



# Contents

Figures .....	2
Revision History .....	3
Reference Documents .....	3
Limited Warranty .....	3
<b>General Information .....</b>	<b>4</b>
Hazard Identification Messages .....	4
Description .....	5
Application .....	5
Component Data .....	6
Reset Button .....	6
Light Emitting Diodes (LEDs) .....	6
BACnet Connections .....	7
BACnet IP/Ethernet Network Connection .....	7
BACnet MS/TP Network Connection .....	7
Unit Controller Interface .....	7
<b>Installation .....</b>	<b>8</b>
Contents of the BACnet Communication Module Kit .....	8
Installing a new BACnet Communication Module .....	8
To install a new BACnet Communication Module .....	8
Replacing an Existing BACnet Communication Module .....	9
To Replace a BACnet Communication Module .....	9
<b>Integration .....</b>	<b>11</b>
Configuring the BACnet Communication Module .....	11
Required Tools .....	11
Connecting to the BCM Configuration Tool .....	11
Configuration using the BCM Configuration Tool .....	13
BACnet Addressing .....	15
Testing Network Communication .....	16
Resetting the BACnet Communication Module .....	17
<b>Service Information .....</b>	<b>18</b>
Test Procedures .....	18
Parts List .....	18
Installation Kit .....	18

## Figures

Figure 1. Maverick I Unit Controller .....	5
Figure 2. BACnet Communication Module Major Components (Top View) .....	6
Figure 3. BACnet Communication Module Network Connections .....	10
Figure 4. BCM Configuration Tool Login Screen .....	12
Figure 5. BCM Configuration Tool Main Menu .....	12
Figure 6. BCM Configuration Tool Administrator Settings Screen .....	13
Figure 7. BCM Configuration Tool Communications Interface Settings Screen .....	14
Figure 8. BCM Configuration Tool Settings Change Confirmation Screen .....	14
Figure 9. Successful Ping and Response .....	17

# Revision History

IM 1000

April 2010

Initial release

## Reference Documents

Number	Company	Title	Source
ANSI/ASHRAE 135-2001	American Society of Heating, Refrigerating and Air-Conditioning Engineers	BACnet® A Data Communication Protocol for Building Automation and Control Networks	www.ashrae.org
OM 1047	McQuay International	Maverick I Unit Controller Installation and Operation Manual	www.mcquay.com
ED 15116	McQuay International	Maverick I Unit Controller Protocol Information, BACnet and BACNET Networks	www.mcquay.com
ED 15126	McQuay International	Maverick I Unit Controller Protocol Information, BACnet Protocol Implementation Conformance Statement (PICS)	www.mcquay.com

## Limited Warranty

Consult your local McQuay Representative for warranty details. Refer to Form 933-43285Y. To find your local McQuay Representative, go to [www.mcquay.com](http://www.mcquay.com).

### Notice

Copyright © 2010 McQuay International, Minneapolis MN. All rights reserved throughout the world. McQuay International reserves the right to change any information contained herein without prior notice. The user is responsible for determining whether this software is appropriate for his or her application.

® ™ The following are tradenames or registered trademarks of their respective companies: BACnet from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; BACNET and LONMARK from Echelon, Inc.; Windows from Microsoft Corporation; McQuay and Maverick from McQuay International. LONMARK and the LONMARK logo are managed, granted, and used by LONMARK International under a license granted by Echelon Corporation.

# General Information

---

This manual contains the information you need to install the BACnet® Communication Module on a Maverick I™ Unit Rooftop Unit Controller, incorporate it into the BACnet network, and maintain it.

## Hazard Identification Messages

### DANGER

Dangers indicate a hazardous situation which will result in death or serious injury if not avoided.

### WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

### CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

### WARNING

**Electric shock hazard. Can cause personal injury or equipment damage.**

This equipment must be properly grounded. Connections and service to the MicroTech III Air Handling Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

### CAUTION

**Static sensitive components. Can cause equipment damage.**

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

### NOTICE

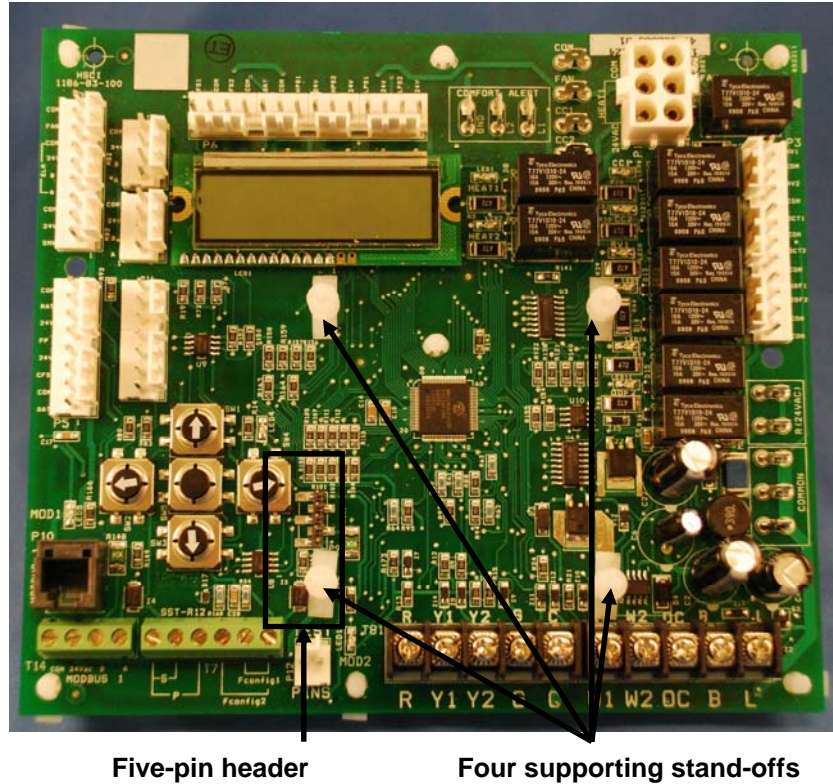
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense. **McQuay International disclaims any liability resulting from any interference or for the correction thereof.**

## Description

The BACnet Communication Module incorporates a Maverick I Unit Rooftop Unit into a BACnet local area network (LAN). It supports the BACnet MS/TP (EIA 485) data link layer (physical layer), BACnet over Ethernet (10Base-T), or BACnet/IP data link layers (physical layer).

The BACnet Communication Module is a printed circuit board that mounts directly on five pins on the top side of the Maverick I Rooftop Unit Controller (see Figure 1).

