

MGate 5217 Series User's Manual

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MGate 5217 Series User's Manual

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Introduction

Welcome to the MGate 5217 line of Modbus-to-BACnet/IP gateways. All models feature easy protocol conversion between Modbus RTU/ASCII, Modbus TCP, and BACnet/IP protocols. This chapter is an introduction to the MGate 5217.

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Product Features**

Overview

The MGate 5217 is an industrial Ethernet gateway for Modbus RTU/ASCII/TCP and BACnet/IP protocol conversions. All models are DIN-rail mountable and comes with built-in serial isolation. The rugged design is suitable for industrial applications such as critical power and HVAC systems.

Package Checklist

All models of the MGate 5217 Series are shipped with the following items:

Standard Accessories:

- 1 MGate 5217 gateway
- Quick installation guide (printed)
- Warranty card

Please notify your sales representative if any of the above items are missing or damaged.

Optional Accessories (can be purchased separately)

- **DK-35A:** DIN-rail mounting kit (35 mm)
- **Mini DB9F-to-TB Adaptor:** DB9 female to terminal block adapter
- **DR-4524:** 45W/2A DIN-rail 24 VDC power supply with universal 85 to 264 VAC input
- **DR-75-24:** 75W/3.2A DIN-rail 24 VDC power supply with universal 85 to 264 VAC input
- **DR-120-24:** 120W/5A DIN-rail 24 VDC power supply with 88 to 132 VAC/176 to 264 VAC input by switch

Product Features

- Supports Modbus RTU/ASCII/TCP master/client
- Supports BACnet/IP server
- Connects up to 62 Modbus RTU/ASCII slaves
- Connects up to 32 Modbus TCP servers
- 600 points and 1200 points models available
- Embedded traffic monitoring and diagnostic information for easy troubleshooting
- Supports COV to provide fast data communication
- Virtual nodes designed to make each Modbus device to be seen as a separate BACnet/IP device
- Configures Modbus commands quickly by editing an Excel spreadsheet
- Built-in Ethernet cascading for easy wiring
- -40 to 75°C wide operating temperature
- Serial port with 2 kV isolation protection
- Supports redundant dual AC or DC power inputs
- Supports 5-year warranty
- Supports security features based on IEC 62443-4-2

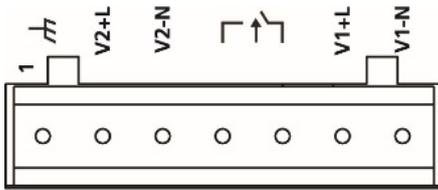
2

Hardware

The following topics are covered in this chapter:

- ❑ **Power Input and Relay Output Pinouts**
- ❑ **LED Indicators**
- ❑ **Panel Layouts**
- ❑ **Dimensions**
- ❑ **Pin Assignments**
- ❑ **Mounting the Unit**
 - Wall or Cabinet Mounting
- ❑ **Reset Button**
- ❑ **Pull-high, Pull-low, and Terminator for RS-485**

Power Input and Relay Output Pinouts



	V2+L	V2-N			V1+L	V1-N
Shielded Ground	AC/DC Power Input 2	AC/DC Power Input 2	Relay Output	Relay Output	AC/DC Power Input 1	AC/DC Power Input 1

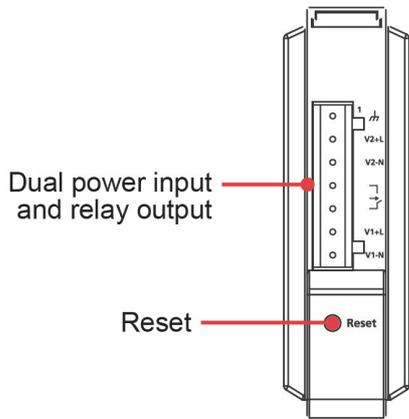
LED Indicators

Name	Color	Function
PWR1	Red	Power is being supplied to the power input
PWR2	Red	Power is being supplied to the power input
RDY	Red	Steady: Power is on and the unit is booting up
		Blinking: IP conflict, DHCP or BOOTP server did not respond properly, or a relay output occurred
	Green	Steady: Power is on and the unit is functioning normally
		Blinking: Unit is responding to locate function
Off	Power is off or power error condition exists	
Ethernet	Amber	10 Mbps Ethernet connection
	Green	100 Mbps Ethernet connection
	Off	Ethernet cable is disconnected or has a short
P1, P2	Amber	Serial port is receiving data
	Green	Serial port is transmitting data
	Off	Serial port is not transmitting or receiving data

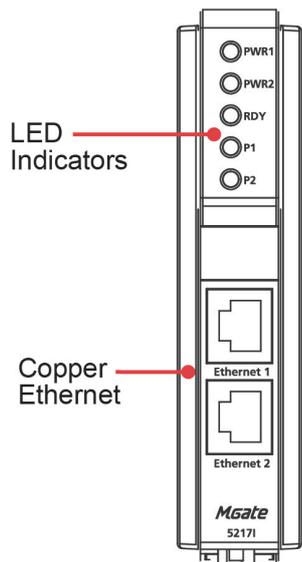
Panel Layouts

The MGate 5217 has two RJ45 Ethernet ports and two DB9 serial ports for connecting to devices.

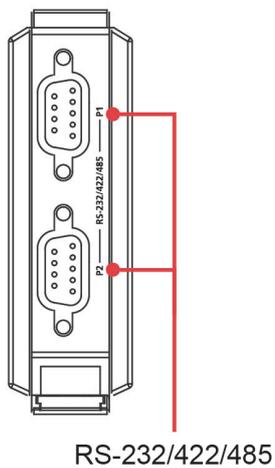
Top View



Front View

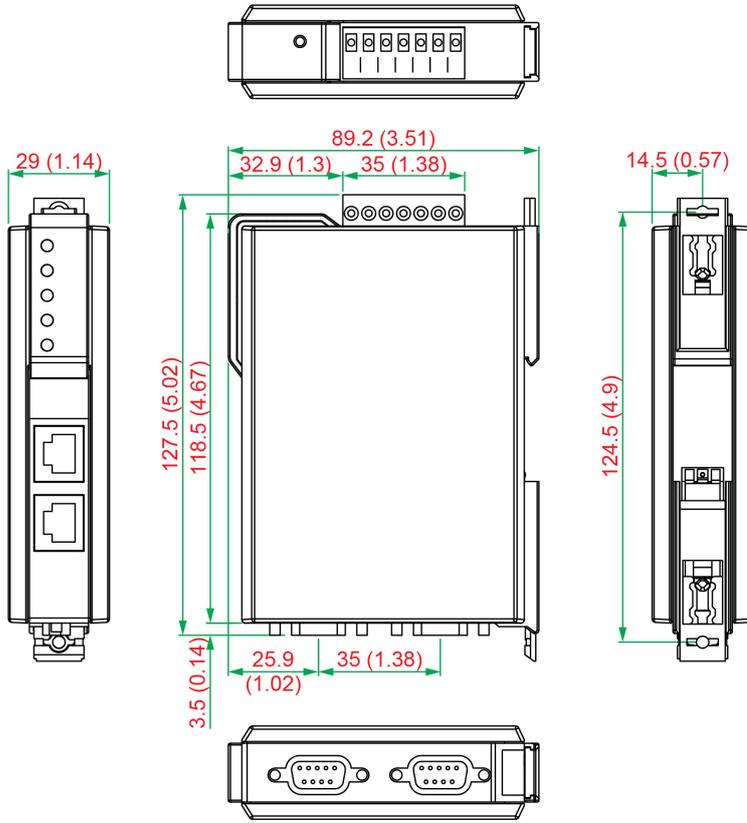


Bottom View



Dimensions

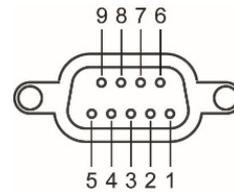
Unit: mm (inch)



Pin Assignments

Serial Port (DB9 Male)

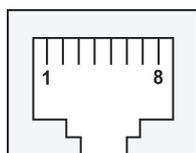
Pin	RS-232	RS-422/RS-485 (4W)	RS-485 (2W)
1	DCD	TxD-	-
2	RXD	TxD+	-
3	TXD	RxD+	Data+
4	DTR	RxD-	Data-
5*	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-
9	-	-	-



*Signal ground

Ethernet Port (RJ45)

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

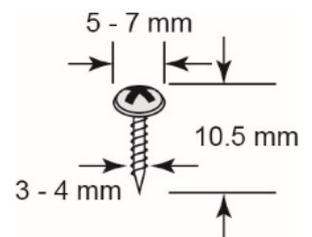


Mounting the Unit

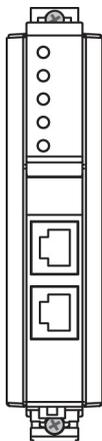
- STEP 1:** After removing the MGate 5217 from the box, connect the MGate 5217 to a network. Use a standard straight-through Ethernet cable to connect the unit to a hub or switch. When setting up or testing the MGate 5217, you might find it convenient to connect directly to your computer’s Ethernet port. In this case, use a crossover Ethernet cable.
- STEP 2:** Connect the serial port(s) of the MGate 5217 to a serial device.
- STEP 3:** The MGate 5217 is designed to be attached to a DIN rail or mounted on a wall. The two sliders on the MGate 5217 rear panel serve a dual purpose. For wall mounting, both sliders should be extended. For DIN-rail mounting, start with one slider pushed in, and the other slider extended. After attaching the MGate 5217 on the DIN rail, push the extended slider in to lock the device server to the rail. The two placement options are illustrated in the accompanying figures.
- STEP 4:** Connect the 12 to 48 VDC or 24 VAC power source to terminal block power input.

Wall or Cabinet Mounting

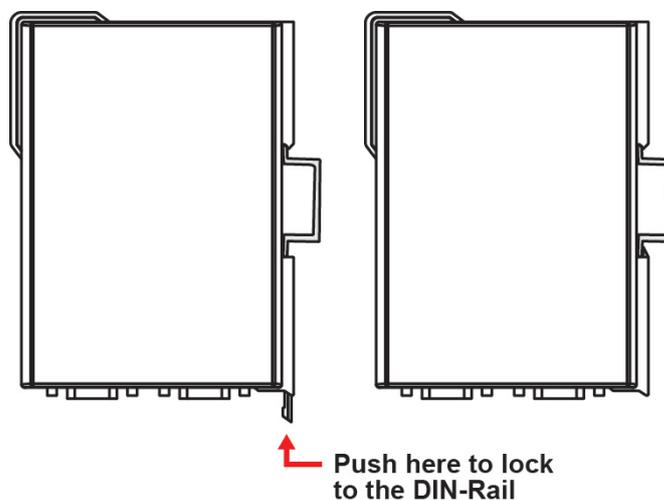
Mounting the MGate 5217 Series on to a wall requires two screws. The heads of the screws should be 5 to 7 mm in diameter, the shafts should be 3 to 4 mm in diameter, and the length of the screws should be more than 10.5 mm.



Wallmount



DIN Rail



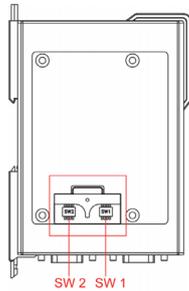
Reset Button

Press the Reset button continuously for 5 sec to load factory defaults:

The reset button is used to load factory defaults. Use a pointed object such as a straightened paper clip to hold the reset button down for five seconds. Release the reset button when the Ready LED stops blinking.

Pull-high, Pull-low, and Terminator for RS-485

Remove the MGate 5217's top cover where you will find the DIP switches to adjust each serial port's pull-high resistor, pull-low resistor, and terminator. Serial port1/port2 can be adjusted by SW1/SW2, respectively.



SW	1	2	3	4
	Pull-high resistor	Pull-low resistor	Terminator	Reserved
ON	1 kΩ	1 kΩ	120 Ω	Reserved
OFF	150 kΩ*	150 kΩ*	-*	Reserved

*Default

3

Getting Started

The following topics are covered in this chapter:

- ❑ **Connecting the Power**
- ❑ **Connecting Serial Devices**
- ❑ **Connecting to a Network**
- ❑ **Installing DSU Software**
- ❑ **Logging in to the Web Console**

Connecting the Power

The unit can be powered by connecting a power source to the terminal block:

1. Loosen or remove the screws on the terminal block.
2. Turn off the power source and then connect a 12–48 VDC or 24 VAC power line to the terminal block.
3. Tighten the connections, using the screws on the terminal block.
4. Turn on the power source.

Note that the unit does not have an on/off switch. It automatically turns on when it receives power. The PWR LED on the top panel will glow to indicate that the unit is receiving power. For power terminal block pin assignments, refer to the **Power Input and Relay Output Pinout** section in *chapter 2*.

Connecting Serial Devices

The MGate 5217 supports connecting to Modbus serial devices. Before connecting or removing the serial connection, first make sure the power is turned off. For the serial port pin assignments, see the *Pin Assignments* section in *chapter 2*.

