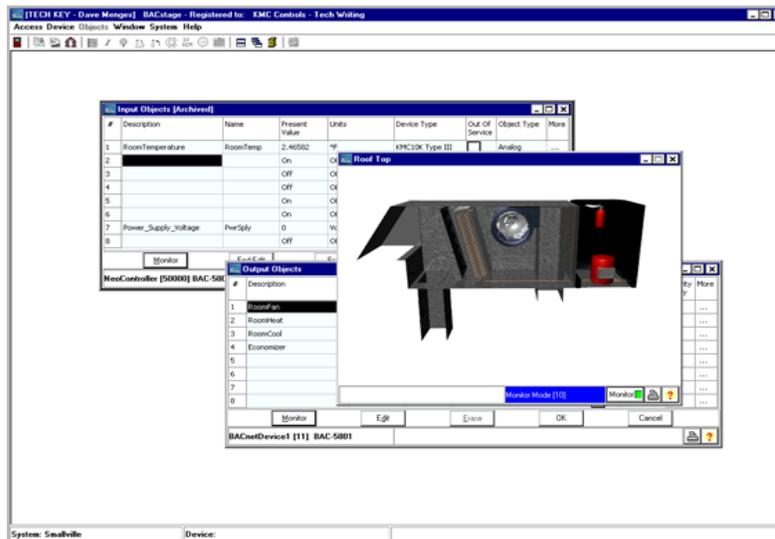# BAC-5000

BACstage Operator Workstation

User's Guide to Installation and Getting Started

KMC
CONTROLS

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About this manual

This publication is an installation manual for BACstage, a BACnet operator workstation. Review this material in its entirety before installing or using BACstage.

This manual offers detailed information about the following functions of BACstage. Sections in this manual include the following topics:

- Installing and licensing BACstage.
- Placing BACstage on a network.
- Configuring a controller for network operation.
- The BACstage operating environment.

What you need to know

This manual assumes your familiarity with the following subjects:

- Your computer and the Windows operating system.
- The principles of BACnet systems and internetworks.
- The principles of the building automation systems that will be managed with the BACstage application.

Related reference materials

In addition to the material presented in this user's guide, review and have available the following reference material.

- The user's guides for each BACnet device in the system.
- A PIC statement for each BACnet device in the system.
- A sequence of operation for each piece of equipment in the site.
- Detailed plans and drawings for the building automation system.
- The application note *Planning BACnet Networks*.

Conventions used

Some of the text in this publication uses special formatting to indicate emphasis or keystrokes. The text conventions are as follows:

Menu and dialog items	Highlights items in the Design Studio interface, including buttons, dialog names, menus and commands in menus.
`Control Basic`	Highlights text that can be used in Control Basic programming.
`File names`	Highlights names of files and extensions.
Italics	Indicates a book or section title, a Control Basic keyword, mnemonic, or a value.
KEY NAMES	Indicates a specific key on the keyboard such as SHIFT, or ENTER.

If you encounter difficulty

If you experience difficulty with BACstage, KMC Controls provides the following assistance.

Printed version of help An Adobe Acrobat version of BACstage help is included on the BACstage installation USB flash drive. The document *Operating BACstage* is identical to the on-line help but, it is formatted to print as a reference manual.

The KMC Controls web site Navigate to the support section on the KMC Controls partner web site for the latest information for BACstage and other KMC Controls BACnet products.

partners.kmccontrols.com

KMC technical support Our distribution partners have unlimited and free access to our team of technical support representatives. We provide coast-to-coast, and toll-free, support from 8 AM to 5 PM.

Toll-Free Technical Support: 866.303.4562

Section 1: **Introduction**

BACstage from KMC Controls is a configuration and user interface for KMC Controls BACnet controllers.

◆ Connects to controllers with Ethernet 802.3, Ethernet IP, MS/TP or PTP.

◆ Worksheet style entry and drop-down list boxes makes programming quick and easy.