Figure 1. Maverick I Unit Controller



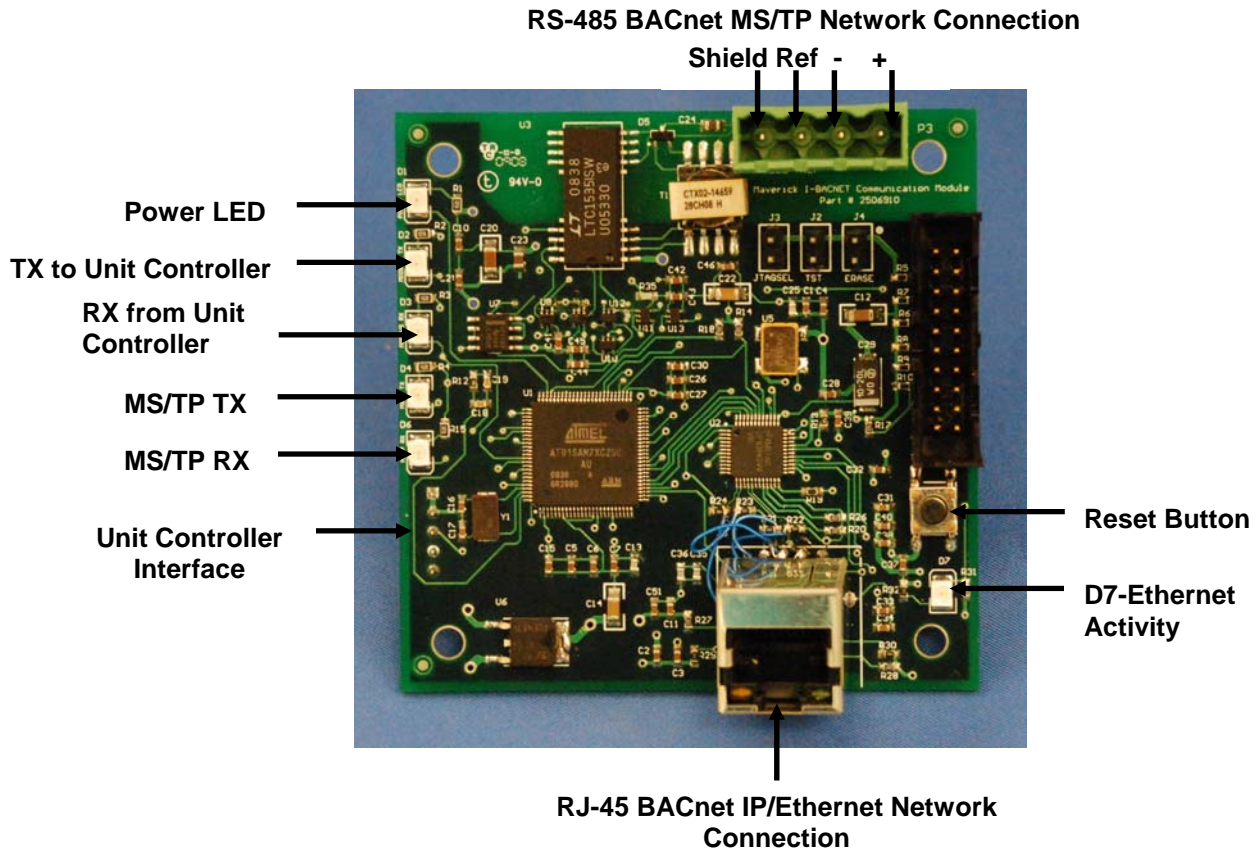
## Application

The BACnet Communication Module connects the Maverick I Unit Rooftop Unit Controller to a building automation system (BAS) on a BACnet local area network. It is the interface for the exchange of BACnet objects between the network and the unit controller. Refer to the McQuay Maverick I Unit Controller Operation Manual 1047 for unit controller details.

## Component Data

Figure 2 shows the location of the major components of the BACnet Communication Module.

Figure 2. BACnet Communication Module Major Components (Top View)



### Reset Button

The reset button is used to reset BACnet addressing and configuration parameters. It is important to note that pressing and holding the Reset button for five seconds causes all BACnet data to revert to factory default values. For more information, see the Resetting the BACnet Communication Module section of this document.

### Light Emitting Diodes (LEDs)

Six LEDs indicate communication activity and status of the BACnet Communications Module. These indicators are visible when the communication module is connected to the Maverick I Unit Rooftop Unit Controller and the unit is powered on (see Table 1 for descriptions of LED activity and Figure 2 for LED locations).

Table 1. LED Description of Activity

LED Title	LED Color	Meaning
TX to Unit Controller	Green	LED flashes when data is being transmitted from the BACnet Communication Module to the unit controller
RX from Unit Controller	Yellow	LED flashes when data is being sent to the BACnet Communication from the unit controller
MS/TP TX	Green	LED flashes when data is being transmitted via the MS/TP network
MS/TP RX	Yellow	LED flashes when data is received via the MS/TP network
Power	Green	This LED remains on when power is applied to the BACnet Communication Module
D7	Green	Ethernet activity LED

## BACnet Connections

The BACnet Communication Module supports BACnet MS/TP (Master Slave Token Passing), BACnet IP, or BACnet Ethernet network communication. All BACnet protocols are available on a single BACnet Communication Module.

## BACnet IP/Ethernet Network Connection

An RJ-45 connector connects the BACnet Communication Module to the IP/Ethernet Network (see Figure 2).

## BACnet MS/TP Network Connection

An RS-485 connector connects the BACnet Communication Module to the MS/TP network and has four pins: +, -, Ref, and Shield (see Figure 2).

## Unit Controller Interface

A 5-pin header provides the physical connection port from the BACnet Communication Module to the Maverick I Unit Controller. The unit controller interface on the BACnet Communication Module plugs into the matching 5-pin header on the Unit Controller. Figure 2 shows the top (or front) side view of the communication module. Note that the actual connection port from the communication module to the unit controller is on the bottom (or back) side of the image shown.

# Installation

---

The following section describes how to field install a new BACnet Communication Module or replace an existing BACnet Communication Module on the Maverick I Rooftop Unit Controller so that it can be incorporated into the BACnet network. The BACnet Communication Module is available for field installation only (see Parts List for ordering information).

