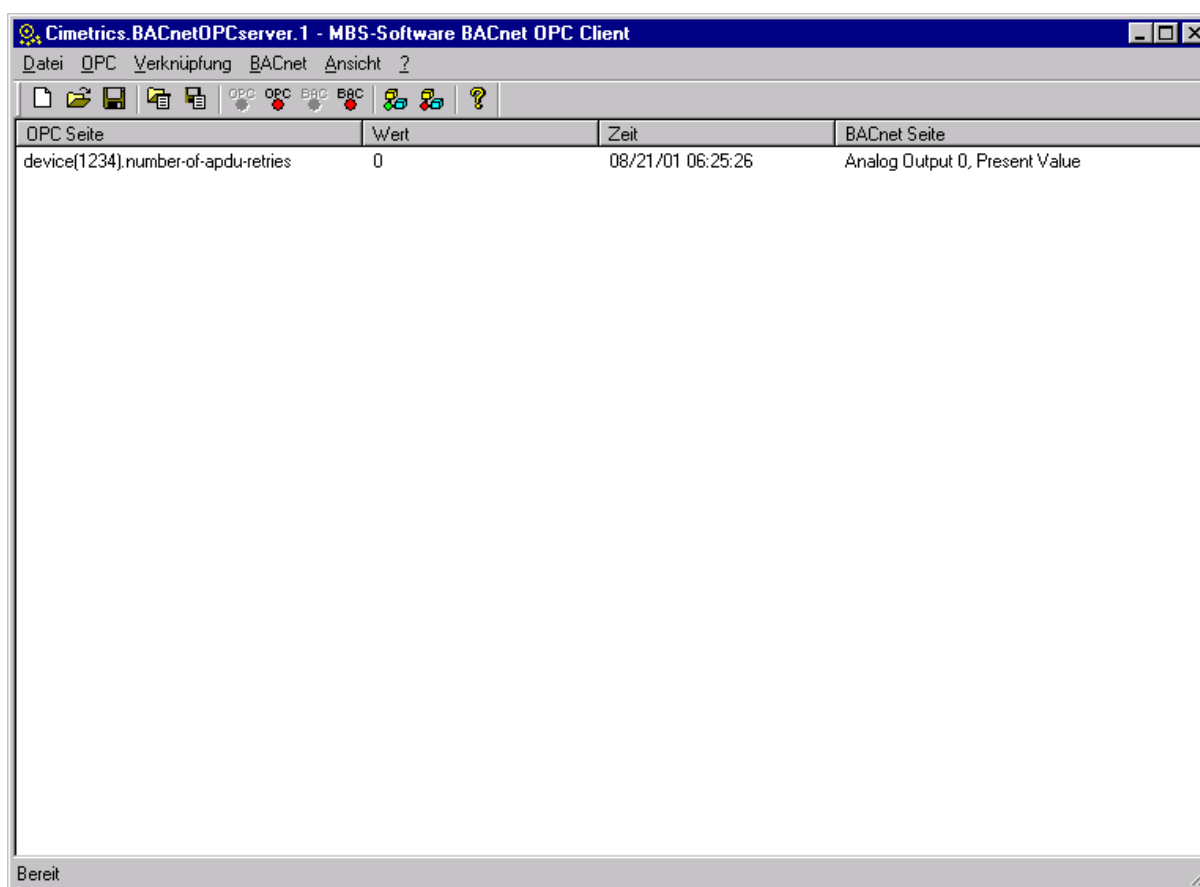
- On the BACnet-side the BACnet OPC-client works as server and makes OPC data points available as BACnet-server.
- The data representation of the OPC-servers which are edited and used by the address converter may be permanently stored on the hard disk as so-called ".boc"-files.
- The support of the OPC/DCOM-Interface (Distributed COM) enables the separation of client and server to different computers in a single network.
- The link of OPC-tags to BACnet object properties is effected comfortably and flexible by means of a comfortable dialog or via the import of a text file.
- The OPC-Browsing Interface is supported which means the OPC-client shows a list of the available OPC-tags from which the desired data points may be selected.
- Depending on the selected software option all Data-Link-Layers (except MS/TP) are supported from the BACnet-side.
- The BACnet-server supports the Conformance Class 3. In addition the functional groups "COV Event Initiation" and "Event Initiation" are implemented. The document "BACnet PICS" describes the supported BACnet-functions. A further document "Bacnet X-PICS" describes the detail properties of the BACnet-objects.

