

AUTOMATIC READ FEATURE



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Automatic Read Feature

The Automatic Read Feature allows the MB-GATEWAY module to utilize some of the idle time that usually occurs between Modbus TCP requests from the Client device. Note that this feature only allows the reading of data from the serial devices and not writing to them. Up to 16 automatic read requests can be configured.

Setup Automatic Reads - Windows Internet Explorer

http://192.168.15.47/settable.html

File Edit View Favorites Tools Help

Setup Automatic Reads

Set up Automatic Reads

Gateway Modbus Address = 120

Auto Assign Gateway Addresses

Memory To Read	Slave Number	RTU Start Address	Number of Elements	Gateway Memory Address
2-Discrete Inputs	7	466	1	0
0-Unused Entry	8	455	1	0
0-Unused Entry	0	0	0	0
2-Discrete Inputs	1	21	16	1
3-Holding Regs	1	100	16	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0
0-Unused Entry	0	0	0	0

Status Data (Holding Register) Address:

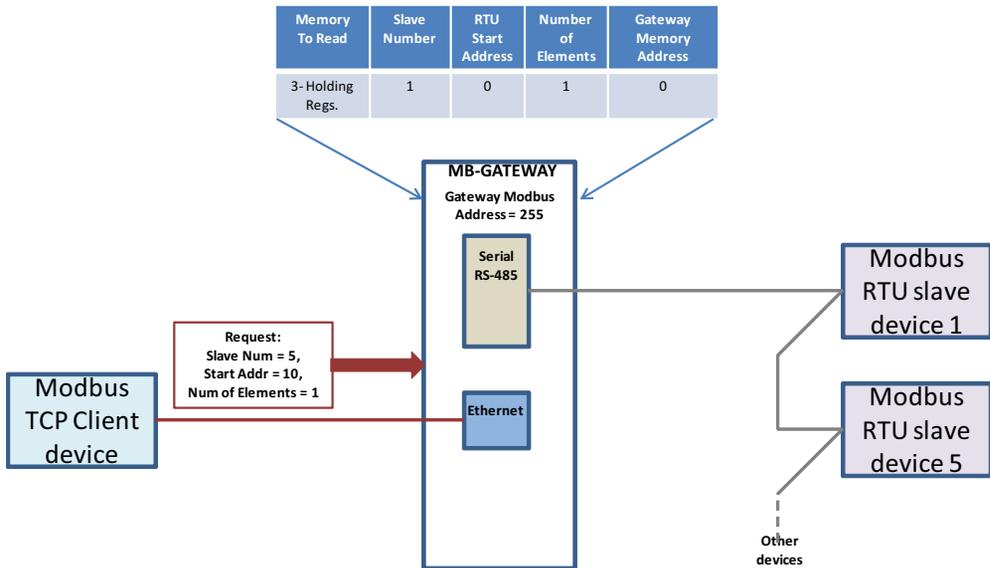
[show status data format](#)

Done Internet 100%

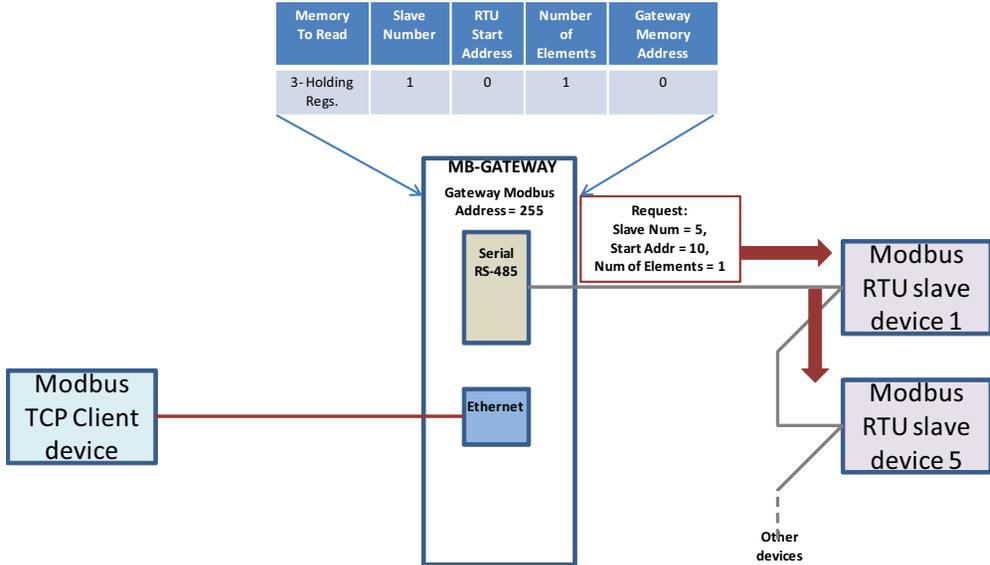
The MB-GATEWAY module can be assigned a Modbus Node address that corresponds with the “Unit ID” number that is sent within the Modbus TCP header that is typically used to target a Modbus RTU node that is on the serial side of the MB-GATEWAY. Therefore, the Node number that is assigned to the MB-GATEWAY module should be unique from any Modbus RTU nodes on the serial network. The Automatic Read function reads the specified registers, bits or coils from the Modbus RTU nodes and places that data into the specified MB-GATEWAY addresses that can be retrieved on the Ethernet side by specifying the MB-GATEWAY’s Modbus address in the Unit ID field of the Modbus TCP client request. An example is shown below:

Situation 1:

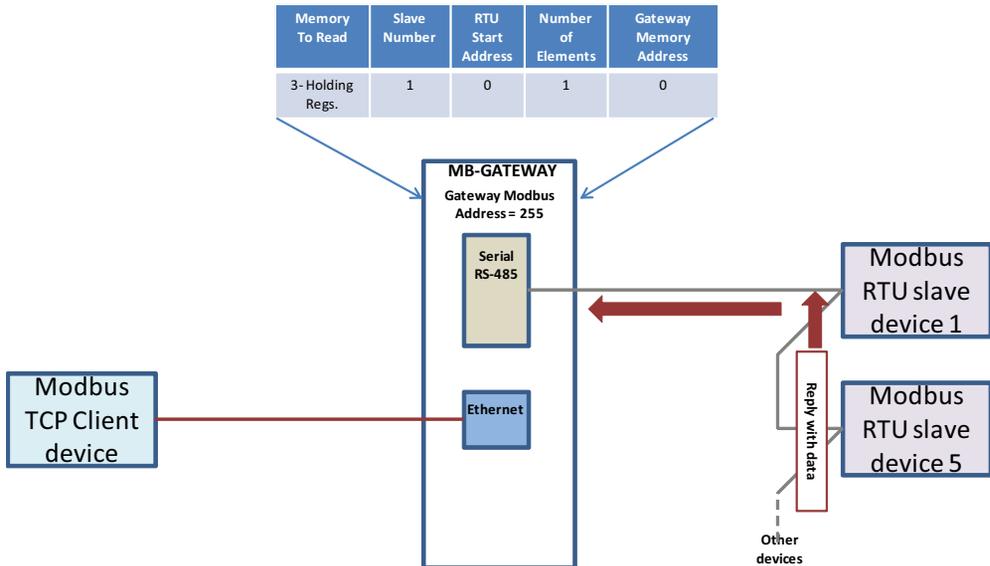
Modbus TCP Client device sends a request for a device not configured in the Automatic Read table. This will, in turn, generate a fresh new request on the serial side of the MB-GATEWAY module.