Connecting to a Network

Connect one end of the Ethernet cable to the MGate's 10/100M Ethernet port and the other end of the cable to the Ethernet network. The MGate will indicate a valid connection to the Ethernet in the following ways:

- The Ethernet LED maintains a solid green color when connected to a 100 Mbps Ethernet network.
- The Ethernet LED maintains a solid orange color when connected to a 10 Mbps Ethernet network.
- The Ethernet LED will flash when Ethernet packets are being transmitted or received.

Installing DSU Software

If you do not know the MGate gateway's IP address when setting it up for the first time (default IP is *192.168.127.254*); use an Ethernet cable to connect the host PC and MGate gateway directly. If you connect the gateway and host PC through the same Ethernet switch, make sure there is no router between them. You can then use Device Search Utility to detect the MGate gateways on your network.

The following instructions explain how to install the Device Search Utility (**DSU**), a utility to search for MGate 5217 units on a network.

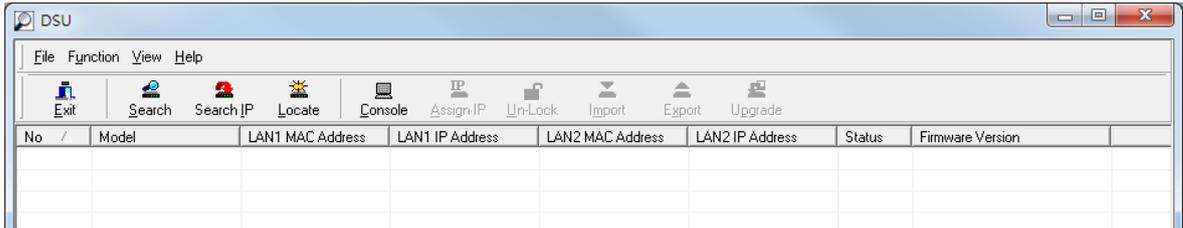
1. Download **DSU** from Moxa's website. Locate and run the following setup program to begin the installation process:

dsu_setup_[Version]_Build_[DateTime].exe

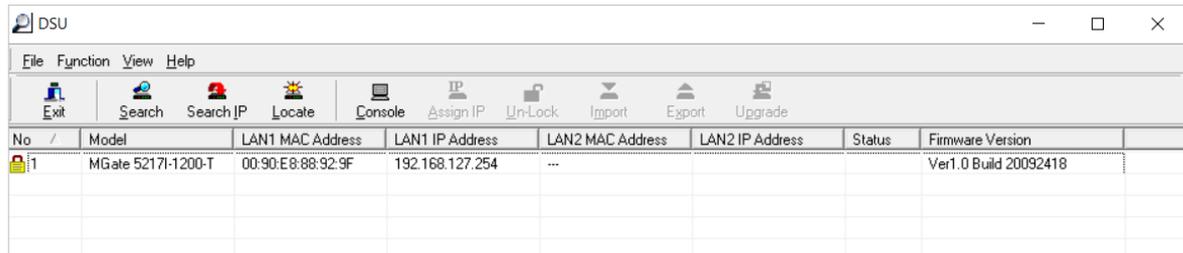
The latest version might be named **dsu_setup_Ver2.0_Build_xxxxxxx.exe**, for example:

2. You will be greeted by the Welcome window. Click **Next** to continue.
3. When the **Select Destination Location** window appears, click **Next** to continue. You may change the destination directory by first clicking on **Browse...**
4. When the **Select Additional Tasks** window appears, click **Next** to continue. You may select **Create a desktop icon** if you would like a shortcut to the DSU on your desktop.
5. Click **Install** to start copying the software files.
6. A progress bar will appear. The procedure should take only a few seconds to complete.
7. A message will indicate that the DSU is successfully installed. You may choose to run it immediately by selecting **Launch DSU**.
8. You may also open the DSU through **Start → Programs → MOXA → DSU**.

The DSU window should appear as shown below.



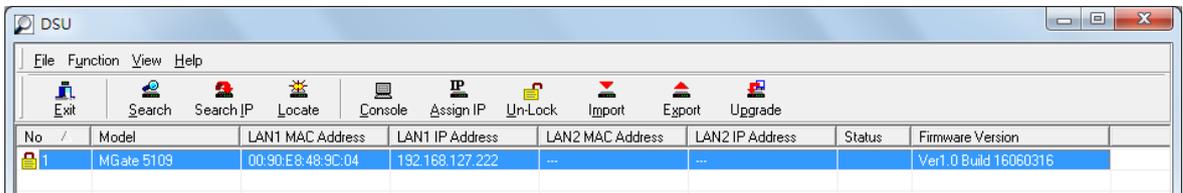
Click **Search** and a new Search window will pop up.



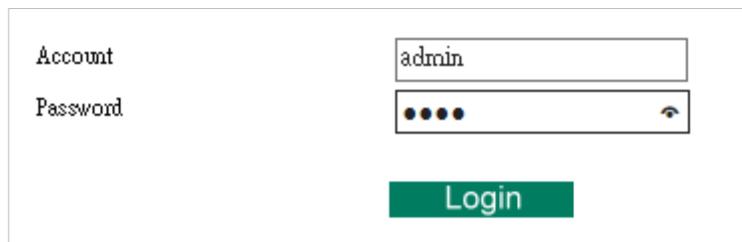
Logging in to the Web Console

Use the Web console to configure the MGate through Ethernet or verify the MGate’s status. Use a web browser, such as Microsoft Internet Explorer or Google Chrome to connect to the MGate, using the HTTP/HTTPS protocol.

When the MGate gateway appears on the DSU device list, select the gateway and use the right-click the mouse button to open a web console to configure the gateway.



On the first page of the web console, enter the **admin** for the default Account name and **moxa** for the default Password.



Web Console Configuration and Troubleshooting

This chapter provides a quick overview of how to configure the MGate 5217 by web console.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Basic Settings**
- ❑ **Network Settings**
- ❑ **Serial Settings**
- ❑ **Protocol Settings**
 - Protocol Settings—Protocol Conversion
 - Protocol Settings—Configure MGate’s Role 1 and Role 2
 - Protocol Settings—I/O Data Mapping
- ❑ **System Management**
 - System Management—Accessible IP List
 - System Management—System Log Settings
 - System Management—Auto Warning Settings
 - System Management—Email Alert
 - System Management—SNMP Trap
 - System Management—SNMP Agent
 - System Management—LLDP Settings
 - System Management—Certificate
 - System Management—Misc. Settings
 - System Management—Maintenance
- ❑ **System Monitoring (Troubleshooting)**

Overview

This section gives an overview of the MGate 5217 information.

Welcome to the MGate 5217I-600-T web console

Model Name	MGate 5217I-600-T
Serial No.	TBZCE1085490
Firmware version	1.0 Build 20101412
Ethernet IP address	192.168.127.254
Ethernet MAC address	00:90:E8:88:92:8D
System uptime	0 days, 0h: 0m:15s

Basic Settings

On this webpage, you can change the name of the device and time zone settings.

Basic Settings

Server Settings

Server name

Server location

Time Settings

Time zone

Local time / / 19 : :

Time server

Server Setting

Parameter	Value	Description
Server Name	(an alphanumeric string)	You can enter a name to help you identify the unit, such as the function, etc.
Server Location	(an alphanumeric string)	You can enter a name to help you identify the unit location. Such as "Cabinet A001."

Time Settings

The MGate 5217 has a built-in Real-Time Clock for time calibration functions. Functions such as the log function can add real-time information to the message.



ATTENTION

First-time users should select the time zone first. The console will display the "real time" according to the time zone relative to GMT. If you would like to modify the real-time clock, select **Local time**. MGate's firmware will modify the GMT time according to the Time Zone.

Parameter	Value	Description
Time Zone	User's selectable time zone	This field shows the currently selected time zone and allows you to select a different time zone.
Local Time	User's adjustable time.	(1900/1/1-2037/12/31)

Parameter	Value	Description
Time Server	IP or Domain address (e.g., 192.168.1.1 or time.stdtime.gov.tw)	This optional field specifies your time server's IP address or domain name if a time server is used on your network. The module supports SNTP (RFC-1769) for automatic time calibration. The MGate will request time information from the specified time server every 10 minutes.

Network Settings

The Network Settings is where the unit's network settings are configured. You can modify the IP Configuration, IP Address, Netmask, Default Gateway, and DNS.

⚙️ Network Settings

Network Settings

IP configuration

IP address

Netmask

Gateway

DNS server 1

DNS server 2

Parameter	Value	Description
IP Configuration	Static IP, DHCP, DHCP/BOOTP, BOOTP	Select Static IP if you are using a fixed IP address. Select one of the other options if the IP address is set dynamically.
IP Address	192.168.127.254 (or other 32-bit number)	The IP (Internet Protocol) address identifies the server on the TCP/IP network.
Netmask	255.255.255.0 (or other 32-bit number)	This identifies the server as belonging to a Class A, B, or C network.
Gateway	0.0.0.0 (or other 32-bit number)	This is the IP address of the router that provides network access outside the server's LAN.
DNS Server 1	0.0.0.0 (or other 32-bit number)	This is the IP address of the primary domain name server.
DNS Server 2	0.0.0.0 (or other 32-bit number)	This is the IP address of the secondary domain name server.

Serial Settings

The MGate 5217 serial interface supports RS-232, 2-wire RS-485, 4-wire RS-485, and RS-422 interfaces. You must configure the baudrate, parity, data bits, and stop bits before using the serial interface with Modbus RTU/ASCII protocol. Incorrect settings will result in communication failures.

⚙️ Serial Settings

Port Baud rate Parity Data bit Stop bit Flow control FIFO Interface RTS on delay RTS off delay

Parameter	Value	Description
Baudrate	50 bps to 921600 bps	
Parity	None, Odd, Even, Mark, Space	
Data bits	8	

Parameter	Value	Description
Stop bits	1, 2	
Flow control	None, RTS/CTS, RTS Toggle DTR/DSR	The RTS Toggle will turn off RTS signal when there is no data to be sent. If there is data to be sent, the RTS toggle will turn on the RTS signal before a data transmission and off after the transmission is completed.
FIFO	Enable, Disable	The internal buffer of UART. Disabling FIFO can reduce the latency time when receiving data from serial communications, but this will also slow down the throughput.
Interface	RS-232, RS-422, RS-485 2 wire, RS-485 4 wire	
RTS on delay	0-100 ms	Only available for RTS Toggle
RTS off delay	0-100 ms	Only available for RTS Toggle

RTS Toggle

The RTS Toggle function is used for **RS-232** mode only. This flow-control mechanism is achieved by toggling the RTS pin in the transmission direction. When activated, data will be sent after the RTS pin is toggled ON for the specified time interval. After the data transmission is finished, the RTS pin will toggle OFF for the specified time interval.

Protocol Settings

A typical MGate 5217 application consists of SCADA/DDC as a BACnet/IP client/master and meters/controllers as a Modbus RTU/ASCII/TCP slave/server. Both these components use different protocols and hence need a gateway between them to exchange data. The MGate acts as the BACnet/IP server/slave when it is connected to the BACnet/IP master/client and as the Modbus RTU/ASCII/TCP client/master when it is connected to the Modbus RTU/ASCII/TCP slave/server. Therefore, to configure the MGate, you must:

Step 1: Select the correct protocols in the **Protocol Conversion** setting where the details of both *sides* of the MGate’s role is shown below the selection.

Step 2: Configure the MGate’s roles for both sides. Configure the **Modbus client/master** side first followed by the **BACnet/IP server** side.

Step 3: After the MGate configuration is completed, click **I/O data mapping** to view the details of the exchanging data between SCADA/DDC and Modbus devices.

The following sections contain detailed MGate configuration instructions organized as per the above outline.

Protocol Settings—Protocol Conversion

The MGate 5217 supports Modbus RTU/ASCII, Modbus TCP, and BACnet/IP protocols. The MGate is dedicated to bring the Modbus device to the BACnet/IP network. Therefore, the MGate is fixed at the BACnet/IP server at one side, but the other side can be selected by your device’s settings.

Protocol Conversion



Protocol Settings—Configure MGate’s Role 1 and Role 2

The following shows the way to configure each role:

- A1. Modbus TCP Client (Master) Settings
- A2. Modbus RTU Master Settings
- A3. BACnet/IP Server Settings

A1. Modbus TCP Client (Master) Settings

In Modbus TCP client/master mode, the MGate works as a Modbus client/master and will send the Modbus request to the Modbus server/slave actively. The gateway supports Excel sheet import/export, which can easily configure Modbus commands via Excel format. Details can be referenced in Chapter 7. Besides, the MGate provides several advanced settings for specific application requirements. It is suggested to use the default settings, which can fit most scenarios.

