

460MCAZR-NNA4 Protocol Gateway

Product User Guide

Firmware Version 8.8.37



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Revision History

Version	Date	Notes
8.4.5	11/18/2019	 Features Added Released OPC UA Server (US) Protocol Ability to now Import/Export Template Files with out an FTP session Bug Fixes Updated Profinet Server (PS) on N34 hardware Platform Updated Wi-Fi software
8.6.0	2/28/20	Bug Fixes 1. Omron Plc Communication fixes for EtherNet/IP 2. Profinet GSDML Substitute values fix
8.7.4	9/1/20	 Features Added: 1. BMS, BM, DFM, DS, DM, TCP, USB, PBS have been ported to the latest base software 2. TCP,BMS,BM now Available on N2E and N2EW hardware Platform 3. New ASCII Mode Available on TCP/A/USB/WI protocols 4. User Guides updated with more examples Bug Fixes: 1. Improved Data Mapping and String Mapping performance 2. Improved functionality/performance on EC,ETC,ES,MC,MS,BS,BC, A,,WI,PS protocols
8.7.22	4/6/21	Features Added: 1. Support for RSLogix Versions 32 + with unsigned data type support 2. ETC now support Long integer files (L files) for MicroLogix PLCS that support them 3. SC now supports data block (DB) access
8.7.53	4/28/21	 Features Added: 5. Added support for the NNBU hardware platform 6. Improved RFIDeas scanner support 7. Updated MM and MRS to use Modbus RTU Client and Modbus RTU Server terminology



Version	Date	Notes
8.9.22	2/5/24	 Features Added: 1. Added priority-based reads for client protocols 2. Added improved diagnostic timers for client protocols 3. Reduced minimum delay between messages to zero ms on client protocols 4. Added support for USB serial connections 5. Added support for multiple connections on EtherNet/IP Adapter 6. Added 100ms and 1000ms heartbeat values for diagnostic use 7. Added configurable data size to EtherNet/IP adapter and DeviceNet Slave 8. Added support for TTL communications on N34, NNA1, NNA4, N2E, and N2EW hardware 9. Added support for JSON payloads to MQTT 10. Added Network Bitmap Status to ASCII, USB, and TCP protocols Bug Fixes: 11. Fixed COV Subscription Issues on BACnet MS/TP 12. Fixed timing issues affecting gateway performance 13. Fixed a bug where the Run Idle Header on the output instance for EtherNet/IP Scanner was not checked by default
8.9.29	4/1/24	 Features Added: 14. Added ability to do raw HEX byte copy when receiving data over ASCII, TCP, or USB. Bug Fixes: 15. Fixed bug where function code 15 did not work on MM/MC. 16. Fixed bug relating to writing zeros on start up on BS. 17. Fixed bug where MQTT client did not appear in display data page when MQTT was paired with BACnet
8.9.37	7/30/24	Bug Fixes: 18. EIP IO Communication fixes 19. Timing fixes 20. USB Fixes a. Inactivity Timeout b. Inactivity Timeout Logging c. Port Restart Logging d. Webpage fixes 21. ProfiNet Timing Fix 22. EIP PanelView Fixes a. Support for Explicit Messaging



Overview

The 460MCAZR-NNA4 gateway Easily and securely connect Modbus TCP devices to cloud applications . By following this guide, you will be able to configure the 460MCAZR-NNA4 gateway.

Number of ASCII devices is dependent on the Hardware and Product number of the 460 gateway.

For further customization and advanced use, please reference the appendices located online at: http://www.rtautomation.com/product/460-gateway-support/.

If at any time you need further assistance, do not hesitate to call Real Time Automation support. Support Hours are Monday-Friday 8am-5pm CST

Toll free: 1-800-249-1612 Email: support@rtautomation.com



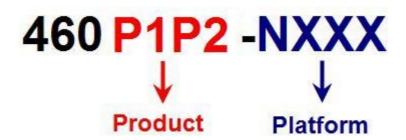
Hardware Platforms

The 460 Product Line supports a number of different hardware platforms. There are differences in how they are powered, what serial settings are supported, and some diagnostic features supported (such as LEDs). For these sections, be sure to identify the hardware platform you are using.

To find which hardware platform you are using:

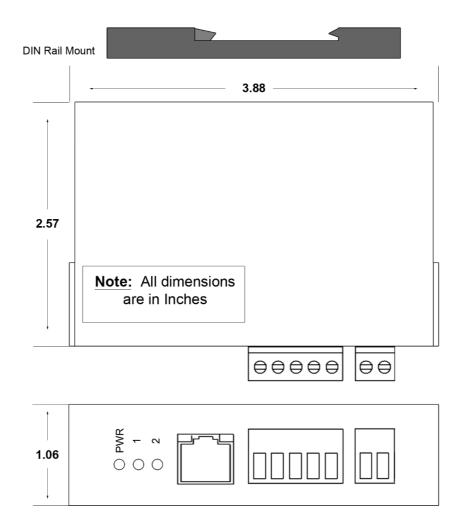
- 1) Look on the front or back label of the unit for the part number.
- On the webpage inside the gateway, navigate to the dropdown menu under Other and select Utilities. Click the Listing of Revisions button. The full part number is displayed here.

Once you have the full part number, the platform will be the number following the "-N":





Hardware - NNA4



Powering the Gateway

- 1) Connect a 12-24 VDC power source to the gateway, Red Wire = (+) Black Wire = (-).
 - a) The unit draws 175mA @ 12 V.



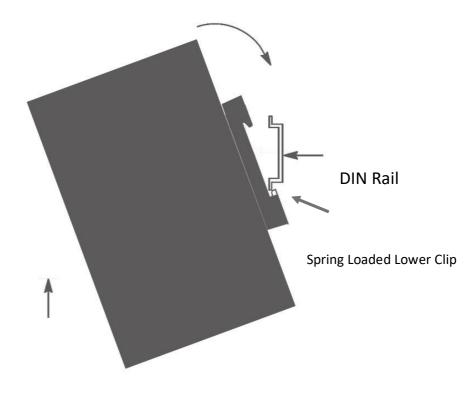


Mounting with a DIN Rail

Installing

Follow these steps to install your interface converter.

- 1) Mount your DIN Rail.
- 2) Hook the bottom mounting flange under the DIN Rail.
- 3) While pressing the 460MCAZR-NNA4 against the rail, press up to engage the spring loaded lower clip and rotate the unit parallel to the DIN Rail.
- 4) Release upward pressure.



Removing

Follow these steps to remove your interface converter.

- 1) Press up on unit to engage the spring loaded lower clip.
- 2) Swing top of the unit away from DIN Rail.



Accessing the Main Page

The following steps will help you access the browser based configuration of the gateway. By default, DHCP is enabled. If the gateway fails to obtain an IP address over DHCP it will Auto IP with 169.254.X.Y. For more information on your Operating system network setting refer to the <u>Accessing Browser</u> <u>Configuration</u> document from our support web site.

1) Scan the QR code on the back of the unit or navigate to <u>www.rtautomation.com/460-gateway-support</u> and download IPSetup.exe.

NDK Settings IP	0.	0.	0.	0		- Select a	2002020	′[00-03-F4-04	D2-8C] Auto	IP at 169.254.4
Network Mask	0.	0.	0.	0						
GateWay	0.	0.	0.	0	Set>					
DNS [0.	0.	0.	0						
								Search	Again	
					-	h Webpa <u>c</u>	1	Advanced	-1	Close

- 2) Run the IPSetup.exe program.
- 3) Find unit under "Select a Unit".
 - a. Change Gateway's IP address to match that of your PC if DHCP has failed.
 - i. You will know DHCP has failed if the gateway's IP address is AutoIP at 169.254.X.Y.
 - ii. If successful, it will say DHCP'd at ex: 192.168.0.100 or however your DCHP Client is set up.
 - b. If you do not see the gateway in this tool, then your PC is most likely set up as a static IP.
 - i. Change your PC's network settings to be DHCP. If DHCP fails, then it will change to be on the 169.254.x.y network.
 - ii. Relaunch the IP Setup tool to see if gateway can be discovered now.
- 4) Click Launch Webpage. The Main page should appear.

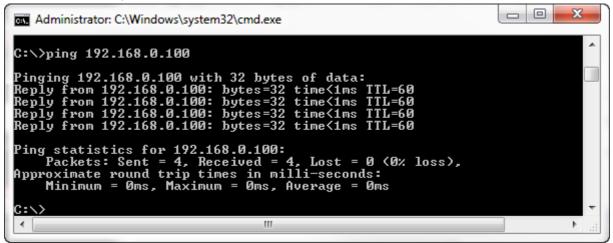
Default setting is set to DHCP. If DHCP fails, default IP Address is 169.254.x.y



Error: Main Page Does Not Launch

If the Main Page does not launch, please verify the following:

- 1) Check that the PC is set for a valid IP Address
 - a. Open a MS-DOS Command Prompt
 - b. Type "ipconfig" and press enter
 - c. Note the PC's IP Address, Subnet, and Default Gateway
- The gateway must be on the same Network/Subnet as the PC whether it's setup for DHCP or Static. Once you have both devices on the same network, you should be able to ping the gateway using a MS-DOS Command Prompt.



The Screenshot above shows a gateway that is currently set to a static IP Address of 192.168.0.100.

If you are able to successfully ping your gateway, open a browser and try to view the main page of the gateway by entering the IP Address of the gateway as the URL.



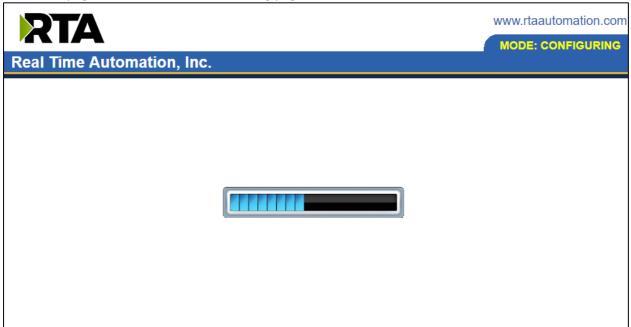


Committing Changes to the Settings

All changes made to the settings of the gateway in Configuration Mode will not take effect until the gateway is restarted via the webpage. Changes will not be stored if the gateway's power is removed prior to a reboot.

NOTE: The gateway does not need to be restarted after every change. Multiple changes can be made before a restart, but they will not be committed until the gateway is restarted.

When all desired changes have been made, press the **Restart Now** button. The webpage will redirect to our rebooting page shown below:



The reboot can take up to 20 seconds.

If the IP address has not been modified, the gateway will automatically redirect to the main page. If the IP address was modified, a message will appear at the top of the page to instruct the user to manually open a new webpage at that new IP.



Main Page

The main page is where important information about your gateway and its connections are displayed. Mode (orange box below):

Running Mode:

- Protocol communications are enabled
- Configuration cannot be changed during Running Mode. If changes are needed, click the **Configuration Mode** button shown in the green box below

Configuring Mode:

- Protocol communication is stopped and no data is transmitted
- Configuration is allowed

Navigation (green box below):

You can easily switch between modes and navigate between pages (Configuration, Diagnostics, and Other pages) using the buttons on the left hand side.

RTA				www.rtaautomation.com
Real Time Auton	nation, Inc.			460ETCMC
Configuration Mode		Mair	n Page	
Main Page		Device Description: Applicat	tion Description	
CONFIGURATION Network Configuration Allen-Bradley PLC		Save F	Parameters	
Modbus TCP/IP Client Display Data	Network Status	Link Status		
DIAGNOSTICS -Select-	Ethernet Port	100Mbps, Full Duplex	MAC Address 00:03:F4:0A:43:CC	IP Address 10.1.28.95
OTHER -Select- ▼	Allen-Bradley PLC Statu Device Status: Last Read Error Code: Last Write Error Code:	JS Fatal Error: No Configurati	ion	
		Connection Status: No Dev	vices Configured / Enabled	
	Last Error Code:	Fatal Error: No Configurati		
		Connection Status: No De	vices Configured / Enabled	
	Data Mapping Status # Enabled: # of Errors: First Error:			



Device Configuration

The device configuration area is where you assign the device description parameter. Changes can only be made when the gateway is in Configuration Mode.

Main Page	
Device Description: Application Description]
Save Parameters	

Once you are done configuring the Description, click the **Save Parameters** button.



Network Configuration

The network configuration area is where you assign the IP address and other network parameters. Changes can only be made when the gateway is in Configuration Mode.

Once you are done configuring the Network Settings, click the **Save Parameters** button.

If you are changing the IP Address of the gateway, the change will not take effect until the unit has been rebooted. After reboot, you must enter the new IP Address into the URL.

Network Configuration	Help
Ethernet Configuration	
Ethernet MAC Address:	00:03:F4:0B:C3:02
Ethernet Link:	Auto-Negotiate 🔻
IP Setting:	Static IP V
IP Address:	10.1.16.40
Subnet:	255.255.0.0
Default Gateway:	0.0.0.0
DNS Gateway:	0.0.0.0
Save Par	rameters

It is recommended to leave the DNS Gateway set to 0.0.0.0 and the Ethernet Link as Auto-Negotiate. If configuring the gateway to use E-mail, the DNS Gateway must be set.



Modbus TCP/IP Client Configuration

Click the **Modbus TCP/IP Client** button to access the configuration page.

- 1) Select which **Network Interface** to use for this Modbus TCP/IP connection. If using single port hardware, the Network Interface will default to Ethernet port only.
- 2) **Delay Between Messages**: Enter the length of time to delay between read and write scan line requests (ms).
- 3) **Response Timeout**: Enter the amount of time the gateway should wait before a timeout is issued for a read/write request (ms).
- 4) **Delay Between Connect Attempts**: Enter the amount of time the gateway should wait between attempts to connect to the PLC.
- 5) **Dependency Protocol**: If enabled, Modbus TCP/IP communication will stop if communication to the selected protocol is lost.
- 6) **Read High Priority**: Configures the number of high priority requests to process before switching to low priority requests. This number should be higher than the Read Low Priority.
- 7) **Read Low Priority**: Enter the number of low priority requests to process before switching to high priority requests. This number should be lower than the Read High Priority.
- 8) **Read All Data Points Once**: If Enabled, the gateway will read all configured data points once on startup regardless of priority, then begin processing requests based on priority after all points have been read once.