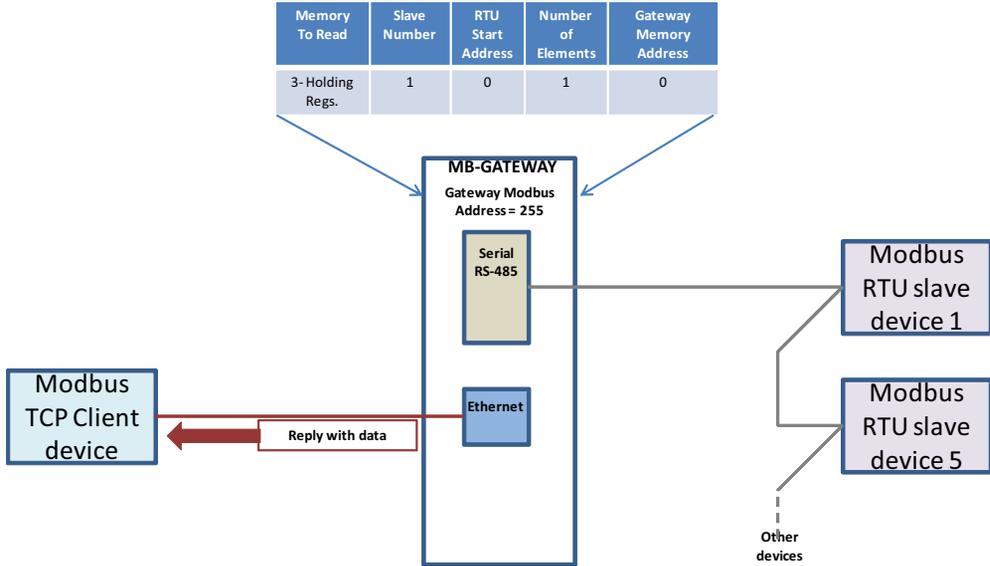
Step 1: Modbus TCP request is generated to Serial Slave Num 5 at Starting Address 10, size 1



Step 2: Request is then generated on the Serial side of the MB-GATEWAY.