6. Operation of the BACnet OPC-Client

A transformation table which may be stored as ".boc"-file on the hard disk or on a floppy disk serves as data basis for the transformation of OPC-tags to properties of BACnet-objects.

When starting the program the parametring list which has been stored latest may be loaded automatically. This allows an automatic start of the software without difficulties e.g. by entry in the auto start-program group.

6.1. The operating surface



This picture displays the operating surface of the BACnet OPC-client.

The list shows the active connections between OPC-tags and BACnet object properties. In addition the last value and the time stamp of the last change of value are displayed.



MBS GmbH
Römerstraße 15
D-47809 Krefeld

Telefon: +49/2151/7294-0
Telefax: +49/2151/7294-50
email: info@mbs-software.de
Internet: <http://www.mbs-software.de>

6.2. The standby display

Bereit

This information line shows the standby status of the program. If the mouse cursor is moved via an entry in the tool bar or within the menus, a short information on the corresponding program function is displayed.

6.3. The tool-bar

The tool-bar enables the rapid access to the most important program functions. Below please find a description of the individual tool-bar functions.



This picture shows the tool-bar of the software.



File / New, creates a new parametring file.



File / Open, opens a parametring file from the hard disk / floppy disk.



File / Store, stores the present parametring file on the hard disk / floppy disk.



File / Import, imports a text file and creates a parametring file.



File / Export, exports the parametring file as text file.



Starts respectively stops the OPC-client, the red OPC-symbol shows an existing connection to the OPC-server.



Starts respectively stops the BACnet-server, the red BACnet-symbol shows that the BACnet-server is active.



Add connection, starts the dialog for determination of the connections.



Delete connection, deletes the presently selected connection.



Info, shows information concerning the program version.



MBS GmbH
Römerstraße 15 D-47809 Krefeld
Telefon: +49/2151/7294-0
Telefax: +49/2151/7294-50
email: info@mbs-software.de
Internet: <http://www.mbs-software.de>

7. The menus of the BACnet OPC-Server

7.1. The menu "File"

7.1.1 New

creates an empty .boc -file

7.1.2 Open

loads a boc-file from the hard disk

7.1.3 Save

saves the present file on the hard disk

7.1.4 Save As

saves the present file on the hard disk while selecting a new file name

7.1.5 Import text file

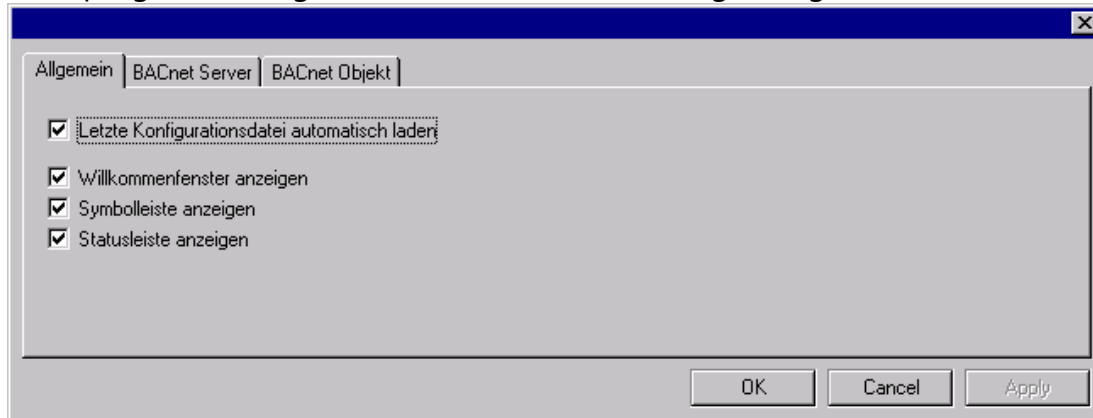
select this option in order to read-in a text file and to create a parametring list from these information

7.1.6 Export text file

select this option in order to store the present parametring as text file on the hard disk or the floppy disk

7.1.7 Settings

Basic program settings are effected in the following dialog



7.1.8 Load last configuration automatically

If this point has been selected, the configuration file which has been edited last is loaded automatically when starting the program and the servers are started. Please select this option if the software is started automatically e.g. in the auto start group after a system start. This ensures that e.g. after a power failure the software starts running again.