Modbus TCP/IP Client Configuration	Help
Network Interface:	Ethernet Port 1 (192.168.1.133) V
Delay Between Messages:	0 0-60000 ms
Response Timeout: 5	500 50-60000 ms
Delay Between Connect Attempts: 1	1000 1000-60000 ms
Dependency Protocol:	None v
Read High Priority: 2	2 1-60000
Read Low Priority: 1	1 1-60000
Read All Data Points Once:	
Save Para	ameters



Modbus TCP/IP Client Device Configuration

The bottom area of the Modbus TCP/IP Client Configuration page lets you configure up to 32 external Modbus TCP/IP server devices.

1) To add additional server connections, click the -Select- dropdown under Modbus TCP/IP Client Device List and select **Add Generic Server** option.



- a) If you are configuring multiple devices click << or >> to navigate to another device.
- b) To create a new server with the same parameters already configured from another server, click the -Select- dropdown and select the Add from Modbus TCP/IP X option (where X represents the server you wish to copy parameters from). Once created, you can make any additional changes needed to that new server.
- c) To remove a device, navigate to the server to delete using the << and >> buttons and click the **Delete Server** button.
- d) Click the **Save Parameters** button to save changes before restarting or going to another configuration page.
- 2) The **Enable** check box should be selected for the device.
- 3) Enter a **Device Label** to identify the device within the gateway.
- 4) Enter the unique **IP Address** that matches the server. If this value doesn't match, the gateway will timeout.
- 5) Enter the **TCP Port** for the Modbus TCP/IP client to open a connection on. Default port for Modbus TCP/IP is 502.
- 6) Force Function Code 15/16 for Single Writes: Only select this if the Modbus TCP/IP device does not support Modbus Function Code 5/6.

Enable	Modbus TCP/IP Server 1				
Device La	abel MC01	IP Address 10.1.16.16			
TCP Port 502		1-65535 (Default: 502)			
Force Function Code 15/16 for Single Writes		Enable 0-Base Addressing			
Bit Pack 1 Bit 🗸 Coil / Input Status Only		Swap Indicator None	~		
# of Read Scan Lines 2 0-100		# of Write Scan Lines 0	0-100		
Generate Scan Lines					

7) **Enable 0-Based Addressing**: Check ONLY if the server you are connecting to begins their register numbering at 0 OR they specify that their device addresses are 0-based.



- 8) **Bit Pack:** Select the formatting of the Coil Status/Input Status. Automap will use this packing size to map coils to/from the other protocol. The bit pack selection here should match that of the other protocol. The starting address is considered Bit 0 and is the low-order bit.
- 9) To enable data swapping, select the required **Swap Indicator**. If the bytes appear in the wrong order, enable swapping to change the data. This swapping does *NOT* change coils and their ordering inside the Bit Pack.
- 10) Enter the number of read scan lines and write scan lines.
- 11) Click the **Generate Scan Lines** button to have the read and write scan lines auto-generate for you. You may manually configure the read and write scan lines after they have been generated.

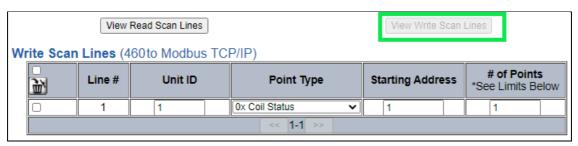


Configuring Read and Write Scan Lines

Follow these steps to manually configure Read and Write Scan Lines.

1) Click the View Read Scan Lines or View Write Scan Lines button.

	View Read Scan Lines View Write Scan Lines							
Read Sca	n Lines	(Modbus T	CP/IP to 4	60ETCMC)				
	Line #	Priority	Unit ID	Point Type	Starting Address	# of Points *See Limits Below		
	1	High 🗸	1	0x Coil Status 🗸 🗸	1	1		
	<< 1-1 >>							



- 2) Enter a Unit ID for the Client to communicate to.
- 3) Select a Point Type for each Scan Line. Options include: Coil Status, Input Status, Input Registers, and Holding Registers.
 - a) **Note:** Input/Holding Registers have a data type associated with them.
 - b) String Point Type- If the mating protocol supports strings, you may select string as a point type in Modbus. With this point type, 2 characters will be packed into a single register and the first register will be set aside for the length.
 - c) **EX:** 4x Hold Reg (String) with a Starting Address of 1 for a length of 5 Registers, this means that Register 1 will hold the length of the string and Registers 2-5 will hold the string contents. So, this string can contain a max of 8 characters.
- 4) Enter a Starting Address (This will be 1 based, if your device is 0 based then check the Enabled 0-Based Addressing box).
 - a) Note: Some manufactures documentation may call out the Starting Address as 00001, 10001, 30001 or 40001. Don't include the first value as this represents (0) coil, (1) Input Status, (3) Input Register and (4) Holding Register.

Enable	Modbus TCP/IP Server 1					
Device La	abel MC01			IP Address 10.1.16.16		
TCP Port 502			1 <mark>-65535 (</mark>	Default: 502)		
Force Function Code 15/16 for Single Writes				Enable 0-Base Addres	sing 🗆	
Bit Pack 1 Bit 🗸 Coil / Input Status Only		Swap	Indicator None	~		
# of Read Scan Lines 2 0-100		#	of Write Scan Lines 0	0-100		
		Generate	Scan Lines			

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5) Enter the # of consecutive points to read for that point/data type. See the *Scan Line Data Limit* section at the bottom of the webpage for max values in a scan line.

Point Type	Length Range
Coil Status	512
Input Status	512
Input Register (16 Bit Int/Uint)	125
Input Register (32 Bit Int/Uint/Float)	62
Input Register (64 Bit Int/Uint/Float)	31
Input Register (String - 2 char/reg)	125
Holding Register (16 Bit Int/Uint)	125
Holding Register (32 Bit Int/Uint/Float)	62
Holding Register (64 Bit Int/Uint/Float)	31
Holding Register (String - 2 char/reg)	125

Scan Line Data Limit

- 6) When configuring read scanlines there is an optional priority configuration. There are three priority selections available, how often each priority is read is configurable in the Modbus TCP Client Configuration section using the Read High Priority and Read Low Priority Configurations.
 - a) High: Read the scanline based on the Read High Priority configuration.
 - b) Low: Read the scanline based on the Read Low Priority configuration.
 - c) Once: Read the scanline once on gateway startup or upon a new connection and never again during normal operation.

Re	ad Sca	n Lines	(Modbus	TCP/IP to 4	60ETCMC)		
		Line #	Priority	Unit ID	Point Type	Starting Address	# of Points *See Limits Below
		1	High 🗸	1	0x Coil Status 🗸 🗸		1
			High		<< 1-1 >>		
			Low				,
			Once		Save Parameters		



MQTT Client Configuration

You can configure up to three MQTT connections.

1. Configure up to one Microsoft Azure (ARZ) connection.

Click the **MQTT** button to continue configuration.

	Main Page
CON	FIGURATION
	Network Configuration
	Allon Bladio, PLO
	MQTT Client
	Data Mapping
	Display Data
	Display String

Microsoft Azure (AZR) Configuration

You can only configure one Microsoft Azure connection with your RTA product.

- 1) To add an ARZ connection, click the -Select- dropdown menu under MQTT Client Connection List and select **Add Generic AZR Connection** option.
 - a. To remove a device, navigate to the AZR device to delete and click the **Delete Connection** button.

MQTT Client Connectio	n List	
-Se	lect- Delete Connection	
	<< 1 >>	
	1-1	

on List	
 -Select- v	Delete Connection
-Select-	0 >>
Add Generic AWS Connection)-0

- 2) The **Enable** check box should be selected for the device.
- 3) Enter a **Device Label** to identify the device within the gateways mapping.
- 4) Select which **Network Interface** to use for Microsoft Azure connection. Option only available on the N2E hardware.
- 5) **Primary Connection String:** Enter the primary connection string for the device in Azure.
- 6) Enter the **TCP Port** for the MQTT broker to open a connection on. If this value doesn't match, the gateway will not open a connection.

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- 7) **Keep Alive:** Enter in the amount of time that the gateway should attempt to ping the broker to keep the MQTT connection alive, 0 disables this feature.
- 8) **Client ID:** The MQTT client ID to be used when connecting to the Broker.
 - a. **NOTE:**This field is not user configurable and will be populated automatically based on the supplied primary connection string when the webpage is saved.
- 9) Check the Add Timestamp to Publishes checkbox to add a timestamp to the payload.

Enable	Azu	re 1
Device L	abel QT01	Network Interface Ethernet Port (DHCP Assigned)
Primary Connect	ion String	
Client ID		Add Timestamp to Publishes
TCP Port 8883	1-65535 (Default: 8883)	Keep Alive 60 0-200 sec (0 to Disable)
	# of JSON Name/Value	e Pairs 0 0-500

Configuring Subscribe and Publish Topics

# of JSON Name/Value	e Pairs 3 0-500
# of Publish Paths 1 0-250	# of Subscribe Paths 1 0-1
Generat	e Paths

JSON Name/Value Pairs

Line #	Path	JSON Name	JSON Point Type
1	-No Path Defined-		INT (8-bit) V
2	-No Path Defined-		INT (8-bit) V
3	-No Path Defined-		INT (8-bit) V
		<< 1-3 >>	

Save Parameters

View Publish Paths

View Subscribe Paths

Publish Paths (460PSQT to MQTT)

Line #	Enable	Path Name	QoS
1			0 ~
		<< 1-1 >>	

- 1) Enter in "# of Subscribe Paths" and/or "# of Publish Paths".
- 2) Enter in "# of JSON Name/Value Pairs"
- 3) Click the **Generate Paths** button to have the lines generated for you.
- 4) **# of Subscribe Paths:** Enter in the number of topics to subscribe from the broker. Once the topics are subscribed to, the MQTT broker will publish the messages to the gateway.

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- a) **NOTE:** Subscribe paths on Microsoft Azure are limited to 1 and are not user configurable. This is due to Microsoft Azure not utilizing a typical pub/sub broker and is instead using Cloud-to-Device messaging and expecting a pre-defined endpoint for these messages. The subscribe path may not populate immediately when generated, to resolve this, click view subscribe paths and then hit save parameters with the subscribe paths selected.
- 5) **# of Publish Paths:** Enter the number of topics to publish to the broker from the mating protocol.
 - a) **NOTE:** Publish paths will be pre-pended with the defined Microsoft Azure Device-to-cloud message path when the page is saved while the View Publish Paths option is selected. This is because Microsoft Azure does not utilize a generic pub/sub broker and instead utilizes Device-to-Cloud messaging expecting a pre-defined endpoint for these messages.
- 6) **# of JSON Name/Value Pairs:** Enter the number of JSON name/value pairs to configure, each name/value pair can be associated with a single publish or subscribe path.
- 7) Select the publish or subscribe path each name/value pair should be associated with.
- 8) Select the **Point Type** of the name/value pairs

Click Save Parameters button when complete.



Microsoft Azure Service Setup

Please note this section outlines the bare minimum configuration to get the RTA gateway connected to Azure and is not necessarily a recommended configuration in a production environment.

- 1. Create a Microsoft Azure subscription if you do not have one already
- 2. Create a resource group
 - a. In the search bar at the top type in "Resource Groups" and select the resource groups under services to navigate to the resource groups page.
 - b. Hit Add in the top left corner, there may also be a create resource group button in the middle if no resource groups exist.

🔨 Subscriptions - Microsoft Azu	re 🗙 🔼 Resource groups - Microsoft Azure 🗙 🕂			- 🗆 ×
d D C D	portal.azure.com/?fromAccountsPortal=true#blade/HubsExtens	sion/BrowseResourceGroups		O 👗 💽
	Upgrade P Search resources, services, and docs (G+/)			
Home >				
Resource group	s ☆			×
+ Add 🕲 Manage view	\sim 🕐 Refresh \pm Export to CSV $~$ Open query $ $ $@$ Assig	n tags 🛛 💙 Feedback		
Filter by name	Subscription == all Location == all X + Add filter			
Showing 0 to 0 of 0 records.			No grouping	V List view V
Name 1.		Subscription ↑↓	Location ↑↓	
	Try changing your filters	urce groups to display sifyou dont see what you're looking for: Learn more of ate resource group		

c. In the create a resource group window give the resource group a name, the available Azure subscription should be selected by default.



Home > Resource groups >	
Create a resource grou	p
Basics Tags Review + create	
resources for the solution, or only those r	related resources for an Azure solution. The resource group can include all the resources that you want to manage as a group. You decide how you want to sed on what makes the most sense for your organization. Learn more 더
Project details	
Subscription * 🕡	Azure subscription 1
Resource group * ①	rta-resource-group-1
Resource details	
Region * 🛈	(US) East US 🗸
Review + create < Previous	Next : Tags >

- d. Hit Review + Create in the bottom left corner.
- e. In the review window, hit create in the bottom left corner to create the resource group.
- f. You should be re-directed back to the resource groups window where you can see the newly created resource group is listed.
- 3. Create an IoT Hub
 - a. In the search bar at the top type in "IoT Hub" and select the IoT under services to navigate to the IoT Hub page.