◆ Password-protected access to either the monitor-only or configuration mode.

Hardware and operating system requirements

To run BACstage, you will need a computer that meets the following minimum requirements:

Table 1–1   Computer system requirements

Component	Windows 2000 Windows XP	Vista Business Vista Enterprise	Windows 8 Professional Windows 7 Professional Windows 7 Ultimate
Processor speed	300 MHz or faster	2 GHz or faster	2 GHz or faster
RAM memory	512 megabytes RAM or greater	3 GB or greater	2 GB or greater
Hard disk space	100 megabytes of hard drive space available after installation	100 megabytes of hard drive space available after installation	100 megabytes of hard drive space available after installation
Monitor	SVGA with minimum 800 x 600 resolution.	SVGA with minimum 800 x 600 resolution.	SVGA with minimum 800 x 600 resolution. DirectX 9 graphics processor
Network connection	Ethernet 10BaseT connection	Ethernet 10BaseT connection	Ethernet 10BaseT connection
MS/TP connection	Serial or USB port with KMD–5579 or third party EIA–485 converter.	Serial or USB port with KMD–5579 or third party EIA–485 converter.	Serial or USB port with KMD–5579 or third party EIA–485 converter.

Computer system requirements (continued)

License key	USB port dedicated to hardware key	USB port dedicated to hardware key	USB port dedicated to hardware key
Sound output and speakers	Required for audible alarm notification	Required for audible alarm notification	Required for audible alarm notification

In addition connecting the computer to the LAN with the Ethernet connection, you will need also one of the following:

 ◆ A KMD–5576 USB to RS–485 converter.
 ◆ A third party RS–232 to RS–485 converter.
 ◆ A third party USB to RS–485 converter.

When installing on Windows 8

Installing BACstage on a computer with Windows 8 requires Microsoft.NET 3.5 Service Pack 1. This will automatically be added to the computer during installation if the computer is connected to the Internet.

Installing BACstage

You must install BACstage from the USB flash drive onto a computer hard disk; BACstage will not run from the flash drive. To install BACstage, you will need the following:

 ◆ The installation USB flash drive.
 ◆ The hardware key.
 ◆ A name and password to establish the site administrator.

Note: The first time a hardware key is plugged into a computer, Windows will notify you that new hardware has been found. In the following procedure, steps and may not be required after the key is inserted for the first time.

To start the BACstage installation wizard, do the following:

1. Insert the flash drive into any USB port.

2. Use Windows Explorer to locate and open the flash drive. The flash drive is labeled Removable Disk.

3. On the flash drive double-click the **SETUP** icon.

4. Follow the on-screen installation instructions and the instructions in the BACstage installation manual.

5. When prompted, choose a location for the program. KMC Controls recommends the default location.

6. When installation is complete, remove the flash drive and store it in a safe location.

7. Plug the hardware key into any USB port in the computer. The key must remain in the USB port at all times BACstage is operating.

8. When the Found New Hardware Wizard opens, choose the **Install the software automatically** option. This may take several minutes to complete.

9. When the wizard finishes installing the software for the hardware key, installation is complete.

BACstage installs with drivers for Ethernet IP protocol. If the internetwork uses BACnet 802.3 protocol, see the topic *Installing drivers for BACnet 8802-3 (Ehternet)* on page 25.

Section 2: Getting started with BACstage

BACstage is a BACnet operator workstation for setting up and configuring controllers on a BACnet internetwork. The following topics briefly cover the first steps to use BACstage to configure a job site.

BACstage is a software configuration tool with which a controls technician can configure BACnet controllers. With BACstage, the controls technician can also do the followings

- Set up security and assign passwords
- Configure and monitor trend logs
- Set schedules
- View and acknowledge alarms

Complete details for using BACstage are included in the BACstage help or the manual *Operating BACstage* that is included on the installation flash drive.