Client Settings

Modbus TCP Client Settings

Client Configuration Import/Export

Select client configuration file (.csv) Choose File No file chosen

Master Settings

Initial delay (0 - 30000 ms)

Max. retry (0 - 5)

Response timeout (10 - 120000 ms)

Modbus Devices

Device name	Slave IP address	Slave ID	Number of Commands

Parameter	Value	Default	Description
Initial delay	0 to 30000 ms	0	Some Modbus servers/slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial boot-up. After booting up, you can force the MGate to wait before sending the first request with the Initial Delay setting.
Max. retry	0 to 5	3	This is used to configure how many times the MGate will try to communicate with the Modbus server/slave when Modbus command timeout occurs.
Response timeout	10 to 120000 ms	1000	The time taken by a slave device to respond to a request is defined by the device manufacturer based on the Modbus standard. A Modbus master can be configured to wait a certain amount of time for a server/slave’s response. If no response is received within the specified time, the master will disregard the request and continue the operation. This allows the Modbus system to continue the operation even if a slave device is disconnected or faulty. On the MGate 5217, the Response timeout field is used to configure how long the gateway will wait for a response from a Modbus server/slave. Refer to your device’ manufacturer’s documentation to manually set the response timeout

Create the communication settings for your Modbus TCP server/slave device by clicking the **Add** button to configure **Slave ID**, **Device Name** and **Slave IP address**. Then, the created Modbus device will be shown under **Modbus Devices** session.

Add Device

Master Settings > Add Device

Device Parameters

Slave ID (1 - 255)

Device Name

Slave IP address Port

Done **Cancel**

After creating Modbus device, we should configure the Modbus command by double-clicking the device list or pressing the **Edit** icon.

Modbus Devices

Device name	Slave IP address	Slave ID	Number of Commands
Device1	192.168.127.1 : 502	1	0

Submit

Then, click the **Add** icon to configure the Modbus commands.

Device Settings

Master Settings > Slave ID 1

Device Parameters

Slave ID

Device name

Slave IP address Port

Modbus Commands

Index	Enable	Name	Data Format	Function	Address / Quantity	Trigger	Poll Interval	Endian Swap
-------	--------	------	-------------	----------	--------------------	---------	---------------	-------------

Done **Cancel**

Add Modbus Commands

Add Command

Master Settings - Serial Port > Slave ID 1 > Add command

Command Parameters

Enable	<input type="text" value="Enable"/>
Name	<input type="text" value="Command1"/>
Data format	<input type="text" value="boolean"/>
Function	<input type="text" value="01 - Read Coils"/>
Read starting address	<input type="text" value="0"/> (0 - 65535)
Read quantity	<input type="text" value="1"/>
Trigger	<input type="text" value="Cyclic"/>
Poll interval	<input type="text" value="1000"/> (10 - 1200000 ms)
Endian swap	<input type="text" value="Byte"/>

Convert To BACnet

Convert to BACnet object	<input type="text" value="Binary Input"/>
--------------------------	-------------------------------------------

Done

Cancel

Parameter	Value	Default	Description
Enable	Enable	Enable	Enable: The command is active.
Name	(an alphanumeric string)	Command1	Max. 32 characters
Data Format	boolean uint16 int16 uint32 int32 float32	boolean	Boolean: 0 or 1. Uint16: Unsigned integer with 16 bits. Int16: Signed integer with 16 bits. Uint32: Unsigned integer with 32 bits. Int32: Signed integer with 32 bits. Float32: Float type with 32 bits.
Function	1 – Read coils 2 – Read discrete inputs 3 – Read holding registers 4 – Read input registers 5 – Write single coil 6 – Write single register 15 – Write multiple coils 16 – Write multiple registers		When a message is sent from a client to a server device, the function code field tells the server what kind of action to perform.
Read starting address	0 to 65535	0	Modbus register address.
Read quantity	1 2	1 2	Specifying how many quantities to read.
Write starting address	0 to 65535	0	Modbus register address.
Write quantity	1 2	1 2	Specifying how many quantities to write into.
Trigger	Cyclic Data Change		Cyclic: The command is sent cyclically at the interval specified in the Poll interval parameter. Data change: A command is issued when a change in data is detected.

Parameter	Value	Default	Description
Poll interval	100 to 1200000 ms	1000	Polling intervals are in milliseconds. Since the module sends all requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 100 to 1,200,000 ms.
Endian swap	None Byte Word Byte and Word	None	None: Don't need to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. ByteWord: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord: 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A
Fault protection	Keep latest data Clear all data bits to 0	Keep latest data	If the MGate's connection to BACnet/IP client fails, the gateway will not be able to receive data, but the gateway will continuously send output data to the Modbus TCP server device. To avoid problems in this case, the MGate 5217 can be configured to react in one of the following two ways: Keep latest data or clear data to zero.
Fault timeout	0 to 65535 ms	6000	Defines the communication timeout for the opposite side.

After completing above settings, each Modbus command should be converted to BACnet object, which needs to be configured.

Convert To BACnet

Convert to BACnet object

Units

COV increment

Data scaling (multiplication) (-1000.000 ~ 1000.000)

Data addition (-10000.000 ~ 10000.000)

Parameters	Value	Description
Convert to BACnet object	Analog input Analog output Analog value Binary input Binary output Binary value Multi-state input Multi-state output Integer value Positive integer value	Select the BACnet object type for this configured Modbus command
Units		While selecting a nonbinary value, the BACnet/IP client sometimes needs to have the value with units to identify the meaning of the value. Various units are supported to be selected.

Parameters	Value	Description
Relinquish default	-1000000000 to 10000000000	If there are no commanded values in the priority array, the present value will be changed to relinquish the default.
COV increment	1 to 10000000000	COV will be triggered when Current Reported Value - Last Reported Value > COV Increment
Data scaling (multiplication)	-1000.000 to 1000.000	Data can be calculated by multiplication. For example, if Modbus receives data that equals x, then the configured data scaling value equals a The output equals y equals ax
Data addition	-10000.000 to 10000.000	Data can be calculated by addition. For example, if Modbus receives data that equals x, then the configured data addition equals b The output equals y equals x + b

Convert To BACnet

Convert to BACnet object Binary Input

Mapping to modbus registers bit

register address 0 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

The MGate 5217 also provides an advanced feature that is used to convert one Modbus register to multiple BACnet BI/BO/BV objects. For example, the MGate uses Modbus function code 03 to read the data from the Modbus RTU device. The register shows the status of several I/Os, and the MGate divides one byte into multiple bits. Select the wanted bit address to map to the BI objects.

NOTE In order to get a better performance, we suggest the number of COV subscription should be under 300.

A2. Modbus RTU/ASCII Master Settings

In Modbus RTU/ASCII master mode, the MGate works as a Modbus RTU/ASCII master and will send the Modbus request to the Modbus RTU/ASCII slave actively. The gateway supports Excel sheet import/export, which can easily configure Modbus commands via Excel format. Details can be referenced in Chapter 7. Besides, the MGate provides several advanced settings for specific application requirements. It is suggested to use the default settings, which can fit in most of scenarios.

Master Settings

Modbus RTU/ASCII Master Settings

Master Configuration Import/Export

Select master configuration file (.csv) No file chosen

Master Settings

Mode selection

Port 1 Port 2

Master Settings - Serial Port 1

Master Parameters

Initial delay (0 - 30000 ms)

Max. retry (0 - 5)

Response timeout (10 - 120000 ms)

Inter-frame delay (10 - 500 ms, 0: default)

Inter-character timeout (10 - 500 ms, 0: default)

Modbus Devices

Slave ID	Device name	Number of Commands
1	Port1_Device1	1

Apply the above setting to P1 P2

Parameter	Value	Default	Description
Modbus selection	RTU ASCII	RTU	Select the Modbus RTU or Modbus ASCII to communicate with Modbus slave device.
Initial delay	0 to 30000 ms	0	Some Modbus slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial boot-up. After booting up, you can force the MGate to wait before sending the first request with the Initial Delay setting.
Max. retry	0 to 5	3	This is used to configure how many times the MGate will try to communicate with the Modbus slave.
Response timeout	10 to 120000 ms	1000	The time taken by a slave device to respond to a request is defined by the device manufacturer, based on the Modbus standard. A Modbus master can be configured to wait a certain amount of time for a server/slave's response. If no response is received within the specified time, the master will disregard the request and continue operation. This allows the Modbus system to continue the operation even if a slave device is disconnected or faulty. On the MGate 5217, the Response timeout field is used to configure how long the gateway will wait for a response from a Modbus server/slave. Refer to your device manufacturer's documentation to manually set the response timeout
Inter-frame delay (only for Modbus RTU)	10 to 500 ms	0	Use this function to determine the timeout interval between characters for Modbus devices that cannot receive Rx signals within an expected time interval. If the response is timed out, all received data will be discarded. The MGate 5217 will automatically determine the timeout interval if the timeout value is set to 0.

Parameter	Value	Default	Description
Inter-character timeout (only for Modbus RTU)	10 to 500 ms	0	The users can determine the time delay to transmit the data frame received from the slave device to the upstream. The MGate 5217 will automatically determine the time interval if it is set to 0.

Create your Modbus RTU/ASCII slave device by clicking the **Add** button to configure **Slave ID**, **Device Name**, and **Inactive time when command failed**. Then, the created Modbus device list will be shown under the **Modbus Devices** session.

Master Settings

Mode selection RTU ▼

Port 1
Port 2

Master Settings - Serial Port 2 > Add Device

Device Parameters

Slave ID (1 - 255)

Device name

Inactive time when command failed (0 - 28800 s)

Done
Cancel

Parameter	Value	Description
Inactive time when a command fails	0 to 28800 s	When the Modbus slave device occurs time-out, the MGate's request commands for the Modbus slave device will be skipped during the configuration time.

After creating a Modbus device, we should configure the Modbus commands by double-clicking the device list or pressing the **Edit** icon.

Modbus Devices

+ Add
✎ Edit
📄 Copy
🗑 Delete

Slave ID	Device name	Number of Commands
1	Power_Meter	2

Apply the above setting to P1 P2

Then, click the **Add** icon to configure the Modbus commands.

Modbus RTU/ASCII Master Settings

Master Configuration Import/Export

Select master configuration file (.csv) No file chosen

Master Settings

Mode selection ASCII ▾

Port 1 Port 2

Master Settings - Serial Port 1 > Slave ID 1

Device Parameters

Slave ID

Device name

Inactive time when command failed (0 - 28800 s)

Modbus Commands

Index	Enable	Name	Data Format	Function	Address / Quantity	Trigger	Poll Interval	Endian Swap
1	Enable	Voltage	float32	3	Read address 3027, Quantity 2	Cyclic	1000	Byte and Word
2	Enable	Frequency	float32	3	Read address 3109, Quantity 2	Cyclic	1000	Byte and Word

Add Modbus Commands

Add Command

Master Settings - Serial Port > Slave ID 1 > Add command

Command Parameters

Enable

Name

Data format

Function

Read starting address (0 - 65535)

Read quantity

Trigger

Poll interval (10 - 1200000 ms)

Endian swap

Convert To BACnet

Convert to BACnet object

Parameter	Value	Default	Description
Enable	Enable	Enable	Enable: The command is active.
Name	(an alphanumeric string)	Command1	Max. 32 characters
Data Format	boolean uint16 int16 uint32 int32 float32	boolean	Boolean: 0 or 1. Uint16: Unsigned integer with 16 bits. Int16: Signed integer with 16 bits. Uint32: Unsigned integer with 32 bits. Int32: Signed integer with 32 bits. Float32: Float type with 32 bits.

Parameter	Value	Default	Description
Function	1 – Read coils 2 – Read discrete inputs 3 – Read holding registers 4 – Read input registers 5 – Write single coil 6 – Write single register 15 – Write multiple coils 16 – Write multiple registers		When a message is sent from a client to a server device, the function code field tells the server what kind of action to perform.
Read starting address	0 to 65535	0	Modbus register address.
Read quantity	1 2	1 2	Specifying how many quantities to read.
Write starting address	0 to 65535	0	Modbus register address.
Write quantity	1 2	1 2	Specifying how many quantities to write into.
Trigger	Cyclic Data Change		Cyclic: The command is sent cyclically at the interval specified in the poll interval parameter. Data change: A command is issued when a change in data is detected.
Poll interval	1 to 1200000 ms	1000	Polling intervals are in milliseconds. Since the module sends all requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 100 to 1,200,000 ms.
Endian swap	None Byte Word Byte and Word	None	None: Don't need to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. ByteWord: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord: 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A
Fault protection	Keep latest data Clear all data bits to 0	Keep latest data	If the MGate's connection to BACnet/IP client fails, the gateway will not be able to receive data, but the gateway will continuously send output data to the Modbus TCP server device. To avoid problems in this case, the MGate 5217 can be configured to react in one the following two ways: Keep latest data or clear data to zero.
Fault timeout	0 to 65535 ms	6000	Defines the communication timeout for the opposite side.

After completing the above settings, the Modbus command should be converted to BACnet object, which needs to be configured.