7.1.9 Display welcome window

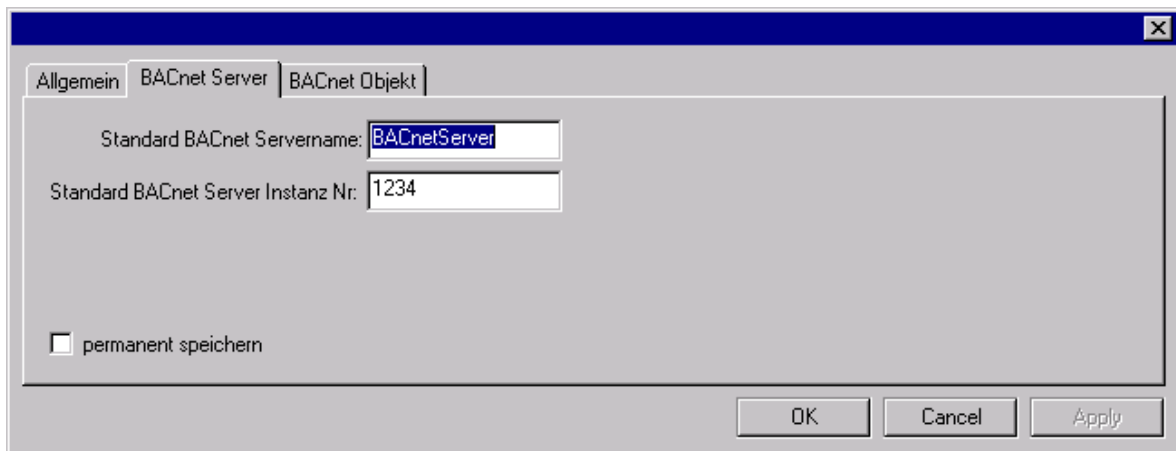
If this point has been selected, the welcome window is displayed when starting the program.

7.1.10 Display tool bar

If this point has been selected, the tool bar is displayed when starting the program.

7.1.11 Display status bar

If this point has been selected, the status bar is displayed when starting the program.



The screenshot shows a Windows-style dialog box with a blue title bar and a close button (X) in the top right corner. The dialog has three tabs: 'Allgemein', 'BACnet Server', and 'BACnet Objekt'. The 'BACnet Server' tab is selected. Inside the dialog, there are two text input fields: 'Standard BACnet Servername:' with the value 'BACnetServer' and 'Standard BACnet Server Instanz Nr:' with the value '1234'. Below these fields is a checkbox labeled 'permanent speichern' which is currently unchecked. At the bottom right of the dialog are three buttons: 'OK', 'Cancel', and 'Apply'.

7.1.12 Standard BACnet server name

Here please determine the object name of the BACnet device-object. Please note that this name must be unique within the BACnet-network.

7.1.13 Standard BACnet server instance number

Here please determine the instance number of the BACnet device-object. Please note that this instance number must be unique within the BACnet-network.

7.1.14 Save permanently

If this point has been selected the settings made in this dialog are saved permanently and are available again at the next request.

Standardname für

| | | | | | |
|----------------|---|----------------|---|--------------------|---|
| Analog Input: | <input type="text" value="AnalogInput"/> | Binary Input: | <input type="text" value="BinaryInput"/> | Multistate Input: | <input type="text" value="MultiStateInput"/> |
| Analog Output: | <input type="text" value="AnalogOutput"/> | Binary Output: | <input type="text" value="BinaryOutput"/> | Multistate Output: | <input type="text" value="MultiStateOutput"/> |
| Analog Value: | <input type="text" value="AnalogValue"/> | Binary Value: | <input type="text" value="BinaryValue"/> | Multistate Value: | <input type="text" value="MultiStateValue"/> |

permanent speichern

OK Cancel Apply

7.1.15 Determine standard names

Here the offsets for the BACnet object names are determined. If a BACnet object is added to the projecting, the unique object name is constructed of the determined offset as well as a unique number.

7.1.16 Stop

Stops the BACnet OPC-client.

