



CHAPTER

2

SUMMARY OF MODBUS MODES

IN THIS CHAPTER...

Introduction2-2

Mode 1: Transparent, RTU Master mode:
Modbus TCP Client/Master Device to Gateway to Modbus RTU Slave Devices2-3

Mode 2: Agent, RTU Master mode:
Modbus TCP Client/Master Device to Gateway Memory. Gateway Talks Directly to Modbus RTU Slave Devices.2-4

Mode 3: Transparent, RTU Slave mode:
Modbus RTU Master Device to Gateway to Modbus TCP Server/Slave Devices2-6

Mode 4: Agent, RTU Slave mode:
Modbus RTU Master Device to Gateway Memory. Gateway Talks Directly to Modbus TCP Server/ Slave Devices.2-7

INTRODUCTION

As mentioned in the previous chapter, the STRIDE® Modbus Gateway may be configured to operate in four distinct modes:

- Mode 1: Transparent mode, with serial port functioning as a master device
- Mode 2: Agent mode, with serial port functioning as a master device
- Mode 3: Transparent mode, with serial port functioning as a slave device
- Mode 4: Agent mode, with serial port functioning as a slave device

Operation under each of the four modes is discussed in this chapter. For simplicity, the discussion uses RTU protocol for the serial port. The operations would be essentially identical if the serial port used ASCII protocol.

MODE 1: TRANSPARENT, RTU MASTER MODE:

MODBUS TCP CLIENT/MASTER DEVICE TO GATEWAY TO MODBUS RTU SLAVE DEVICES

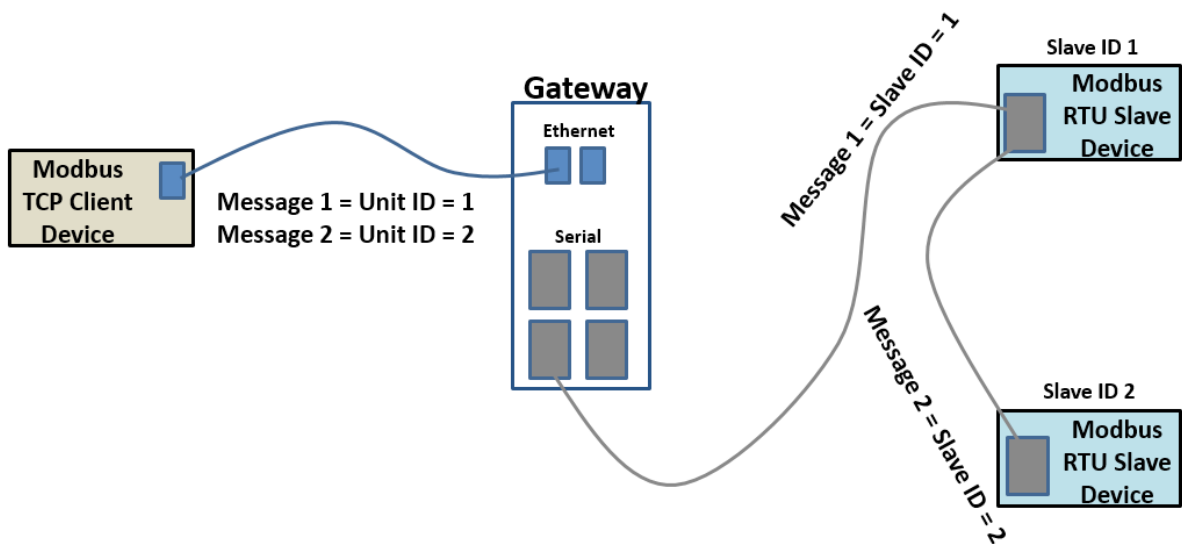
In this mode, the Current Working Mode is set to “Transparent” and the Serial Port Mode is set to “RTU Master”. These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information			
Device Name	SGW-MB1524-T	SN	K10A0004A180100036
Model Type	MB-Gateway	Firmware Version	V3.5.019
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16

- Transparent Mode
- Agent Mode

Operating Settings			
S1	S2	S3	S4
Serial Port Mode	RTU Master		
Filter Enable	<input type="checkbox"/>		
Filter ID Start	1		
Filter ID End	247		
Protocol	TCP		
Gateway Modbus TCP Port	502		

A typical network using the gateway to connect a Modbus TCP client device to multiple Modbus RTU slave devices is illustrated below. The Modbus messages are simply translated in the gateway from Modbus TCP framing to Modbus RTU framing and then sent on to the serial network. Addressing a specific slave device is handled by the Unit Identifier (Slave ID) contained in the Modbus message.