Convert To BACnet

Convert to BACnet object

Units

COV increment

Data scaling (multiplication) (-1000.000 ~ 1000.000)

Data addition (-10000.000 ~ 10000.000)

Parameters	Value	Description
Convert to BACnet object	Analog input Analog output Analog value Binary input Binary output Binary value Multi-state Input Multi-state output Integer value Positive integer value	Select the BACnet object type for this configured Modbus command
Units		While selecting a nonbinary value, the BACnet/IP client sometimes needs to have the value with units to identify the meaning of the value. Various units are supported to be selected.
Relinquish default	-1000000000 to 10000000000	If there are no commanded values in the priority array, the present value will be changed to relinquish the default.
COV increment	1 to 10000000000	COV will be triggered when Current Reported Value - Last Reported Value > COV Increment
Data scaling (multiplication)	-1000.000 to 1000.000	Data can be calculated by multiplication. For example, if Modbus receives data that equals x, then the configured data scaling value equals a The output equals y equals ax
Data addition	-10000.000 to 10000.000	Data can be calculated by addition. For example, if Modbus receives data that equals x, then the configured data addition equals b The output equals y equals x + b

Convert To BACnet

Convert to BACnet object

Mapping to modbus registers bit

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

register address 0

The MGate 5217 also provides an advanced feature that is used to convert one Modbus register to multiple BACnet BI/BO/BV objects. For example, the MGate uses Modbus function code 03 to read the data from the Modbus RTU device. The register shows the status of several I/Os, and the MGate divides one byte into multiple bits. Select the wanted bit address to map to the BI objects.

NOTE In order to get a better performance, we suggest the number of COV subscription should be under 300.

When the serial port is configured, and you find out all the serial connected Modbus devices are all the same, you can use **Apply the above setting to** other serial ports to save configuration time.

Modbus Devices

Slave ID	Device name	Number of Commands
1	Power_Meter	2

Apply the above setting to P1 P2

A3. BACnet/IP Server Settings

The MGate gateway supports BACnet/IP server only. In BACnet/IP server mode, assign the **Device name**, **Device instance**, **Network number**, and **BACnet/IP port**.

BACnet/IP Server Settings

Server Settings

Device name
Device instance
Ethernet port network number
Virtual network number
BACnet/IP port

If the MGate and monitor system are not in the same subnet, the MGate provides a technology called **BBMD** –BACnet/IP Broadcast Management Device—that can forward broadcast messages to different subnet network.

BBMD Settings

BBMD enable Enable
BBMD role
Remote BBMD server IP
Remote BBMD server UDP port
Time to live (seconds)

Parameters	Value	Description
BBMD role	Register as a foreign device	
Remote BBMD server IP	0.0.0.0 to 255.255.255.255	The IP addresses of a remote BBMD server.
Remote BBMD UDP port	0 to 65535	The UDP port number of a remote BBMD server.
Time to live (seconds)	0 to 65535	Indicates the time to register the MGate as a foreign device. If the MGate fails to re-register before the time expires, the BBMD may delete the foreign device from its Foreign-Device-Table.

Besides, the MGate provides advanced COV settings for special scenarios.

Misc Settings

COV notification delay 0 - 1000 (ms)

COV subscription redundant notification 0 - 10 (times)

Parameters	Value	Description
COV notification delay	0 to 1000 ms	It indicates the time intervals between COV redundant notifications.
COV subscription redundant notification	0 to 10 times	COV notification uses UDP transmission, which is loss-tolerating connections. To ensure the COV will be received by BACnet/IP client, the MGate as a BACnet/IP server will reply COV value with 1+ configured times.

Protocol Settings—I/O Data Mapping

After you have configured Role 1 and Role 2 (client/master and server/slave) of the MGate settings, the SCADA/DDC in the BACnet/IP client role will start monitoring and controlling the remote Modbus slave device. The MGate uses its internal memory to facilitate data exchanges. The **I/O Data Mapping** page shows the complete mapping status.

For example, Modbus **Slave ID 1** is connected to the MGate’s **Serial Port 1**. The Modbus slave device’s **Function code 1 (coil data)** with **Address (register) 0** can be read by BACnet/IP Object **Binary Input, Instance 0** from the BACnet/IP client side.

I/O Data Mapping

Modbus RTU/ASCII - Master						BACnet/IP - Server			
Serial port	Device slave ID	Device name	Command name	Function	Starting address	Device instance	Object name	Object type	Object instance
1	1	Port1_Device1	Command1	1 (Read)	0 (0x00001)	101404	Command1	Binary Input	0
1	1	Port1_Device1	Command2	1 (Read)	0 (0x00001)	101404	Command2	Binary Input	1
1	1	Port1_Device1	Command3	1 (Read)	0 (0x00001)	101404	Command3	Binary Input	2

If object settings are wrong and needed to be modified, we can press the **Edit** icon to modify Object name, Object type, and Object Instance ID.

BACnet/IP - Server

Device addr	Object name	Object type	Instance
101404	Command1	Binary Input	3
101404	Command2	Binary Input	1
101404	Command3	Binary Input	2



BACnet/IP Object Settings

Command Parameters

Object Name

Object Type

Object Instance ID

System Management

System Management—Accessible IP List

The Accessible IP List function allows you to add or block remote host IP addresses to prevent unauthorized access. Access to the MGate 5217 is controlled by IP address. That is, if a host’s IP address is in the accessible IP table, then the host will be allowed to access the MGate 5217.

Accessible IP List

Activate the accessible IP list (All device services are NOT allowed for the IPs NOT on the list)

Index	Active	IP	NetMask
1	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
3	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
4	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
6	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

These settings are used to restrict access to the module by IP address. Only IP addresses on the list will be allowed access to the device. You may add a specific address or range of addresses by using a combination of IP address and netmask, as follows:

To allow access to a specific IP address: Enter the IP address in the corresponding field; enter 255.255.255.255 for the netmask.

To allow access to hosts on a specific subnet: For both the IP address and netmask, use 0 for the last digit (e.g., “192.168.1.0” and “255.255.255.0”).

To allow access to all IP addresses: Make sure that **Enable** the accessible IP list is not checked.

Additional configuration examples are shown in the following table:

Desired IP Range	IP Address Field	Netmask Field
192.168.1.120	192.168.1.120	255.255.255.255
192.168.1.1 to 192.168.1.254	192.168.1.1	255.255.255.0
192.168.1.1 to 192.168.255.254	192.168.0.1	255.255.0.0
192.168.1.1 to 192.168.1.126	192.168.1.1	255.255.255.128
192.168.1.129 to 192.168.1.254	192.168.1.128	255.255.255.128

System Management—System Log Settings

These settings enable the MGate firmware to record important events for future verification. The recorded information can only be shown on the **System Log** page.

System Log Settings

Event Group	Syslog	Local Log	Summary
System	<input type="checkbox"/>	<input type="checkbox"/>	System cold start, System warm start
Network	<input type="checkbox"/>	<input type="checkbox"/>	DHCP/BOOTP get IP/renew, NTP connect fail, IP conflict, Network link down
Configuration	<input type="checkbox"/>	<input type="checkbox"/>	Login fail, IP changed, Password changed, Firmware upgrade, Certificate import, Configuration import/export, Configuration change, Clear event log
Modbus TCP	<input type="checkbox"/>	<input type="checkbox"/>	Modbus TCP communication logs

Local Log Settings

Enable log capacity warning at (%)

Warning by: SNMP Trap E-mail

Event log oversize action :

Syslog Settings

Syslog server IP

Syslog server port

The available information that can be recorded includes the following events:

Event Group	Description
System	System Cold Start, System Warm Start
Network	DHCP/BOOTP Get IP/Renew, NTP Connect Fail, IP Conflict, Network Link Down
Configuration	Login Fail, IP Changed, Password Changed, Firmware Upgrade, SSL Certificate Import, Configuration Import/Export
Modbus TCP	The Modbus TCP connection is connected or disconnected

Local Log Settings	Description
Enable log capacity warning (%)	When the log amount exceeds the warning percentage, it will trigger an event to SNMP Trap or Email.
Warning by	SNMP Trap Email
Event log oversize action	Overwrites the oldest event log Stops recording event log

Syslog Settings	Description
Syslog server IP	IP address of a server which will record the log data.
Syslog server port	514

System Management—Auto Warning Settings

Auto Warning is triggered by different events. When a checked trigger event occurs, the MGate can send email alerts, SNMP Trap messages, or open/close the circuit of the relay output and trigger the Fault LED to start blinking. To enable an email alert, configure the email address on the **E-mail Alert** page. Likewise, to enable SNMP Trap alerts, configure SNMP trap server on the **SNMP Trap** page.

Auto Warning Settings

System Event			
Cold start	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	
Warm start	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	
Power input failure	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	Relay <input type="checkbox"/>
Ethernet 1 link down	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	Relay <input type="checkbox"/>
Ethernet 2 link down	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	Relay <input type="checkbox"/>
Config Event			
Console login failed	Mail <input type="checkbox"/>	Trap <input type="checkbox"/>	
IP changed	Mail <input type="checkbox"/>		
Password changed	Mail <input type="checkbox"/>		

System Management—Email Alert

Along with activating the Mail function from events on the **Auto Warning Settings** page, the Email alert should be set up.

Email Alert

Mail Settings	
Mail server (SMTP)	<input type="text"/>
<input type="checkbox"/> My server requires authentication	
Username	<input type="text"/>
Password	<input type="password"/>
From e-mail address	<input type="text"/>
To e-mail address 1	<input type="text"/>
To e-mail address 2	<input type="text"/>
To e-mail address 3	<input type="text"/>
To e-mail address 4	<input type="text"/>

Parameters	Description
Mail server (SMTP)	The mail server’s domain name or IP address.
User name	This field is for your mail server’s user name, if required.
Password	This field is for your mail server’s password, if required.
From email address	This is the email address from which automatic email warnings will be sent.
To email address 1 to 4	Email addresses to which automatic email warnings will be sent.

System Management—SNMP Trap

Along with activating the **Trap** function from events on the **Auto Warning Settings** page, the SNMP Trap should be set up.

SNMP Trap

SNMP Trap

SNMP trap server IP or domain name

Trap version v1 v2c

Trap community

Parameters	Description
SNMP trap server IP	Use this field to indicate the IP address to use for receiving SNMP traps.
Trap version	Use this field to select the SNMP trap version.
Trap community	Use this field to designate the SNMP trap community.

System Management—SNMP Agent

The SNMP Agent is a network-management tool for collecting and organizing information about managed devices on an IP network and for modifying the information on the device.

SNMP Agent

SNMP Settings

SNMP

Contact

Read community string

Write community string

SNMP agent version

Read-only username

Read-only authentication mode

Read-only password

Read-only privacy mode

Read-only privacy

Read/Write username

Read/Write authentication mode

Read/Write password

Read/Write privacy mode

Read/Write privacy

Parameters	Description
SNMP	To enable the SNMP Agent function, select the Enable option, and enter a community name (e.g., public).
Contact name	The optional SNMP contact information usually includes an emergency contact name and telephone number.
Read community string	This is a text password mechanism that is used to weakly authenticate queries to agents of managed network devices.
Write community string	This is a text password mechanism that is used to weakly authenticate changes to agents of managed network devices.
SNMP agent version	The MGate 5217 supports SNMP V1, V2c, and V3.

Read-only and Read/Write Access Control

While selecting SNMP agent V3, the read-only and read/write access control parameters need to be configured. The following fields allow you to define usernames, passwords, and authentication parameters for two levels of access: read-only and read/write. The name of the field will indicate which level of access it refers to. For example, **Read-only** authentication mode allows you to configure the authentication mode for read-only access, whereas **Read/write** authentication mode allows you to configure the authentication mode for read/write access. For each level of access, you may configure the following:

Parameters	Description
User name	Use this optional field to identify the user name for the specified level of access.
Authentication mode	Use this field to select MD5 or SHA as the method of password encryption for the specified level of access, or to disable authentication.
Privacy mode	Use this field to enable or disable DES_CBC data encryption for the specified level of access.
Password	Use this field to set the password for the specified level of access.
Privacy	Use this field to define the encryption key for the specified level of access.

System Management—LLDP Settings

The Link Layer Discovery Protocol (LLDP) standardizes the method that devices on a network use to periodically send information on their configuration and status. This self-identification method keeps all LLDP devices on a network informed of each other's status and configuration. You can use SNMP protocol to then send the LLDP information on the network devices to Moxa's MXview to create auto network topology and for network visualization.

The MGate web interface lets you enable or disable LLDP, and set the LLDP transmit interval. In addition, you can go to **System Monitoring—System Status—LLDP Table** to view the MGate's neighbor-list, which is created based on the information reported by neighboring devices on the network.

LLDP Settings

Configurations

LLDP ▾

Message transmit interval (5 ~ 16383 sec)

Parameters	Values	Description
Message transmit interval	5-16383 secs (Default:30 secs)	MGate will send information on the configuration and status of devices in a network at regular intervals based on the value configured here.

System Management—Certificate

For the MGate self-signed certificate:

When we encounter the valid date of the certificate expired, we can regenerate the “MGate self-signed” certificate through the following steps.

Step1: Users should delete the SSL certificate file originated from the MGate device.

Step2: Then, enable the NTP server by setting up the time zone and local time.

Step3: After restarting the device, the “MGate self-signed” certificate will be regenerated with the updated valid time.