Additional topics in this section include the following:

- *Connecting BACstage to an internetwork* on page 12
- *Configuring a controller for the network* on page 15

Starting BACstage

BACstage starts the same as other Windows applications. To start BACstage do the following:

1. Insert a valid hardware key or verify that a hardware key is inserted into a USB port.
2. Choose **Start** > **Programs** > **KMC Controls** > **BACstage**.

When BACstage starts, the work window opens. The work window contains controls, menu bar, toolbar and status information.

Illustration 2–1 BACstage work window
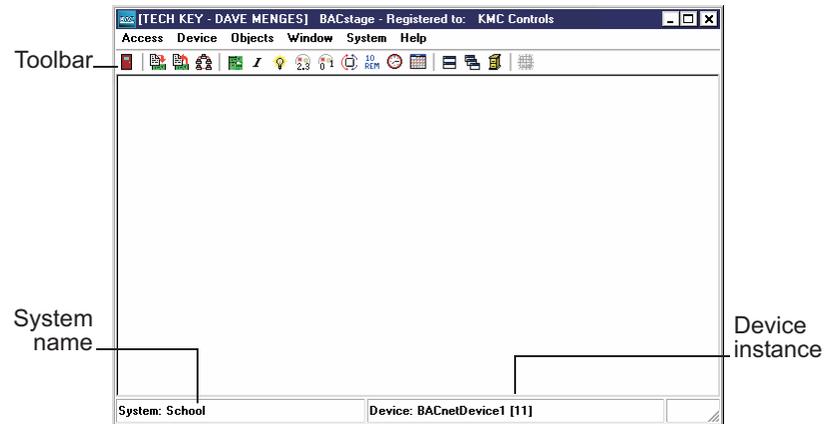
System Name of the system to which BACstage is connected.

Device Name and device instance number of the device to which BACstage is connected.

Toolbar The toolbar icons provide shortcuts to many of the often used menu commands.

Connecting BACstage to an internetwork

BACstage connects to a BACnet internetwork by one of several methods.

 * BACnet IP over a buildings Ethernet LAN
 * BACnet 802.3 over a buildings Ethernet LAN
 * Direct serial port connection to an MS/TP network
 * Point to point (PTP) connection.

Tip:

KMC Controls recommends connecting BACstage to an internetwork over Ethernet using either BACnet IP or the BACnet 802.3 protocol. Connecting BACstage through an MS/TP network to an internetwork creates a potential bottleneck for network traffic.

Connecting to the building's Ethernet LAN
BACstage and the BAC–5050 router support both BACnet IP and BACnet 802.3 protocols. To connect to an internetwork operating on a building's Ethernet LAN, the computer upon which BACstage is running must meet one of the following conditions.

 * On the same IP subnet as one of the routers.
 * Connected as a foreign device to a BBMD (BACnet Broadcast Management Device).

To configure BACstage for a LAN, do the following:

1. Connect the computer to the Ethernet LAN.

2. Start BACstage.

3. Open the BACdoor OEM Client. See *BACdoor OEM Client* on page 19 for details about using the BACdoor OEM Client.

4. Set or verify the parameters in the table *Parameters required for Ethernet LAN.*

5. If applicable, enter the BBMD configuration from the table *Foreign device registration.*

6. Close BACdoor OEM Client.

Table 2–1   Parameters required for Ethernet LAN

Parameter	Source
UDP Port	Supplied by the network administrator or system plans
Subnet	Supplied by the network administrator
Our Device Instance	From system plans
Our Peername	From system plans

Table 2–2   Foreign device registration

Parameter	Source
Settings in BACdoor OEM client	From system plans
UPD Port	From the system plans
Registration as Time-to-live	Use default or from the system plans

Connecting to an MS/TP network

Connect the computer running BACstage to an MS/TP network through a serial or USB port and an RS-485 protocol converter.