Microsoft Azure 👩	P igt hub		×) @ ? @		
Azure services + Create a resource Navigate	Services Services Device Update for IoT I Notification Hubs Notification Hubs Notification Hubs Notification Hub Name Servert Hubs Clusters So IoT Central Application	spaces	See al Marketplace a lot Hub c lot Hub Device F c crosser lot Conr Documentation Azure lot Hub Docu Introduction to Azur	Provisioning Service	Analytics ft Docs t Docs	orrau 	DiR
Subscriptions	Services Hub Connecto The Identity Hub Azure Defender for IoT Resources No			availability and disas	ter recovery	-	
Microsoft Learn Learn Azure with training from M	tree online	Monitor your apps and infrastructure	Secure your apps an infrastructure	d 🗸	Analyze and optin cloud spend for fr		
Useful links Technical Documentation	n o" Azure Se	ervices g*	Recent Azure Updates 😭	Az	ure mobile app	GETITON	
Azure Migration Tools	Find an <i>i</i>	Azure expert	Quickstart Center	•	App Store	Google Play	

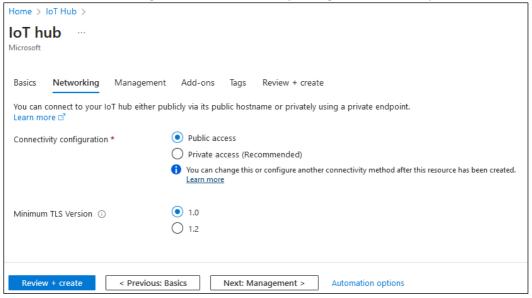
a. Hit Add in the top left corner, there may also be a create IoT Hub button in the middle if no IoT Hubs exist.



b. Select the resource group created previously, enter a name for the hub, and select a region.

oT hub … ^{Iicrosoft}		
Basics Networking Manag	ement Add-ons Tags Review+create	
Create an IoT hub to help you conr	nect, monitor, and manage billions of your IoT assets	. Learn more ⊡"
Project details		
Choose the subscription you'll use organize and manage resources.	to manage deployments and costs. Use resource gr	oups like folders to help you
Subscription * 🕕	Azure subscription 1	~
Resource group * 🕕	rta-resource-group	
2 .	Create new	
Instance details		
IoT hub name * i	rta-test-hub-1	N
Region * 🛈	East US	~
	Standard (most popular)	~
Tier *	Compare tiers	
Tier *	compare tiers	
Tier * Daily message limit * 🛈	400,000 (\$25/month)	~

- c. Hit Next at the bottom of the page to proceed to the networking tab.
- d. In the networking tab under connectivity configuration, ensure public access is selected.



- e. Hit review and create in the bottom left corner of the page.
- f. On the review and create page, hit create in the bottom left corner of the page.



g. One the deployment is completed click on "Go to Resource" to be re-directed to the newly created IoT Hubs overview page. If go to resource is not an option, navigate to the IoT hub and select your newly created IoT hub to access the overview page.

rta-test-hub 🖉 ☆			×
	$ ightarrow$ Move \sim 🔋 Delete 💍 Refresh 🔗 Feedback		
X Overview	↑ Essentials		JSON View
Activity log	Resource group (move) : rta-resource-group	Hostname : rta-te	est-hub.azure-devices.net
Access control (IAM)	Status : Active	Tier : Free	
🗳 Tags	Location : East US	Daily message limit : 8,000	
X Diagnose and solve problems	Service region : East US	Minimum TLS Version : 1.0	
Events	Subscription (move) : Azure subscription 1		
Device management	Tags (edit) : Add tags		
Devices	See more		
	Usage Get started		
 IoT Edge Configurations + Deployments 	S	Show data for last: 1 Hour 6 Hours 12 Hours 12 Day 7 Days	30 Days
Updates Queries Hub settings Security settings	IoT Hub Usage	Number of messages used	Device to cloud messages
Defender for IoT	Messages used today: 2		70
> Monitoring	Daily messages quota: 8000	15	50
> Automation	IoT Devices: 2	1	40 30
> Help		05 0 € PM Oci 15 6 ÅM UTC-6800 Total number of messages used (Max), rta-t 2	- 30 - 9 - 6 54 Oct 18 6 ÅM UTC-0500 - Telemetry messages sent (Sum), rta-test-hub (0

- h. In the left panel of the IoT Hub overview select Devices under the Device Management section.
- i. Click Add Device button in the top left corner of the page to create a new IoT device in this hub.
- j. In the create a device window enter a name for the device in the Device ID section and ensure the "Connect his device to an IoT hub" option is enabled.

Create a device	
1 Find Certified for Azure IoT devices in the Device Catalog	
Device ID * 🛈	
rta-test-device-1	
IoT Edge Device	
Authentication type 🕕	
Symmetric key X.509 Self-Signed X.509 CA Signed	
Auto-generate keys ①	
Connect this device to an IoT hub	
Enable Disable	
Parent device 🕕	
No parent device	

- k. Hit Save in the bottom left corner of the window to create the device and be re-directed to the device list in the IoT Hubs overview window.
- I. Click on the newly created device in the device list to view the devices configuration.



m. Copy the Primary connection string for the device, this will be used when connecting the RTA gateway to Azure.

Home > IoT Hub > rta-test-hub De	vices >		
rta-test-device ☆ … ^{rta-test-hub}			
🗟 Save 🔍 Manage keys 🗡 🖂 I	Message to Device 🚿 Direct met	thod 🕂 Add Module Identity 🗮 Device twin 🖒 Refresh	
Device ID ①	rta-test-device		0
Primary key ①	•••••		• D
Secondary key ①	•••••		•
Primary connection string ①	•••••		•
Secondary connection string ①	•••••		•
Tags (<u>edit</u>)	No tags		
Enable connection to IoT Hub ①	🖲 Enable 🔘 Disable		
Parent device ①	No parent device		
Module Identities Configurations			
Module ID C	Connection State	Connection State Last Updated Last Activity Time (UTC)	
There are no module identities for this d	evice.		



- 4. Create an Event Hub
 - a. In the search bar at the top type in "Event Hubs" and select the Event Hubs under services to navigate to the Event Hubs page.
 - b. Hit Add in the top left corner, there may also be a create Event Hub button in the middle if no Event Hubs Namespaces exist.
 - c. In the Create Namespace window, select your previously created resource group, enter a name for the namespace, and select a pricing tier based on your needs.

Home > Event Hubs >		
Event Hubs		
Basics Advanced Networking	Tags Review + create	
Project Details		
Select the subscription to manage deplo manage all your resources.	oyed resources and costs. Use resource groups like folders to orga	nize and
Subscription *	Azure subscription 1	\sim
Resource group *	rta-resource-group Create new	\sim
Instance Details		
Enter required settings for this namespa	ace, including a price tier and configuring the number of units (capa	city).
Namespace name *	rta-test-namespace-1	~
	.servicebus.w	indows.net
Location *	East US	\sim
	The region selected supports Availability zones. Your namespace wi Availability Zones enabled. <u>Learn more.</u>	ll have
Pricing tier *	Basic (~\$11 USD per TU per Month)	\sim
	Browse the available plans and their features	
Throughput Units *	0	- 1
Review + create < Previous	Next: Advanced >	

- d. Hit Review + Create in the bottom left corner of the page.
- e. Hit Create in the bottom left corner of the page to create the namespace.



f. Once the namespace has finished initializing click on go to resource to navigate to the namespaces main panel. If go to resource in not an option navigate to Event Hubs and select the newly created namespace to open the main panel.

Event Hubs Namespace	× * ···				×
	🕂 Event Hub 📋 Delete 🖒 Refresh 🔗 Give feedback				
🗵 Overview	↑ Essentials				JSON View
Activity log	Resource group (move) : rta-resource-group		Created	: Monday, February 5, 2024 at 13:10:12 CST	
Access control (IAM)	Status : Active		Updated	: Monday, February 5, 2024 at 13:11:02 CST	
🗳 Tags	Location : East US		Zone Redundancy	: Enabled	
X Diagnose and solve problems	Subscription (move) : Azure subscription 1		Pricing tier	: Basic	
	Subscription ID : 4f0bf630-94d0-4b0b-b594-fccd8aa31	dff	Throughput Units	: <u>1 unit</u>	
Data Explorer (preview)	Host name : rta-test-namespace.servicebus.windo	ws.net 🗅	Auto-inflate throughput	: Not Supported	
Events			Local Authentication	: Enabled	
> Settings	Tags (edit) : Add tags				
> Entities	NAMESRACE CONTENTS KAFKA SURFACE ZONE REDUNDANCY				
> Monitoring	1 EVENT HUB NOT SUPPORTED ENABLED				
> Automation	Show data for the last: 1 hour 6 hours 12 hours 1 d	lay 7 days 30 days			
> Help	Show data for the last:	ay / days so days			
	Requests	Messages		Throughput	
		100		1008	
	- 1	90		908	
	0.8	70		708	
		60		808	
	0.6	50		50B	
	0.4	40		408 308	
	02	20		208	
	V.6	10		108	
	0	0		0811/45 AM 12 PM	
	11:45 AM 12 PM UTC-C	11:45 AM 12 PM	UTC-05:00	Incoming Bytes. (Sum), rta-test-namespace OB	UTC-05:00
	1/2	1/2		Outgoing Bytes. (Sum), rta-test-namespace OB	
	Successful Requests (Sum), rta-test-namespace 1 Server Errors. (Sum), rta-test-namespace 0	Captured Messages. (Sum), rta-t		Captured Bytes. (Sum), rta-test-namespace 0B	
	- server chora (dam), ha cas herrispace 0	espered messages. (Sulli), Ita-t	er minespace 0	- contact bytes (suring the test normspace UB	

- g. Click Add Event Hub in the top left corner.
- h. Enter in a name for the event hub
- i. Click review + create in the bottom left corner.
- j. On the review page hit create in the bottom left corner.

Home > Event Hubs > rta-test-namespace >	·
Create Event Hub	
Basics Capture Review + create	
Event Hub Details	
Enter required settings for this event hub,	including partition count and message retention.
Name * 🕕	rta-test-hub-1
Partition count ③	01
Retention	
Configure retention settings for this Event	Hub. Learn more
Cleanup policy 🛈	Delete V
Retention time (hrs) * 🕕	1 🗸
	min. 1 hour, max. 24 hours (1day)
Review + create < Previous	Next: Capture >

Real Time Automation, Inc.

1-800-249-1612



k. You should be returned to the namespace overview, scroll down and you should see the newly created event hub at the bottom of the overview section.

rta-test-namespace	\$ \$ ··· \$			\times
Search • «	🕂 Event Hub 📋 Delete 🖒 Refresh 🔗 Give f			
🔄 Overview	Host name : rta-test-namespace.servicebu		nflate throughput : <u>Not Supported</u> Authentication : Enabled	
Activity log	Tags (edit) : Add tags	LUCAI P	authentication : <u>Enabled</u>	
Access control (IAM)				
🗳 Tags	NAMESPACE CONTENTS KAFKA SURFACE ZONE RE 1 EVENT HUB NOT SUPPORTED ENABLED	DUNDANCY		
× Diagnose and solve problems	_			
🛃 Data Explorer (preview)	Show data for the last: 1 hour 6 hours 12 hour	s 1 day 7 days 30 days		
🗲 Events	Requests	Messages	Throughput	
> Settings		90	1008	
> Entities	1		908	
> Monitoring	0.8	70	708	
> Automation	0.6	60	608 508	
	0.4	40	408	
> Help	0.4		308	
	0.2	20	208	
	0	0	08	
	11:45 AM 12 PM 12:15 PM	UTC-05:00 11:45 AM 12 PM 12:15 PM	UTC-05:00 11:45 AM 12 PM 12:15 PM UTC-05:00	
	Incoming Requests (Sum), rta-test-namespace 1 Successful Requests (Sum), rta-test-namespace 1	1/2		
	Server Errors. (Sum), rta-test-namespace 1	 Outgoing Messages (Sum), rta-test-namesp Captured Messages. (Sum), rta-test-namesp 		
		coptare and a second se		
	Event Hubs (1)			
	Search to filter items by name			
	Name	Status Message	retention Partition count	
	rta-test-hub	Active 1 hour	2	

- 5. Create an Event Grid System Topic
 - a. In the search bar at the top type in "Event Grid System Topics" and select the event grid system topics option under services to navigate to the even grid system topics page..
 - b. Click create in the top left corner to create a new event grid system topic.
 - c. In the Create Even Grid System Topic window enter set the Topic Types to "Azure IoT Hub Accounts, Select your azure subscription, select your resource group, and enter a name for the topic



Home > Event Grid System topics >	- ·
Event Grid Syste	em Topic
Basics Tags Review + create	
Topic Details	
	in existing azure resource which allows customer to subscribe events ource is created in the same subscription and resource group as the
Topic Types	Azure IoT Hub Accounts
Subscription *	Azure subscription 1
Resource Group *	Azure subscription 1 Ita-resource-group Ita-test-bub
Resource *	rta-test-hub V
System Topic Details	
Enter required settings for this system top	ic.
Name *	rta-test-topic 🗸
Location	eastus
Identity	
Managed identities are used to authentica Learn more about Managed Identities	ite an Event Grid topic to Azure service instances when delivering events.
System assigned identity \bigcirc	
Review + create < Previous	Next: Tags >

- d. Click Review + create in the bottom left corner.
- e. On the review + create page click create the create the Event Grid System Topic.
- f. Once the event grid system topic is initialized click go to resource to navigate to the Event Grid System Topic Panel. If go to resource is not an option navigate back to the even grid system topic section and select the newly created event grid system topic from there to access the main panel.

Home > Event Grid System topics >		-					-			
Tta-test-topic										×
P Search ○ «	+ Event Subscription	n 🔋 Delete 🖒 Refresh 🔗 Give fee	dback							
E Overview										JSON View
Activity log	Resource group (move	a : rta-resource-group			Source : rta-test-hub					
Access control (IAM)	Status	: Active			Source Type : Microsoft.Devices.IoTHub	bs				
	Location	: East US								
	Subscription (move)	Azure subscription 1								
> Settings	Subscription ID	: 4f0bf630-94d0-4b0b-b594-fccd8aa31d	Ħ							
> Entities	Tags (edit)	: Add tags								
> Monitoring	- syr caas									
> Automation	Show metrics: Gene	eral Errors Latency Dead-Letter				For the last: 1 hour	6 hours 12 hours	1 day	7 days	30 days
> Help	100									
	90									
	80									
	70									
	60									
	50									
	40									
	20									
	10									
	0									
	12 PM		12:15 PM		2:30 PM	12.45 PM			L	UTC-05:00
	Published Events (S	ium) sta-test-tonic Publish Failed	Events (Sum), rta-test-topic	Matched Events (Sum), rta-test-top	c Delivered Events (Sum), rta-test-topi	ic Dead Lettered Events (Si	um) ita-test-tonic			
			Events (Sum), rta-test-topic	Advanced Filter Evaluations (Sum), r		-				

- g. In the your new event grid system topics main panel hit add event subscription in the top left corner.
- h. In the create Event Subscription window:
 - i. Enter a name for the subscription



- ii. Under event types, ensure that Device Created, Device Deleted, Device Connect, Device Disconnect, and Device Telemetry are all selected.
- iii. Under Endpoint Select Event Hub as the endpoint type.
- iv. Under endpoint details click "Configure an Endpoint"
- v. In the newly opened Select Event Hub window, select your azure subscription, resource group, namespace, and event hub and click confirm selection.