For importing the third-party trusted SSL certificate:

By importing the third-party trusted SSL certificate, the security level can be enhanced. A snapshot of the GUI for the web console is shown below. To generate the SSL certificate through the third party, here are the steps:

Step1: Create a certification authority (Root CA), such as Microsoft AD Certificate Service (<https://mizitechinfo.wordpress.com/2014/07/19/step-by-step-installing-certificate-authority-on-windows-server-2012-r2/>)

Step 2: Find a tool to issue a “Certificate Signing Requests” file, where you can find it from third-party CA companies, such as DigiCert (<https://www.digicert.com/easy-csr/openssl.htm>).

Step3: Submit it to a public certification authority for signing the certificate.

Step4. Import the certificate to the MGate Series. Please note that the MGate Series only accepts “xxxx.pem” format.

NOTE The maximum key length of the MGate devices supports 2,048 bits.

Some well-known third-party CA (Certificate Authority) companies are listed below for your reference: (https://en.wikipedia.org/wiki/Certificate_authority):

IdenTrust (<https://www.identrust.com/>)

DigiCert (<https://www.digicert.com/>)

Comodo Cybersecurity (<https://www.comodo.com/>)

GoDaddy (<https://www.godaddy.com/>)

Verisign (<https://www.verisign.com/>)

Certificate

Certificate Settings	
Issued to	10.144.8.226
Issued by	10.144.8.226
Valid	from 2000/3/4 to 2020/3/4
Select SSL certificate file	<input type="button" value="Choose File"/> No file chosen <input type="button" value="Import"/>
Delete SSL certificate file	<input type="button" value="Delete"/>

System Management—Misc. Settings

This page includes console settings, password and relay output.

System Management—Misc. Settings—Console Settings

Console Settings

Configurations

HTTP console	Enable ▾
HTTPS console	Enable ▾
Telnet console	Disable ▾
Reset button	Always Enable ▾
MOXA command	Enable ▾
Sensitive data encryption	MD5/AES128 ▾
Accept arbitrary host header	Disable ▾

Session Settings

Maximum login user for HTTP+HTTPS	<input type="text" value="5"/> (1 ~ 10)
Auto logout timeout	<input type="text" value="600"/> (60 ~ 3600 sec)

Submit

Configuration	Value	Description
HTTP/HTTPS	Enable/Disable	This setting is to enable/disable the web console. For security reasons, users can only enable the HTTPS or just disable all settings.
Telnet console	Enable/Disable	Enable or disable telnet console service.
Reset button	Disable after 60 sec., Always enable	The MGate provides the reset button to clear the password or load factory default settings. But for security reasons, users can disable this function. In disabled mode, the MGate will still enable this function within 60 seconds after boot-up, just in case users really need to reset this function.
MOXA command	Enable/Disable	Enable or disable the DSU/MXStudio/MCC tool service.
Sensitive data encryption	MD5/AES128 SHA256/AES256	When you enable the Moxa command, use the selected algorithm to encrypt sensitive data.
Accept arbitrary host header	Enable/Disable	If a web service accepts a connection using arbitrary HTTP Host headers, attackers may use DNS rebinding to bypass any IP or firewall-based access restrictions that may be in place, by proxying through their target's browser. The website may be vulnerable to HTTP Host header attacks by enabling this function. Therefore, the default setting is disabled.

Session Settings	Value	Description
Maximum Login User for HTTP+HTTPS	1 to 10	
Auto Logout Setting	60 to 3600 sec.	Sets the auto logout time period.

System Management—Misc. Settings—Notification Message

Notification Message

Notification Message

Login message

0 character/Maximum 240 character

Login authentication failure message

The account or password you entered is incorrect.
(Your account will be temporarily locked if excessive tried.)

111 character/Maximum 240 character

Users can input a message for Login or for Login authentication failure message.

System Management—Misc. Settings—Account Management

Account Management

Add Account Settings

+ Add
✎ Edit
🗑 Delete

Account Name	Group
admin	admin
user	user

Submit

Parameters	Value	Description
Account	admin, user	Users can modify the password for different accounts. MGate provides two different level accounts: admin and user . Admin account can access and modify all the settings through the web console. User account can only view the setting and can't change anything.

System Management—Maintenance—Firmware Upgrade

Firmware updates for the MGate 5217 are located at www.moxa.com. After you have downloaded the new firmware onto your PC, you can use the web console to write it onto your MGate 5217. Select the desired unit from the list in the web console and click **Submit** to begin the process.

⚙️ Firmware Upgrade

Warning !

Note: Firmware upgrade will discard your unsaved configuration changes and restart the system.

Select firmware file No file chosen



ATTENTION

DO NOT turn off the MGate power before the firmware upgrade process is completed. The MGate will be erasing the old firmware to make room for the new firmware to flash memory. If you power off the MGate and terminate the progress, the flash memory will contain corrupted firmware and the MGate will fail to boot. If this happens, call Moxa RMA services.

System Management—Maintenance—Configuration Import/Export

There are three main reasons for using the Import and Export functions:

- **Applying the same configuration to multiple units.** The Import/Export configuration function is a convenient way to apply the same settings to units located in different sites. You can export the configuration as a file and then import the configuration file onto other units at any time.
- **Backing up configurations for system recovery.** The export function allows you to export configuration files that can be imported onto other gateways to restore malfunctioning systems within minutes.
- **Troubleshooting.** Exported configuration files can help administrators to identify system problems that provide useful information for Moxa’s Technical Service Team when maintenance visits are requested.

⚙️ Configuration Import/Export

Configuration Import

Select configuration file

Keep IP settings

Configuration Export

System Management—Maintenance—Load Factory Default

To clear all the settings on the unit, use the Load Factory Default to reset the unit to its initial factory default values.

⚙️ Load Factory Default

Click on **Submit** to reset all settings, including the console password, to the factory default values. To leave the IP address, netmask and gateway settings unchanged, make sure that **Keep IP settings** is enabled.

Reset to Factory Default

Keep IP settings

Submit



ATTENTION

Load Default will completely reset the configuration of the unit, and all of the parameters you have saved will be discarded. Do not use this function unless you are sure you want to completely reset your unit.

System Monitoring (Troubleshooting)

MGate 5217 provides easy-to-use and useful troubleshooting tools. If a communication issue occurs, we suggest that you first check the **Protocol Status > Diagnostics** page for the status of the protocol. To analyze the Modbus or BACnet/IP traffic in detail, view the network logs available at **Protocol Status > Traffic**.

System Monitoring—System Log

Go to **System Log** to view log information. The desired log categories can be configured in the System Log settings.

⚙️ System Log

System Log

Export

Clear log

Refresh

System Monitoring—Relay State

The MGate gateway includes a built-in relay circuit that is triggered in the event of a power failure or if the Ethernet link is down. You can view the relay status on this page.

Relay State

Auto refresh

Power input failure	N/A	Acknowledge Event
Ethernet 1 link down	N/A	Acknowledge Event
Ethernet 2 link down	N/A	Acknowledge Event

System Monitoring—LLDP Table

You can see LLDP related information, including Port, Neighbor ID, Neighbor Port, Neighbor Port Description, and Neighbor System.

LLDP Table

Port	Neighbor ID	Neighbor Port	Neighbor Port Description	Neighbor System
sw0	ks-hsu01	port-001		KS-HSU01

System Monitoring—Protocol Status—I/O Data View

This page displays the internal memory information for input and output data transfers. View updated values for communication verification here. This function is only available in the web console.

Protocol Status

I/O Data View
BACnet/IP Diagnostics
BACnet/IP Traffic
Modbus RTU/ASCII Diagnostics
Modbus RTU/ASCII Traffic

Auto refresh

Data flow direction: BACnet/IP --> Modbus RTU/ASCII Start address(Hex): Length: Format:

Internal Address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0010h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0020h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0030h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0040h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0050h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0060h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0070h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

System Monitoring—Protocol Status—Diagnostics

The MGate provides status information for BACnet/IP, Modbus RTU/ASCII, and Modbus TCP troubleshooting. Verify data or packet counters to make sure the communications are running smoothly.

Modbus RTU/ASCII Diagnostics

Protocol Status

I/O Data View
BACnet/IP Diagnostics
BACnet/IP Traffic
Modbus RTU/ASCII Diagnostics
Modbus RTU/ASCII Traffic

Auto refresh Select port:

Category	Item	Value
Modbus	Master Mode	RTU Master
	Sent requests	16
	Received valid responses	0
	Received invalid responses	0
	Received CRC/LRC Error	0
	Received exceptions	0
	Timeout	15

Modbus TCP Diagnostics

Protocol Status

I/O Data View			BACnet/IP Diagnostics			BACnet/IP Traffic			Modbus TCP Diagnostics			Modbus TCP Traffic		
<input checked="" type="checkbox"/> Auto refresh														
Category	Item	Value												
Modbus	Mode	Master												
	Number of connections	1												
	Sent requests	83												
	Received valid responses	42												
	Received invalid responses	0												
	Received exceptions	41												
Connections	Timeout	0												
	Slave 1	Status	OK											
	Remote IP:Port	192.168.127.1.502												
	Sent requests	83												
	Received valid responses	42												
	Received invalid responses	0												
	Received exceptions	41												
	Timeout	0												

BACnet/IP Diagnostics

I/O Data View			BACnet/IP Diagnostics			BACnet/IP Traffic			Modbus RTU/ASCII Diagnostics			Modbus RTU/ASCII Traffic		
<input type="checkbox"/> Auto refresh														
Object Information														
Device instance		101404		Object type		Analog Input								
Object type	Object instance	Object name	Value	Fault	Out of service									
Analog Input	0	Voltage	107.213455	false	false									
Analog Input	1	Frequency	60.02142	false	false									

System Monitoring—Protocol Status—Traffic

Modbus RTU/ASCII/TCP Traffic

For troubleshooting or management purposes, you can monitor the Modbus RTU/ASCII/TCP data passing through the MGate 5217 on the network. Rather than simply echoing the data, Traffic features the data in an intelligent, easy-to-understand format with clearly designated fields, including type, destination, contents, and more. Moreover, the complete log can be exported to a file for later analysis.

I/O Data View			BACnet/IP Diagnostics			BACnet/IP Traffic			Modbus TCP Diagnostics			Modbus TCP Traffic		
<input type="checkbox"/> Auto scroll														
Start			Stop			Export			Ready to capture.					
No.	Time	Routing	Dst	Function	Data									
1	0.010	MGate -> 192.168.127.1:502	1	1	03 17 00 00 00 06 01 01 00 00 00 01									
2	0.020	MGate <- 192.168.127.1:502	1	1	03 17 00 00 00 04 01 01 01 00 00									
3	0.030	MGate -> 192.168.127.1:502	1	1	03 18 00 00 00 06 01 01 00 00 00 01									
4	0.040	MGate <- 192.168.127.1:502	1	1	03 18 00 00 00 04 01 01 01 00 00									
5	0.060	MGate -> 192.168.127.1:502	1	1	03 19 00 00 00 06 01 01 00 00 00 01									
6	0.070	MGate <- 192.168.127.1:502	1	1	03 19 00 00 00 04 01 01 01 00 00									
7	1.010	MGate -> 192.168.127.1:502	1	1	03 1A 00 00 00 06 01 01 00 00 00 01									
8	1.020	MGate <- 192.168.127.1:502	1	1	03 1A 00 00 00 04 01 01 01 00 00									
9	1.030	MGate -> 192.168.127.1:502	1	1	03 1B 00 00 00 06 01 01 00 00 00 01									
10	1.040	MGate <- 192.168.127.1:502	1	1	03 1B 00 00 00 04 01 01 01 00 00									
11	1.060	MGate -> 192.168.127.1:502	1	1	03 1C 00 00 00 06 01 01 00 00 00 01									
12	1.070	MGate <- 192.168.127.1:502	1	1	03 1C 00 00 00 04 01 01 01 00 00									
13	2.010	MGate -> 192.168.127.1:502	1	1	03 1D 00 00 00 06 01 01 00 00 00 01									
14	2.020	MGate <- 192.168.127.1:502	1	1	03 1D 00 00 00 04 01 01 01 00 00									
15	2.030	MGate -> 192.168.127.1:502	1	1	03 1E 00 00 00 06 01 01 00 00 00 01									
16	2.045	MGate <- 192.168.127.1:502	1	1	03 1E 00 00 00 04 01 01 01 00 00									
17	2.060	MGate -> 192.168.127.1:502	1	1	03 1F 00 00 00 06 01 01 00 00 00 01									
18	2.070	MGate <- 192.168.127.1:502	1	1	03 1F 00 00 00 04 01 01 01 00 00									

BACnet/IP Traffic

You can monitor the BACnet/IP data passing through the MGate 5217 on the network. The completed logs can be saved to TXT file or PCAP file for later analysis.

I/O Data View
BACnet/IP Diagnostics
BACnet/IP Traffic
Modbus TCP Diagnostics
Modbus TCP Traffic

Auto scroll

Start
Stop
Export TXT File
Export PCAP File
Ready to capture.