**MODE 2: AGENT, RTU MASTER MODE:
MODBUS TCP CLIENT/MASTER DEVICE TO GATEWAY MEMORY. GATEWAY TALKS DIRECTLY
TO MODBUS RTU SLAVE DEVICES**

In this mode, the Current Working Mode is set to “Agent” and the Serial Port Mode is set to “RTU Master”. These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information			
Device Name	SGW-MB1524-T	SN	K10A0004A180100036
Model Type	MB-Gateway	Firmware Version	V3.5.019
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16

- Transparent Mode
- Agent Mode

Operating Settings	
S1	S2 S3 S4
Serial Port Mode	RTU Master ▾
Filter Enable	<input type="checkbox"/>
Filter ID Start	1
Filter ID End	247
Protocol	TCP ▾ (Note: In Agent mode, you can modify the Modbus port on the 'Gateway Settings' page.)
Gateway Modbus TCP Port	502 (Note: In Agent mode, you can modify the Modbus port on the 'Gateway Settings' page.)

In Agent mode, the gateway must be assigned a Modbus ID, as shown below, since the Modbus TCP Client will query the gateway memory using that Unit ID rather than querying the slave devices directly.

Gateway Settings	
Gateway Modbus ID	220
Protocol	TCP ▾
Gateway Modbus Port	502
Default Timeout(ms)	1000
Inter-packet TX Delay(ms)	100

A list of messages must be created defining the data to be collected from various RTU slave devices connected to the serial port, and the addresses within the gateway at which to store the collected data.

Add Message Delete Message Modify Message

Display 50 per page Refresh Search:

Item	Serial Port	Slave ID	Alias	Function	Data Address	Data Length	Mapping Address Head	Status
1	1	1	Device_Alias	3	0	1	0	●
2	1	2	Device_Alias	3	100	1	1	●

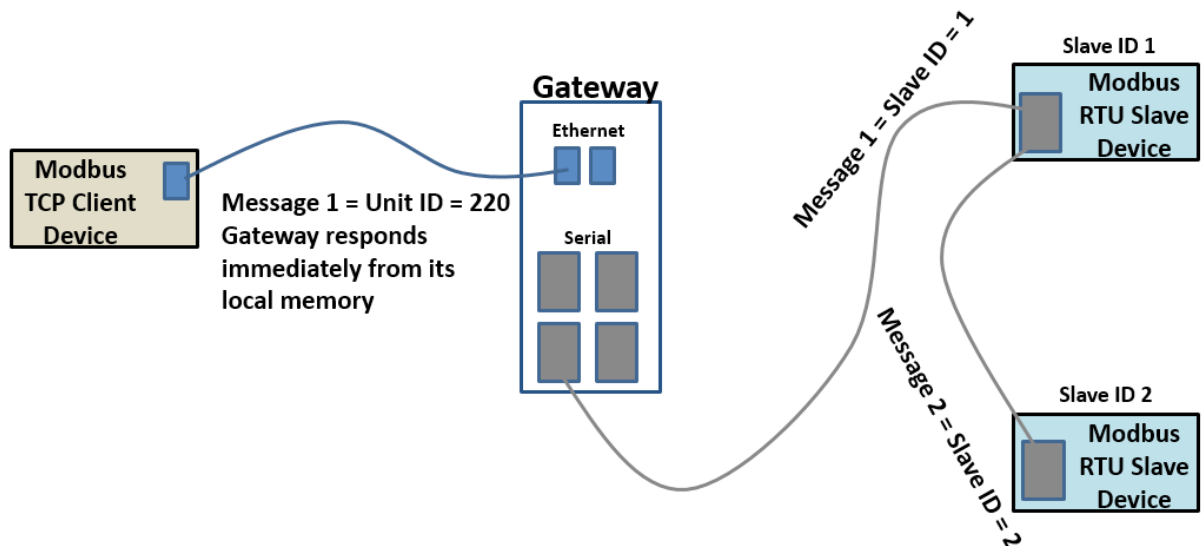
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Refresh to get latest status.

In Agent mode, the Gateway sends messages created by the Slave list to the Modbus RTU slave devices. The response data from these messages are stored in local memory of the Gateway for access by the Modbus TCP Client device. The data is stored in 4 different memory blocks depending upon the Function Code used.