## CAUTION

**Electrostatic discharge hazard.**

**Can cause equipment damage.**

This equipment contains sensitive electronic components that may be damaged by electrostatic discharge from your hands. Before you handle a communications module, you need to touch a grounded object, such as the metal enclosure, in order to discharge the electrostatic potential in your body.

## Contents of the BACnet Communication Module Kit

The following is the list of items included in the field-installed kit:

- The BACnet Communication Module
- Four plastic stand-offs
- 4-pin RS-485 network connector (MS/TP)
- IM 1000

## Installing a new BACnet Communication Module

The BACnet Communication Module is mounted directly to the unit controller via the four stand-offs and 5-pin header. Follow the steps below to install a new BACnet Communication Module Maverick I Rooftop Unit Controller.

## WARNING

**Electric shock hazard. Can cause personal injury or equipment damage.**

This equipment must be properly grounded. Only personnel knowledgeable in the operation of the equipment being controlled must perform connections and service to the Maverick I Rooftop Unit Controller.

### To install a new BACnet Communication Module

1. Remove power from the unit controller.
2. Connect the BACnet Communication Module to the unit controller. The unit controller interface on the BACnet Communication Module plugs directly into the 5-pin header on the unit controller (see Figures 1 and 2).
3. Further secure the BACnet Communication Module to the four plastic support stand offs (see Figure 1).
4. Connect the BACnet Communication Module to the BACnet MS/TP or BACnet IP/Ethernet network.
  - a. For BACnet MS/TP, insert the proper network cable into the BACnet Communication Module's 4-pin RS-485 (MS/TP) network connector (see figures 2 and 3).

- b. For BACnet IP or Ethernet, insert the proper network cable into the BACnet Communication Module's RJ-45 network connector (see figures 2 and 3).
5. Apply power to the unit controller.

## Replacing an Existing BACnet Communication Module

Follow these steps to remove an existing BACnet Communication Module from the unit controller and replace it with a new BACnet Communication Module.

### **WARNING**

**Electric shock hazard. Can cause personal injury or equipment damage.**

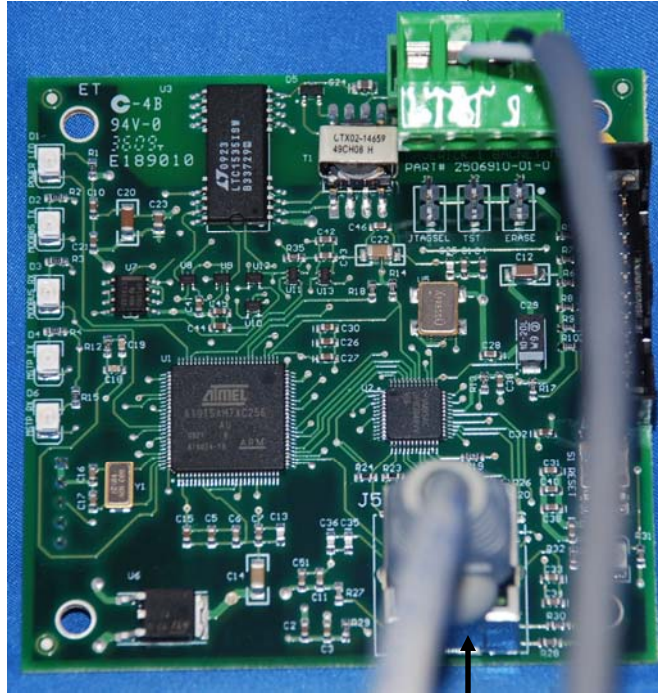
This equipment must be properly grounded. Only personnel knowledgeable in the operation of the equipment being controlled must perform connections and service to the Maverick I Rooftop Unit Controller.

### To Replace a BACnet Communication Module

1. Remove power from the unit controller.
2. Pull the network cable connector from the BACnet Communication Module (see Figure 3).
3. Release the stand-off latches and carefully remove the BACnet Communication Module from the unit controller (see Figures 1 and 2).
4. Connect the BACnet Communication Module to the unit controller. The unit controller interface on the BACnet Communication Module plugs directly into the 5-pin header on the unit controller (see Figures 1 and 2).
5. Further secure the BACnet Communication Module to the four plastic support stand offs (see Figure 1).
6. Connect the BACnet Communication Module to the BACnet MS/TP or BACnet IP/Ethernet network.
  - a. For BACnet MS/TP, insert the proper network cable into the BACnet Communication Module's 4-pin RS-485 network connector (see figure 3).
  - b. For BACnet IP or Ethernet, insert the proper network cable into the BACnet Communication Module's RJ-45 network connector (see figure 3).
7. Apply power to the unit controller.