Limit connecting BACstage with the MS/TP protocol to:

- Internetworks that *do not* include the higher speed protocols such as BACnet IP and BACnet 802.3.
- Programming and testing an MS/TP network.
- Configuring a controller before placing it on a network.

⚠️ **Caution**	Routing network traffic from a high-speed protocol though MS/TP to BACstage will create a network traffic bottleneck and result in poor network performance.

Illustration 2–2 Typical MS/TP connection
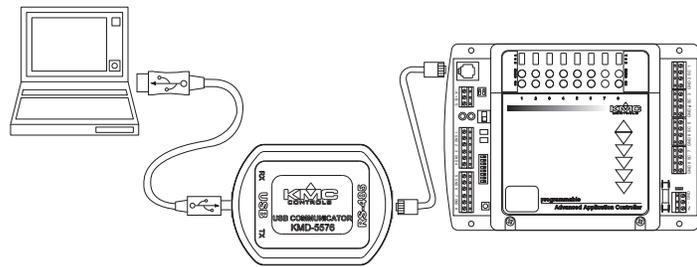
KMD-5576 connection

Use BACdoor OEM Client to set network parameters to match the network work to which BACstage is connecting. See *BACdoor OEM Client* on page 19 for instructions on using BACdoor OEM Client.

Table 2–3   MS/TP Parameters

Parameters	Source
All MS/TP settings	System plans
Our Device Instance	System plans
Our Peername	System plans

1. Connect the computer to the MS/TP network.
2. Start BACstage.
3. Open the BACdoor OEM Client. See *BACdoor OEM Client* on page 19 for details about using the BACdoor OEM Client.
4. Verify or set the parameters listed in the table *MS/TP Parameters*.
5. Close BACdoor Client.

Configuring a controller for the network

Use BACstage to configure a controller with the following properties before connecting it to a network.

- Device instance
- MAC address
- Baud rate.

⚠️ **Caution** Connecting a controller to a network with a MAC address or device instance number that duplicates an existing MAC address or device instance numbers will result in poor or disrupted network traffic.

Setting up for configuration

To configure a controller with BACstage, you will need a direct MS/TP connection between the computer and the controller you are configuring. You will also need to be familiar with System List, *Device List* and *Device Object* menus in BACstage.

To connect to a BACnet network or controller, do the following:

1. Connect the controller to a computer running BACstage. This is usually done with a direct MS/TP connection. See the illustration *Direct RS-232 and MS/TP network connections* on page 16.

2. If BACstage is not running, start it.

3. Verify or set BACstage to a Device Instance and MAC address that will not be used by the controller connected for configuration. See *Settings in BACdoor OEM client* on page 21.

4. Set the baud rate to the same rate as the controller connected for configuration. For new KMC Controls BACnet controllers this is 38,400.

Illustration 2–3 Direct RS-232 and MS/TP network connections

KMD-5576 connection

USB to RS-485 converter
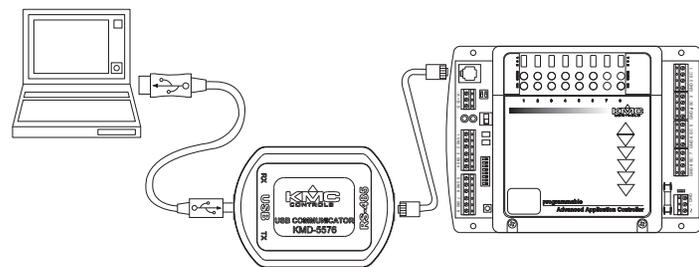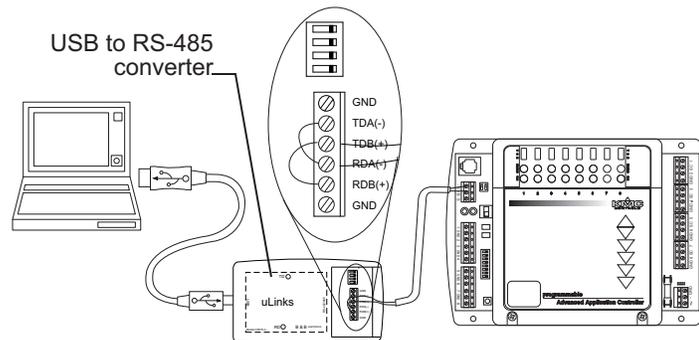
B&B Electronics USB connection

