User’s Manual
BACnet/IP Router Module
RBIP-01
## RBIP-01 Router and ACH550 Drive manuals

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BACnet is a registered trademark of ASHRAE.
Safety instructions

Overview

This chapter states the general safety instructions that must be followed when installing and operating the RBIP-01 BACnet/IP Router Module.

The material in this chapter must be studied before attempting any work on, or with, the unit.

In addition to the safety instructions given below, read the complete safety instructions of the specific drive you are working on.

General safety instructions

**WARNING!** All electrical installation and maintenance work on the drive should be carried out by qualified electricians. The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors to discharge for 5 minutes before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when working on the unit. Neglecting these instructions can cause physical injury or death.
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**BACnet Protocol Implementation Conformance Statement (PICS)**
Introduction to this manual

What this chapter contains

This chapter describes RBIP-01 BACnet/IP Router Module User’s Manual.

Intended audience

The manual is intended for the people who are responsible for commissioning and using an RBIP-01 BACnet/IP Router Module. The reader is expected to have basic knowledge of electrical fundamentals, Building Automation and Control networks (BACnet), electrical wiring practices and operating the drive.

Before you start

It is assumed that the drive is installed and ready to operate before starting the installation of the module. Detailed installation instructions of the module are given in RBIP-01 BACnet/IP Router Module Installation Manual (3AUA0000040168 Rev A [English]).

In addition to conventional installation tools, have the drive manuals available during the installation and commissioning as they contain important information not included in this manual. The drive manuals are referred to at various points of this document.

What this manual contains

This manual contains information on the configuration and use of the RBIP-01 BACnet/IP Router Module.

Safety instructions are featured in the first few pages of this manual.

Introduction to this manual contains a short description of the manual.

Overview gives basic information on BACnet routing and contains a short description of the RBIP-01 BACnet/IP Router Module.

Quick start-up guide gives short instructions on configuring the RBIP-01 BACnet/IP Router Module settings.

Working with the web server describes how to connect to the router module’s web server and how to login and logout, gives general setting instructions and lists the user right levels.

User interface describes the user interface menus of the router module and their use.

Fault tracing lists the LED indications and their meaning.

BACnet Protocol Implementation Conformance Statement (PICS) is attached to the end of the document.
### Terms, abbreviations and acronyms used in this manual

<table>
<thead>
<tr>
<th>Term or abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APDU</td>
<td>Application Layer Protocol Data Units are used in BACnet to convey the information contained in the application service primitives and associated parameters. BACnet APDUs consist of protocol control information and, possibly, user data. The variable portion of each APDU may contain service-specific information.</td>
</tr>
<tr>
<td>BACnet</td>
<td>Building Automation and Control networks is a registered trademark of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). For more information, see <a href="http://www.bacnet.org/">http://www.bacnet.org/</a>.</td>
</tr>
<tr>
<td>BACnet device</td>
<td>Any device, real or virtual, that supports digital communication using the BACnet protocol</td>
</tr>
<tr>
<td>BACnet device object</td>
<td>The device object type defines a standardized object whose properties represent the externally visible characteristics of a BACnet device. Each BACnet device must have only one device object that in practice identifies the device in the BACnet network.</td>
</tr>
<tr>
<td>BACnet device object instance</td>
<td>For the description, see the Object Instance description in section Device submenu in chapter User interface.</td>
</tr>
<tr>
<td>BACnet/Ethernet</td>
<td>For the description, see section BACnet/IP vs. BACnet/Ethernet in chapter Overview.</td>
</tr>
<tr>
<td>BACnet/IP (B/IP)</td>
<td>A BACnet/IP network is a collection of one or more IP subnetworks (IP domains) that are assigned a single BACnet network number. For a comparison between BACnet/IP and BACnet/Ethernet, see section BACnet/IP vs. BACnet/Ethernet in chapter Overview.</td>
</tr>
<tr>
<td>BACnet network number</td>
<td>For the description, see section BACnet network numbers in chapter Overview.</td>
</tr>
<tr>
<td>BACnet router</td>
<td>For the description, see section BACnet routers in chapter Overview.</td>
</tr>
<tr>
<td>BBMD</td>
<td>BACnet/IP Broadcast Management Device Each IP subnetwork that is part of a B/IP network comprised of two or more subnets has one BBMD. Each BBMD possesses a Broadcast Distribution Table (BDT) which is the same in every BBMD in a given B/IP network. For more information, see section BACnet/IP Broadcast Management Device in chapter Overview.</td>
</tr>
<tr>
<td>BDT</td>
<td>Each BBMD possesses a Broadcast Distribution Table (BDT). BDT contains a list of external BBMDs to which the broadcast messages are transported. For more information, see section BACnet/IP Broadcast Management Device in chapter Overview and sections Global Options, Two-hop forwarding and Broadcast Distribution Table Entry in chapter User interface.</td>
</tr>
<tr>
<td>B/IP</td>
<td>See the BACnet/IP description in this table.</td>
</tr>
<tr>
<td><strong>DCC/RD</strong></td>
<td>Device Communication Control/Reinitialize Device</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>DHCP</strong></td>
<td>Dynamic Host Configuration Protocol</td>
</tr>
<tr>
<td><strong>Directed broadcast</strong></td>
<td>See the one-hop forwarding description in this table.</td>
</tr>
<tr>
<td><strong>Distribution mask</strong></td>
<td>A distribution mask or broadcast distribution mask indicates how broadcast messages are to be distributed on the IP subnetwork served by the BBMD.</td>
</tr>
<tr>
<td><strong>FD</strong></td>
<td>A Foreign Device is a BACnet device that has an IP subnetwork address different from those comprising the BACnet/IP network that the device seeks to join. For more information, see section <em>Foreign Devices</em> in chapter <em>Overview</em>.</td>
</tr>
<tr>
<td><strong>FW_Revision</strong></td>
<td>Firmware_Revision is a property assigned by the vendor to represent the level of firmware installed in the BACnet device.</td>
</tr>
<tr>
<td><strong>MAC address</strong></td>
<td>The MAC address of the router module in the MS/TP network</td>
</tr>
<tr>
<td><strong>MAX Info Frames</strong></td>
<td>In MS/TP, the Max_Info_Frames property specifies the maximum number of information frames the node may send before it must pass the token to the next node.</td>
</tr>
<tr>
<td><strong>MS/TP</strong></td>
<td>Master-Slave/Token-Passing protocol designed specifically for building automation and control devices as part of the BACnet standard</td>
</tr>
<tr>
<td><strong>One-hop forwarding</strong></td>
<td>There are two ways that a BBMD may distribute broadcast messages to remote IP subnetworks: One-hop or two-hop distribution. For two-hop forwarding, see the description in this table. For more information on one hop forwarding or directed broadcast, see section <em>Broadcast Distribution Table Entry</em> in chapter <em>User interface</em>. The one-hop mode requires that the IP router serving the destination subnetwork is configured to support the passage of directed broadcasts.</td>
</tr>
<tr>
<td><strong>Poll For Master frame</strong></td>
<td>In MS/TP, the Poll For Master frame is transmitted by master nodes during configuration and periodically during normal network operation. It is used to discover the presence of other master nodes on the network and to determine a successor node in the token ring. Both master and slave nodes shall expect to receive the Poll For Master frames. The master nodes must respond to Poll For Master frames, and the slave nodes must ignore them.</td>
</tr>
<tr>
<td><strong>Token</strong></td>
<td>MS/TP uses a token to control access to a bus network. A master node may initiate the transmission of a data frame when it holds the token. Both master and slave nodes may transmit data frames in response to requests from master nodes. See also the description of Max_Info_Frames.</td>
</tr>
<tr>
<td>Two-hop forwarding</td>
<td>There are two ways that a BBMD may distribute broadcast messages to remote IP subnetworks: One-hop or two-hop distribution. For one-hop forwarding, see the description in this table. All IP routers are not configured to pass directed broadcasts. Therefore BBMD may be configured to send a directed message to the BBMD on the remote subnetwork (two-hop distribution) which then transmits it using the B/IP broadcast address. For more information on two-hop forwarding or two-hop distribution, see section <em>Global Options, Two-hop forwarding</em> in chapter <em>User interface</em>.</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol uses the Internet Protocol as the underlying protocol. It enables programs running on different computers on a network to communicate by sending short messages known as datagrams to each other.</td>
</tr>
</tbody>
</table>
What this chapter contains