7.2. Menu "OPC"

7.2.1 Connect

Establishes the connection to an OPC-server. In the following dialog you may select the desired OPC-server.



This list shows the locally registered OPC-servers. If you want to start an OPC-server on a remote computer in the network please select the computer from the list of the server knots. The OPC-data access specifications 1.0 and 2.0 are supported. Please note that servers which only support version 1.0 are not displayed in the list if option 2.0 has been selected.

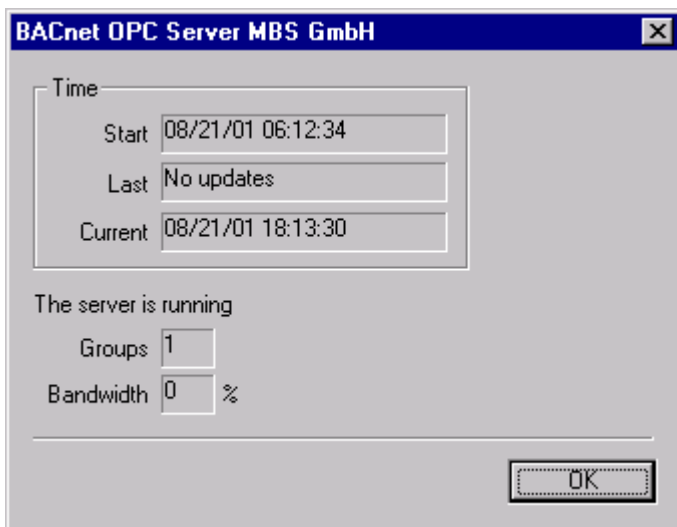
Please note that for the connection to an OPC-server on a remote computer settings have to be made with the "DCOMCNFG.EXE" program (contained in the Windows delivery package). In general the access rights on the remote computer have to be set in such a way that a remote program start is allowed. Help for this can be found among other things in the OPC-specifications (www.opcfoundation.org).

7.2.2 Stop connection

Stops the connection to the OPC-server. If the OPC-server has been started by the "remote" software, the server is stopped again if no other clients are logged-in.

7.2.3 Server status

This dialog displays information on the connected OPC-server.



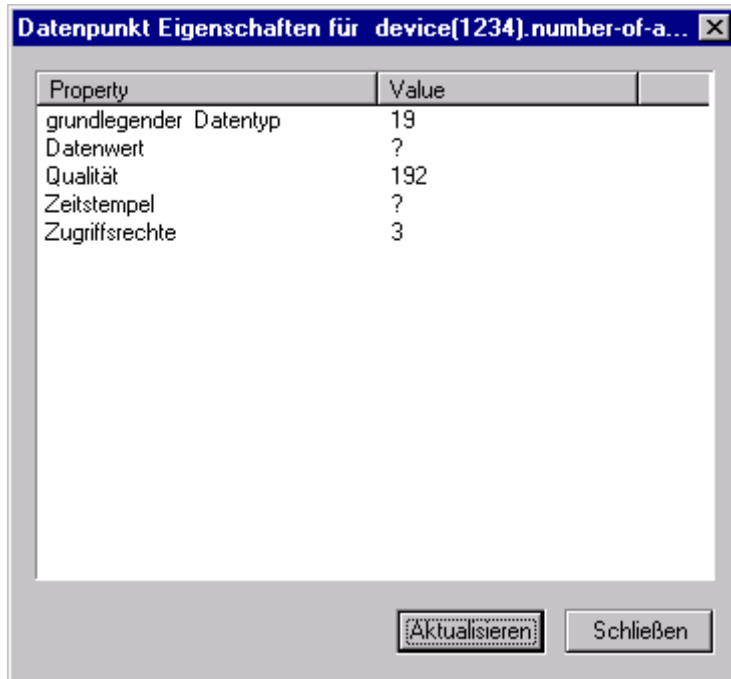
7.2.4 Group parameter

In this dialog the settings for communication with the OPC-server are made. For more detailed information please refer to the OPC-specifications.



7.2.5 Data point parameters

In this dialog the details (from the OPC-side) of the presently selected link are displayed.



This display may be used for diagnosis purposes.

7.2.6 Write data point

In this dialog the present value of the selected data point may be written for diagnosis purposes.