No.	Time	Routing	Data
1	30.140	MGate <- 192.168.127.1:55293	81 0B 00 0C 01 20 FF FF 00 FF 10 08
2	30.140	MGate -> 192.168.127.255:47808	81 0B 00 19 01 20 FF FF 00 FF 10 00 C4 02 00 01 94 22 05 C4 91 03 22 04 48
3	30.140	MGate -> 192.168.127.255:47808	81 0B 00 22 01 28 FF FF 00 03 E8 06 C0 A8 7F FE 00 01 FF 10 00 C4 02 01 8C 1C 22 05 C4 91 03 22 04 48
4	31.140	MGate <- 192.168.127.1:55293	81 0B 00 0C 01 20 FF FF 00 FF 10 08
5	31.140	MGate -> 192.168.127.255:47808	81 0B 00 19 01 20 FF FF 00 FF 10 00 C4 02 00 01 94 22 05 C4 91 03 22 04 48
6	31.140	MGate -> 192.168.127.255:47808	81 0B 00 22 01 28 FF FF 00 03 E8 06 C0 A8 7F FE 00 01 FF 10 00 C4 02 01 8C 1C 22 05 C4 91 03 22 04 48
7	31.425	MGate <- 192.168.127.1:55293	81 0A 00 1B 01 24 03 E8 06 C0 A8 7F FE 00 01 FF 02 75 00 0C 0C 02 01 8C 1C 19 4C
8	31.425	MGate -> 192.168.127.1:55293	81 0A 00 2F 01 08 03 E8 06 C0 A8 7F FE 00 01 30 00 0C 0C 02 01 8C 1C 19 4C 3E C4 02 01 8C 1C C4 00 C0 00 00 C4 00 C0 00 01 C4 00 C0 00 02 3F
9	31.435	MGate <- 192.168.127.1:55293	81 0A 00 1B 01 24 03 E8 06 C0 A8 7F FE 00 01 FF 02 75 01 0C 0C 02 01 8C 1C 19 4D
10	31.435	MGate -> 192.168.127.1:55293	81 0A 00 25 01 08 03 E8 06 C0 A8 7F FE 00 01 30 01 0C 0C 02 01 8C 1C 19 4D 3E 75 08 00 44 65 76 69 63 65 31 3F
11	31.440	MGate <- 192.168.127.1:55293	81 0A 00 1B 01 24 03 E8 06 C0 A8 7F FE 00 01 FF 02 75 02 0C 0C 02 01 8C 1C 19 D1
12	31.440	MGate -> 192.168.127.1:55293	81 0A 00 16 01 08 03 E8 06 C0 A8 7F FE 00 01 50 02 0C 91 02 91 20
13	31.745	MGate <- 192.168.127.1:55293	81 0A 00 11 01 04 02 75 03 0C 0C 02 00 01 94 19 4C
14	31.745	MGate -> 192.168.127.1:55293	81 0A 00 17 01 00 30 03 0C 0C 02 00 01 94 19 4C 3E C4 02 00 01 94 3F
15	31.750	MGate <- 192.168.127.1:55293	81 0A 00 11 01 04 02 75 04 0C 0C 02 00 01 94 19 4D

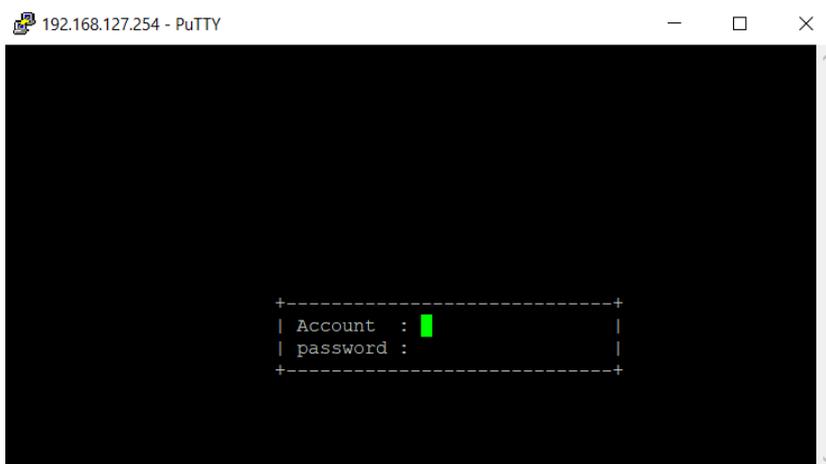
Configuration (Text Mode Console)

The MGate 5217 supports a text-mode console with the Telnet protocol. The user interface is the same in all text mode consoles. Note that the text mode console does not support all configuration items. Some parameters must be configured through the web console.

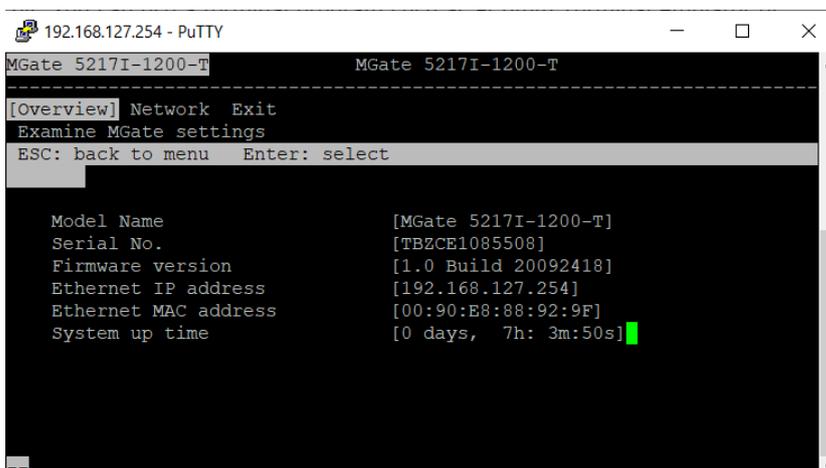
For Telnet, use HyperTerminal or PuTTY to connect to the MGate. Note that the Telnet protocol will transfer the account and password information over the Internet using plain text. If you are concerned about security risks, we suggest that you disable the Telnet function by **Console Settings > Telnet Console > Disable**.

To connect to the MGate Telnet console, load the Telnet program and connect to the MGate IP address.

On the first page, input the account and password. The account supports two types of users: **admin** and **user**. An "admin" account can modify all of the settings, but a "user" account can only review the settings. A "user" account cannot modify the configuration. The default password for **admin** is **moxa**.



The text mode console will display the menu driven interface. Users can use arrow key to move the menu bar. To select the option, press the "Enter" key to go next level menu. To go previous level menu, press "Esc" key to quit. If necessary, MGate will need to restart to activate the setting.



Network Management Tool (MXstudio)

This chapter provides an overview of Moxa's MXstudio industrial network management suite.

The following topics are covered in this chapter:

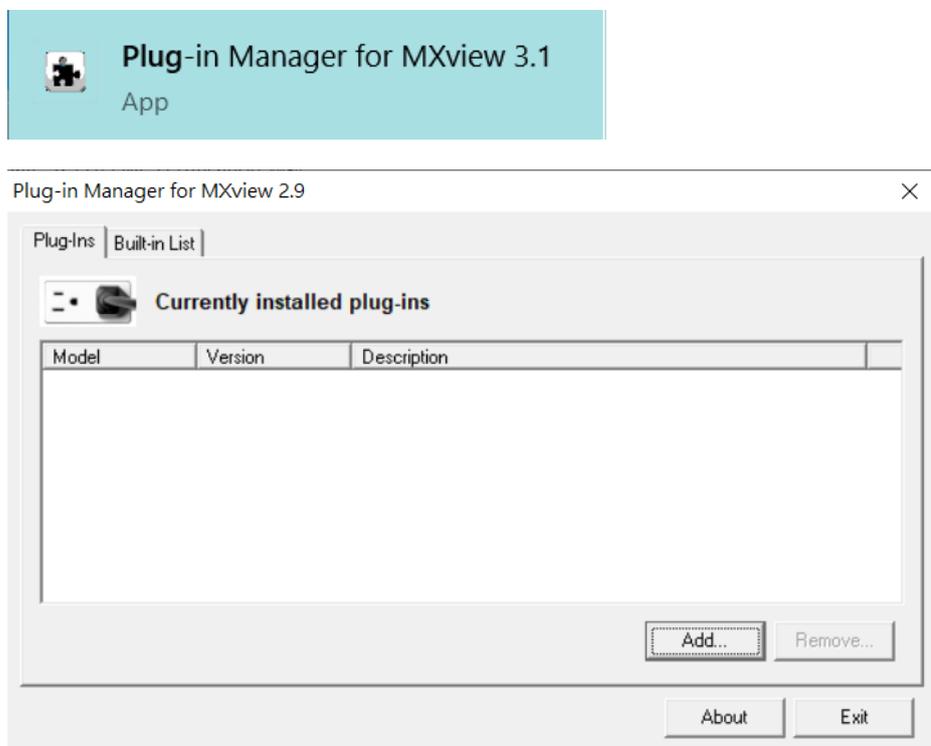
- **MXview**
- **MXconfig**

MXview

The Moxa MXview network management software gives you a convenient graphical representation of your Ethernet network and allows you to configure, monitor, and diagnose Moxa networking devices. MXview provides an integrated management platform that can manage the Moxa MGate series of products as well as Ethernet switches and wireless APs, and SNMP-enabled and ICMP-enabled devices installed on subnets. MXview includes an integrated MIB complier that supports any third-party MIB. It also allows you to monitor third-party OIDs and Traps. Network and Trap components that have been located by MXview can be managed via web browsers from both local and remote sites—anytime, anywhere.

Additionally, the Moxa MXview supports Security View function to follow Moxa's security guidelines, which are based on current IEC 62443 component-level recommendations. Security View checks the security level of Moxa's network devices, including MGate 5217 Series.

Before adding the MGate 5217 devices to the MXview utility, you must add the plug-in package to MXview via Plug-in Manager. The Plug-in Manager is automatically installed when setting up MXview. You can download the plug-in package in the product page. Please execute **Plug-in Manager** and **add** the plug-in package.



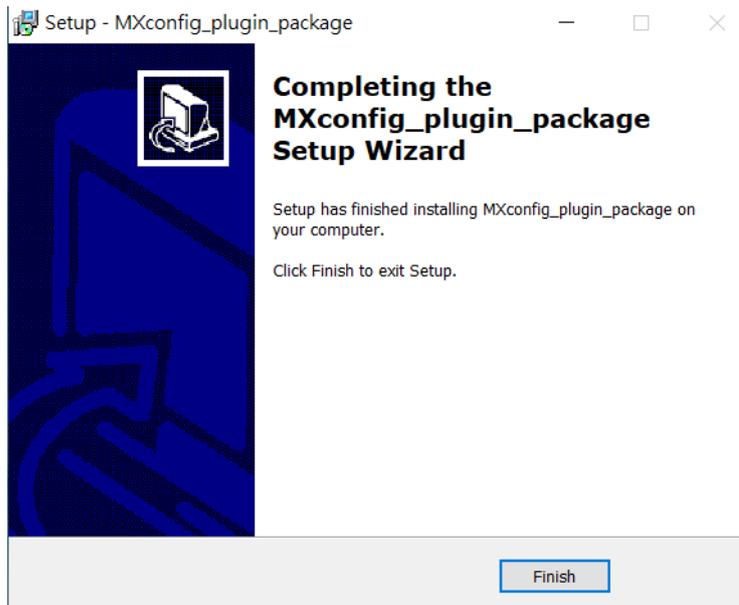
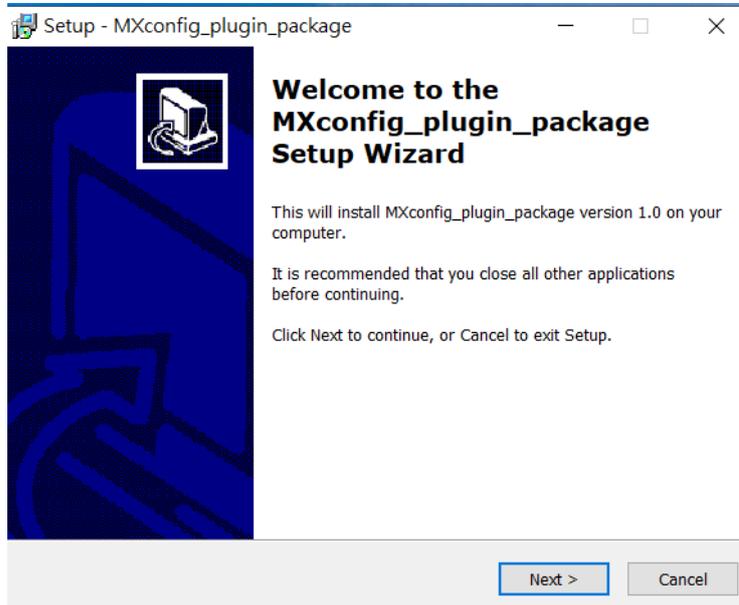
MXconfig

Moxa's MXconfig is a comprehensive Windows-based utility that is used to install, configure, and maintain multiple Moxa devices in industrial networks. This suite of useful tools helps users set the IP addresses of multiple devices with one click, configure the redundant protocols and VLAN settings, modify multiple network configurations of multiple Moxa devices, upload firmware to multiple devices, export/import configuration files, copy configuration settings across devices, easily link to web and Telnet consoles, and test device connectivity. MXconfig gives device installers and control engineers a powerful and easy way to mass configure devices, and effectively reduces the setup and maintenance cost.