This chapter gives basic information on BACnet routing and describes the RBIP-01 BACnet/IP Router Module.

Introduction to BACnet routing

BACnet routers

BACnet routers are devices that interconnect BACnet networks to form a BACnet internetwork. The BACnet routers use the messages of the BACnet network layer protocol (layer 3) to maintain their routing tables and exchange their routing information.

BACnet network numbers

BACnet network numbers are assigned to the BACnet router devices. Each single router knows the BACnet network number of each of the data link layers and interfaces supported by the router.

The network number is valid in the range from 1 to 65,535.

The BACnet network numbers must be unique within the entire BACnet network.

BACnet network layer messages

BACnet supports 10 network layer messages that the router devices exchange. The two most important messages are "Who-Is-Router-To-Network" and "I-Am-Router-To-Network". They are sent as broadcast to determine other router devices and to distribute to the other router devices information about the router's own routing capabilities.

BACnet/IP vs. BACnet/Ethernet

BACnet/Ethernet (ISO 8802-2 type 1 on ISO 8802-3), the so-called layer 2 Ethernet uses only ISO/OSI layer 1 and 2 for transport. Standard IT routers transport the Internet Protocol up to layer 3, so BACnet/Ethernet would not be transported through networks based on the Internet Protocol.

BACnet/IP uses the User Datagram Protocol (UDP) based on the Internet Protocol, so BACnet/IP normally is transported through networks transporting IP messages.

The RBIP-01 BACnet/IP Router Module fully supports both BACnet/IP and BACnet/Ethernet.
**BACnet/IP and BACnet/Ethernet in the same media**

If you use BACnet/IP and BACnet/Ethernet in the same media (same network), always make sure that only one router from BACnet/IP to BACnet/Ethernet is used per network.

Using more than one router from BACnet/IP to BACnet/Ethernet in the same media causes a network broadcast flood, which can stop most communication on this network. Adding more than one router of this kind creates a loop of telegrams and the router starts to send broadcast messages back and forth permanently. The connected router then at least doubles the telegram.

If you notice that the network communication often fails or slows down significantly, check all routers and make sure that only one router provides routing from BACnet/IP to BACnet/Ethernet in your network.

In the RBIP-01 BACnet/IP Router Module, BACnet/Ethernet is not activated by default.

**BACnet/IP Broadcast Management Device**

BACnet/IP Broadcast Management Devices (BBMD) are used to transport broadcast messages through networks, where standard IP routers block the transport of broadcast messages.

BBMD transports the broadcast messages from the local network to other BBMD devices as a unicast message, so the messages pass the IP router. The external BBMD sends this broadcast message within the external local network as a forwarded broadcast. This method is like a tunnel through the entire network for transporting the messages from or to the BACnet subnetworks.

This way the broadcast messages do not appear in other subnetworks except the ones with a connected BBMD.

Each BBMD possesses a Broadcast Distribution Table (BDT). BDT contains a list of external BBMDs to which the broadcast messages are transported.