Step 3: Serial Node replies with data

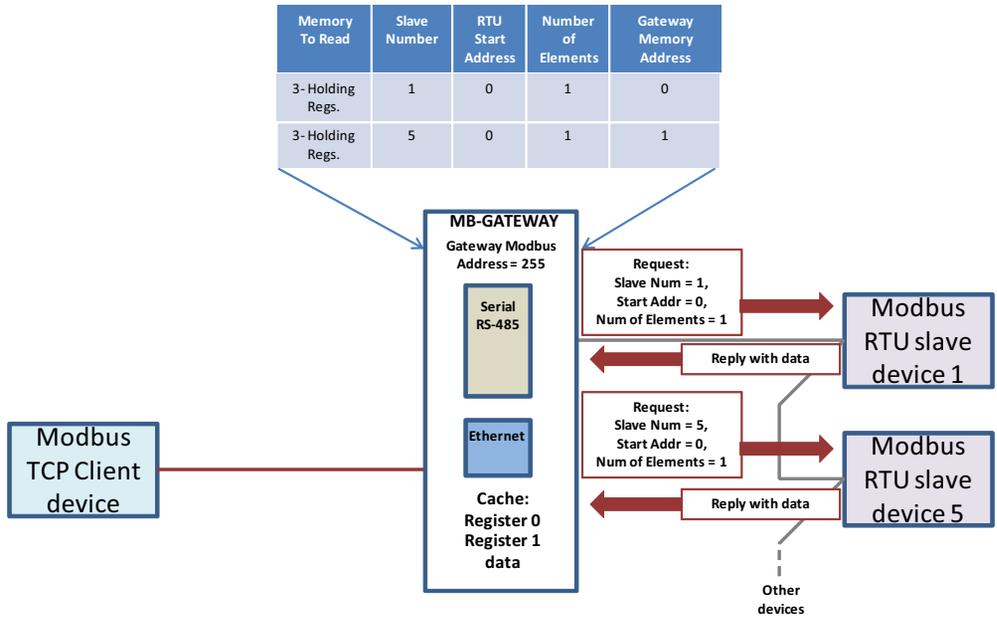


5

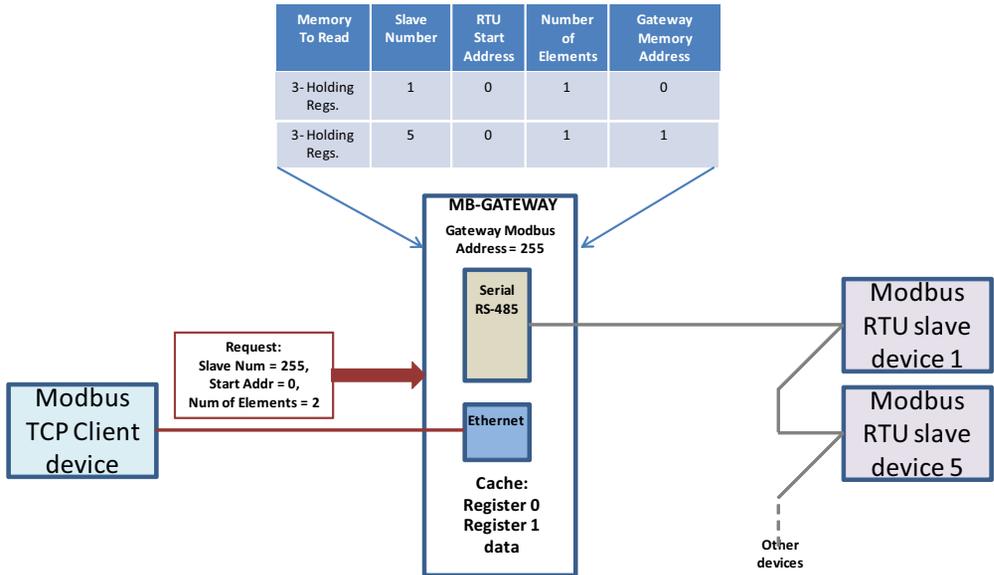
Step 4: Gateway generates TCP reply and sends back to Client device.

Situation 2:

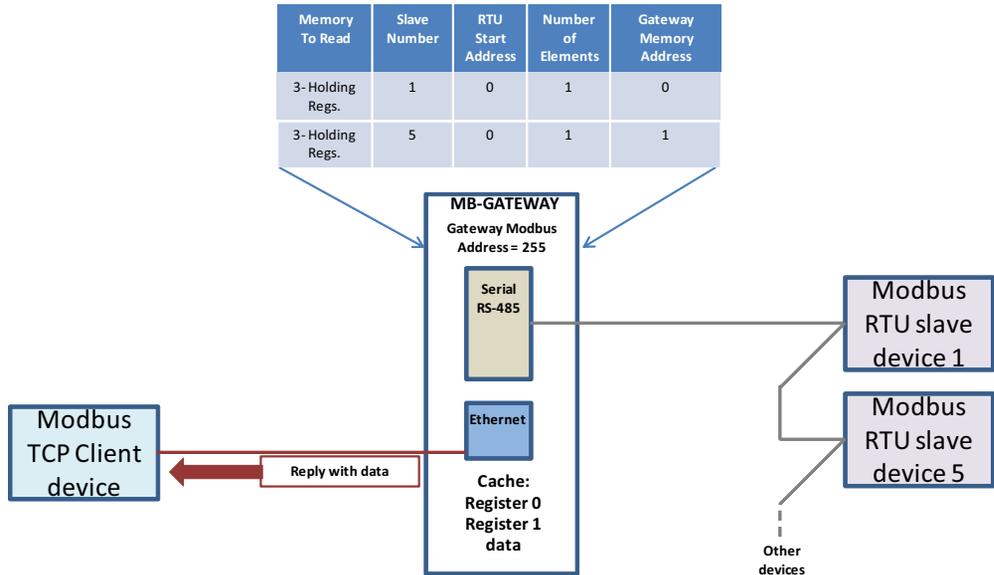
In this example, the Modbus TCP Client device is sending a request directly to the MB-GATEWAY itself that spans multiple entries in the Automatic Read table.



Step 1: Before a request even comes in on the Ethernet side, the MB-GATEWAY is reading data from the serial slaves at the “Inter-packet TX Delay” rate and placing that data into its local cache.



Step 2: Modbus TCP Request is generated to Serial Slave Num 255 at Starting Address 0, size 2.



Step 3: MB-GATEWAY immediately generates TCP reply and sends back to Client device from local cache without generating a new serial request.

The response time for the TCP request will be significantly faster when the request is targeted at an address in the Automatic Read table. This can be advantageous if the Modbus TCP Client is a device that is busy doing numerous other tasks, such as a PLC.

Additional Optimization

An additional method of optimization is used in the MB-GATEWAY. If a request is sent to the MB-GATEWAY from the Modbus TCP Client targeted at a Node number and starting address that is equivalent to an entry in the Automatic Read table, the MB-GATEWAY will treat the request as if it had been targeted at the MB-GATEWAY Modbus address and will respond from its local data cache since the data is the same.

Shown below are some more detailed explanations of the different fields that can be configured in the Automatic Read Function table.