Through MXconfig, users can access the MGate 5217 devices and take advantage of additional functions, such as searching for the MGate 5217 devices, setting network configurations, upgrading firmware, and importing/exporting configurations.

Before configuring the MGate 5217 devices via MXconfig utility, you must add the plug-in package to MXconfig. You can download the plug-in package in the product page and execute plug-in package with just a few clicks.

MXconfig_plugin_package_setup_Ver1.0_Build_20090815	9/8/2020 3:53 PM	Application	1,290 KB
Version	9/8/2020 3:51 PM	Text Document	3 KB



For more detailed information regarding MXview/MXconfig, download the user's manual from Moxa's website at <http://www.moxa.com>

Modbus Configuration Import/Export

The MGate 5217 provides **Modbus Configuration Import/Export** feature. On a large scale, you may connect lots of Modbus devices, which have to configure lots of Modbus commands to get data. The MGate provides the **Master Configuration Import/Export** feature, which help you easily edit massive Modbus commands through Excel to save configuration time. To get the template, just click **Export** to download the comma-separated values (**CSV**) file on your computer.

NOTE In order to have an overview of the template, we strongly suggest that you create some Modbus commands in the web console before downloading it.

When you are done editing CSV file, the well-configured file can **import** to the MGate. Then, all the Modbus settings will be effective if we fill in the correct format.

Modbus RTU/ASCII Master Settings

Master Configuration Import/Export

Select master configuration file (.csv) Choose File No file chosen

Import
Export

Below shows the way to configure CSV file, which includes four parts:

1. **[mode_selection]**: configures the Modbus type (only for Modbus RTU/ASCII)
2. **[master_parameters]**: configures Modbus master/client parameters
3. **[device_parameters]**: configures connected Modbus device parameters
4. **[command_parameters]**: configures Modbus device's commands with BACnet object parameters

#modeType [mode_selection]					
RTU					
#portIndex [master_parameters]	initDelay	maxRetry	respTout	interFrameDelay	interCharDelay
	1	0	3	1000	0
	2	0	3	1000	0
#devIndex [device_parameters]	portIndex	devSlaveId	devName	devInactiveTime	
	1	1	1 Port1_Device1	0	
#cmdIndex [command_parameters]	cmdEnable	cmdName	cmdDevIndex	cmdDataFormat	cmdFunc
	1 Enable	Command1		1 boolean	1 Cyclic

[mode_selection]

Parameters	Value	Description	Remark
modeType	RTU ASCII	Selects the Modbus RTU or Modbus ASCII to communicate with Modbus slave device	

[master_parameters]

Parameters	Value	Description	Remark
portIndex	1 2	Indicates serial port 1 and serial port 2 respectively	

Parameters	Value	Description	Remark
initDelay	0 to 30000	Some Modbus servers/slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial boot-up. After booting up, you can force the MGate to wait before sending the first request with the Initial Delay setting.	Suggested value: 0
maxRetry	0 to 5	This is used to configure how many times the MGate will try to communicate with the Modbus server/slave when timeout occurs	Suggested value: 3
respTout	10 to 120000	The time taken by a slave device to respond to a request is defined by the device manufacturer, based on the Modbus standard. A Modbus master can be configured to wait a certain amount of time for a server/slave's response. If no response is received within the specified time, the master will disregard the request and continue operation. This allows the Modbus system to continue the operation even if a slave device is disconnected or faulty. On the MGate 5217, the Response timeout field is used to configure how long the gateway will wait for a response from a Modbus server/slave. Refer to your device manufacturer's documentation to manually set the response timeout	Suggested value: 1000
interFrameDelay	10 to 500	Use this function to determine the timeout interval between characters for Modbus devices that cannot receive Rx signals within an expected time interval. If the response is timed out, all received data will be discarded. The MGate 5217 will automatically determine the timeout interval if the timeout value is set to 0.	Only for RTU mode Suggested value: 0
interCharDelay	10 to 500	The users can determine the time delay to transmit the data frame received from the slave device to the upstream. The MGate 5217 will automatically determine the time interval if it is set to 0.	Only for RTU mode Suggested value: 0

[device_parameters]

Parameters	Value	Description	Remark
devIndex	1 to 31 1 to 32	Indicates the Modbus device index that is used to bind to Modbus commands. The parameter will be used in [command_parameters].	Up to 31 devices per serial port Up to 32 devices for Modbus TCP
portIndex	1 2	Indicates the device is under serial port 1 or serial port 2	
devSlaveId	1 to 255	Indicates Modbus slave ID	Ensures that the Modbus slave ID is unique under the same serial port.

Parameters	Value	Description	Remark
devName	(an alphanumeric string)	Enter a name to help you to identify the Modbus device	Up to 39 characters
devIpAddr	(other 32-bit number)	Modbus TCP server device's IP address	
devPort	1 to 65535	Modbus TCP server's port number	
devInactiveTime	0 to 28800	When timeout occurs in the Modbus slave device, the MGate's request commands for the Modbus slave device will be ignored during the configuration time.	0: Disable

[command_parameters]

Parameters	Value	Description	Remark
cmdIndex	1 to 1200	Indicats the index of this Modbus command	the index must increase in order
cmdEnable	Enable	Enable: the command is active	
cmdName	(an alphanumeric string)	You can enter a name to help you identify the Modbus command	Up to 39 characters
cmdDevIndex	1 to 32	This command belongs to the devIndex that is configured in [device_parameters]	The selected devIndex in [device_parameters] must exist
cmdDataFormat	boolean uint16 int16 uint32 int32 float32	boolean: 0 or 1. uint16: Unsigned integer with 16 bits. int16: Signed integer with 16 bits. uint32: Unsigned integer with 32 bits. int32: Signed integer with 32 bits. float32: Float type with 32 bits.	
cmdFunc	1 2 3 4 5 6 15 16	1: Read coils 2: Read discrete inputs 3: Read holding registers 4: Read input registers 5: Write single coil 6: Write single register 15: Write multiple coils 16: Write multiple registers	- If cmdDataFormat=boolean, cmdFunc=1,2,5 - If cmdDataFormat=uint16, int16, cmdFunc=3,4,6 - If cmdDataFormat=uint32, int32, float32, cmdFunc=3,4,16
cmdTrigger	Cyclic	A command is sent cyclically at the interval specified in the poll interval parameter.	- If cmdFunc=1,2,3,4, cmdTrigger=Cyclic
	Data Change	A command is issued when a change in data is detected.	- If cmdFunc=5,6,15,16, cmdTrigger=Cyclic, Data Change
cmdPollinterval	*	Polling intervals are in milliseconds. Since the module sends all requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 100 to 1,200,000 ms.	- If cmdTrigger=Data Change, cmdPollinterval = *
	1 to 1200000		- If cmdTrigger=Cyclic, cmdPollinterval=10 - 1200000
cmdEndianSwap	*		
	None	None: Don't need to swap	

Parameters	Value	Description	Remark
	Byte	Byte: 0x0A, 0x0B, 0x0C, 0x0D become 0x0B, 0x0A, 0x0D, 0x0C.	- If cmdDataFormat=boolean, cmdEndianSwap=*
	Word	Word: 0x0A, 0x0B, 0x0C, 0x0D become 0x0C, 0x0D, 0x0A, 0x0B.	- If cmdDataFormat=uint16, int16, cmdEndianSwap=None, Byte
	Byte and Word	ByteWord: 0x0A, 0x0B, 0x0C, 0x0D become 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord: 1) 0x0A, 0x0B, 0x0C, 0x0D become 0x0B, 0x0A, 0x0D, 0x0C 2) 0x0B, 0x0A, 0x0D, 0x0C become 0x0D, 0x0C, 0x0B, 0x0A	- If cmdDataFormat=uint32, int32, float32, cmdEndianSwap=None, Byte, Word, Byte and Word
cmdReadStartAddr	*	Modbus register address	-If cmdFunc=5,6,15,16, cmdReadStartAddr=*
	0 to 65535		-If cmdFunc=1,2,3,4, cmdReadStartAddr= 0 - 65535
cmdReadQuan	1	Specifying how many quantities to be read	- If cmdDataFormat=boolean, cmdReadQuan=1 - If cmdDataFormat=uint16, int16, cmdReadQuan=1
	2		- If cmdDataFormat=uint32, int32, float32, cmdReadQuan=2
cmdWriteStartAddr	*	Modbus register address.	-If cmdFunc=1,2,3,4 cmdReadStartAddr=*
	0 to 65535		-If cmdFunc=5,6,15,16, cmdReadStartAddr=0 - 65535
cmdWriteQuan	1	Specifying how many quantities to write.	- If cmdDataFormat=boolean, cmdReadQuan=1 - If cmdDataFormat=uint16, int16, cmdReadQuan=1
	2		- If cmdDataFormat=uint32, int32, float32, cmdReadQuan=2
cmdFaultProtType	*	If the MGate’s connection to the BACnet/IP client fails, the gateway will not be able to receive data, but the gateway will continuously send output data to the Modbus TCP server device. To avoid problems in this case, the MGate 5217 can be configured to react in one the following two ways: Keep latest data or clear data to zero.	-If cmdFunc=1,2,3,4, cmdFaultProtType=*
	Keep latest data Clear all data bits to 0		-If cmdFunc=5,6,15,16, cmdFaultProtType= Keep latest data, Clear all data bit to 0

Parameters	Value	Description	Remark
cmdFaultProtTout	*	Defines the communication timeout for the opposite side.	- If cmdFaultProtType=Keep latest data, cmdFaultProtTout=*
	0 to 65535		- If cmdFaultProtType=Clear all data bits to 0, cmdFaultProtTout=0 - 65535
bacnetObjectType	Binary Input	Select the BACnet object type for the configured Modbus command	Binary Input (cmdFunc=1,2,3,4)
	Binary Output		Binary Output (cmdFunc=5,6,15,16)
	Binary Value		Binary Value (cmdFunc=5,6,15,16)
	Analog Input		Analog Input (only when cmdDataFormat≠boolean, cmdFunc=1,2,3,4)
	Analog Output		Analog Output (only when cmdDataFormat≠boolean, cmdFunc=5,6,15,16)
	Analog Value		Analog Value (only when cmdDataFormat≠boolean, cmdFunc=5,6,15,16)
	Multi-state Input		Multi-state Input (only when cmdDataFormat≠boolean, cmdFunc=1,2,3,4)
	Multi-state Output		Multi-state Output (only when cmdDataFormat≠boolean, cmdFunc=5,6,15,16)
	Multi-state Value		Multi-state Value (only when cmdDataFormat≠boolean, cmdFunc=5,6,15,16)
	Integer Value		Integer Value (only when cmdDataFormat≠boolean, cmdFunc=1,2,3,4)
Positive Integer Value	Positive Integer Value (only when cmdDataFormat≠boolean, cmdFunc=1,2,3,4)		

Parameters	Value	Description	Remark
bacnetUnit	*		If bacnetObjectType = Binary Input, Binary Value, Binary Output, Multi-state Input, Multi-state Output, bacnetUnit=* = no-units (95)
	0 to 254 47808 to 47815	While selecting a nonbinary value, the BACnet/IP client sometimes needs to have the value with units to identify the meaning of the value.	The codes of units can be found in the bottom table bacnetUnit=* = no-units (95)
bacnetCovIncrement	*	COV will be triggered when Current Reported Value - Last Reported Value > COV Increment	- if bacnetObjectType=Binary Input, Binary Output bacnetCovIncrement=*
	1 to 10000000000		- If bacnetObjectType=Analog Input, Analog Output, Analog Value, bacnetCovIncrement=1 to 10000000000 (float)
	1 to 2147483647		- If bacnetObjectType=Integer Value, Positive Integer Value, bacnetCovIncrement=1 to 2147483647 (integer)
bacnetRelinquishDefault	*	If there are no commanded values in the priority array, the present value will be changed to relinquish the default	- If bacnetObjectType=Analog Input, Binary Input, bacnetRelinquishDefault=*
	-999999999 to 10000000000		- If bacnetObjectType=Analog Output, Analog Value, bacnetRelinquishDefault=-999999999 to 10000000000 (float)
	0 to1		- If bacnetObjectType=Binary Output, Binary Value, bacnetRelinquishDefault=0 to 1 (integer)
	1to 4294967295		- If bacnetObjectType=Multi-state Output,Multi-state Value, bacnetRelinquishDefault=1 to 4294967295 (integer)
bacnetInstance	0 to 4194302	Enter the instance for this mapped BACnet object	Ensure instance is unique under same object type