---

**Note:** Use BBMD only in the networks where IT routers block broadcast messages. If you connect two BBMDs in a subnetwork without IP routers (or in a subnetwork where IP routers do not block broadcast messages), this causes a broadcast flood (exactly the same as providing more than one BACnet/IP to BACnet/Ethernet router in the same media).

---

**Foreign Devices**

Foreign Devices (FD) connect to BBMD to retrieve the broadcast messages from the subnetwork where the BBMD resides. FDs do not provide broadcast distribution to its local subnetwork.
RBIP-01 BACnet/IP Router Module

The RBIP-01 BACnet/IP Router Module is a BACnet router. It is a snap-on module, fitted inside the drive and fully compatible with all ABB ACH550 standard drives for HVAC including older ACH550 product generations.

The router module provides an internal web server functionality. You can use the web server, for example, for the following purposes:

- Make the general IP settings of the router module
- Set the BACnet routing type (BACnet/IP, BACnet/Ethernet and MS/TP)
- Make the BACnet/IP settings
- In the BACnet/IP mode, set the router to work as BBMD or FD
- Give the broadcast mode for the BBMD and add and remove the contents of the BDT
- Make the BACnet MS/TP settings
- Make the Ethernet settings
- Give the diagnostics levels and display the log files
- Restart the router module
- Check the connection or local host with the Ping function
- Display and restore the backup file
- Restore the previous configuration
- As the admin user, change the passwords
- Browse, upload or remove the documentation stored in the module
- Select the language pack for the user interface of the web server
- Save and activate the settings you have made

For more information on the router, the drives, the BACnet protocol, the router placement in the MS/TP network, see section RBIP-01 Router and ACH550 Drive manuals. By default, the documents are stored in electronic format in the router module. Note that the admin user has the right to upload or remove the documents stored in the web server.
Quick start-up guide

What this chapter contains

This chapter presents the steps to take during the start-up of the RBIP-01 BACnet/IP Router Module and is intended for experienced professionals of IT and BACnet communication. Detailed installation instructions of the module are given in RBIP-01 BACnet/IP Router Module Installation Manual (3AUA0000040168 Rev A [English]).

For more detailed commissioning instructions, refer to the following chapters.

Configuring RBIP-01 BACnet/IP Router Module settings

**WARNING!** Before installation, switch off the drive power supply. Wait five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive. For more information, see chapter *Safety instructions*.

**Note:** Do not connect the router module to the network before you have commissioned the device!

1. Connect the crossover cable delivered in the router module package to the module and your PC.
2. If not done, set your PC to run as a Dynamic Host Configuration Protocol (DHCP) client or set the IP address of your PC manually to 192.168.0.2/255.255.255.0.
   - If you use DHCP, activate the DHCP server in the router module by pressing and holding the Reset switch of the router module down for more than 5 seconds, but not longer than 10 seconds. As soon as the STATUS LED flashes red and green alternating, the DHCP server is active.
3. In your web browser, enter the IP address [http://192.168.0.1](http://192.168.0.1) and login to the router module using the user name/password combination admin/admin. For supported browsers, see RBIP-01 BACnet/IP Router Module Installation Manual (3AUA0000040168 Rev A [English]).
4. Open the Assistant menu. Go through all its pages from left to right and apply the settings according to your BACnet project. Confirm all settings on each page by clicking the Save button.
5. On the Activate page, activate the configuration by clicking Activate and Restart. Restarting the router module takes 25 seconds.
6. If you changed the IP address of the router module, adjust the IP address settings of your PC accordingly.
7. Use your BACnet client software to access the connected frequency drive using BACnet/IP (or BACnet/Ethernet).

For instructions on resetting the router module, see *RBIP-01 BACnet/IP Router Module Installation Manual* (3AUA0000040168 Rev A [English]).
Working with the web server

What this chapter contains

This chapter contains instructions on connecting to the web server of the RBIP-01 BACnet/IP Router Module, login/logout instructions, general setting instructions and a list of the user right levels. For more information on the menu structure of the web server and detailed setting instructions, see chapter User interface.

Connecting to the web server

The router module package contains a crossover network cable. The cable is inside the package under a lid. Use this cable only for commissioning the router module. It is not designed to be used for any other purpose after commissioning the module. You can also use a standard CAT 5 STP cable.

WARNING! Before installation, switch off the drive power supply. Wait five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.

Note: Do not connect the router module to the network before you have commissioned the device!

For more information, see chapter Safety instructions.

1. Connect the crossover network cable to the RJ-45 connector of the router module with the network connector of your PC. Avoid parallel runs with power cables, for example, motor cables.
2. Switch the drive power on.
3. Wait till the steady orange STATUS LED of the router module is no more on. It is lit for approximately 25 seconds in the starting phase after power-up. During start-up, the router module does not respond. The flashing orange STATUS LED after start-up indicates that the module is running with factory settings and needs to be commissioned.
4. If not done, set your PC to run as a Dynamic Host Configuration Protocol (DHCP) client or set the IP address of your PC manually to 192.168.0.2/255.255.255.0.

• If you use DHCP, activate the DHCP server in the router module by pressing and holding the Reset switch of the router module down for more than 5 seconds, but not longer than 10 seconds. As soon as the STATUS LED flashes red and green alternating, the DHCP server is active.
5. To connect to the web server of the router module, open your web browser, for example Microsoft Internet Explorer. Enter IP address **192.168.0.1** in the address field and press **Enter**. The router module displays the web server Start page. For the supported browsers, see *RBIP-01 BACnet/IP Router Module Installation Manual* (3AU000040168 Rev A [English]).

When you start the router module for the first time, the Start page displays "RBIP-01 not commissioned. Default configuration active!". The router module must be set up according to the settings of your BACnet project.
Logging into the web server

When you select the Login/Logout menu, the Login/Logout page opens.
1. On the Login/Logout page, click Login to start the login process.
2. Enter the user name and password. For more information on the user rights, see section User right levels. For more information on the menu structure, see section Menu structure of the router module in chapter User interface.