Home & Event Grid System tension >	the test tests >				
Home > Event Grid System topics > rta-test-topic >					
Create Event Subsci Event Grid	ription				
Basics Filters Additional Features	5 Delivery Properties				
Event Subscriptions listen for events emitte Learn more	ed by the topic resource and send them to the endpoint resource.				
EVENT SUBSCRIPTION DETAILS					
Name *	rta-test-sub 🗸				
Event Schema	Event Grid Schema V				
TOPIC DETAILS					
Pick a topic resource for which events show	uld be pushed to your destination. Learn more				
Торіс Туре	🕅 loT Hub				
Source Resource	🛱 rta-test-hub				
Topic Name	🗵 rta-test-topic				
EVENT TYPES					
Pick which event types get pushed to your	destination. Learn more				
Filter to Event Types *	5 selected V				
ENDPOINT DETAILS					
Pick an event handler to receive your event	s. Learn more				
Endpoint Type *	E Event Hub (change)				
Endpoint *	rta-test-hub (change)				
MANAGED IDENTITY FOR DELIVERY					
events. Select either a system assigned or a	te an Event Grid topic to Azure service instances when delivering user assigned managed identity. You should have already configured ch this event subscription is associated. Learn more about Managed				
Managed identity type	None				
Create					

i. Click create in the lower left corner of the webpage.



Testing Microsoft Azure Communication

Once you have the Azure configured, you can use their <u>Azure IoT Explorer</u> utility to test the connection is working.

To set up Azure IoT Explorer:

- 1. open the utility and select the IoT Hubs tab on the left
- 2. Click the Add connection button
- 3. In the Add connection String window that appears enter the connection string for your IoT Hub.
 - a. This can be obtained by navigating to the IoT Hubs overview window in azure, selecting Shared access policies from the left pane, and opening the iothubowner policy.
- 4. Click save.
- 5. Your hub should now be listed in the IoT hubs section as shown below.

Home > IoT hubs		
=	+ Add connection Switch authentication method	
器 loT hubs		
🔗 IoT Plug and Play Settings	rta-test-hub	1
Notification Center	Host name	
	rta-test-hub.azure-devices.net	D
	Shared access policy name	
	iothubowner	D
	Shared access policy key	
	•••••	D
	Connection String	
	······································	ß
	ightarrow View devices in this hub	

6. You can then click on the hub name to view devices available in the hub and see their current status.



Home > rta-test-hub > Devices				
🛨 New 💍 Refresh 🔟 Delete				
Query by device ID	\rightarrow \bigcirc Add query	y parameter		
Device ID $ \smallsetminus $	Status \vee	Connectio \vee	Authentica \vee	Last status \vee
mqtt-explorer-device	Enabled	Disconnected	Sas	
rta-test-device	Enabled	Disconnected	Sas	

7. Selecting a device within the hub will provide device specific information such as its Primary Connection string. It also provides useful tools for seeing data being from the device to Azure as well as send test messages from Azure to the device.



Send data from Microsoft Azure to RTA gateway

Below is how the RTA Microsoft Azure Service is set up to receive data from Microsoft Azure.

	Enable					Azu	re 1							
	Device Label QT01						Netw	work Inte	rface	Switch N	1od	e (DHCP	Assigne	ed) ~
	Prim	ary Connecti	on String	HostName	=rta-test	-hub.a	zure-dev	ices.net;[DeviceI	id=rta-tes	st-de	evice;Sha	aredAcc	es
	Client	ID rta-test-de	evice						Add Ti	imestam	p to	o Publis	hes	
	TCP	Port 8883	1-6553	85 (Defau	lt: 8883))	Ke	ep Alive	60	0-	200) sec (0	to Disa	able)
				# of JSO	N Name	/Value	Pairs	1	0-50	0				
		# of Publish	Paths 0	0-2	50			# of \$	Subsc	ribe Pat	hs	1	0-1	
					G	Generat	e Paths							
s	ON Nam	e/Value Pa	airs											
	Line #		Path				J	SON Na	ime			JSO	N Poin	t Type
	1	devices/rta-t	est-device/o	devicebour	nd, v	messa	ge					INT (8-bit)	~
						<<]1-	·1 >>							
					Sa	ave Par	ameters)						
	View Publish Paths								V	iew Subs	cribe	e Paths		
u	bscribe	Paths (MC	QTT to 46	0ETCC	(T)									
	Line #	Enable					Path N	Name						QoS
	1													0 ~
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	101100/ 00		unu/#/							

In Azure IoT Explorer, navigate to the device you wish to receive data from Azure on. In the device configuration select the Cloud-to-device message tab on the left.

In the Cloud-to-device message tab, enter the message to be sent to the RTA in the message body section and click Send message to device at the top of the page. An example payload for the configuration above can be seen in the image below.



Home > rta-test-hub > Devices > rta-t	est-device > Cloud-to-device message
=	☑ Send message to device
Device identity	Claud to device manager / You can and more
🔁 Device twin	Cloud-to-device message You can send mess
C Telemetry	Message body 🛈
y Direct method	{ "message" : 24 }
☑ Cloud-to-device message	
🛠 Module identities	Add timestamp to message body
ST IoT Plug and Play components	∧ Properties ①
	 Add custom property Add system
	Key \sim

Navigate to the RTA display data page, view data from MQTT, refresh the page, and the value should be visible as shown below.

	RTA						www.rtautomation.com
	eal Time Autor	mation, Inc.					MODE: RUNNING 460ETCQT
	Configuration Mode	Display Data					Edit Mapping View as Text
	Main Page	Select a Device	llen-Bradley PLC	(Not Configu	red) v View		
CON	IFIGURATION	Select a Device	then-bradley FLO	(Not Conligu	view		
	Network Configuration		MQTT to PLC				PLC to MQTT
	Allen-Bradley PLC						
	MQTT Client				<< 1 >>		
	Data Mapping				Displaying 1-1 of 1		
	Display Data				460ETCQT		
			MQTT				PLC
DIAC	SNOSTICS				$\rightarrow \rightarrow$		
	-Select- v	Name	Value (Hex)	Manipulation	Name	Value (Hex)
отн	IER	message	24	0x18	~~	N/A	Point Not Mapped
	-Select- v						



Send data from RTA gateway to Microsoft Azure (Publish Topics)

This example shows a PLC writing data to the RTA gateway and presenting that data to the Publish topic on Microsoft Azure

Ī	Enable				Azu	ro 1					
ļ					Azu						
		Device L	abel QT01			Network Inte	erface Swit	ch Mode	e (DHCP	Assigne	d) ~
	Prim	ary Connect	ion String Hos	stName=rta-te	est-hub.a	zure-devices.net;	DeviceId=rta	a-test-de	vice;Sha	aredAcce	es
	Client	ID rta-test-d	evice				Add Times	tamp to	Publis	hes	
	TCP	Port 8883	1-65535 (Default: 888	3)	Keep Alive	60	0-200	sec (0	to Disa	ble)
			# o	f JSON Nan	ne/Value	e Pairs 1	0-500				
		# of Publish	Paths 1	0-250		# of	Subscribe	Paths ()	0-1	
					Generat	e Paths					
19/		o/Voluo D									
	SON Name/Value Pairs										
- -		e value P									4 Turn e
	Line #		Path			JSON N	ame			N Poin	t Type
[sages/ev v	Data	JSON N	ame			N Poin (8-bit)	t Type ~
	Line #		Path	sages/ev >	Data		ame				
	Line #		Path		<< 1-	1 >>	ame				
	Line #		Path			1 >>					
	Line #	devices/rta-	Path		<< 1-	1 >>		ubscribe			
	Line # 1	devices/rta-	Path test-device/mes	(<< 1-	1 >>		ubscribe			
	Line # 1	devices/rta-	Path test-device/mes Publish Paths	(<< 1-	1 >>		ubscribe			
	Line # 1	devices/rta- View	Path test-device/mes Publish Paths TCQT to MC	2 TT)	Save Par	-1 >> rameters	View S				×]

P	LC	460ET		1	ΜQTT
Name	Value (Hex)	Manipu	lation	Name	Value (Hex)
Data_From_PLC_2_AZR	68	0x44	→ →	devices/rta-test-d messages/eve Data_From_RTA_: Data	nts/



In Azure IoT Explorer, navigate to the device you would like to publish data to and select the telemetry tab on the left. In the telemetry window click Start in the top left corner. Any messages published to the selected device will now be shown in the telemetry window.

Home > rta-test-hub > Devices > rta-te	est-device > Telemetry
=	Stop 🗌 Show system properties 💼 Clear events {} Simulate a device 🗍 Customize Content Type
Device identity	Tolows the second secon
🔁 Device twin	Telemetry You can monitor telemetry that the device sends to the IoT hub
🖵 Telemetry	Consumer group ① \$Default
✓ Direct method	Specify enqueue time ①
Cloud-to-device message	No Use built-in event hub Yes
ST IoT Plug and Play components	① Receiving events
griot hug and hay components	Tue Oct 22 2024 09:50:31 GMT-0500 (Central Daylight Time):
	<pre>{ "body": { "Data": 68 }, "enqueuedTime": "Tue Oct 22 2024 09:50:31 GMT-0500 (Central Daylight Time)" }</pre>



QT Publish Trigger

By default, the RTA gateway will publish to the broker based on change of state. This means a new publish to the broker will occur any time a value changes. In an application where the client is being charged per publish, such as with Azure, this is not ideal. In this situation the QT Publish trigger can be configured. When the QT Publish Trigger is configured a publish will only occur when the trigger value is incremented, allowing the user to control when data is published.

In the example below, it is shown how the trigger would be configured for MQTT device 1. A trigger value is being mapped from the mating protocol into the QT TriggerPublish1 destination. With this configuration all topics configured on MQTT device 1 will be published when the trigger value is incremented.

Enable	Mapping 2	
Source	Enable Manipulation	Destination
Group: ETC01 Trigger_Value (Int16) V Start: Trigger_Value V End: Trigger_Value V	• • -> • •	Group: QT TriggerPublish1 (Uint16) v Start: TriggerPublish1 v End: TriggerPublish1

To trigger for MQTT device 2 or 3, TriggerPublish2 or TriggerPublish3 should be selected under the "Start" dropdown in the destination configuration as shown below.

C Enable	nable Mapping 2						
Source	Enable Manipulation	Destination					
Group: ETC01 Trigger_Value (Int16) V Start: Trigger_Value V End: Trigger_Value V	• • -> • •	Group: QT TriggerPublish1 (Uint16) V Start: TriggerPublish1 V End: TriggerPublish1					
	<< >>	TriggerPublish2 TriggerPublish3					



Mapping - Transferring Data Between Devices

There are 5 ways to move data from one protocol to the other. You can combine any of the following options to customize your gateway as needed.

Option 1 – Data Auto-Configure Mappings: The gateway will automatically take the data type (excluding strings) from one protocol and look for the same data type defined in the other protocol. If there isn't a matching data type, the gateway will map the data to the largest available data type. See Data Auto-Configure section for more details.

Option 2 – String Auto-Configure: The gateway will automatically take the string data type from one protocol and map it into the other. See String Auto-Configure section for more details.

Option 3 – Manual Configure Mappings: If you don't want to use the Auto-Configure Mappings function, you must use the manual mapping feature to configure translations.

Option 4 – Manipulation/Scaling: You can customize your data by using math operations, scaling, or bit manipulation. See Data Mapping-Explanation section for more details.

Option 5 – Move Diagnostic Information: You can manually move diagnostic information from the gateway to either protocol. Diagnostic information is not mapped in Auto-Configure Mappings Mode. See Diagnostic Info section for more details.

Going from Manual Mapping to Auto-Mapping will delete ALL mappings and manipulations configured.

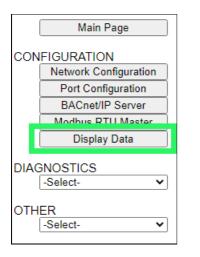


Display Mapping and Values

The Display Data and Display String pages are where you can view the actual data for each mapping that is set up.

Display Data

Click the **Display Data** button to view how the data is mapped and what the values of each mapping are.



Here you will see how each data point (excluding strings) is mapped. To view, select the device from the dropdown menu and click **View** to generate the information regarding that device. Then select either the **Protocol 1 to Protocol 2** or **Protocol 2 to Protocol 1** button, correlating to the direction you wish to see the data.

Display Data	Edit Mapping View as Text
Select a Device Modbus TCP Server IP Address: 0.0.0.0 View	
Protocol 1 to Protocol 2	Protocol 2 to Protocol 1



This page is very useful when verifying that all data is mapped somehow from one protocol to another. If a data point is not mapped, it will display on this page in a yellow highlighted box. The Display Data page will display up to 200 mappings per page, simply navigate to the next page for the additional mapping to display.

Mod	bus RTU to BACne	t/IP			BACnet/IP to Modb	us RTU
			< 1 > Displaying 1-201 of 3	> 300		
	Modbus RTU		460MMBS 		BACnet/IP	
Name	Value	e (Hex)	Manipulation	Name	Valu	e (Hex)
400001			> >	AI1		
400002			→→	AI2	Mapping Dis	abled for Point
400003			→→	AI3		

In the above example, we see the following:

- Modbus register 400001 from Slave 1 is being mapped to Al1 on BACnet
- Nothing is being moved from Modbus register 400002 to AI2 on BACnet because the mapping is disabled
- Modbus register 400003 from Slave 1 is being mapped to AI3 on BACnet

NOTE: If a data point is mapped twice, only the first instance of it will show here. EX: If Modbus 400001 & 400040 from Slave 1 are both mapped to Al1, only 400001 will show as being mapped to Al1.