Figure 3. BACnet Communication Module Network Connections

**RS-485 BACnet MS/TP Network Connector**



**RJ-45 BACnet IP/Ethernet Network Connector**

# Integration

---

Once the BACnet Communication Module has been properly installed on the unit controller, it is then necessary to adjust the communication interface settings to match your Building Automation System (BAS) requirements. Once that is complete, you can then integrate the unit controller into the BAS via a BACnet MS/TP or BACnet IP/Ethernet network.

The BACnet configuration process is described in the following section. Additional information about network parameters can be found in Table 2 as well as the BACnet Addressing section.

## Configuring the BACnet Communication Module

The BACnet Communication Module may be configured and addressed using the BACnet Communication Module's browser-based user interface (further referred to as the BCM Configuration Tool). The BCM Configuration Tool is used for setting and adjusting network parameters for BACnet MS/TP, BACnet IP, or BACnet Ethernet networks. Refer to McQuay Protocol Document ED 15125 for detailed descriptions of all available BACnet points.

The following sections describe how to open the BCM Configuration Tool, customize user settings, modify, test, and reset BACnet network parameters.

### Required Tools

You need the following tools to configure the BACnet Communication Module for network operation:

- PC with Ethernet card and TCP/IP protocol
- Internet Explorer® version 6.0 or later
- Ethernet Cable (either an Ethernet crossover cable or a standard Ethernet cable may be used)

### Connecting to the BCM Configuration Tool

The BACnet Communication Module is configured using the BCM Configuration Tool's web-based user interface. Follow these steps to connect to the BCM Configuration Tool and adjust user name and password.

1. Verify that your PC is on the same subnet mask and similar (but not identical) IP address as the BACnet Communication Module.
2. Confirm that a network cable is connected to the BACnet Communication Module.
3. Open Internet Explorer and type in the IP address of the BCM Configuration Tool.

---

**Note:** The BACnet Communication Module ships with a default IP subnet mask (255.255.0.0) and IP address (172.16.5.8). It may be necessary to change the IP address and subnet mask of your PC to access the BCM Configuration Tool's user interface.

---

4. Once the BCM Configuration Tool's initial Login screen appears, you can then change the user name and password, if desired (see Figure 4).
  - a. Type the default user name, which is "Administrator."
  - b. Type the default password, which is "Admin."
  - c. Click on the Submit button.
  - d. After a user name and password have been entered, the Main Menu screen appears (see Figure 5). The Main Menu provides the option to select either Administrator Settings or

Communication Settings. The Administrator Settings screen allows alteration of the user name and password (see Figure 6.) The Communication Interface Settings screen allows configuration of network parameters (see Figure 7 and following section titled Configuration using the BCM Configuration Tool).

- e. To change the user name and/or password, press the Administrator Settings button.
- f. Modify user name and password as desired.

---

**Note:** Both the user name and password are case sensitive and must be 4-15 characters in length. They may be changed at any time in the Administrator Settings section of the user interface.

---

- g. Once changes have been made to the Administrator Settings screen, a message appears to confirm that the changes have been accepted (see Figure 8).

*Figure 4. BCM Configuration Tool Login Screen*

Address <http://172.16.5.8/>

**BACnet® Communication Module (BCM) Configuration Tool, v1.0**

**Login**

Note: User name and password are case sensitive.

User Name:

Password:

*Figure 5. BCM Configuration Tool Main Menu*

Address <http://172.16.5.8/menu.shtml>

**BACnet® Communication Module (BCM) Configuration Tool, v1.0**

**Main Menu**

Figure 6. BCM Configuration Tool Administrator Settings Screen

Address http://172.16.5.8/AdminConf.shtml

**BACnet® Communication Module (BCM) Configuration Tool, v1.0**

**Administrator Settings**

Note: User name and password must be 4 - 15 characters and are case sensitive.