User right levels

The RBIP-01 BACnet/IP Router Module has three user right levels:

<table>
<thead>
<tr>
<th>User name</th>
<th>Default password</th>
<th>Rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>guest</td>
<td>(No password needed)</td>
<td>When you connect to the router module, you are already logged in as the guest user. The guest user has a right to read all settings but cannot make any modifications. The guest user needs no password.</td>
</tr>
<tr>
<td>user</td>
<td>user</td>
<td>The user level has rights to modify most settings except for changing the passwords, uploading documentation or performing backup of the configuration or restoring it.</td>
</tr>
<tr>
<td>admin</td>
<td>admin</td>
<td>The admin level has the same modification rights as the user level, but is additionally allowed to change passwords, upload or remove documents stored in the web server. The admin user has rights to perform a backup of the configuration and restore it.</td>
</tr>
</tbody>
</table>

Note: All passwords are case-sensitive!

Logging out from the web server

1. On the Login/Logout page, click Logout to logout from the web server. The access level returns to the guest mode and the Start page is displayed.
Automatic logout from the web server

After 30 minutes of inactivity, the current user is automatically logged out.

Resetting the router module

For instructions on resetting the router module, see RBIP-01 BACnet/IP Router Module Installation Manual (3AUABAC0000040168 Rev A [English]).

General setting instructions

This section instructs you to:

• Save and activate the settings you have made on each page of the web browser
• Return back to the start page.

Saving and activating the settings

Each configuration page provides a **Save** button. When you click this button, the changes you have made to the configuration are temporarily stored.

---

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

---

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section **Activate menu** in chapter **User interface**.

After you apply the first change to the router module, the web server displays the “Configuration is not active!” warning in blue color. Additionally, the **Activate** menu tab turns into blue color.

Returning to the Start page

Click the ABB logo on the top left corner to return back to the Start page.
User interface

What this chapter contains

This chapter describes the user interface of the RBIP-01 BACnet/IP Router Module and gives detailed instructions on the settings you can make with the web server.

Menu structure of the router module

The user interface of the router module provides three levels.

<table>
<thead>
<tr>
<th>User interface level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Login/Logout menu bar</td>
<td>The Login/Logout menu bar provides access to the login/logout functions. The menu bar displays the user right level of the current user, for example, “Logged in as: admin”. For more information on the user right levels, see section User right levels in chapter Working with the web server.</td>
</tr>
<tr>
<td>Main menu bar</td>
<td>The main menu bar is below the Login/Logout menu bar. It provides access to the main menu items. When you select one of the main menu items, for example, Assistant, its submenus are displayed in the submenu bar.</td>
</tr>
<tr>
<td>Submenu bar</td>
<td>The submenu bar is below the main menu bar. It provides submenus for the main menu items. For example, if you select the Assistant main menu, its submenus are displayed in the submenu bar and you can select one of them. If you select, for example, the Device submenu, the Device Settings page is displayed below the submenu bar.</td>
</tr>
</tbody>
</table>

Login/Logout menu bar

When you select the Login/Logout menu bar, the Login/Logout page is displayed. For the login function, see section Logging into the web server and for the logout function, see section Logging out from the web server in chapter Working with the web server. See also the table above.
Assistant menu

The Commissioning Assistant helps you in performing the setup of the router module. The Assistant menu bar provides from left to right the required steps for commissioning the router.

Menu items that are unavailable in certain operating modes are disabled. For example, if you have not configured BACnet/IP as the routing type and thus not configured a BACnet/IP Broadcast Management Device (BBMD), the BBMD tab is not accessible.

Start submenu

The Start submenu contains the Start page. It is displayed when you start the module or logout from it.

When you start the router module for the first time, the Start page displays "RBIP-01 not commissioned. Default configuration active!". The router module must be set up according to the settings of your BACnet project.

See also section Returning to the Start page in chapter Working with the web server.
Device submenu

When you select the Device submenu, the Device Settings page opens. It provides general settings for the BACnet operation.

Device Settings page

Select the options required for your BACnet project or choose a free text where it is possible.

**Note:** You can freely choose the text written in *italics* in the Option column of the following table. The Description column gives the conventions for the text.

<table>
<thead>
<tr>
<th>Device Settings</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routing Type</td>
<td>B/IP Ethernet MS/TP</td>
<td>Defines a router supporting all three layers: BACnet/IP, BACnet/Ethernet and MS/TP.</td>
</tr>
<tr>
<td></td>
<td>B/IP Ethernet</td>
<td>Defines a router supporting the BACnet/IP and BACnet/Ethernet layers.</td>
</tr>
<tr>
<td></td>
<td>B/IP MS/TP</td>
<td>Defines a router supporting the BACnet/IP and MS/TP layers. This is the default routing mode.</td>
</tr>
<tr>
<td></td>
<td>Ethernet MS/TP</td>
<td>Defines a router supporting BACnet/Ethernet and MS/TP.</td>
</tr>
<tr>
<td>Device Settings</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BBMD/FD Mode</td>
<td>NONE</td>
<td>BBMD and FD are not active. BBMD and FD can be active only in BACnet/IP.</td>
</tr>
<tr>
<td></td>
<td>BBMD</td>
<td>The router module provides the BBMD functionality to the BACnet subnetwork, allowing connections from external FD.</td>
</tr>
<tr>
<td></td>
<td>FD</td>
<td>The router module runs in the BACnet/IP FD mode, connecting to an external BBMD.</td>
</tr>
<tr>
<td>Object Name</td>
<td>Object name</td>
<td>The BACnet object name of the router module device object. The name must be unique for each device within the entire BACnet network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum length of this string is 256 characters.</td>
</tr>
<tr>
<td>Object Instance</td>
<td>Object instance number</td>
<td>The BACnet object instance number of the router module device object. The object instance number must be unique for each device within the entire BACnet network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The value range of this property is 0 to 4,194,302.</td>
</tr>
<tr>
<td>Description</td>
<td>Object description</td>
<td>A free description text for the router module. This text appears in the router module device object and can be read by the communication partners in the BACnet network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum length of this string is 256 characters.</td>
</tr>
<tr>
<td>Location</td>
<td>Object location</td>
<td>A free location text for the router module indicates the physical location of the BACnet device. This text appears in the device object of the router module and can be read by the communication partners in the BACnet network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum length of this string is 256 characters.</td>
</tr>
<tr>
<td>DCC/RD Password</td>
<td>Password</td>
<td>A password for the device communication control (DCC) and reinitialize device (RD) operation</td>
</tr>
<tr>
<td>APDU Retries</td>
<td>APDU retry number</td>
<td>The Number_Of_APDU_Retries property indicates the maximum number of times that an APDU is retransmitted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The default value for this property is 5.</td>
</tr>
</tbody>
</table>
The **Save** button temporarily saves the changes made on this page.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section *Activate menu* in chapter *User interface*.