Memory to Read:

There are 5 options:

- 0 – **Unused Entry** = Disables this entry in the table.
- 1 – **Coils** = Configures this entry to read “Modbus Coils” (Read/Write bits).
- 2 – **Discrete Inputs** = Configures this entry to read “Modbus Input Bits” (Read Only bits).
- 3 – **Holding Regs** = Configures this entry to read “Modbus Holding Registers” (Read/Write 16 bit registers).
- 4 – **Input Regs** = Configures this entry to read “Modbus Input Registers” (Read Only 16 bit registers).

Slave Number:

The network address of the Modbus RTU device to be read on the serial network.

RTU Start Address:

The starting address (based at 0) to be read in the targeted Modbus RTU device on the serial network.

Number of Elements:

The Number of elements to read from the targeted Modbus RTU device on the serial network. If the Read is from Coils or Discrete Inputs, the number specified will be the number of bits from 1 - 2000. If the Read is from Holding or Input Registers, the number specified will be the number of words (16 bit) from 1 - 125.

Gateway Memory Address:

The starting address in the GATEWAY module’s local data cache to place the data that has been read from the Modbus RTU device on the serial network.

Gateway Modbus Address:

Displays the Modbus address that the GATEWAY module has been configured for (done in the “Gateway Modbus ID” section of the home page).

Auto Assign Gateway Addresses:

Selecting this option will allow the configuration software to automatically choose the best local addresses to place the data that has been read from the Modbus RTU devices.

When the Auto Assign Gateway Addresses option is NOT selected, care must be taken so the data from different Automatic Reads doesn’t overlap in the Gateway’s internal memory. If you specify an Automatic Read that will create overlapping data, the value in the Gateway Memory Address field for that Read will be red.

By default the Gateway will store the data from the individual automatic reads for the same memory types in consecutive locations in the Gateway’s internal memory. Storing this data in consecutive data locations in the Gateway’s internal memory allows reads to be optimized into as few requests as possible.

There are several different ways of addressing when communicating to Modbus devices. The method of specifying a Function Code and offset that is utilized in the Automatic Read function is a very common way. Another way that is very common and is seen often in AutomationDirect products is the use of the Modicon style addressing. This method employs a PLC style address that contains a Modbus memory type in the highest digit of the address followed by the offset from 1. A table is provided below that shows comparable addresses for both of these addressing styles.

*Modbus Function Type	Address Range	Equivalent Modicon Style Addressing	Number of Elements
1. Coils	0 - 65535	00001 - 065536	1 - 2000
2. Discrete Inputs	0 - 65535	100001 - 165536	1 - 2000
3. Holding Regs	0 - 65535	400001 - 465536	1 - 125
4. Input Regs	0 - 65535	300001 - 365536	1 - 125

* NOTE: "Memory to Read" column on Setup Automatic Reads web page

Automatic Read Status Data

Available in firmware 1.0.679 and later

The final selection on this page is the Status Data (Holding Register) Address which allows the user to map a data area into the Gateway's Modbus Holding Register memory which will report the health of each of the automatic read operations. These 17 consecutive Holding Registers area can then be read from the Modbus Gateway (using the Gateway Modbus Address as Unit ID in the MRX instruction) to monitor the Automatic reads by the Modbus/TCP Client.

Status Data (Holding Register) Address: 4000

[show status data format](#)

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Send

Reset

Click the "show status data format" link to display a page that explains the layout of the data. The first register contains 1 Bit for each of the possible 16 Automatic Reads. Bit 0 = 1st Automatic Read Operation, Bit 1 = 2nd Automatic Read Operation, ... Bit 15 = 16th Automatic Read Operation.

A value of 1 in a Bit location means the last Automatic Read operation that corresponds to that Bit worked and the resulting data is valid.

A Value of 0 in a Bit location means the last Automatic Read operation that corresponds to that Bit DID NOT work, and the Error Count for that Read Operation was incremented.

For example, if the Status Data Address is set to 4000, the data layout will be:

Holding Register	Description	
4000	Bit 0	If set, 1st auto read entry is valid and communicating.
	Bit 1	If set, 2nd auto read entry is valid and communicating.

	Bit 15	If set, 16th auto read entry is valid and communicating.
4001	Error count for 1st auto read entry	
4002	Error count for 2nd auto read entry	
...	...	
4016	Error count for 16th auto read entry	