If there are values of "--" on this page, it indicates that the source has not yet been validated and no data is being sent to the destination.

The example below reflects the Modbus to PLC flow of data. The Modbus (left side) is the source and the PLC (right side) is the destination.

- The 460 gateway has received valid responses from Modbus registers 400001- 400005 and therefore can pass the data on to the PLC tag called MC2PLC_INT.
- The 460 gateway has NOT received valid responses from Modbus register 400011 & 400012. As
 a result, the data cannot be passed to the PLC tag ETC01_GN0_INT2 and indicates so by using "- "in the value column of the table.



Display Data	1					Edit Mapping View as Text
Select a Device	Modbus TC	CP Server IP Address	s: 10.1.16.16	✓ View		
1	Nodbus TCP/I	P to PLC		F	LC to Modbus	TCP/IP
			Cisplayin	1 >> g 1-7 of 7		
	Modbus	TCP/IP		тсмс ➔	PLC	
Name		Value (Hex)	Manip	ulation Name	Valu	ie (Hex)
400001	15	0x000F	→→	ETC01 MC2PLC_INT[0]	15	0x000F
400002	1495	0x05D7	→→	ETC01 MC2PLC_INT[1]	1495	0x05D7
400003	1	0x0001	→→	ETC01 MC2PLC_INT[2]	1	0x0001
400004	23	0x0017	→→	ETC01 MC2PLC_INT[3]	23	0x0017
400005	3	0x0003	→→	ETC01 MC2PLC_INT[4]	3	0x0003
400011			→→	ETC01 ETC01_G2N0_INT[0]		
400012			→→	ETC01 ETC01_G2N0_INT[1]		

To view the actual data mappings, click the **Edit Mapping** button. For more details, see the Data Mapping-Explanation section.

To view the data mappings purely as text, click the **View as Text** button. For more details, see the View Data Mapping as Text section.



Display String

Click the **Display String** button to view what the values of each Parsing and/or Concatenating strings are, you can also click on the Edit Mapping to view the mapping of each string.

	Main Page
CON	FIGURATION
	Network Configuration
	Port Configuration
	ASCII
	Allen-Bradley PLC
	Display Data
	Display String
	Restart Now
DIAG	NOSTICS
	-Select-
OTH	ER -Select-

To view the source or destination groups from a string, click the dropdown menu to generate the information regarding that device. The string data will be displayed in both Hex and ASCII (only the ASCII data is sent). The example below shows data that is coming from the source device. A group will be displayed for each Parsing/Concatenating String field that is configured.

Display String	Edit Mapping View as Text
Select a Group Src: Line 1 Barcode Scanner and a String Barcode Scanner (11 byte	5)
0000: 68 65 6C 6C 6F 20 77 6F 72 6C 64 hello world	

In the Group drop down, "Line1" is defined on the ASCII Device configuration page and "Barcode Scanner" is defined in the ASCII Parsing configuration.

C Enable ASCII I	Device 1			
Port Port 1 (DB9)		Device Label Line1		
LED Inactivity 0 0-60000 s	Opera	ation Mode Mark Data New	on New Messa	age 🗸

Field	Start Location	Length	Data Type	Internal Tag Name	•
1:	1	0	String 🗸	Barcode Scanner	



If there are values of "Data Not Valid "on this page, it indicates that the source has not been validated yet and no data is being sent to the destination.

Display String	Edit Mapping
	View as Text
Select a Group Src: Line 1 Barcode Scanner and a String Barcode Scanner (0 by	tes)
Data Not Valid	

NOTE: You can view the whole string data by clicking on **Diagnostics Info** drop down and navigating to ASCII Diagnostics page. You will also have to select the port you want to view in the dropdown below ASCII.

Diagnostics	;
ASCII	View
Port 1 (DB9) ~	View

To view the string mappings, click the **Edit Mapping** button. For more details see the **String Mapping-Explanation** section.

Display String	Edit Mapping
•	view as rext
Select a Group Src: Line 1 Barcode Scanner and a String Barcode Scanner (11 bytes)	;)
0000: 68 65 6C 6C 6F 20 77 6F 72 6C 64 hello world	

NOTE: Only String data types can be mapped to another String data type.

String Mapping Configuration		Help
# o	Manual Configure f Mappings to Configure: 1 Set Max # of Mappings </th <th>250</th>	250
Enable	Mapping 1	
Source		Destination
Group: Line 1 Barcode Scanner	• • • • • •	Group: ETC01 ETC01_G2N0_STRIN String: ETC01_G2N0_STRING

To view the string mappings purely as text, click the **View as Text** button. For more details see the **View String Mapping** as Text section.

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Display String use case

Sending a message of "RTA,Support,Rocks" from an ASCII device to the RTA unit. The ASCII Parsing Configuration would look like my example below. There are more detailed examples of what all the fields represent in the ASCII Parsing section.

		ASC	II Devi	ce 1 (Line1)
Max	Number of Fields	: 3	1-50	Min Numb	per of Fields: 1 1-50
		Parsing D	elimiter:	, 44 0x2c	▼
			Update	Fields	
Field	Start Location	Length	Dat	ta Type	Internal Tag Name
1:	1	0	String	~	Header 1
2:	1	0	String	~	Header 2
3:	1	0	String	~	Header 3

The message is broken up into 3 "Groups" or Parsing fields.

Display String			Edit Mapping View as Text
Select a Group Src: Line1 Header 1	✓ and a String Header 1 ✓	(3 bytes)	
0000: 52 54 41	RTA		
Display String			Edit Mapping View as Text
Select a Group Src: Line1 Header 2	✓ and a String Header 2 ✓	(7 bytes)	
0000: 53 75 70 70 6F 72 74	Support		
Display String			Edit Mapping View as Text
Select a Group Src: Line1 Header 3	✓ and a String Header 3 ✓	(5 bytes)	
0000: 52 6F 63 6B 73	Rocks		

To view the Entire message, click on the Diagnostic drop down, select Diagnostics Info. Select ASCII, click view, select your Port. Whole data will be in the Last Message Sent Diagnostic box.

Diagnostica	Last Messag	ge Sent (1	7 bytes)			
Diagnostics	0000:		1 2C 53	75 70 70	6F 72 74 2C 52 6F 63	6B RTA,Support,Rock
ASCII View Port 1 (DB9) View	0016:	73				5

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Data and String Mapping – Auto-Configure

The Auto-Configure function looks at both protocols and will map the data between the two protocols as best as it can so that all data is mapped. Inputs of like data types will map to outputs of the other protocols like data types first. If a matching data type cannot be found, then the largest available data type will be used. Only when there is no other option is data truncated and mapped into a smaller data type.

If the Auto-Configure function does not map the data as you want or you want to add/modify the mappings, you may do so by going into Manual Configure mode.

The following are examples of the Auto-Configure function.

1) This example shows a common valid setup.



- a. Both Source values were able to be mapped to a corresponding Destination value.
- 2) This example shows how Auto-Configure will make its best guess.

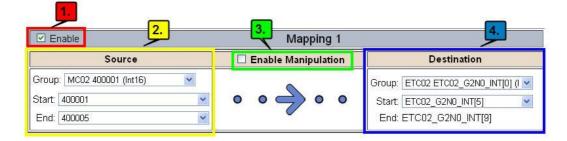
Source	Destination
8-bit Sint	8-bit Sint
16-bit Int	16-bit Int
32-bit Uint	32-bit Uint
32-bit Float	32-bit Uint

 a. The 32-bit Float from the Source location could not find a matching Destination data-type. After all other like data types were mapped, the only data type available was the 2nd 32-bit Uint data type. Auto-Configure was completed even though the data in the Float will be truncated.



Data Mapping – Explanation

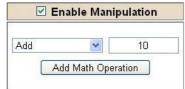
Below are the different parts that can be modified to make up a data mapping.



1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.

2) Source Field (yellow box above):

- a) Group Select the data group you set up in the protocol config to use for this mapping.
- b) Start This is the starting point for this mapping.
- c) End This is the final point to be included for this mapping.
- 3) Manipulation Area (green box above):
 - a) Enable the Data Manipulation. This can be enabled for any mapping.
 - b) Click Add Math Operation for each operation needed. Up to 3 are allowed unless you are using the Scale, Set Bit, or Invert Bit functions. If using Scale, Set Bit, or Invert Bit, then only 1 operation is allowed.
 - c) Select the Operation(s) to perform.
 - i) Math Operations are performed in the order they are selected.
 - ii) If more than one point is selected on the source, the Math Operations will be performed on every point.
 - d) Enter the value(s) for the operation.



Example of Add (similar for Subtract, Multiple, Divide, and MOD). This will add a value of 10 to the source field before it is written to the destination field.

Enable Manipulation					
	Scale		*		
Src [1	to	10		
Dst 🛛	1	to	100		

Example of Scale. This will scale the source values from 1-10 into 1-100 for the destination.

Enable Manipulation				
Set B	it 💌			
Src	Dst			
0	5			
(0-15)	(0-15)			

Example of Set Bit (similar to Invert Bit). This will take the value of the Oth source bit and copy it into the value of the 5th destination bit.

- 4) Destination Field (blue box above):
 - a) Group Select the data group you set up in the protocol config to use for this mapping.
 - b) Start This is the starting point for where the data is being stored.
 - c) End The End point is derived from the length of the source and cannot be modified.
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Data Mapping – Adding Diagnostic Information

Data Mapping offers 5 different types of information in addition to any scan lines specified for each protocol.

IMPORTANT NOTE: Only add Diagnostic Information **AFTER** both sides of the gateway have been configured. If changes to either protocol are made after diagnostic information has been added to the mapping table, it is necessary to verify all mappings. Remapping may be necessary.

1) Temporary Ram (Int64)

- a) This offers five levels of 64bit Integer space to assist in multiple stages of math operations. For example, you may wish to scale and then add 5. You can set up a single translation to scale with the destination as the temporary ram. Then another translation to add 5 with the source as the temporary ram.
- b) The gateway will automatically convert the Source to fit the Destination, so there is no need for Int 8, 16, 32 since the 64 may be used for any case.

✓ Enable	Mapping 1			
Source	Enable Manipulation	Destination		
	Scale Image: Scale Src 1 to 10 Dst 1 to 100	Group: Temporary Ram0 (Int64) Start: Ram1 End: Ram1		
🗹 Enable	Mapping 2			
Source	Enable Manipulation	Destination		
	Add S Add Math Operation	Group: Temporary Ram0 (Int64)		

In this example, Ram0 is scaled into Ram1. Ram1 is then increased by 5 and stored into Ram2. Ram0 and Ram2 could be considered a source or destination group.

2) Temporary Ram (Double)

a) This is like the Temporary Ram (Int 64), except manipulations will be conducted against the 64bit floating point to allow for large data.

3) Ticks Per Second

a) The gateway operates at 200 ticks per second. This equates to one tick every 5ms. Thus, mapping this to a destination will give easy confirmation of data flow without involving one of the two protocols. If data stops on the destination end, then the RTA is offline.

C Enable Mapping 1					
Source	Enable Manipulation	Destination			
Group: Ticks Since Powerup (Uint32) Start: Since Powerup End: Since Powerup	• • -> • •	Group: BS01 Al1 (Float) Start: Al1 Contemporation Al1			

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4) Heartbeat 100ms Update

a) The Heartbeat 100ms Update variable can be used as a heartbeat that updates once every 100ms. The variable starts at 0 on gateway startup and increments by 1 every 100ms. This can be mapped into a destination on one of the available protocols to monitor the gateways connection status. If the value stops updating every 100ms the gateway is offline.

Enable Mapping 1						
Source Enable Manipulation Destination						
Group: Heartbeat 100ms Update (Uir ~		Group: ETC01 Heartbeat (Int32) V				
Start: 100ms Update	$\circ \circ \longrightarrow \circ \circ$	Start: Heartbeat 🗸				
End: 100ms Update V		End: Heartbeat				

5) Heartbeat 1000ms Update

a) The Heartbeat 1000ms Update variable can be used as a heartbeat that updates once every 1000ms. The variable starts at 0 on gateway startup and increments by 1 every 1000ms. This can be mapped into a destination on one of the available protocols to monitor the gateways connection status. If the value stops updating every 1000ms the gateway is offline.

Enable Mapping 1						
Source Enable Manipulation Destination						
Group: Heartbeat 1000ms Update (Ui 🗸		Group: ETC01 Heartbeat (Int32) V				
Start: 1000ms Update 🗸 🗸	$\circ \circ \longrightarrow \circ \circ$	Start: Heartbeat				
End: 1000ms Update v		End: Heartbeat				

6) XY_NetBmpStat

a) If a protocol is a Client/Master, there is a Network Bitmap Status that is provided on the Diagnostics Info page under the Variables section.

Modbus RTU Master	
Device Status Connected and Running	
LED Status Connection Status:	Connected
Variables	
Network Bitmap Status:	0x0000001f

- b) Since a Client/Master may be trying to communicate with multiple devices on the network, it may be beneficial to know if a Server/Slave device is down. By using this Network Bitmap Status, you can expose the connection statuses of individual devices. **Values shown are in HEX.**
 - i) 0x0000002 shows that only device 2 is connected
 - ii) 0x00000003 shows that only devices 1 and 2 are connected
 - iii) 0x0000001f shows that all 5 devices are connected (shown in image above)



c) There are multiple ways to map the NetBmpStat.

Option 1: Map the whole 32bit value to a destination. Example below shows the NetBmpStat is going to an Analog BACnet object. Using a connection of 5 Modbus Slave devices Al1 will show a value of 31.0000. Open a calculator with programmer mode and type in 31, this will represent bits 0 - 4 are on. This mean all 5 devices are connected and running.

If using an AB PLC with a Tag defined as a Dint, then expand the tag within your RSlogix software to expose the bit level and define each bit as a description such as device1, device2, etc.