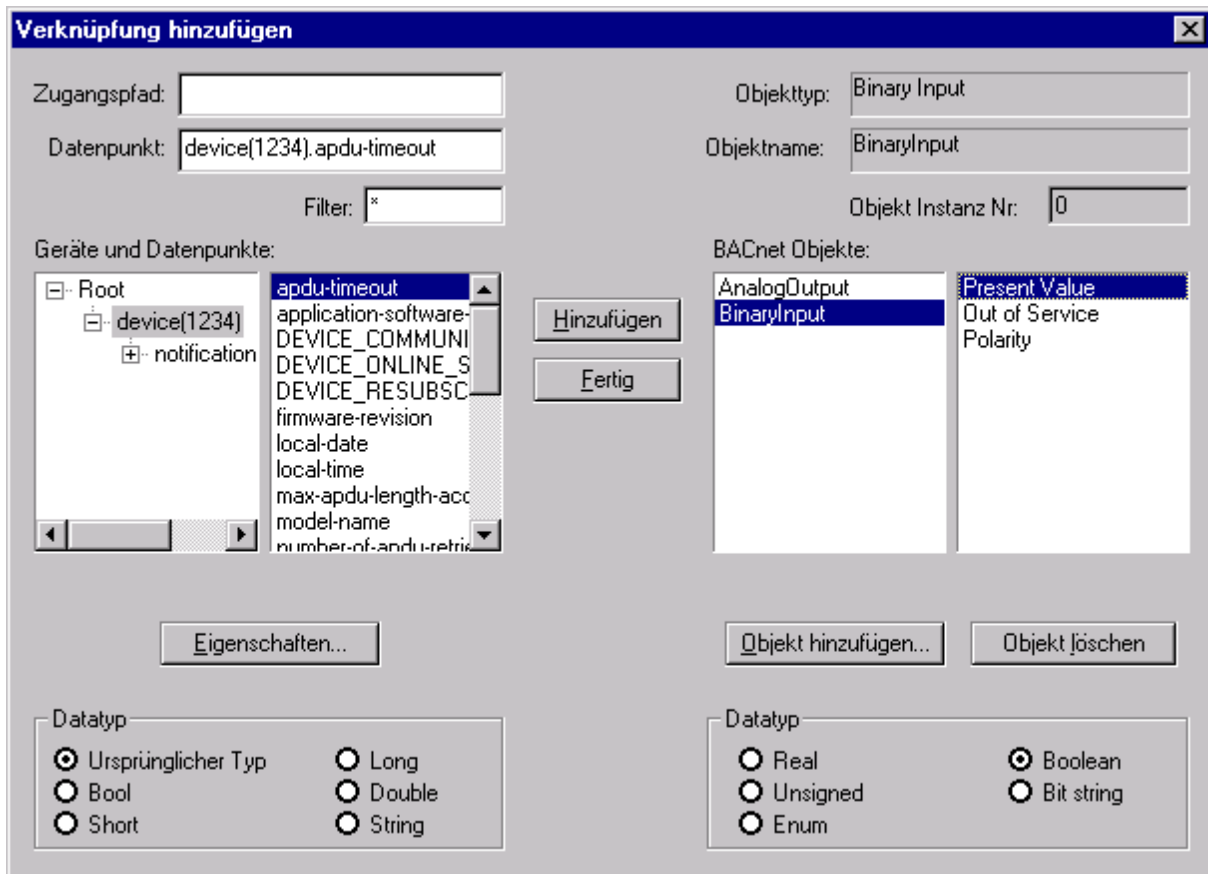
7.2.7 Read data point

This menu point enables to read the value of the selected data point.