RS-232 to RS-485 converter
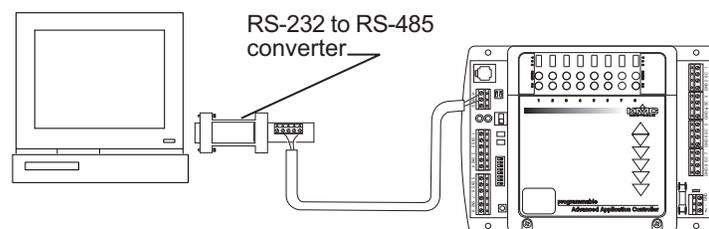
B&B Electronics RS-232 connection

Configure the controller

Use the following steps for each controller to configure. It may be useful to add a system name to the system list that is used only for configuring controllers.

1. Open the *System List* from the *Access* menu.
2. Choose the system to which the controller is connected. The *Device List* opens.
3. Choose the device for configuration from the device list.
4. Choose *Device Object* from the *Objects* menu.
5. Click *Edit* and enter values specified in the system plans for the properties listed in the table *Configuration properties* on page 17.

Table 2–4   Configuration properties

Property	
MAC address	Required during configuration
Baud	Required during configuration
Device Instance	Required during configuration
Description	May be changed across a network.
Name	May be changed across a network.
Location	May be changed across a network.

1. Click *End Edit* and then *Close*.
2. Cycle the power for the controller or choose *Reinitialize Device* from the *Device* menu to make the changes effective.

Appendix A: **BACdoor OEM Client**

BACdoor OEM client is the driver that connects BACstage to the BACnet internetwork.

Opening BACdoor

Most functions of BACdoor can be configured by choosing Connection Parameters from the BACstage access menu.

To configure BACdoor with the BACdoor configuration, do the following:

1. Start BACstage.
2. If the BACdoor icon is not in the system tray, choose *System List* from the *Access* menu and then choose any system. The BACdoor icons appear in the Windows Notification Area.

Illustration A–1 BACdoor icon in Notification Area
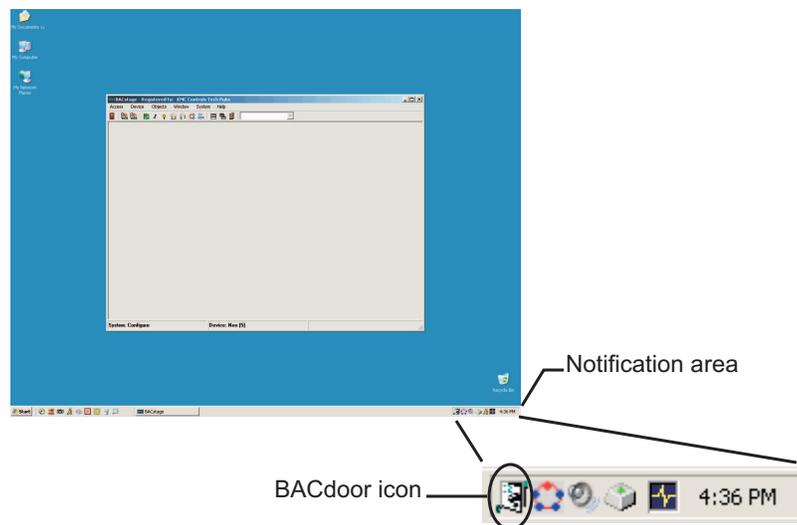
3. Click the BACdoor icon in the system tray. The BACdoor Client Status window opens.