<table>
<thead>
<tr>
<th>Device Settings</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APDU Timeout</td>
<td>APDU timeout amount</td>
<td>The APDU_Timeout property indicates the amount of time in milliseconds between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received. The default value for this property is 3000 milliseconds.</td>
</tr>
<tr>
<td>APDU Segment Timeout</td>
<td>APDU segment timeout amount</td>
<td>The APDU_Segment_Timeout property indicates the amount of time in milliseconds between retransmission of an APDU segment. The default value for this property is 2000 milliseconds.</td>
</tr>
<tr>
<td>Language</td>
<td>en</td>
<td>The language of the router module user interface. The language is identified by the international abbreviation for the language according to ISO 639-1, for example en for the English language, de for German. The default language is English.</td>
</tr>
<tr>
<td></td>
<td>de</td>
<td></td>
</tr>
</tbody>
</table>

**User interface**
Network submenu

When you select the **Network** submenu, the **Network Settings** page opens. It provides general IP settings of the router module. If needed, retrieve this information from your IT administrator.

**Network Settings page**

On the **Network Settings** page, give the following settings for the router module:

<table>
<thead>
<tr>
<th>Network Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>The IP address of the router module in the designated network</td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>The subnet mask of the router module according to the IP address</td>
</tr>
<tr>
<td>Default Gateway</td>
<td>In networks where subnetworks are connected by IP routers, this address is used to define the gateway to other networks (the IP address of the router of the subnetwork where your router module is installed). If default gateways are used, broadcast messages are most likely blocked by the IP routers and you need to use a BBMD to transport the broadcast messages.</td>
</tr>
</tbody>
</table>

**Save button**

The **Save** button temporarily saves the changes made on this page.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section **Activate menu** in chapter **User interface**.

---

*User interface*
BACnet/IP submenu

When you select the BACnet/IP submenu, the BACnet/IP Settings page opens. It provides settings for BACnet/IP.

BACnet/IP Settings page

If your router works as a BACnet/IP router, give the following settings on the BACnet/IP Settings page:

<table>
<thead>
<tr>
<th>BACnet/IP Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Number</td>
<td>The network number of your local BACnet/IP network. The BACnet network number must be unique within the entire network. The network number is valid in the range from 1 to 65,535. The default value is 1.</td>
</tr>
<tr>
<td>UDP Port</td>
<td>The port number for BACnet/IP in your local IP network. The value is in decimal notation. The default value is 47808 dec. (0xBAC0 hex.).</td>
</tr>
</tbody>
</table>

Save button

The Save button temporarily saves the changes made on this page.

Note: You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

Note: You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section Activate menu in chapter User interface.
When you select the **BBMD** submenu, the page that provides the settings for the BACnet/IP Broadcast Management Device (BBMD) opens.

In the BBMD mode, the router module provides the BBMD functionality to the local subnetwork.

**Global Options, Two-hop forwarding**

In the two-hop mode, the IP routers are not involved in the broadcast transport. In this mode, the broadcast messages are transported to BBMD and BBMD sends the forwarded broadcast to the local network.

In the two-hop mode, the Broadcast Distribution Table (BDT) contains the address of the external BBMD and the Subnet/Distribution Mask specifies the distribution of the forwarded broadcast to the local network for each connected BBMD.

1. If you wish that your BACnet/IP router works in the two-hop mode, select the **Two-hop forwarding** check box.

2. For adding entries to the Broadcast Distribution table, see the following procedure.
**Broadcast Distribution Table Entry**

In the one-hop mode, BDT contains the addresses of the IP routers, which forward the broadcast messages to the external subnetworks. In the one-hop mode, you must set up the IP routers to support the so-called directed broadcast.

In this mode, BDT contains the addresses of the external IP routers (not the external BBMD) and the Subnet/Distribution Mask is the subnet mask of the IP router providing the broadcast forwarding.

**Adding a Broadcast Distribution Table Entry**

1. In the **Broadcast Distribution Table Entry** field, fill in the **IP Address**, **UDP Port** and **Subnet/Distribution Mask**. For more information, see the table below.