User name:

Password:

Re-type password:

## Configuration using the BCM Configuration Tool

Once the user name and password have been set, the BCM Configuration Tool can be used to view and adjust network parameters for the BACnet Communication Module. The following section describes how to change parameters necessary for BACnet addressing and initial network connection. These parameters are discussed in greater detail in Table 2.

1. After login, select the Communication Interface Settings option from the Main Menu screen (see Figures 5 and 7).
2. Under the Device section, change the following values to meet the installation requirements:
  - a. Device Name
  - b. Device Instance
  - c. Select the Communication Type (BACnet IP, BACnet Ethernet, or BACnet MS/P).
3. Modify other parameters under the BACnet IP or BACnet MS/TP section as required for your network.
4. Click on the Submit button.
5. Once changes have been made to the BACnet Communications Interface Settings screen, a message appears to confirm that the changes have been accepted (see Figure 8).

Figure 7. BCM Configuration Tool Communications Interface Settings Screen

Address <http://172.16.5.8/InterfaceConf.shtml>

**BACnet® Communication Module (BCM) Configuration Tool, v1.0**

**Communications Interface Settings**

**Device**

Device Name:

Device Instance:  0 - 4194302

Device Location:

Communication Type:

Max APDU Length: 1024

Ethernet MAC Address: 00:00:DB:21:05:E1

**BACnet IP**

DHCP Enabled:

IP Address:  **Note:** The same IP settings are used for both the BCM Configuration Tool and the BACnet/IP Interface

IP Subnet Mask:

IP Router Address:

UDP Port Number:

**BACnet MS/TP**

MSTP MAC Address:  0 - 127

MSTP Baud Rate:

MSTP Max Master:  1 - 127

MSTP Info Frames:  1 - 5

Figure 8. BCM Configuration Tool Settings Change Confirmation Screen

Address <http://172.16.5.8/faceConf>

**BACnet® Communication Module (BCM) Configuration Tool, v1.0**

**The settings have been saved.**

**Note:**

If any of the BACnet settings have been changed, the device may need to be re-discovered.

If any of the IP settings have changed, the communications will be re-initialized. You will need to re-establish your web connection to the web interface, by closing Internet Explorer and re-opening it using the new IP address.

Table 2. Network Configuration Parameters

Parameter	Value (Range)/Definition	Initial Value/Note
Device Name	12 – 20 character Device Object Name. Change this value as needed to match installation parameters	RTU_CXXXXXXXXX Where XXXXXXXXX is the Device Instance Number
Device Instance	0-4194302/Device Instance of the BACnet Communication Module	47065 for IP and Ethernet 3002 for BACnet MS/TP <sup>1</sup> Must be unique throughout the entire network
Device Location	0 – 31 characters. An optional BACnet property intended to indicate the physical location of the unit controller	Initial values is NULL or blank
Communication Type	1 – BACnet/IP 2 – BACnet/Ethernet 3 – BACnet MS/TP	1 – BACnet/IP
DHCP Enabled	Off-On/Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP Address	Default = disabled
IP Address	IP Address of the BACnet Communication Module	172.16.5.8
IP Subnet Mask	Subnet Mask of the BACnet Communication Module	255.255.0.0
IP Router Address	Internet Protocol Router Address	0.0.0.0
UDP Port Number	0 – 65535, (User Datagram Protocol) Identifies the application process in the destination unit	47808
MSTP MAC Address	0-127/ The MS/TP address of the BACnet Communication Module	0/ Each device on the BACnet network must have a unique MS/TP address
MSTP Baud Rate	9600-19200-38400-76800/ Data transfer speed	19200 bps
MSTP Max Master	0-127/ This variable specifies the highest possible address for master node and shall be less than or equal to 127	127
MSTP Info Frames	0-5/ This variable specifies the maximum number of information frames the BACnet Communication Module may send before it must pass the token	1

<sup>1</sup> The default device instance for BACnet MSTP is 3002 + the MAC address.

## BACnet Addressing

The following section describes the common BACnet configuration parameters used to establish network communication between the unit controller and the BAS.

### BACnet MS/TP

Typical BACnet MS/TP parameters required for configuration are: MAC address, Device Instance, and Baud Rate.

The BACnet MS/TP Media Access Control (MAC) address is a one-octet address that must be set during the BACnet Communication Module configuration. The MAC address must be unique to the MS/TP network and have a valid range of 0-127. It is shipped set to a default value of 0.