Coils (0x) Data stored from Function Code 1	Inputs (1x) Data stored from Function Code 2	Holding Registers (4x) Data stored from Function Code 3	Input Registers (3x) Data stored from Function Code 4
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The Gateway generates the serial messages from the slave list items. It stores the data from the responses in its local memory that is available to Modbus TCP devices. Modbus TCP client devices query the gateway using its Unit ID, and the gateway responds immediately with its cached data.



NOTE: Modbus writes sent from the Modbus TCP client go across directly to the Modbus RTU slave devices as if the gateway were in Transparent mode. When the gateway is in Agent mode, addresses that devices will use to WRITE data into must be configured in the Message List even though conceptually this is a list of data that is READ from connected devices.

MODE 3: TRANSPARENT, RTU SLAVE MODE:

MODBUS RTU MASTER DEVICE TO GATEWAY TO MODBUS TCP SERVER/SLAVE DEVICES

In this mode, the Current Working Mode is set to “Transparent” and the Serial Port Mode is set to “RTU Slave”. These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

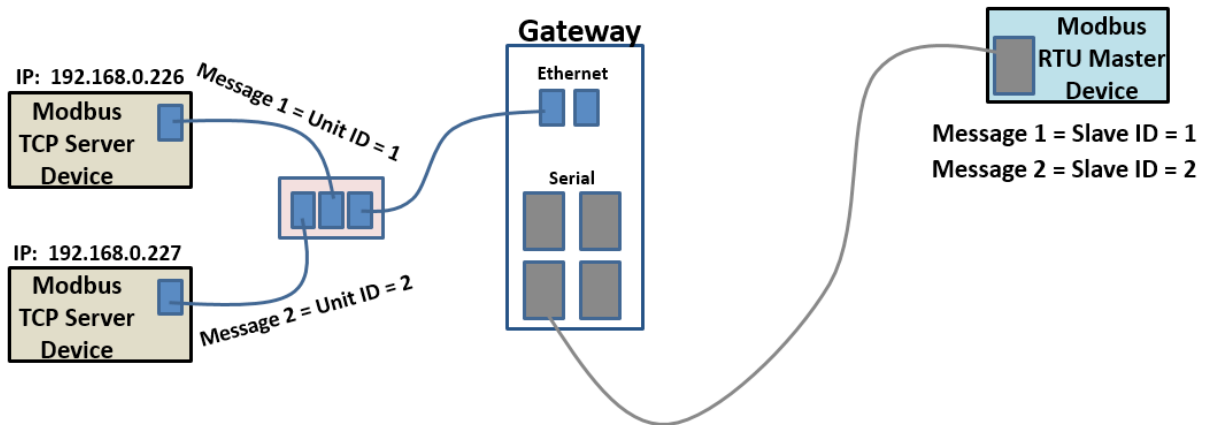
Device Information			
Device Name	SGW-MB1524-T	SN	K10A0004A180100036
Model Type	MB-Gateway	Firmware Version	V3.5.019
IP(E1)	192.168.0.249	MAC(E1)	00:1E:CD:1B:FA:15
IP(E2)	192.168.1.249	MAC(E2)	00:1E:CD:1B:FA:16

- Transparent Mode
- Agent Mode

Operating Settings						
S1		S2		S3		S4
Serial Port Mode	RTU Slave					
Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bind	
1	192.168.0.226	502	TCP	NA	E1	+ -
2	192.168.0.227	502	TCP	NA	E1	+ -

In RTU Slave mode, each TCP server device must be configured in the gateway with an IP address, remote port, and Unit ID (Slave ID). A unique local port is set only when the protocol is UDP.

A typical network using the gateway to connect a Modbus RTU master device to multiple Modbus TCP server devices is illustrated below. The gateway reads the Slave ID from the message of the Modbus RTU master device and does a lookup in the table to find the target IP address. It also places the Slave ID value into the Unit ID field of the Modbus TCP frame.



NOTE: Remember that only one master may be connected to each serial port.

**MODE 4: AGENT, RTU SLAVE MODE:
MODBUS RTU MASTER DEVICE TO GATEWAY MEMORY. GATEWAY TALKS DIRECTLY TO
MODBUS TCP SERVER/SLAVE DEVICES**

In this mode, the Current Working Mode is set to “Agent” and the Serial Port Mode is set to “RTU Slave”. These settings are displayed on the Device Information page and Operating Settings page of the web interface, respectively, as shown below.