Codes for bacnetUnit

millimeters (30),
 meters (31),
 inches (32),
 feet (33),
 watts-per-square-foot (34),
 watts-per-square-meter (35),
 lumens (36),
 luxes (37),
 foot-candles (38),
 kilograms (39),
 pounds-mass (40),
 tons (41),
 kilograms-per-second (42),
 kilograms-per-minute (43),
 kilograms-per-hour (44),
 pounds-mass-per-minute (45),
 pounds-mass-per-hour (46),
 watts (47),
 kilowatts (48),
 megawatts (49),
 btus-per-hour (50),
 horsepower (51),
 tons-refrigeration (52),
 pascals (53),
 kilopascals (54),
 bars (55),
 pounds-force-per-square-inch (56),
 centimeters-of-water (57),
 inches-of-water (58),
 millimeters-of-mercury (59),
 centimeters-of-mercury (60),
 inches-of-mercury (61),
 degrees-celsius (62),
 degrees-kelvin (63),
 degrees-fahrenheit (64),
 degree-days-celsius (65),
 degree-days-fahrenheit (66),
 years (67),
 months (68),
 weeks (69),
 days (70),
 hours (71),
 minutes (72),
 seconds (73),
 meters-per-second (74),
 kilometers-per-hour (75),
 feet-per-second (76),
 feet-per-minute (77),
 miles-per-hour (78),
 cubic-feet (79),
 cubic-meters (80),
 imperial-gallons (81),
 liters (82),
 us-gallons (83),
 cubic-feet-per-minute (84),
 cubic-meters-per-second (85),
 imperial-gallons-per-minute (86),
 liters-per-second (87),
 liters-per-minute (88),
 us-gallons-per-minute (89),
 degrees-angular (90),
 degrees-celsius-per-hour (91),
 degrees-celsius-per-minute (92),
 degrees-fahrenheit-per-hour (93),
 degrees-fahrenheit-per-minute (94),
 no-units (95),
 parts-per-million (96),
 parts-per-billion (97),
 percent (98),
 percent-per-second (99),
 per-minute (100),
 per-second (101),
 psi-per-degree-fahrenheit (102),
 radians (103),
 revolutions-per-minute (104),
 currency1 (105),
 currency2 (106),
 currency3 (107),
 currency4 (108),
 currency5 (109),
 currency6 (110),
 currency7 (111),
 currency8 (112),
 currency9 (113),
 currency10 (114),
 square-inches (115),
 square-centimeters (116),
 btus-per-pound (117),
 centimeters (118),
 pounds-mass-per-second (119),
 delta-degrees-fahrenheit (120),
 delta-degrees-kelvin (121),
 kilohms (122),
 megohms (123),
 millivolts (124),
 kilojoules-per-kilogram (125),
 megajoules (126),
 joules-per-degree-kelvin (127),
 joules-per-kilogram-degree-kelvin (128),
 kilohertz (129),
 megahertz (130),
 per-hour (131),
 milliwatts (132),
 hectopascals (133),
 millibars (134),
 liters-per-hour (136),
 cubic-meters-per-hour (135),
 kilowatt-hours-per-square-meter (137),
 kilowatt-hours-per-square-foot (138),
 megajoules-per-square-meter (139),
 megajoules-per-square-foot (140),
 watts-per-square-meter-degree-kelvin (141),
 cubic-feet-per-second (142),
 percent-obscuracion-per-foot (143),
 percent-obscuracion-per-meter (144),
 milliohms (145),
 megawatt-hours (146),
 kilo-btus (147),
 mega-btus (148),
 kilojoules-per-kilogram-dry-air (149),
 megajoules-per-kilogram-dry-air (150),
 kilojoules-per-degree-kelvin (151),
 megajoules-per-degree-kelvin (152),
 newton (153),
 grams-per-second (154),
 grams-per-minute (155),
 tons-per-hour (156),
 kilo-btus-per-hour (157),
 hundredths-seconds (158),
 milliseconds (159),
 newton-meters (160),
 millimeters-per-second (161),
 millimeters-per-minute (162),
 meters-per-minute (163),
 meters-per-hour (164),
 cubic-meters-per-minute (165),
 meters-per-second-per-second (166),
 amperes-per-meter (167),
 amperes-per-square-meter (168),
 ampere-square-meters (169),
 farads (170),
 henrys (171),
 ohm-meters (172),
 siemens (173),
 siemens-per-meter (174),
 teslas (175),
 volts-per-degree-kelvin (176),
 volts-per-meter (177),
 webers (178),
 candelas (179),
 candelas-per-square-meter (180),
 degrees-kelvin-per-hour (181),
 degrees-kelvin-per-minute (182),
 joule-seconds (183),
 radians-per-second (184),

square-meters-per-newton (185), ohm-meter-squared-per-meter
 kilograms-per-cubic-meter (186), (237),
 newton-seconds (187), ampere-seconds (238),
 newtons-per-meter (188), volt-ampere-hours (239),
 watts-per-meter-per-degree-kelvin (189), kilovolt-ampere-hours (240),
 (189), megavolt-ampere-hours (241),
 micro-siemens (190), volt-ampere-hours-reactive (242),
 cubic-feet-per-hour (191), kilovolt-ampere-hours-reactive
 us-gallons-per-hour (192), (243),
 kilometers (193), megavolt-ampere-hours-reactive
 micrometers (194), (244),
 grams (195), volt-square-hours (245),
 milligrams (196), ampere-square-hours (246),
 milliliters (197), joule-per-hours (247),
 milliliters-per-second (198), cubic-feet-per-day (248),
 decibels (199), cubic-meters-per-day (249),
 decibels-millivolt (200), watt-hours-per-cubic-meter
 decibels-volt (201), (250),
 millisiemens (202), joules-per-cubic-meter (251),
 watt-hours-reactive (203), mole-percent (252),
 kilowatt-hours-reactive (204), pascal-seconds (253),
 megawatt-hours-reactive (205), million-standard-cubic-feet-per-
 millimeters-of-water (206), minute (254),
 per-mille (207), standard-cubic-feet-per-day
 grams-per-gram (208), (47808),
 kilograms-per-kilogram (209), million-standard-cubic-feet-per-
 grams-per-kilogram (210), day (47809),
 milligrams-per-gram (211), thousand-cubic-feet-per-day
 milligrams-per-kilogram (212), (47810),
 grams-per-milliliter (213), thousand-standard-cubic-feet-
 grams-per-liter (214), per-day (47811),
 milligrams-per-liter (215), pounds-mass-per-day (47812),
 micrograms-per-liter (216), millirems (47814),
 grams-per-cubic-meter (217), millirems-per-hour (47815),
 milligrams-per-cubic-meter (218),
 micrograms-per-cubic-meter
 (219),
 nanograms-per-cubic-meter (220),
 grams-per-cubic-centimeter (221),
 becquerels (222),
 kilobecquerels (223),
 megabecquerels (224),
 gray (225),
 milligray (226),
 microgray (227),
 sieverts (228),
 millisieverts (229),
 microsieverts (230),
 microsieverts-per-hour (231),
 decibels-a (232),
 nephelometric-turbidity-unit (233),
 pH (234),
 grams-per-square-meter (235),
 minutes-per-degree-kelvin (236),

A

SNMP Agents with MIB II and RS-232-Like Groups

The MGate 5217 has built-in Simple Network Management Protocol (SNMP) agent software that supports SNMP Trap, RFC1317 and RS-232-like groups, and RFC 1213 MIB-II. The following topics are covered in this appendix:

The following topics are covered in this appendix:

- ❑ **RFC1213 MIB-II Supported SNMP Variable**
- ❑ **RFC1317 RS-232-Like Groups**

RFC1213 MIB-II Supported SNMP Variable

System MIB	Interfaces MIB	IP MIB	ICMP MIB
sysDescr	ifNumber	ipForwarding	icmpInMsgs
sysObjectID	ifIndex	ipDefaultTTL	icmpInErrors
sysUpTime	ifDescr	ipInReceives	icmpInDestUnreachs
sysContact	ifType	ipInHdrErrors	icmpInTimeExcds
sysName	ifMtu	ipInAddrErrors	icmpInParmProbs
sysLocation	ifSpeed	ipForwDatagrams	icmpInSrcQuenchs
sysServices	ifPhysAddress	ipInUnknownProtos	icmpInRedirects
	ifAdminStatus	ipInDiscards	icmpInEchos
	ifOperStatus	ipInDelivers	icmpInEchoReps
	ifLastChange	ipOutRequests	icmpInTimestamps
	ifInOctets	ipOutDiscards	icmpTimestampReps
	ifInUcastPkts	ipOutNoRoutes	icmpInAddrMasks
	ifInNUcastPkts	ipReasmTimeout	icmpInAddrMaskReps
	ifInDiscards	ipReasmReqds	icmpOutMsgs
	ifInErrors	ipReasmOKs	icmpOutErrors
	ifInUnknownProtos	ipReasmFails	icmpOutDestUnreachs
	ifOutOctets	ipFragOKs	icmpOutTimeExcds
	ifOutUcastPkts	ipFragFails	icmpOutParmProbs
	ifOutNUcastPkts	ipFragCreates	icmpOutSrcQuenchs
	ifOutDiscards	ipAdEntAddr	icmpOutRedirects
	ifOutErrors	ipAdEntIfIndex	icmpOutEchos
	ifOutQLen	ipAdEntNetMask	icmpOutEchoReps
	ifSpecific	ipAdEntBcastAddr	icmpOutTimestamps
		ipAdEntReasmMaxSize	icmpOutTimestampReps
		ipRouteDest	icmpOutAddrMasks
		ipRouteIfIndex	icmpOutAddrMaskReps
		ipRouteMetric1	
		ipRouteMetric2	
		ipRouteMetric3	
		ipRouteMetric4	
		ipRouteNextHop	
		ipRouteType	
		ipRouteProto	
		ipRouteAge	
		ipRouteMask	
		ipRouteMetric5	
		ipRouteInfo	
		ipNetToMediaIfIndex	
		ipNetToMediaPhysAddress	
		ipNetToMediaNetAddress	
		ipNetToMediaType	
		ipRoutingDiscards	

Address Translation MIB	TCP MIB	UDP MIB	SNMP MIB
atIfIndex	tcpRtoAlgorithm	udpInDatagrams	snmpInPkts
atPhysAddress	tcpRtoMin	udpNoPorts	snmpOutPkts
atNetAddress	tcpRtoMax	udpInErrors	snmpInBadVersions
	tcpMaxConn	udpOutDatagrams	snmpInBadCommunityNames
	tcpActiveOpens	udpLocalAddress	snmpInBadCommunityUses
	tcpPassiveOpens	udpLocalPort	snmpInASNParseErrs
	tcpAttemptFails		snmpInTooBigs
	tcpEstabResets		snmpInNoSuchNames
	tcpCurrEstab		snmpInBadValues
	tcpInSegs		snmpInReadOnlys
	tcpOutSegs		snmpInGenErrs
	tcpRetransSegs		snmpInTotalReqVars
	tcpConnState		snmpInTotalSetVars
	tcpConnLocalAddress		snmpInGetRequests
	tcpConnLocalPort		snmpInGetNexts
	tcpConnRemAddress		snmpInSetRequests
	tcpConnRemPort		snmpInGetResponses
	tcpInErrs		snmpInTraps
	tcpOutRsts		snmpOutTooBigs
			snmpOutNoSuchNames
			snmpOutBadValues
			snmpOutGenErrs
			snmpOutGetRequests
			snmpOutGetNexts
			snmpOutSetRequests
			snmpOutGetResponses
			snmpOutTraps
			snmpEnableAuthenTraps
			snmpSilentDrops
			snmpProxyDrops

RFC1317 RS-232-Like Groups

RS-232 MIB	Async Port MIB
rs232Number	rs232AsyncPortIndex
rs232PortIndex	rs232AsyncPortBits
rs232PortType	rs232AsyncPortStopBits
rs232PortInSigNumber	rs232AsyncPortParity
rs232PortOutSigNumber	
rs232PortInSpeed	
rs232PortOutSpeed	

Input Signal MIB	Output Signal MIB
rs232InSigPortIndex	rs232OutSigPortIndex
rs232InSigName	rs232OutSigName
rs232InSigState	rs232OutSigState

Status Monitoring

If a Modbus slave device fails or a cable comes loose, then gateways that are in agent mode will not be able to receive up-to-date data from the Modbus slave device. The out-of-date data will be stored in the gateway's memory and then retrieved by the BACnet/IP client system, which will not be aware that the Modbus slave device is not providing up-to-date data. The MGate 5217 supports the Status Monitoring function, which provides a warning mechanism to report the list of slave devices that are still active.

In the MGate 5217's design, each Modbus command will be mapped to a BACnet object. Once the MGate 5217 detects a Modbus command timeout, the status-flags in the BACnet object will turn from "false" to "true", which indicates a fault status. You can see how it works in the figures below.

BACnet status-flags show "true" when there is a Modbus command timeout

object-identifier	(Analog Input, 0)
object-name	Command3
object-type	Analog Input
present-value	12.000000
status-flags	{false,true,false,false}
event-state	normal
out-of-service	0
units	no-units
description	Command3

BACnet status-flags show "false" when Modbus command is exchanging data

Property	Value
object-identifier	(Analog Input, 0)
object-name	Command3
object-type	Analog Input
present-value	18.000000
status-flags	{false,false,false,false}
event-state	normal
out-of-service	0
units	no-units
description	Command3