<table>
<thead>
<tr>
<th>Broadcast Distribution Table Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>The IP address of the external BBMD or the external IP router</td>
</tr>
<tr>
<td>UDP Port</td>
<td>The UDP port which is used for BACnet communication in the external BACnet - subnetwork. This value is in decimal notation and the default value is 47808 dec (0xBAC0 hex.).</td>
</tr>
</tbody>
</table>
| Subnet/Distribution Mask           | The subnet mask or distribution mask of the BDT entry. Depending on the operation mode, the entry may vary:  
   - In the one-hop mode, this mask is the subnet mask of the external IP router, for example, 255.255.0.0 in class B networks, 255.255.255.0 in class C networks or even supernetting addresses like 255.255.252.0 or subnetting addresses like 255.255.255.248.  
   - In the two-hop mode, this mask is a distribution mask. It allows to restrict the distribution of the broadcast messages to only parts of the external network.  
   - If you wish to distribute the broadcast messages to all hosts in the external network, you must set the value of the mask to 255.255.255.255. |

2. Click the **Add** button.

A new BDT entry is created and displayed in the Broadcast Distribution Table list. The BDT can contain up to 30 entries.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged. You must also activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

---

**User interface**
Removing Broadcast Distribution Table Entries

1. Select the BDT entry/entries you wish to remove.
2. Click the Remove button.

Save button

The Save button temporarily saves the changes made on this page.

---

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

---

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

---

For activating your settings, see section Activate menu in chapter User interface.
FD submenu

When you select the FD submenu, the Foreign Device Settings page opens. It provides settings for a foreign device (FD). In this mode, the router module acts as a foreign device to retrieve broadcast messages from an external BBMD.

Foreign Device Settings page

If your BACnet/IP router works as a foreign device, fill in the following settings:

<table>
<thead>
<tr>
<th>Foreign Device Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address BBMD</td>
<td>The IP address of the external BBMD to connect to</td>
</tr>
<tr>
<td>UDP Port</td>
<td>The UDP port which is used for BACnet communication in the external BACnet - subnetwork. This value is in decimal notation and the default value is 47808 dec. (0xBAC0 hex.).</td>
</tr>
<tr>
<td>Re-register Time</td>
<td>The interval within which the foreign device must re-register at the external BBMD. The value is in seconds and the default value is 10s.</td>
</tr>
</tbody>
</table>

Save button

The Save button temporarily saves the changes made on this page.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section Activate menu in chapter User interface.
MS/TP submenu

When you select the MS/TP submenu, the MS/TP Settings page opens. It provides the settings for BACnet MS/TP.

MS/TP Settings page

If your BACnet router works in MS/TP, give the following settings:

<table>
<thead>
<tr>
<th>MS/TP Settings</th>
<th>Description</th>
</tr>
</thead>
</table>
| Baud Rate          | The baud rate in the MS/TP network  
                      The potential values are: 9600, 19200, 38400, 57600, 76800 and 115200 bit/s. The default value is 38400.  
                      Note that the 57600 and 115200 baud rates are not BACnet standard baud rates and all MS/TP implementations may not support them. |
| MAC Address        | The MAC address of the router module in the MS/TP network. The router module acts as an MS/TP master node.  
                      The value is valid from 0 to 127 and the default value is 0. |
| Network Number     | The network number of your local MS/TP network. The network number must be unique within the entire network.  
                      The network number is valid in the range from 1 to 65.535. The default value is 2. |
<table>
<thead>
<tr>
<th>MS/TP Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Token Timeout</td>
<td>The Token timeout is the minimum time without a DataAvailable or ReceiveError event that a node must wait for a remote node to begin using a token or replying to a Poll For Master frame. The valid range is from 20 to 100 milliseconds, and the default value is 20 milliseconds.</td>
</tr>
<tr>
<td>Reply Timeout</td>
<td>The Reply timeout is the minimum time without a DataAvailable or ReceiveError event that a node must wait for a station to begin replying to a confirmed request. The valid range is from 200 to 300 milliseconds, and the default value is 250 milliseconds.</td>
</tr>
<tr>
<td>Max Master</td>
<td>The Max_Master property specifies the highest possible address for master nodes. The valid range is from 1 to 127, and the default value is 127.</td>
</tr>
<tr>
<td>Max Info Frames</td>
<td>The Max_Info_Frames property specifies the maximum number of information frames the node may send before it must pass the token to the next node. The valid range is from 1 to 127, and the default value is 1.</td>
</tr>
</tbody>
</table>

**Save button**

The **Save** button temporarily saves the changes made on this page.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section **Activate menu** in chapter **User interface**.
**Ethernet submenu**

When you select the Ethernet submenu, the Ethernet Settings page opens. It provides settings for BACnet/Ethernet (ISO 8802-2 type 1 on ISO 8802-3).

**Ethernet Settings page**

If your router works as an Ethernet router, fill in the BACnet/Ethernet network number:

<table>
<thead>
<tr>
<th>Ethernet Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Number</td>
<td>The network number of your local BACnet/Ethernet network. The network number must be unique within the entire network. The network number is valid in the range from 1 to 65.535.</td>
</tr>
</tbody>
</table>

**Save button**

The Save button temporarily saves the changes made on this page.

**Note:** You must save your changes before switching to another configuration page. If you switch to another page without saving, the settings remain unchanged.

**Note:** You must activate the configuration before restarting the router module. Activating the configuration saves all settings permanently. If you restart the router module without activating the configuration, the old configuration remains active and the changes are lost.

For activating your settings, see section **Activate menu** in chapter **User interface**.
Diagnostics menu

The Diagnostics menu contains the Verbose, Restart and Ping submenus.

Verbose submenu

When you select the Verbose submenu, the Verbose Levels page opens. It provides different levels of diagnostics and is intended for experienced users. The RBIP-01 BACnet/IP Router Module provides two separate log files, the error log file and the verbose log file.