Illustration A–2 BACdoor client status
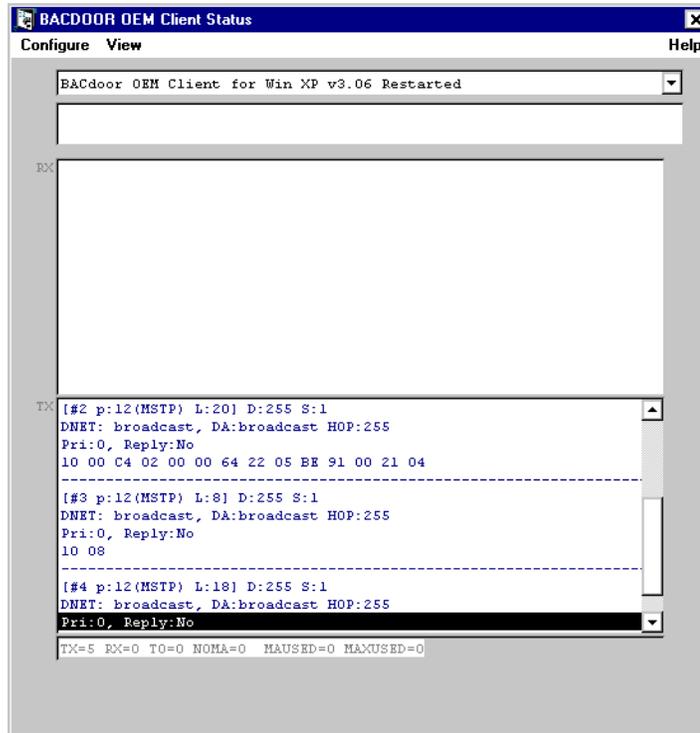
4. Click *Configuration* in the upper left corner of the client status dialog. The *BACdoor Client Configuration* opens.

Illustration A–3 BACdoor client configuration

5. Change the settings as required for the internetwork on which BACstage is operating.

6. Click *Close* to return to BACstage.

Settings in BACdoor OEM client

Use BACdoor OEM Client to configure BACstage for the internetwork on which it running.

  ◆ *BACnet/IP Parameters* on page 23
  ◆ *MS/TP Parameters* on page 23
  ◆ *PTP Parameters* on page 24
  ◆ *Parameters for Connecting to Routers* on page 25

Illustration A–4 BACdoor client configuration

BACstage internetwork

These are parameters that must be configured for BACstage regardless of the type of connection.

Our Device Instance A number that uniquely identifies BACstage as a BACnet device on the internetwork. The device instance number is assigned by the BACnet system designer. Valid instance number's range from 0 to 4, 194,303. It is by reference to the device instance number that data is exchanged between BACnet devices.

Our Peername A 16-character name for the BACstage operator workstation and must be unique among all devices on the internetwork. The set of characters used in *Our Peername* is restricted to printable characters.

Time Sync Interval Sets the interval at which BACstage will update the master time device with the time in the computer on which BACstage is running.

Who Is?/I Am Interval Sets the interval between automatic Who Is? broadcast messages.

BACnet/IP Parameters

Use the BACnet/IP Parameter configure BACstage for the IP network to which it is connected.

Register as Foreign Device with BBMD at IP Select to register BACstage as a foreign device with a BACnet Broadcast Management Device. Foreign device registration to a BBMD is a technique for crossing an IP-only router with BACnet broadcast messages.

Enter also the IP address of the BBMD. If network address translation (NAT) is used between the BACstage computer and the BBMD, contact the network system administrator for the correct public IP address.

Registration Time-to-Live (For Foreign Device only) Sets the interval at which BACstage sends a registration message to the BBMD with which it is registered.

If the BBMD does not receive a registration message within the Time-To-Live period plus 30 seconds, the BBMD will remove BACstage from its foreign device table and will not send broadcast messages to BACstage .