7.3. Menu "Link"

7.3.1 Add link

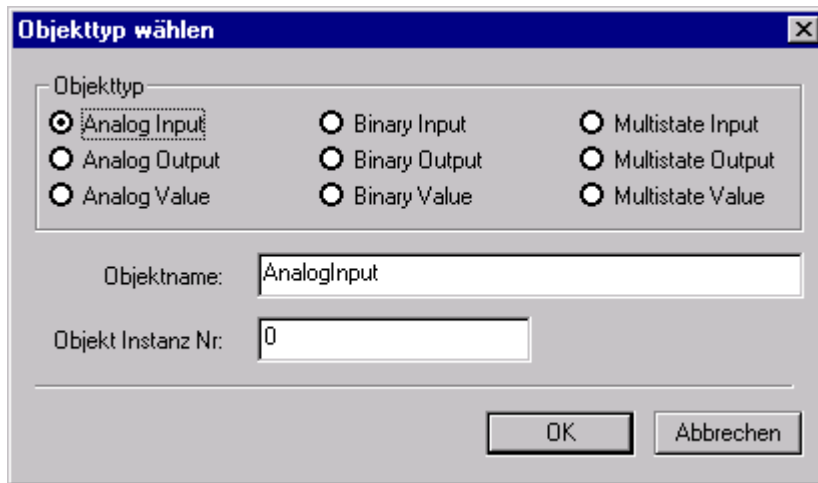
In this dialog the allocations of the OPC-data points to the BACnet object properties are made.



In order to add a link please proceed as follows:

- In the left half of this dialog select the desired OPC-tag.
- From the right half of this dialog select the desired BACnet-object and finally the object property with which you wish to link the OPC-tag. Normally the links of OPC-tags are linked to the property "PresentValue" of a BACnet-object. To add the link please select "Add", the link will be added to the data point list of the main window.

- To add a new BACnet object please select "Add object". The following dialog displays.



Select the desired object type as well as the instance number. Please note that the instance number as well as the object name of a BACnet-object per object type has to be unique within a BACnet-device (in this case the server part of the software).

For this purpose object name and instance number are checked with regard to their uniqueness which may take some time.

If you have added a new object you may link it immediately with an OPC-tag in the link dialog.

7.3.2 Delete link

This menu point deletes the presently selected link from the configuration file.

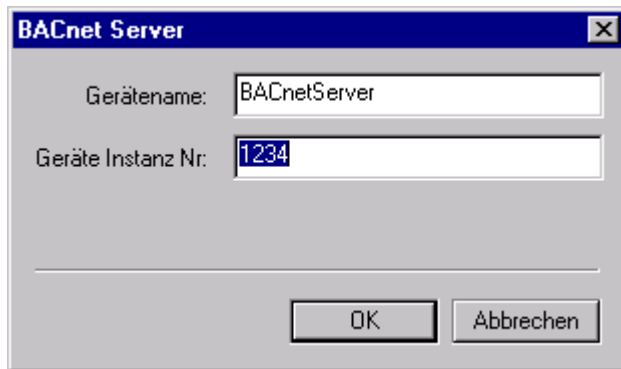
7.3.3 Refresh

With this menu point the link will be actualized which means that a read access as well as an update of the value is effected.

7.4. Menu "BACnet"

7.4.1 Start server

This menu point starts the BACnet-server. In the following dialog the object name and the object instance number of the BACnet device object will be interrogated.



The screenshot shows a standard Windows-style dialog box titled "BACnet Server". It contains two text input fields. The first field is labeled "Gerätename:" and contains the text "BACnetServer". The second field is labeled "Geräte Instanz Nr:" and contains the number "1234". Below the input fields, there are two buttons: "OK" and "Abbrechen".

Please note that these entries must be unique within a BACnet-network.

7.4.2 Stop server

This menu point stops the BACnet-server.

7.5. Menu "View"

7.5.1 Tool bar

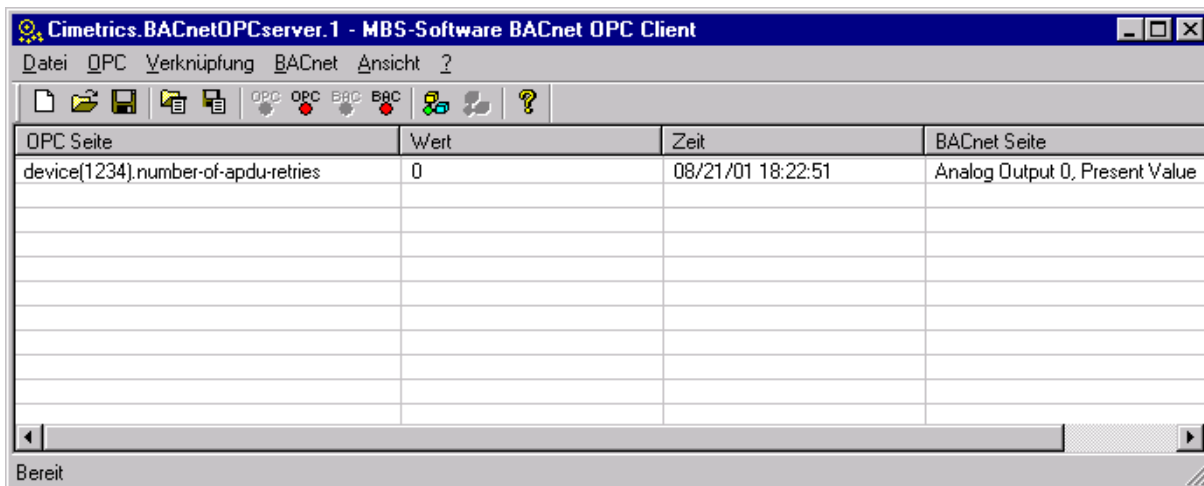
With this menu point the tool bar will be switched on or off.