<table>
<thead>
<tr>
<th>Log file</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error log file</td>
<td>The error log file contains information about errors which occurred while operating.</td>
</tr>
<tr>
<td>Verbose log file</td>
<td>The verbose log file contains verbose information if one of the verbose options has been previously selected.</td>
</tr>
</tbody>
</table>

1. In the Verbose Levels field, select the information you wish to be collected in the verbose log file.
2. To display the file, click the relevant link for downloading the log file (error or verbose).
3. If you wish to save the files to your local hard disk, right-click the relevant link and select Save as.
Restart submenu

When you select the Restart submenu, the Restart page opens. It contains the Restart button.

**Note:** After clicking the Restart button, the router automatically restarts. Restarting the router takes approximately 25 seconds. The router does not respond during restart.

**Note:** If the IP address of the router changes in the configuration change, set the IP address of your PC accordingly. For instructions, see section *Connecting to the web server.*

1. Click the Restart button to restart the router.

User interface
Ping submenu

When you select the Ping submenu, the Ping Execution page opens.

**Note:** The Ping Execution page is intended for experienced users for checking the connection or displaying the information of the local host.
Backup menu

The Backup menu contains the Backup, Restore and Last config submenus.

Backup submenu

When you select the Backup submenu, the Backup page opens. The page allows you to display the contents of the configuration file backup and to save the backup file to your own hard disk.

The backup file is a simple text file which allows easy modification for experienced users.

**Note:** Removing tags from the backup file may cause malfunction and loss of entries.

1. On the Backup page, click the configuration file backup link to display the contents of the file.
2. If you wish to save the backup file to your local hard disk, right-click the relevant configuration file backup link and select Save as.
Restore submenu

When you select the **Restore** submenu, the Restore page opens. The page allows you to upload a backup file from your own hard disk and restore the configuration from it.

The backup file is a simple text file which allows easy modification for experienced users.

**Note:** Removing tags from the backup file may cause malfunction and loss of entries.

1. To upload a backup file, locate the backup file on your local hard disk.

**Note:** Restore only valid backup files. Restoring other text files may cause malfunction.

2. To restore the configuration, click the **Restore** button.

3. After restoring the configuration, activate it. For instructions, see section *Activate menu.*
Last Config submenu

When you select the Last Config submenu, the Last Config page opens. The Last Config function restores the configuration that was used before activating the configuration changes. It is assumed to be used as the last resort before restoring the factory settings in case the configuration changes cause malfunction.

**Note:** After clicking the Undo and Restart button, the router automatically restarts. Restarting the router takes approximately 25 seconds. The router does not respond during restart.

**Note:** If the IP address of the router changes in the configuration change, set the IP address of your PC accordingly. For instructions, see section Connecting to the web server.

1. On the Last Config page, click the Undo and Restart button to restore the previous configuration.
2. If restoring the previous configuration fails or you are unsatisfied with the result, perform the factory reset by pressing and holding down the Reset switch for at least 15 seconds. See also RBIP-01 BACnet/IP Router Module Installation Manual (3AUA0000040168 Rev A [English]).
Passwords menu

The Passwords menu contains the User and Admin submenus for changing the user and admin passwords. For more information on the user levels, see section User right levels in chapter Working with the web server.

**Note:** Only the admin user has the right to change passwords.

User submenu

When you select the User submenu, the Password Change page opens. It allows you to change the user-level password.

1. Enter the new user-level password and confirm it.
2. Click Change.
Admin submenu

When you select the Admin submenu, the Password Change page opens. It allows you to change the Admin password.

1. Enter the old Admin password. The default password is admin/admin.
2. Enter the new password and confirm it.
3. Click Change.

Maintenance menu

The Maintenance menu is reserved for the ABB service people.
Activate menu

When you select the **Activate** menu, the **Activate** page opens.

**Note:** After clicking the Activate and Restart button, the router automatically restarts. Restarting the router takes approximately 25 seconds. The router does not respond during restart.

**Note:** If the IP address of the router changes in the configuration change, set the IP address of your PC accordingly. For instructions, see section *Connecting to the web server*.

1. Click the **Activate and Restart** button to restart the router and to activate the configuration.
   - OR

1. Click the **Cancel** button to discard the configuration changes.
Help menu

The Help menu contains the Factory Manuals, Project Manuals, Language Pack, Support and About submenus.

Factory Manuals submenu

When you select the Factory Manuals submenu, the relevant page opens. It contains a list of the manuals included in the server. The available space for factory manuals is 150 MB.

1. In the File List, select the manual or file that you wish to retrieve.
2. If you wish to copy the file to your local hard disk, right-click the file and select Save as.

Note: If you remove manuals or files, they are permanently removed and cannot be restored with a factory reset. Only the admin user has the right to remove manuals.

3. If you wish to remove manuals or files from the web server, check the file(s) and click the Remove button.
**Note:** Only the admin user has the right to upload new manuals or files.

4. In the **File Upload** field, select the manual or file, for example, on your local hard disk.
5. Click the **Upload** button.

**Project Manuals submenu**

When you select the **Project Manuals** submenu, the relevant page opens. It contains a list of the manuals and files included in the server. The purpose of the submenu is to store project documents or to leave messages in text files for other router module users. The available space for the project manuals is 50 MB.

1. In the **File List**, select the manual or file that you wish to retrieve.
2. If you wish to copy the file to your local hard disk, right-click the file and select **Save as**.

**Note:** If you remove manuals or files, they are permanently removed and cannot be restored with a factory reset. Only the admin user has the right to remove manuals.

3. If you wish to remove files from the web server, check the file(s) and click the **Remove** button.

**Note:** Only the admin user has the right to upload new manuals or files.

4. In the **File Upload** field, select the manual or file to be uploaded.
5. Click the **Upload** button.
The router module supports languages by adding so-called language packs. The language packs are binary files that provide translations of the user interface texts. The language packs are identified by the international abbreviation for the language according to ISO 639-1, for example en for the English language, de for German.