- The valid time range is 1 to 65535 seconds.
- If the entry is zero (0), the registration is forever.
- The default value is 30.

Subnet The IP subnet to which the computer running BACstage and BACdoor is connected.

UDP Port Sets the BACnet UDP port number which is supplied by the network system administrator.

- The port must match the port in use by BACnet devices on the network to which BACstage is connecting. Valid port numbers are 0xBAC0 in hexadecimal notation (47808 in decimal notation) to 0xBAC9 (47817).
- When registered as a foreign device, enter the port number of the BBMD. If port address translation (PAT) is used between the local router and the PAD or BBMD, contact the network system administrator for the correct public IP address.

MS/TP Parameters

Use these settings when connecting BACstage to an internetwork with an MS/TP connection.

Com Port Init (restart) Enter the character string to match the parameter of the MS/TP network to which BACstage is connected. Use only the settings shown below.

Illustration A–5 MS/TP parameters command string

```
                              COM1:38400,N,8,1
The serial port to which                    └───── Parity, length, and
 the MS/TP network is          │       │           stop bits. Use only
           connected. ──┘      │       │           as shown.

Set the baud rate. Valid       │
 rates are 9600, 19200,        │
   38400 and 76800. ───────────┘
```
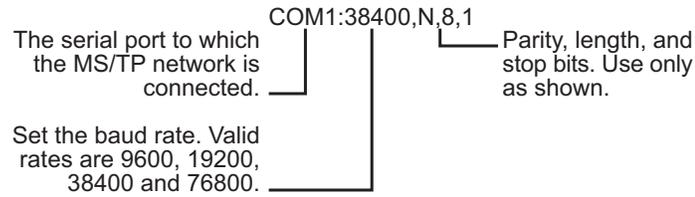
TS (MS/TP Node) TS (This Station) is equivalent to the MAC address in a KMC BACnet controller or router. This number assigns to BACstage a node number on the MS/TP network to which it is connected. The number must be unique on the local network but, may be duplicated on remote MS/TP networks.

Max Master Indicates the highest Media Access Control (MAC) address assigned to any device on the MS/TP network to which the device is connected.

- ◆ Setting *Max Master* significantly higher than the highest numbered device may result in increased polling and slower response times.
- ◆ Setting *Max Master* lower than the highest numbered device will result in devices not appearing on the network.
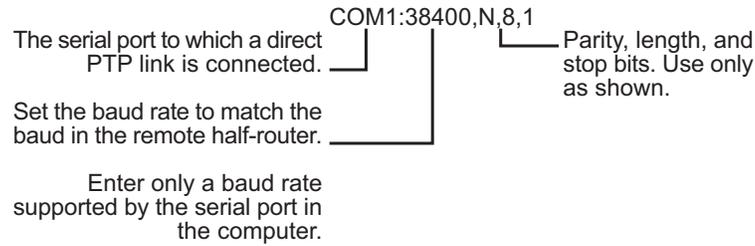
MaxInfoFrames Sets the maximum number of packets that are sent before passing the token. *Max. Info Frames* affects response time and throughput. The recommended setting is *20*.

PTP Parameters

Use *PTP Parameters* to configure BACdoor for a point-to-point communications link over either a modem or a direct serial connection.

Dialed When checked, BACdoor establishes a PTP link using an installed modem which can then dial a modem connected to another half-router. If more than one modem in installed, the Windows *Dialer* dialog will open.

Non-Dialed Com Port(reset) When *Dialed* is not checked, BACdoor establishes a PTP communication link over the designated serial port. The parameters in *Non-Dialed Com* must match the parameters of the serial port in the remote half-router.

Illustration A–6 PTP non-dialed configuration string

COM1:38400,N,8,1

The serial port to which a direct PTP link is connected.

Parity, length, and stop bits. Use only as shown.