7.5.2 Status bar

With this menu point the status line will be switched on or off.

7.5.3 Grid

With this menu point the grid of the data point list will be switched on or off. If the grid is switched on, the data point list of the main window will be displayed with lines which helps to enhance the readability.



The screenshot shows a window titled "Cimetrics.BACnetOPCserver.1 - MBS-Software BACnet OPC Client". The menu bar includes "Datei", "OPC", "Verknüpfung", "BACnet", and "Ansicht". The toolbar contains icons for file operations and application settings. The main area displays a table with the following data:

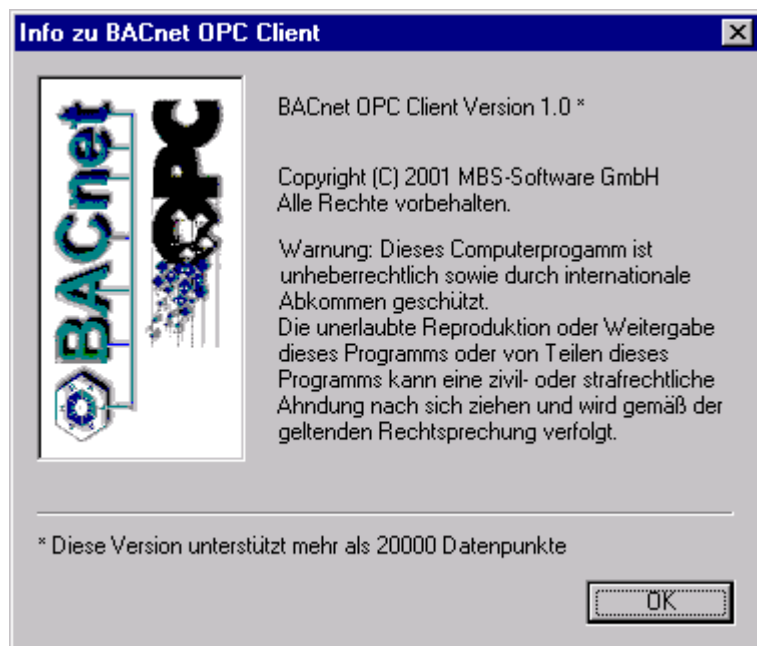
| OPC Seite | Wert | Zeit | BACnet Seite |
|-------------------------------------|------|-------------------|--------------------------------|
| device(1234).number-of-apdu-retries | 0 | 08/21/01 18:22:51 | Analog Output 0, Present Value |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

The status bar at the bottom left shows the text "Bereit".

7.6. Menu “?”

7.6.1 Info concerning BACnet OPC-client

Here information concerning the program version is displayed.



This dialog also displays the amount of data points corresponding to the software version.