1. In the **Language Upload** field, select the language file on your local hard disk to upload a language pack.
2. Click the **Upload** button.

**Note:** If you remove the files by clicking the Remove button, they are permanently removed and cannot be restored with a factory reset.

3. In the **Language List**, select the languages to be removed.
4. Click the **Remove** button.
5. For selecting the user interface language, see section **Device submenu** in the **Assistant menu**.
Support submenu

When you select the **Support** submenu, the Support page opens. It provides contact information for retrieving support for your RBIP-01 BACnet/IP Router Module and your BACnet project.
About submenu

The About page displays the copyright and version information of the RBIP-01 BACnet/IP Router Module. In addition, the FW-Revision (Firmware_Revision) of the BACnet device object (router module) is displayed.
Fault tracing

What this chapter contains

This chapter lists the LEDs of the RBIP-01 BACnet/IP Router Module and describes their function.

LED indications

The RBIP-01 BACnet/IP Router Module is equipped with the following LEDs:

<table>
<thead>
<tr>
<th>LED name</th>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
</table>
| POWER     | Green        | Off - No power  
|           |              | Steady green - Power is connected                                          |
| MS/TP TxD | Yellow       | Flashing yellow - Module is transmitting data to MS/TP network            |
| MS/TP RxD | Yellow       | Flashing yellow - Module is receiving data from MS/TP network             |
| STATUS    | Green/Red/Orange | Steady green - Reset switch is pressed and held  
|           |              | Flashing green - Normal operation mode or commissioning  
|           |              | Alternating green/red - DHCP server activated  
|           |              | Steady orange - Lit for approximately 25 seconds in starting phase after power-up. When the steady orange LED is lit, the router module is starting up and does not respond during boot.  
|           |              | Flasing orange - Flashing after start-up phase; module is running with factory settings and needs to be commissioned  
|           |              | Flashing red - Bus errors on MS/TP bus, for example, framing errors  
|           |              | Steady red - Module is performing reset                                   |
| Network LED | Orange | Orange network LED is located to the right of RJ-45 network connector.  
|            |          | Off - 10 MBit/s connection  
|            |          | On - 100 MBit/s connection                                                |
| Network LED | Green  | Green network LED is located to the left of RJ-45 network connector.  
|            |          | Off - Module cannot detect a link                                           
|            |          | On - Module has detected a link                                             
|            |          | Flashing green - Activity on the link                                      |
BACnet Protocol Implementation Conformance Statement

Date: October 16, 2008
Vendor Name: ABB, Inc
Product Name: BACnet Router
Product Model Number: RBIP-01
Applications Software Version: 1.1  Firmware Revision: 2.0  BACnet Protocol Revision: 4

Product Description:
The ABB RBIP-01 snap-on module is a high-performance BACnet router for ABB standard drives for HVAC, ACH550. This router supports 10/100 MBit/s BACnet/IP and BACnet over Ethernet networks, as well as BACnet MS/TP (EIA-485) network.

The RBIP-01 router supports all standardized BACnet MS/TP baud rates up to 76.8k, as well as the master mode functionality. BBMD (BACnet Broadcast Management Device) and FD (Foreign Device) functionalities are also supported. The web server functionality enables access and configuration of the router using a standard web browser.

The RBIP-01 snap-on router is fully compatible with ABB standard drives for HVAC, ACH550, including older product generations. The router fits inside the drive and does not affect the enclosure class of the drive. The router can be powered from the drive or from an external power supply.

BACnet Standardized Device Profile (Annex L):
☐ BACnet Operator Workstation (B-OWS)
☐ BACnet Building Controller (B-BC)
☐ BACnet Advanced Application Controller (B-AAC)
☐ BACnet Application Specific Controller (B-ASC)
☐ BACnet Smart Sensor (B-SS)
☐ BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):
DS-RP-B  Data Sharing-ReadProperty-B
DS-RPM-B  Data Sharing-ReadPropertyMultiple-B
DS-WP-B  Data Sharing-WriteProperty-B
DS-WPM-B  Data Sharing-WritePropertyMultiple-B
DM-DDB-B  Device Management-DynamicDeviceBinding-B
DM-DOB-B  Device Management-DynamicObjectBinding-B
DM-DCC-B  Device Management-DeviceCommunicationControl-B
DM-RD-B  Device Management-ReinitializeDevice-B

Segmentation Capability:
☐ Segmented requests supported  Window Size: 16
☐ Segmented responses supported  Window Size: 16

Standard Object Types Supported:
Object instantiation is static, i.e. objects cannot be created or deleted. Refer to tables at end of this document for object details.

Data Link Layer Options:
☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) ____________
MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☐ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
☐ Point-To-Point, modem, (Clause 10), baud rate(s):
☐ LonTalk, (Clause 11), medium:
☐ Other:

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)  ☐ Yes  ☐ No

Networking Options:

☐ Router, Clause 6
  BACnet/IP to MS/TP
  BACnet/ISO 8802-3, Ethernet to MS/TP
  BACnet/IP to BACnet/ISO 8802-3, Ethernet
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)
  Does the BBMD support registrations by Foreign Devices?  ☐ Yes  ☐ No
  Max BDT (Broadcast Distribution Table)-Entries: 30

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☐ ANSI X3.4  ☐ IBM™/Microsoft™ DBCS  ☐ ISO 8859-1
☐ ISO 10646 (UCS-2)  ☐ ISO 10646 (UCS-4)  ☐ JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
### Object/Property Support Matrix

The following table summarizes the Object Types/Properties Supported:

<table>
<thead>
<tr>
<th>Property Identifier</th>
<th>Property Datatype</th>
<th>Conformance Code 135-2004</th>
<th>Conformance Code RBIP-01</th>
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<td>Object_Name</td>
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