Enable Mapping 1					
Source	Destination				
Group: MM NetBmpStat (Uint32) Start: NetBmpStat Contemp Stat Contemp	•	• -> • •	Group: BS01 Al1 (Float) Start: Al1 Control Al1 Control Al1 Control Al1		

Option 2: You can extract individual bits from the NetBmpStat by using the Set Bit Manipulation and map those to a destination. You'll need a mapping for each device you want to monitor. Example below shows Modbus device 2 (out of 5) is being monitor to a BACnet Binary Object. You can define the object in the BACnet Name configuration.

Enable Mapping 1						
Source	Enable Manipulation	Destination				
Group: MM NetBmpStat (Uint32) Start: NetBmpStat End: NetBmpStat	Set Bit Src Dst 1 0 (0-31) (0)	Group: BS01 BI1 (Bit1) Start: BI1 Find: BI1				



7) Status_XY

a) There are two Statuses provided, one for each protocol. This gives access to the overall status of that Protocol. Each Bit has its own meaning as follows:

Commo	on Status:	0x000000FF	(bit 0-7)1 st byte
Hex:	Bit Position:	Decimal:	Explanation:
0x00	0	0	if we are a Slave/Server
0x01	0	1	if we are a Master/Client
0x02	1	2	connected (0 not connected)
0x04	2	4	first time scan
0x08	3	8	idle (usually added to connected)
0x10	4	16	running (usually added to connected)
0x20	5	32	bit not used
0x40	6	64	recoverable fault
0x80	7	128	nonrecoverable fault

For this example, the ETC Status is mapped to a PLC tag called PLC_Status

	example, e			u . 20 ti	ab canet		
	PLC to Me	odbus TCP/IP				Modbus TCP/I	IP to PLC
		PLC		тсмс		Modbus TC	CP/IP
Name		Value (Hex) Ma			Name	Val	lue (Hex)
PLC_Sta	itus 19	9 0x0	0000013	~	ETC Status	19	0x00000013
Example	e: ETC Statu	us is 0x00000	013 (19 decim	al), here	e is the l	oreak down	
	Hex	Bit Decir	nal	Expla	ination		
	0x01	0(on) 1	if w	e are	a Mast	ter/Client	
	0x02	1(on) 2	conn	ected	(0 not	t connecte	d)
	<u>0x10</u>	4(on) 16	runn	ing (u	suall	y added to	connected)
	Total: (Dx13 19					
Exter.	nal Faul	lts:	0x00	000FFC	00 (bi	t 8-15)2 nd	^d byte
Hex:	Bit Posi	tion: De	ecimal:	Expla	natio	n:	
0x00 0x01 0x02 0x04 0x08	8 8 9 10 11		0 256 512 1,024 2,048	remo remo idle	e due t		-
	erable H		0x00FF000	0 (bi	t 16-2	23)3 rd byt	
Hex:	Bit Posi	tion: De	ecimal:	Expla	anation	n:	
0x01 0x02	16 17		65,536 131,072				timed out Slave err

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Non-Recoverable Faults 0xFF000000 (bit 24-31)4th byte

Hex:	Bit Position	: Decimal:	Explanation:
0x01	24	16,777,216	nonrecoverable fault - task fatal err
0x02	25	33,554,432	nonrecoverable fault - config missing
0x04	26	67,108,864	nonrecoverable fault - bad hardware port
0x08	27	134,217,728	nonrecoverable fault - config err
0x10 0x20	28 29	268,435,456 536,870,912	Configuration Mode No Ethernet Cable Plugged In

For this example, the MC Status is mapped to a PLC tag called MC_Status

PLC to Modbus TCP/IP to PLC Modbus TCP/IP to PLC						P to PLC
PLC			460ETCMC		Modbus TC	P/IP
Name	Val	ue (Hex)	Manipulation	Name	Val	ue (Hex)
MC_Status	<mark>65601</mark>	0x00010041	*	MC Status	65601	0x00010041

Example: MC Status is 0x00010041 (65601 decimal), here is the break down, we know that bytes 1 and 3 are being used, so here is the break down,

Common	Status	:	
Hex:	<u>Bit:</u>	Decimal:	Explanation:
0x01	0(on)	1	if we are a Master/Client
0x40	6(on)	64	recoverable fault
Hex:	rable F Bit:	Decimal:	Explanation:
0x01	16	65 , 536	recoverable fault - timed
0x01004	-1	65,601	

Total:



String Mapping – Explanation

Below are the different parts that can be modified to make up a string mapping.

String data types can only be mapped to other string data types. There is no manipulation that can be done on the string.

Enable	Mapping 1		
Source		Destination	
Group: Line 1 Barcode Scanner		Group: ETC01 ETC01_G2N0_STRIN♥ String: ETC01_G2N0_STRING ♥	

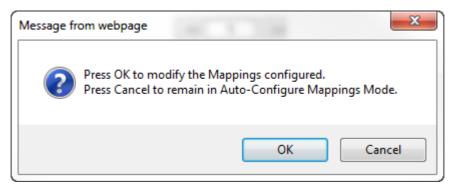
- 1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.
- 2) Source Field (yellow box above):
 - a) Group Select the string data group you set up in the protocol config to use for this mapping.
 - b) String This is the string used for this mapping.
- 3) Destination Field (green box above):
 - a) Group Select the string data group you set up in the protocol config to use for this mapping.
 - b) String This is the string where the data is being stored.



Mapping - Auto-Configure Mode to Manual Configure Mode

To transition from Auto-Configure Mapping Mode to Manual Configure Mode, click the dropdown at the top of the Mapping Configuration page and select Manual Configure.

After you click this button, you will be prompted to confirm if this is really what you want to do.



Click **OK** to proceed to Manual Configure Mode or click **Cancel** to remain in Auto-Configure Mappings Mode.

Once OK is clicked, there are 2 options on how to proceed from here.

Message from webpage	x
Press OK to keep the current Mapping Press Cancel to Delete all Mappings.	s.
OK	cel

- 1) To keep the mappings that are already configured press **OK**.
 - a) You would want this option if you are adding additional mappings or you want to modify the mapping(s) that already exist.
- 2) To delete the mappings that are already there and start over press **Cancel**.

To modify the number of mappings, enter a number in the text field next to **# of Mappings to Configure** and click the **Set Max # of Mappings** button. You can always add more mappings if needed.



Mapping - Manual Configure Mode to Auto-Configure Mode

To transition from Manual Configure Mode to Auto-Configure Mapping Mode, click the dropdown menu at the top of the Mapping Configuration page and select Auto-Configure Mappings.

Message fr	rom webpage
?	Press OK to delete the current Mappings and go back to Auto-Configure Mappings mode. Press Cancel to keep Mappings and remain in current Mode.
	OK Cancel

Click **OK** to proceed to delete all current mappings and go back to Auto-Configure Mappings Mode. Click **Cancel** to keep all mappings and remain in Manual Configure Mode.

NOTE: Once you revert to Auto-Configure Mapping Mode there is no way to recover the mappings you lost. Any mappings you previously have added will be deleted as well.



View as Text

Data Mapping

The View as Text page displays the point to point mapping(s) you set up in the Data Mapping section. This will also display any manipulation(s) that are configured.

Each line on this page will read as follows:

Mapping number: source point **Len**: Number of points mapped -> manipulation (if blank then no manipulation) -> destination point

If you are looking for a specific point to see if it is mapped, you can do a find in this text box for your point in question. Example: you defined 20 Registers starting at register 1 and want to see if 400011 is mapped. If it is not in this text box, then it is not mapped, and no data will be transferred.

This is the text display for the example shown under the *Data Mapping-Adding Diagnostic Information* section.

Data Mapping							
Mapping 1: Mapping 2:	Temporary RamO Temporary Ram1) 1:100 -> Temporary Ram2	Temporary Ram1	

String Mapping

The View as Text page displays the string mapping(s) you set up in the String Mapping section.

Each line on this page will read as follows:

Mapping number: source point -> **Copy** -> destination point

If you are looking for a specific point to see if it is mapped, you can do a find in this text box for your point in question. Example: you defined 20 String Tags in the PLC and want to see if "Test_String" in the Logix PLC is mapped. If it is not in this text box, then it is not mapped, and no data will be transferred.

		String Mapping		
Mapping 1:	Logix Test_String	-> Copy ->	MCO2 400001	
				1

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Base Triggering – Data Validiation Triggering

With Base Triggering, you will be marking data as "Invalid" and force RTA Master/Controller/Client protocols to read all the read data points sources until ALL source protocols data is valid. You will be able to utilize the Handshake to map over to Technology Trigger and/or back over to your source protocol for reference.

How does this work?

- 1) Map the Triggering Variable (Source) over to Trigger # (Dest).
- 2) If Trigger # value changes states mark all Trigger # protocols read data as "Invalid".
- 3) Read all source read data points until ALL source read data is valid.
- 4) Handshake # value is set equal to Trigger # value.
- 5) Map Handshake # to reference data point. Note: # is an internal reference to the Server/Slave number you are settings up. ex. RTA Server/Slave products can only be Trigger 1 and Handshake 1 since we are only 1 device. If RTA is a Master/Client, then you can have a Trigger# for each server/slave connected too.

How do you set this up?

W

In this example I'm using a 460MCBS. My Building Automation System wants to verify that all data read from Modbus TCP/IP Server is valid.

1) Add an extra Analog Output for your Trigger. This tells the RTA to mark all data invalid.

Vrite Data Groups (BACnet/IP to 460MCBS)							
	Data Group	Object Type	Starting Object	# of Objects			
	1	Analog Output (32 Bit Float)	1	21			
	2	Binary Output	1	0			
	3	CharacterString Value	51	0			

a) You can define AI21 as your validation name in the Setup BACnet Names Configuration.

		Setup BACn	ICOV			
21	G01 🗸	Data Validation Trigger	Other 🗸	no-units	~	1.000000

2) Add another Analog Input as reference for when data has been validated. When you write from AO21 to validate data, the RTA will reply to AI40 saying "validation complete".

Data Group	Object Type	Starting Object	# of Objects
1	Analog Input (32 Bit Float)	1	40
2	Binary Input	1	0
3	CharacterString Value	1	0

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40	G01 🗸	Data Validation Result	Other 🗸	no-units 🗸 🗸	1.000000

- 3) Within the Data Mapping page manually add 2 additional mappings.
- 4) The first mapping is going to be the Data Validation Triggering. AO21 will write to the RTA, MC Trigger 1 will mark data invalid.

C Enable	Mapping 2					
Source	Enable Manipulation	Destination				
Group: BS01 AO1 (Float)	Grou	Ip: MC Trigger 0 (Uint16) 🗸				
Start: A021	🛛 O 🔾 O O 🛛 Sta	irt: Trigger 1 🗸 🗸				
End: AO21	Ei Ei	id: Trigger 1				

5) The second mapping, the MC Handshake will increment that all data is validated and write to Al21 "all data is validated". The value of Al40 and AO21 should be the same.

C Enable	Mapping 3						
Source	Enable Manipulation			oulat	ion	Destination	
Group: MC Handshake 0 (Uint16)						Group: BS01 Al1 (Float)	
Start: Handshake 1	•	0	$ \Rightarrow $	0	0	Start: AI40 🗸	
End: Handshake 1						End: AI40	



Security Configuration

To setup security on the 460 gateway, navigate to **Other->Security Configuration**. You can configure Security for 3 administrators, 5 users, and 1 guest.

THIS IS NOT A TOTAL SECURITY FEATURE

The security feature offers a way to password protect access to diagnostics and configuration on the network. The security feature does not protect against "Air Gap" threats. If the gateway can be physically accessed, security can be reset. All security can be disabled if physical contact can be made. From the login page, click the Reset Password button twice. You will be forced to do a hard reboot (power down) on the gateway within 15 minutes of clicking the button. This process should be used in the event a password is forgotten.

Note: Only Admins have configuration access to all web pages.

- Log Out Timer: The system will automatically log inactive users off after this period of time.
 NOTE: A time of 0 means that the user will not be automatically logged off. Instead, they must manually click the Logout button.
- 2) Username: Enter a username, max of 32 characters.
- 3) Password: Enter a password for the username, max of 32 characters, case sensitive.
 - a. Re-enter the Password
- 4) E-mail: In case the password was forgotten, a user can have their password e-mailed to them if e-mail was configured.
- 5) Hint: A helpful reminder of what the password is.

	nfiguration				
Admin	Username	Password	Re-enter Password	Email	Hint
1				Not Configured	
2 [Not Configured	
3				Not Configured	
ser Con	figuration	Admi	in Contact Informatio	סח	
	figuration Username	Admi	in Contact Information Re-enter Password	Email	Hint
			Re-enter		Hint
User			Re-enter	Email	Hint
User 1 [Re-enter	Email Not Configured	Hint
User 1 [2 [Re-enter	Email Not Configured Not Configured	Hint

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Security Configuration-Security Levels

Each webpage in the gateway can have a separate security level associated with it for each user.

Security Levels:

- 1) Full Access: Capability to view and configure a web page.
- 2) View Access: Capability to view a web page, but cannot configure parameters.
- 3) **No Access**: No capability of viewing the web page and page will be removed from Navigation.

Jser 1: Jser 2:	Web Page	Security	
User 3: User 4: User 5:	All Web Pages	No Access 👻 Set	
Guest	Web Page	Security	
	Main Page	Full Access 💌	
	Device Configuration	Full Access 😽	
Port Configuration		Full Access 💌	
	BACnet/IP Server	Full Access 🗸	
	Modbus RTU Master	Full Access 💌	
	View Mapping	Full Access 💙	
	Mapping	Full Access 🛩	
Setup LED's Diagnostic Info Logging		Full Access 👻	
		Full Access 💌	
		Full Access 👻	
	Display Data	Full Access 💌	
	Export Configuration	Full Access 😽	
	Import Configuration	Full Access 💌	
	Save As Template	Full Access 🐱	
	Load From Template	Full Access 💌	
	Utilities	Full Access 🐱	
	Email Configuration	Full Access 💌	
	Alarm Configuration	Full Access 💙	
	String Mapping	Full Access 💌	
	View String Mapping	Full Access 💙	
	Display String	Full Access 💙	



Security - Log In

Username: Name of the user to login.

Password: Password of the user to login.

Log In: If login is successful, the user will be redirected to the Main Page.