## **BACnet IP**

Typical BACnet IP parameters required for configuration are: IP Address, Subnet Mask, and Device Instance. The BACnet Communication Module is assigned a factory default IP address and Subnet Mask. These are only temporary but are required so that the user knows what address to access the BACnet Communication Module in order to change network parameters. See your system administrator for the correct IP Address and Subnet Mask required for your network.

The BACnet/IP (B/IP) address of the Maverick I unit controller consists of the four-octet IP address followed by the two-octet UDP (User Datagram Protocol) port number. The BACnet/IP Address is a six-octet value analogous to a MAC (Media Access Control) address. The IP Address portion of the BACnet/IP address must be unique in the BACnet network segment. The default UDP port number in the unit controller is 47808 (BAC0 in hexadecimal).

### ***Dynamic Host Configuration Protocol***

The BACnet Communication Module supports Dynamic Host Configuration Protocol (DHCP) IP Addressing for BACnet IP networks.

By default, this feature is disabled. To configure the BACnet Communication Module to use the DHCP feature, select “DHCP Enabled” check box in the BACnet IP section of the Communications Interface Settings page (see Figure 7). In a DHCP-based network, the BACnet Communication Module automatically receives the required parameters from the DHCP server. Consult with your network administrator for the information on your network setting.

## **BACnet Ethernet**

BACnet Ethernet requires configuration of the Device Instance.

The Ethernet MAC address of the BACnet Communication Module is a six-octet address assigned when it was manufactured. It is fixed and cannot be changed. Use this address to access the BACnet Communication Module on a BACnet over Ethernet network.

## **Testing Network Communication**

You can determine whether your PC is properly configured to access the BACnet Communication Module. To test whether your computer is properly addressed to communicate with the BACnet Communication Module, follow these steps:

1. Make sure the PC has Subnet Mask 255.255.0.0 and similar (but not identical) IP Address as the BACnet Communication Module.
2. Open a DOS window (go to Start button\Programs\Accessories\Command Prompt.)
3. Type “ping 172.16.5.8” at the DOS prompt.
4. Press Enter.
5. Observe response. See Figure 9 for a successful response.

*Figure 9. Successful Ping and Response*

```
C:\>ping 172.16.5.8

Pinging 172.16.5.8 with 32 bytes of data:

Reply from 172.16.5.8: bytes=32 time=93ms TTL=63
Reply from 172.16.5.8: bytes=32 time=5ms TTL=63
Reply from 172.16.5.8: bytes=32 time=70ms TTL=63
Reply from 172.16.5.8: bytes=32 time=16ms TTL=63

Ping statistics for 172.16.5.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 93ms, Average = 46ms

C:\>
```

## Resetting the BACnet Communication Module

All settings that can be changed with the BCM Configuration Tool may be reset to factory defaults with the Reset Button (see Figure 2 for location of the Reset Button on the BACnet Communication Module). If the IP Address or the MAC Address has been lost or forgotten, the BACnet Communication Module can be reset to the default IP Address and Subnet Mask.

All settings from Administrator Settings and/or Communications Interface Settings screens are reset to factory defaults.

To activate the reset function, push and hold the Reset Button for five seconds while the BACnet Communication Module is attached to unit controller and while power is applied to both.

---

**Note:** The Power, TX to Unit Controller, and RX from Unit Controller LEDs all blink during regular operation. After the Reset Button is pushed, the Power LED will be solid green for a few seconds and the TX to Unit Controller and RX from Unit Controller LEDs will be blank for a few seconds.

---

# Service Information

---

## Test Procedures

If you can control the unit from the unit controller but you are not able to communicate with unit via the network, follows these steps:

- Check the network wiring
- Check the network parameters and verify that they are correct and that there are no duplicate devices on the network
- Check communications

If the BACnet Communication Module still does not respond, contact the McQuay Controls Customer Support Group at 866-4MCQUAY (866-462-7829).

## Parts List

### Installation Kit

Description	Part Number
Maverick I BACnet Communication Module kit (kit includes communication module, 4 stand-offs, 4-pin network connector, and Installation Manual 1000	090016715

This document contains the most current product information as of this printing. For the most current product information, please go to [www.mcquay.com](http://www.mcquay.com). All McQuay equipment is sold pursuant to McQuay's Standard Terms and Conditions of Sale and Limited Warranty.