Device Information			
Device Name	SGW-MB1524-T	SN	K10A0
Model Type	MB-Gateway	Firmware Version	V3.5.0
IP(E1)	192.168.0.249	MAC(E1)	00:1E:
IP(E2)	192.168.1.249	MAC(E2)	00:1E:

- Transparent Mode
- Agent Mode

Operating Settings						
S1	S2	S3	S4			
Serial Port Mode		RTU Slave ▼				
Slave ID	Remote IP	Remote Port	Protocol	Local Port	Ethernet Port Bind	
1	192.168.0.226	502	TCP ▼	NA	E1 ▼	+ -
2	192.168.0.227	502	TCP ▼	NA	E1 ▼	+ -

In Agent mode, the gateway must be assigned a Modbus ID, as shown below, since the Modbus RTU Master will query the gateway memory using that Unit ID rather than querying the slave devices directly.

Gateway Settings	
Gateway Modbus ID	220
Protocol	TCP ▼
Gateway Modbus Port	502
Default Timeout(ms)	1000
Inter-packet TX Delay(ms)	100

A list of messages must be created defining the data to be collected from various TCP server devices connected to the Ethernet port specified in the Operating Settings, and the addresses within the gateway at which to store the collected data.

Add Message Delete Message Modify Message

Display 50 per page Refresh Search:

Item	Serial Port	Slave ID	Alias	Function	Data Address	Data Length	Mapping Address Head	Status
1	1	1	Device_Alias	3	0	1	0	●
2	1	2	Device_Alias	3	100	1	1	●

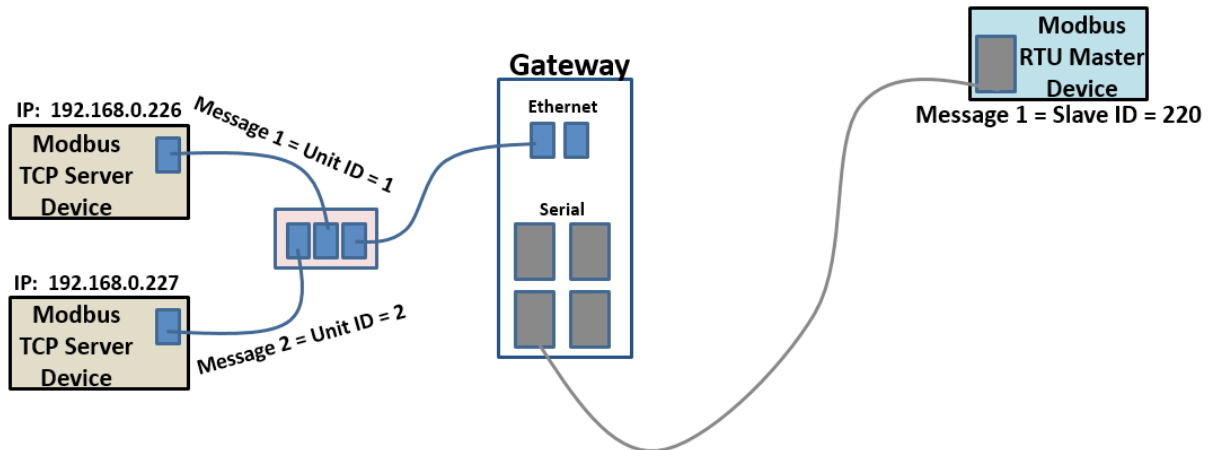
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Refresh to get latest status.

In Agent mode, the Gateway sends messages created by the Slave list to the Modbus TCP server devices. The response data from these messages are stored in local memory of the Gateway for access by the RTU master device. The data is stored in 4 different memory blocks depending upon the Function Code used.

Coils (0x) Data stored from Function Code 1	Inputs (1x) Data stored from Function Code 2	Holding Registers (4x) Data stored from Function Code 3	Input Registers (3x) Data stored from Function Code 4
--	---	--	--

The Gateway generates the Modbus TCP messages from the Slave list items. It must first reference the table in the Operating settings to do a lookup from the Slave ID of the Slave list message to find the corresponding IP address. It stores the data from the responses in its local memory that is available to Modbus RTU devices. The Modbus RTU master device queries the gateway using its Unit ID, and the gateway responds immediately with its cached data.



NOTE: Modbus writes sent from the Modbus RTU master go across directly to the Modbus TCP server devices as if the gateway were in Transparent mode. When the gateway is in Agent mode, addresses that devices will use to WRITE data into must be configured in the Message List even though conceptually this is a list of data that is READ from connected devices.