Send Password to Email: Sends the specified User's Password to the email configured for that user.

Display Hint: Displays the hint specified for the User if one was set up.

Reset Password: This is used to reset security settings. Confirm reset password must be selected to confirm this action. Once confirmed, there is a 15 minute window to do a hard reset of the gateway by physically removing and restoring power from the gateway. Once power is restored, you may navigate to the IP address of the gateway as normal.

	curity Log In cation Description
Username:	Admin
Password:	
Display Hint	Log In Reset Password

Security - Log Out

Once a user is done with a session they may click **logout** at the top of any page. The user may also be logged out for inactivity based off of the Log Out Timer specified during the configuration.



Closing the browser is not sufficient to log out.



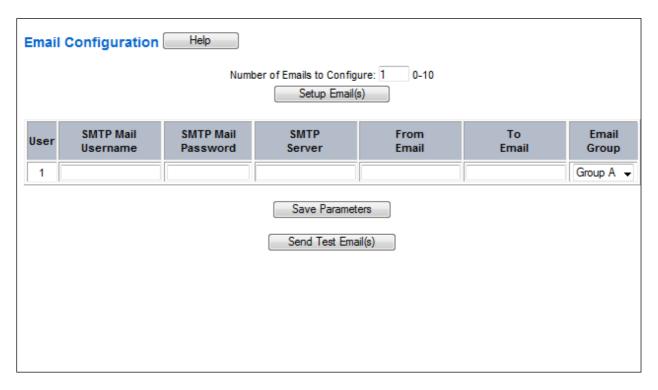
Email Configuration

To setup e-mails on the 460 gateway, navigate to **Other->Email Configuration**.

You can configure up to 10 email addresses.

- 1) SMTP Mail Username: The email address that the SMTP server has set up to use.
- 2) SMTP Mail Password: If authentication is required, enter the SMTP Server's password (Optional).
- 3) SMTP Server: Enter the Name of the SMTP Server or the IP Address of the Server.
- 4) From E-mail: Enter the e-mail that will show up as the sender.
- 5) To E-mail: Enter the e-mail that is to receive the e-mail.
- 6) E-mail Group: Choose a group for the user. This is used in other web pages.

Click the **Save Parameters** button to commit the changes and reboot the gateway.





Alarm Configuration

To setup alarms on the 460 gateway, navigate to **Other->Alarm Configuration**.

1) Alarm Delay upon Powerup: At Powerup, the gateway will have values of '0' stored for all data. This may cause alarms to trigger before these values are updated by the mating protocols. Set this field to provide needed time to update fields before considering values for alarms.

Alarm Configuration				Help
	Alarm Delay	upon Powerup:	0 0-3600 s	
	# of Alarm	is to Configure: Set Max #Ala	1 0-100 arms	
		< <u>1</u>		
🗹 Enable	-	1	Alarm 1	
Data Point	Set Error	Clear Error	Alarm Name	Email
Ticks Since Powerup (Uint32) Ticks Since Powerup	>= 👻	None 💌	Gateway_test	Group A
2				

- 2) Enter the number of alarms to configure and click **Set Max # Alarms** to generate those lines.
- 3) In the Data Point Section:
 - a. Top dropdown: select the Data Group. This dropdown menu will contain all groups that go from the gateway to the network.
 - b. Lower dropdown: select the Data Point's Specific Point. This is used to select which point in the group will be monitored for alarms.
- 4) In the Set Error Section:
 - a. Select the Set Error Operation in the top dropdown menu. Available options are <, >, <=, >=,
 !=, ==, and Change of State (COS). This is the operation that will be used to compare the
 Data Point value against the Error Value to determine if the alarm needs to be set.
 - b. Select the Set Error Value. This value is used as: 'Data Point's Value' 'Operation' 'Value.' Ex: Ticks Since Powerup >= 1000. This will set the alarm after 1000 ticks have elapsed since the unit powered up.



- 5) In the Clear Error Section:
 - a. Select the Clear Error Operation. Available options are <, >, <=, >=, !=, ==, and Change of State (COS). This is the operation that will be used to compare the Data Point value against the Error Value to determine if the alarm needs to be cleared.
 - b. Select the Clear Error Value.
 -Ex: Ticks Since Powerup >= 5000. This will clear the alarm after 5000 ticks have elapsed since the unit powered up.
- 6) Enter an Alarm Name. This will make the alarm unique and will be available in the Alarm Status page as well as in the email generated by the alarm.
- 7) Select an email to associate this alarm with. When an alarm is set, it sends an email. When an alarm is cleared, it will also send an email.

Click the **Save Parameters** button to commit the changes to memory and reboot the gateway.



Diagnostics – Alarm Status

Alarm Status will only display under the Diagnostic menu tab if at least 1 Alarm is enabled.

- 1) # Alarms Enabled: This is a count of enabled alarms.
- 2) # Alarms Active: This is how many alarms are presently active (set).
- 3) Last Active Alarm: This is the last alarm that the gateway detected.
- 4) Clear # of Times Active: This will reset all alarms '# of Times Active' to 0.
- 5) Alarm #: The reference number to the given alarm on the alarm setup page.
- 6) Name: The name of the alarm.
- 7) Status: The current status of the alarm, either OK or ALARM.
- 8) # of Times Active: This count represents the number of times this alarm has become active. If an alarm is triggered, this count will increment.

Alarm Status					
# Alarms Enabled:		1			
# Alarms Ac	tive:	0			
Last Active Alarm:					
				r # of Times Active	
	Alarm#	Name	Status	# of Times Active	
	1	Alarm Example	OK	0	

Alarms - Active

While one or more alarms are active, every page will display 'Alarms Active' at the top of the page. This will no longer be displayed if all active alarms have been cleared.



When an alarm is activated, the following will occur:

- 1) A one-time notification will be sent out to the email associated with the alarm.
- 2) For duplicate emails to occur, the alarm must be cleared and then become active again.
- 3) # Alarms Active and # of Times Active will be incremented.
- 4) Status of the Individual Alarm will be set to Alarm.
- 5) *Last Active Alarm* field will be populated with details on what triggered the alarm. Real Time Automation, Inc. 68 1-800-249-1612



Alarm Status				
# Alarms Enal	oled:	1		
# Alarms Activ	e:	1		
Last Active Ala	arm:	Alarm 1 is Set: Actual: (0 < Limit: 20	
_				ear # of Times Active
	Alarm#	Name	Status	# of Times Active
	1	Alarm Example	Alarm	1

Alarms – Clear

When an alarm is cleared, the following will occur:

- 1) A one-time notification will be sent to the email associated with the alarm.
 - a. For duplicate emails to occur, the alarm must become active and then be cleared again.
- 2) Total # Alarms Active will decrement. Last Active Alarm will not be changed.
- 3) Status of the Individual Alarm will be reset to OK.



Change of State (COS) Configuration

To access the configuration files in the 460 gateway, navigate to dropdown **Other->COS Configuration**. The gateway, by default only writes when data has changed. The gateway also waits to write any data to the destination until the source protocol is successfully connected.

Default values should fit most applications. Change these values with caution as they affect performance.

1)	5						
	the data will be marked as stale within the gateway and will force a write request to occur. This timer is to be used to force cyclic undates in the gateway, since data will only be written if it has						
	timer is to be used to force cyclic updates in the gateway, since data will only be written if it has						
	changed by default. There is a separate timer per data mapping.						
	Gateway behavior:						
	 If time = 0s => (DEFAULT) The gateway will write out new values on a Change of State basis. 						
	 If time > 0s => The gateway will write out new values whenever the timer expires to force cyclic updates (write every x seconds). 						
2)	Production Inhibit Timer: Amount of time after a Change of State write request has occurred						
	before allowing a new Change of State to be written. This is to be used to prevent jitter. Default						
	value is 0ms. This timer takes priority over the Stale Data Timer. There is a separate timer per						
	data mapping. This timer is active only after the first write goes out and the first COS event						
	OCCURS.						
3)							
	next read occurs. Default is 10 and should fit most applications.						
	Warning: A value of 0 here may starve reads if a lot of writes are queued. This may be useful in						
	applications where a burst of writes may occur and you want to guarantee they all go out before						
	the next set of reads begin.						
4)							
	before starting the # of Reads Before Writes. Once the # of Reads Before Writes has occurred,						
- \	the counter for both reads and write will be reset. Default is 1 and should fit most applications.						
5)							
\sim	source data point is connected and communicating. This prevents writes of 0 upon power up.						
6)	Enable Mark Whole Entry New : If Enabled, mark the entire scan line or data group new upon 1 data element within the scan line or data group to be new.						
	change of State Configuration Help						
Ŭ							
	Stale Data Timer: 0 0-3600 s						
	Production Inhibit Timer: 0 0-60000 ms						
	Writes Before Reads: 10 0-255						
	Reads Before Writes: 1 1-255						
	Enable Data Integrity: 🗹						
	Enable Mark Whole Entry New:						
	Save Parameters						

Click the **Save Parameters** button to commit the changes to memory and reboot the gateway.

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Diagnostics Info

The Diagnostics page is where you can view both protocols' diagnostics information, # of Data Mappings, # of String Mapping and # Alarm Mappings.

DIAG	SNOSTICS	
	-Select-	~
	-Select-	
OTH	Diagnostic Info	
	Logging	

For protocol specific diagnostic information, refer to the next few pages.

Diagnostics Mapping

This section displays the number of mappings that are enabled, Data Mapping and String Mapping will show the # of Errors and First Errors. Alarms will show # active and Last Alarm that was active.

Common Errors:

- Destination or Source Point does not exist

 a) Solution: Re-map the mapping
- 2) Source or Destination Pointer too small
 - a) There is not enough space on either the Source, or the Destination for the data you want to copy. This is typically seen when the Destination is smaller than the amount of data being transferred to it.
- 3) Range Discard, Min or Max Value
 - a) The actual data value is outside of the defined range
- 4) Math Error
 - a) Operation value cannot be 0
- 5) Scaling Error
 - a) Source Min must be smaller than Source Max
 - b) Destination Min must be smaller than Destination Max

Data Mapping # Enabled:	5 of 5
# of Errors: First Error:	0
String Mapping # Enabled: # of Errors: First Error:	2 of 2 0
Alarms # Enabled: # Active: Last Active:	3 0

Note: you can also view this information on the Main Page.



Diagnostics – Modbus TCP/IP Client

Select the Modbus TCP/IP Client in the dropdown menu on the Diagnostics Page to view breakdown of the diagnostics and common strings that are displayed on the page. You may also view individual server counters by selecting the device in the *All Servers* dropdown and clicking **View**. Additional diagnostic information can be found by clicking the **Help** button.

Diagnostics		
Modbus TCP/IP Clien	View	Clear All Values
All Server's	View	
All Server's		
MC01 192.168.0.100		Help
MC01 192.168.0.101	way Restart Needed	
MC01 192.168.0.102		

NOTE: This page will auto-refresh every five seconds with the latest data.

Clear All Values - This will only affect displayed values.

 This will return all values displayed to zero and clear the Status Strings. Example: If viewing Modbus TCP/IP client – MC02 10.1.100.17, this will only clear the values for that specific device. This will reduce the overall values indirectly, otherwise select All Servers to clear all devices.

Device Status - This will only display when viewing All Servers.



- 1) Connected The gateway is connected to all the Modbus TCP servers that are enabled and configured.
- 2) Nodes Missing (timed out) One or more enabled Modbus TCP servers are missing.
- 3) Empty Scan List No Modbus TCP servers are configured.



- 4) Dependency Protocol Faulted The dependent protocol is missing causing the communication to go to inactive.
- 5) Unknown: First Scan Not Complete Multiple scan lines are set up for the device and the gateway has not completed all the scan lines.

Diagnostics (MAC: 00:03:F4:06:5D	D6)		Diagnostics (MAC: 00:03:F4:06:5D	:D6)	
Modbus TCP/IP Client View All Server's View		Clear All Values	Modbus TCP/IP Client View MC02 10.1.100.17 View		Clear All Values
Device Status Connected and Running LED Status Connection Status: Variables Network Bitmap Status: FC01 Read Coil Status: FC02 Read Input Status: FC03 Read Holding Registers: FC04 Read Input Registers: FC04 Read Input Registers: FC05 Force Single Coil: FC06 Preset Single Register: FC15 Force Multiple Coils: FC16 Preset Multiple Coils: FC16 Preset Multiple Registers: Successful Responses Received: Error Responses Received: Trimeouts: Status Strings	Connected 0x00000003 3125 0 0 0 3130 0 3130 0 0 0 6255 0 0	Help	LED Status Connection Status: Variables Network Bitmap Status: FC01 Read Coil Status: FC02 Read Input Status: FC03 Read Holding Registers: FC04 Read Input Registers: FC04 Read Input Registers: FC05 Force Single Coil: FC06 Preset Single Register: FC15 Force Multiple Registers: Successful Responses Received: Error Responses Received: Timeouts: Status Strings	Connected 0x00000003 0 0 0 11111 0 0 0 1204 0 0	Help
Last Error Code:			Last Error Code:		

LED Status - This is the Status for All Servers or the specific server selected.



- 1) Solid Green (Connected) The gateway is connected to all the Modbus TCP servers that are configured and enabled.
- 2) Flashing Green (Not Connected) No Modbus TCP servers are configured/enabled.
 - a) Verify Modbus TCP/IP settings and ensure that the *Enable* checkbox is checked for the appropriate device(s).
- 3) Solid Red (Fatal Error) Invalid configuration
 - a) Verify that there are valid scan lines configured for each server that is enabled.
 - b) Verify that the IP address of each Modbus TCP server is valid and is on the same network as the gateway.
- 4) Flashing Red (Connection Timeout) One or more enabled Modbus TCP servers are missing or no configured scan lines with one or more Modbus TCP servers enabled.
 - a) Verify IP address match the device the gateway is connecting to.
 - b) Verify Modbus/TCP server is communicating on the correct TCP Port.
 - c) Verify Modbus/TCP server Device ID



- 5) Flashing Red (Empty Scan List) One or more enabled Modbus TCP servers have no scan lines configured.
- 6) Flashing Red (Communication not attempted yet) (Specific server only) No reads are configured and data needed for writes isn't valid yet.
- 7) Flashing Red (Dependency Error) The dependent protocol is missing causing the communication to go to inactive.
 - a) The other protocol must be *Connected*.
- 8) Off The Ethernet cable is not connected to the gateway or there is no power to the gateway.