8. Abbreviations and important terms

| | |
|-------------------|--|
| Acknowledge | Bestätigen |
| AddListElement | Hinzufügen eines Eintrags in eine Liste |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers, INC. Amerikanische Vereinigung der Heizungs-, Kälte- und Klima-Ingenieure |
| ANSI | American National Standards Institute Nationales Normungsinstitut Amerika |
| Array | Speicherbereich mit festgelegter Größe, kann eine bestimmte Anzahl festgelegter Daten aufnehmen |
| BACnet | Abkürzung für B uilding A utomation and C ontrol N etwork Mit dem Begriff BACnet ist der ASHRAE-Standard 135-1995 gemeint |
| Bit | kleinste Einheit der EDV, bildet die Zustände 0 oder 1 ab |
| BTA | Abkürzung für b etriebstechnische A nlage |
| ChangeOfBitstring | Änderung einer Folge von Bits |

| | |
|-------------------|--|
| ChangeOfState | Änderung eines Zustandes |
| ChangeOfValue | Änderung eines Wertes |
| Client | Gerät, welches auf Daten anderer Geräte zugreift und diese weiterverarbeitet |
| CommandFailure | Fehler beim Ausführen eines Kommandos (Stellbefehls) |
| Condition | Bedingung |
| Confirmed | bestätigte Datenübertragung, der Empfänger quittiert den Empfang |
| Conformance Class | Konformitätsklasse |
| COV | Abkürzung für C hange o f V alue BACnet-Dienst, der Wertänderungen an angeschlossene BACnet-Clients meldet |
| CreateObject | Erzeugen eines Objektes |
| DataLinkLayer | Schicht 2 des ISO/OSI Schichtenmodells für Netzwerkkommunikation, beschreibt die Sicherungsschicht einer Datenübertragung |
| DDC | Abkürzung für D irect D igital C ontrol |

Intelligente Controller, die in einer betriebstechnischen Anlage, selbständig Steuerungs- und Regelungsaufgaben ausführen können.

| | |
|------------------|---|
| Device | Gerät |
| DeleteObject | Löschen eines Objektes |
| Event | Ereignis Ereignisse treten aufgrund von Zustandsänderungen innerhalb der betriebstechnischen Anlage auf |
| File | Datei |
| Floating Limit | Grenzverletzung eines Fließkommawertes |
| Functional Group | Funktionsgruppe |
| Gateway | Hiermit ist ein Gerät gemeint, das eine Datenumsetzung von unterschiedlichen Protokollen ermöglicht. |
| I-Am | „Ich bin...“ |
| I-Have | „Ich habe...“ |
| LONTalk | Local Operating Network Talk (=Sprechen) Datenprotokoll der Firma Echelon konzipiert für die Feld- und Automationsebene der Gebäudeautomation |

| | |
|------------------|---|
| MAC-Adresse | M edium A ccess C ontrol Eindeutige Netzwerkkartenadresse, wird vom Hersteller der Netzwerkkarte weltweit eindeutig vergeben |
| Minimum-On-Time | Minimale Einschaltzeit |
| Minimum-Off-Time | Minimale Ausschaltzeit |
| Multiple | Mehrfach |
| Notification | Benachrichtigung |
| Objekt | Hiermit sind BACnet Objekte gemeint. Diese stellen Abbildungen realer Größen , zum Beispiel Meßwerte (Analog Input) oder Schalterstufen (Multistate) dar. |
| Out-Of-Range | Wert außerhalb des Meßbereichs |
| PICS | P rotocol I mplementation C onformance S tatement Dokument, welches den implementierten BACnet Funktionsumfang eines Gerätes bzw. einer Software kennzeichnet. |
| Priority_Array | Speicherbereich, der zur Aufnahme der Schreibprioritäten dient |

| | |
|--------------------|---|
| Property | Eigenschaft |
| | Hiermit sind Eigenschaften von BACnet Objekten gemeint, zum Beispiel der aktuelle Wert, obere/untere Grenze, usw. |
| Range | Bereich |
| Relinquish_Default | Vorgabewert, wenn das Priority_Array leer ist |
| RemoveListElement | Entfernen eines Eintrags aus einer Liste |
| Remote | entfernt, Ausführen einer Funktion in einem entfernten (Remote-) Gerät |
| Read | Lesen |
| Server | Gerät, welches Daten anderen Geräten bereitstellt |
| Synchronization | Synchronisierung von Daten |
| Time | Zeit |
| Unconfirmed | unbestätigte Datenübertragung, keine Quittierung vom Empfänger erforderlich |
| Who-Is | „Wer ist...“ |

Who-Has „Wer hat...“

Write Schreiben



MBS GmbH
Römerstraße 15
D-47809 Krefeld

Telefon: +49/2151/7294-0
Telefax: +49/2151/7294-50
email: info@mbs-software.de
Internet: http://www.mbs-software.de