Set the baud rate to match the baud in the remote half-router.

Enter only a baud rate supported by the serial port in the computer.

SNET Assigns a BACnet network number. This number must be unique among all network numbers on the BACnet internetwork.

SLEN and SADR used only by PTP connections. *Source Address Length* (SLEN) is the number of bytes in the field *Source Address (SADR)*. SLEN must be non-zero; SADR can be any value that meets the number of bytes specified in SLEN. For connecting to a BAC–5050 set *SLEN* to 1 and *SADR* to 00. Connections to half-routers from other vendors may require different values.

Parameters for Connecting to Routers
Use these parameters to configure communications between BACdoor and a half-router such as the modem port on a BAC–5050.

Time to wait for Connection Sets the time in seconds before BACdoor assumes that a point-to-point connection could not be established.

Time to wait for Disconnect The time in seconds before BACdoor assumes that a half-router has disconnected from another, since half-routers give no confirmation of disconnection.

Default T active The time in seconds that BACdoor will maintain a point-to-point connection without traffic. If Default T active is set to 0, the connection will be maintained indefinitely.

Installing drivers for BACnet 8802-3 (Ehternet)

Following installation of the BACDOC components, the BACnet MAC-layer protocol component must be installed and bound to one network adapter. Following the procedure in this section results in the installation of BACMAC2K.SYS.

> ⚠ **Caution** BACDOC will not function on computers with 64-bit operating systems. For computers running a 64-bit Windows operating system, use only MS/TP or an Internet protocol (IP) to connect BACstage to an internetwork.

Before you install

  ◆ Install one or two network adapters (such as an NE5500) through the standard Windows installation procedure. This installation is outside the scope of this topic. Refer to the installation procedures supplied with the adaptor.

  ◆ Make sure you have installed the BACDOC components for Windows 2000. These components are typically installed with BACstage.

Installing the driver

To install the BACnet 8802-3 driver, do the following:

1. Do one of the following

   • Choose **Start**, **Settings**, **Network**, and then **Dial-up Connections**.

   • Choose **My Computer**, **Control Panel**, **Network**, and then **Dial-up Connections**.

2. Double-click **Local Area Connection** for your Ethernet/ARCNET Adapter.

3. In the Local Area Connection Status dialog click **Properties**.

4. In the Local Area Connection Properties dialog click **Install**.

5. In the Select Network Component Type dialog select **Protocol** and click **Add**.

6. In the Select Network Protocol dialog select **Manufacturer: PolarSoft Inc**. You should see Network Protocol: BACMAC2K BACnet MAC Layer Protocol. Click **OK**.

7. In the Files Needed dialog click **Browse** and then navigate to the folder where the BACDOC Client was installed and select the subfolder Drivers\bacmac2k. Select **bacmac2k.sys** and click **Open**.

8. In the Files Needed dialog click **OK**.

9. You should be returned to the Local Area Connection Properties dialog. BACMAC2K BACnet MAC Layer Protocol should have been added to your list of protocols.

10. For Windows XP only: Clear the QoS packet scheduler check box as this will interfere with BACMAC2K transmissions.

11. Click **Close**.

12. Close the Local Area Connection Status and Network and Dial-up Connections dialog boxes.

Removing the driver

To remove the BACnet 8802-3 driver, do the following:

1. Do one of the following:

   - Choose **Start**, **Settings**, **Network**, and then **Dial-up Connections**.

   - Choose **My Computer**, **Control Panel**, **Network**, and then **Dial-up Connections**.

2. Double-click **Local Area Connection** for your Ethernet/ARCNET Adapter.

3. In the Local Area Connection Status dialog click **Properties**.

4. In the Local Area Connection Properties dialog select BACMAC2K BACnet MAC Layer Protocol and then click **Uninstall**.

5. Close the Local Area Connection Properties dialog, Local Area Connection Status dialog, and Network and Dial-up Connections dialog.