Variables - These are the values for All Servers, or the specific server selected.

Variables	
Network Bitmap Status:	0x0000000
FC01 Read Coil Status:	0
FC02 Read Input Status:	0
FC03 Read Holding Registers:	0
FC04 Read Input Registers:	0
FC05 Force Single Coil:	0
FC06 Preset Single Register:	0
FC15 Force Multiple Coils:	0
FC16 Preset Multiple Registers:	0
Successful Responses Received:	0
Error Responses Received:	0
Timeouts:	0
Read Request to Response Time (ms):	0
Read Response to Request Time (ms):	0
High Priority Read Loop Time (ms):	0
Low Priority Read Loop Time (ms):	0
Write Request to Response Time (ms):	0
Write Response to Request Time (ms):	0
Write Loop Time (ms):	0
Status Strings	
Leaf Errar Cealer	

Last Error Code:

- 1) Network Bitmap Status (Displayed in Hex):
 - a) Each bit corresponds to a server. If the bit is set, the server is connected, otherwise the bit is 0.
 - b) Bit 0 corresponds to server 1 and Bit 4 is for server 5 and so on.
- 2) FC01 Read Coil Status:
 - a) Function Code 1: Number of read Coil Status requests sent
 - b) Point Type Used: 0x Coil Status
 - c) # of Points: Any
- 3) FC02 Read Input Status:
 - a) Function Code 2: Number of read Input Status requests sent
 - b) Point Type Used: 1x Input Status
 - c) # of Points: Any
- 4) FC03 Read Holding Registers:
 - a) Function Code 3: Number of read Holding Register requests sent
 - b) Point Type Used: 4x Hold Reg
 - c) # of Points: Any
- 5) FC04 Read Input Registers:
 - a) Function Code 4: Number of read Input Register requests sent



- b) Point Type Used: 3x Input Reg
- c) # of Points: Any
- 6) FC05 Force Single Coil:
 - a) Function Code 5: Number of write Coil Status requests sent
 - b) Point Type Used: 0x Coil Status
 - c) # of Points: 1
- 7) FC06 Preset Holding Register:
 - a) Function Code 6: Number of write Holding Register requests sent
 - b) Point Type Used: 4x Holding Reg
 - c) # of Points: 1
- 8) FC15 Force Multiple Coils:
 - a) Function Code 15: Number of write multiple Coil Status requests sent
 - b) Point Type Used: 0x Coil Status
 - c) # of Points: 2 or More OR Force Function Code 15/16 Enabled for # of Points of 1
- 9) FC16 Preset Multiple Registers:
 - a) Function Code 16: Number of write multiple Holding Register requests sent
 - b) Point Type Used: 4x Holding Reg
 - c) # of Points: 2 or More OR Force Function Code 15/16 Enabled for # of Points of 1
- 10) Successful Responses Received:
 - a) Total number of Read and Write response messages received by the gateway
 - b) Note: Add up all the Function Code Variables and it should be equal to the number of Successful Responses Received
- 11) Error Responses Received:
 - a) Total number of Read and Write error messages sent by the server
- 12) Timeouts:
 - a) Total number of Read and Write response messages not received by the gateway
- 13) Read Request to Response Time (ms):
 - a) -Number of milliseconds it took the Modbus TCP device to reply to a request
- 14) Read Response to Request Time (ms):
 - a) -Number of milliseconds it took the gateway to execute the next request once the previous response has been received
- 15) High Priority Read Loop Time (ms):
 - a) -Number of milliseconds it took to execute all high priority read requests
- 16) Low Priority Read Loop Time (ms):
 - a) -Number of milliseconds it took to execute all low priority read requests
- 17) Write Request to Response Time (ms):
 - a) -Number of milliseconds it took the Modbus TCP device to reply to a request
- 18) Write Response to Request Time (ms):
 - a) -Number of milliseconds it took the gateway to execute the next request once the previous response has been received
- 19) Write Loop Time (ms):
 - a) -Number of milliseconds it took to execute all write requests

Status Strings - These are the values for *All Servers*, or the specific server selected.

1) Last Error Code:



a) Last read request error that the gateway received

Error Code Breakdown:

- 1) Error Code "code" "Function" (N:"ServerAddr" A:"StartAddr" L:"Length"))
 - a) Note: The slave address will inform you of the device that had the error. The starting address and length will inform you the specific scan line that had the error in the device
- 2) Error Codes:
 - a) Error Code 1: Function code received by the slave is not valid
 - b) Error Code 2: The register/status received by the slave is not valid
 - c) Error Code 3: The value received by the slave is not allowable
 - d) Error Code 4: An unrecoverable error occurred while the slave was attempting to reply
 - e) Error Code 5: The slave has accepted the request and is processing it, but a long duration of time will be required to reply
 - f) Error Code 6: The slave is processing another message. The gateway will skip this message.
 - g) Error Code 7: The slave has replied with a NAK. The server cannot perform the program function received in the query

3) Functions:

- a) Specific to the function code being used for the scan line
- 4) N (Slave Address):
 - a) Slave address of the slave that the error was received from
- 5) A (Starting Address):
 - a) Starting address of the register/status that the error was received from
- 6) L (Length):
 - a) Number of points of the register/status that the error was received from

Example:

Error Responses Received:	1434
Timeouts:	0
Status Strings	
Last Error Code:	Error Code 2 - FC01_RdOCI (IP:10.1.50.27 N:1 A:1 L:16)

This Error Code indicates Error Code 2, the register was not valid. Other details are:

- Received the error with FC 01, trying to read a single coil for any number of points
- IP:10.1.50.27 is the address that sent the error.
- N:1, from device 1. This was setup as Unit ID in Modbus TCP/IP Client page.
- A:1, Starting address of 1; aka: 000001 or 00001
- L:16, attempting to read 16 addresses starting at A:1. This is 1 through 16.



The Error Code Indicates *not valid*, so the starting address was not found or there were not 16 sequential coils to be written (1 through 16). To solve this, we need to change the starting address, or reduce the *# of Points* configured.



Diagnostic – MQTT Client

Select the MQTT Client in the dropdown menu on the Diagnostic page to view the breakdown of the diagnostics and common strings that are display on the page. You may also view the individual MQTT device counters by selecting the device in the All Devices drop down and clicking **View**.

NOTE: This page will auto-refresh every five seconds.

Diagnostics			
MQTT Client	View	(Clear All Values
All Devices View			
All Devices		ſ	Help
AWS QT01 ode	. Gateway Restart Needed		
с. — г	Diagnostics		
	MQTT ClientViewAll DevicesView		
	Device Status Configuration Mode Gateway Restar LED Status Connection Status:	t Needed Configuration Mode	

Clear All Values: This will only affect the Variables values.

• This will return all values displayed to zero.

Device Status: This will only display when viewing All Devices. **Connected:** All Devices configured/enabled are communicating

Not Connected: Fatal Error No Configuration

- No Devices that have been configured are enabled
- No Devices that have been configured and enabled have topics configured

Not Connected: Dependency Protocol is Faulted

The Dependency Protocol has Faulted

Error: Timeout

- One or more enabled devices are missing
- Verify MQTT broker for correct IP address.



LED Status

Solid Green (Connected):

- The gateway is connected to all the MQTT devices that are configured and enabled **Flashing Green (Not Connected):**
 - No MQTT devices are configured / enabled. Go to the MQTT Client Device Configuration to configure a device

Flashing Red (Not Connected):

- One or more of the MQTT brokers configured are missing (nodes missing)
- One or more of the MQTT brokers configured do not have topics configured
- The Dependency Protocol has faulted

Flashing Red (Communication not attempted yet):

• No topics are configured and data needed for writes isn't valid yet

Solid Red (Invalid Configuration):

- No devices are enabled
- One or more of the MQTT devices have a conflicted IP address

Off:

- No Power
- No Ethernet cable connected

Variables: These are the values for all servers, or the specific server selected.

Variables	
Network Bitmap Status:	0x0000000
Published Messages to MQTT:	0
Published Messages from MQTT:	0
Subscribed Messages Actual:	0
Subscribed Messages Expected:	0

Network Bitmap Status (Displayed in Hex):

- Each bit corresponds to a MQTT device. If the bit is set, the MQTT device is connected, otherwise the bit is 0.
- Bit 0 corresponds to MQTT device 1 and Bit 2 is for MQTT device 3 and so on.

Published Messages to MQTT:

• Number of Write Topics which have been sent to the MQTT broker

Published Messages from MQTT:

- Number of Read Topics which have been sent from the MQTT broker to the gateway **Subscribed Messages Actual:**
 - Number of Successful Subscribed Topics
 - This should equal the Subscribed Messages Expected

Subscribed Messages Expected:

• Number of Subscribed Topics that the gateway should have open



LED Configuration

To modify the behavior of the LEDs on the 460 gateway, navigate to **Other->Setup LEDs**.

OTH	IER	
	-Select-	~
	-Select-	
	Setup LED's	
		-

Each LED may be set to Disabled, Protocol 1, or Protocol 2. If either protocol is a master/client, you may set the LED to represent either all slaves/servers configured in the gateway or a slave/server device.

To select a slave/server device:

- 1) Select the protocol in the left dropdown menu.
- 2) Click **Save Parameters** to generate the second dropdown menu.
- 3) Select the individual slave/server in the right dropdown menu.

Click the **Save Parameters** button to commit the changes and reboot the gateway.

LED Configuration		
	LED 1 Modbus RTU Master: Connection Status V LED 2 BACnet/IP Server: Connection Status V	All Slave's 🗸
	Save Parameters	



Configuration Files

To access the configuration file in the 460 gateway, select the dropdown Other->Export/Import Config.

отн	ER	
	-Select-	
	-Select-	
	Setup LED's	
	Export / Import Config 📐	
	Export / Import Template	
	Utilities	

Export Configuration

Export Configuration		
	Save Configuration to File	

The Export Configuration allows you to save your configuration file for backup or to be imported into another gateway. This file is named *rta_cfg.rtax* by default.

Upon clicking the **Save Configuration to File** button, you will be prompted to select a location to save the file. Different web browsers will yield different looks.

What do you want to do with rta_cfg.rtax? From: 10.1.16.106	Open	Save	^	Cancel	\times

Import Configuration

You can import a previously exported configuration file or a configuration file from another device into the 460 gateway, whenever it is in Configuration Mode.

Upon clicking the **Choose File** button, you will be prompted to select a location from which to load the saved file. Once the location is selected, you can choose the **Import Network Settings** checkbox if you want to load the network settings of the configuration file or just load the configuration without the network setting.

If you choose to Import Network Settings, this will override your current gateway's network setting with the settings in the configuration file. After you click on the Load Configuration button, a banner will display your gateway's new IP address.

Network Settings have changed. Manually enter IP Address of X.X.X.X in the URL.

If the configuration has successfully loaded, the gateway will indicate that it was successful, and a message will appear under the Load Configuration button indicating Restart Needed.



Import Configuration	
	Choose File No file chosen
	Import Network Settings
	Load Configuration

If it encountered an error while trying to load the saved configuration, the gateway will indicate the first error it found and a brief description about it under the Load Configuration button. Contact RTA Support with a screenshot of this error to further troubleshoot.



Save and Replace Configuration Using SD Card

Saving Configuration Using SD Card

This function saves the gateway's configuration automatically to an SD Card each time the gateway is rebooted via the **Restart Now** button on the web page. If this unit should fail in the future, the last configuration stored on the SD card and can be used for a new gateway to get the application back up and running quickly.

This SD Card replaces every configurable field in the gateway, **EXCEPT** for IP Address, Subnet Mask, and Default Gateway.

Replacing Configuration Using SD Card

To replace a configuration in a gateway using the SD Card, a specific sequence of events must be followed for the replacement to happen correctly:

- 1) Extract SD Card from gateway you wish to copy the configuration from.
- 2) Power up the gateway you wish to copy the configuration to. DO NOT INSERT SD CARD YET.
- 3) Navigate to the webpage inside the unit.
- 4) Navigate to the dropdown **Other->Utilities**.
- 5) If you are not currently in *Mode: Configuration*, go into Configuration Mode by clicking the **Configuration Mode** button at the top left-hand side of the screen.
- 6) Press the **Revert to Manufacturing Defaults** button on the Utilities Page. The Configuration will ONLY be replaced by the SD Card if the gateway does not have a configuration already in it.
- 7) When the unit comes back in *Mode: Running,* insert the SD Card.
- 8) Do a hard power cycle to the unit by unplugging power. DO NOT RESET POWER VIA WEB PAGES.
 - a. It will take an additional 30 seconds for the unit to power up while it is transferring the configuration. During this time, the gateway cannot be accessed via the web page.
- 9) When the unit comes back up, the configuration should be exactly what was on the SD Card.



Intelligent Reset Button

If the IP Address of the gateway is forgotten or is unknown, there is an easy way to recover the IP Address using a reset button on the hardware.



- 1) On the side of the gateway with the SD card slot, there is a small pinhole. Using a paperclip, press the button through this pinhole and hold the button for at least 5 seconds.
- 2) After 5 seconds, the unit will acknowledge the command and LED 1 and LED 2 will start an alternate Blink Green quickly pattern.
- 3) Release the button and the gateway will reset to default IP settings (DHCP).



Utilities

To access the Utilities page in the 460 gateway, navigate to **Other->Utilities**. The Utilities screen displays information about the gateway including Operation Time, File System Usage, Memory Usage, and Memory Block Usage.

OTHER

	-Select- 🗸
	-Select-
	Setup LED's
	Export / Import Config
	Export / Import Template
	Utilities
	Time Configuration
	Email Configuration
1	Security Configuration
	Alarm Configuration
	COS Configuration

Here you can also:

- View the full revision of the software.
- View all the files stored in the Flash File System within the gateway.
- Identify your device by clicking the **Start Flashing LEDs** button. By clicking this button, the two diagnostic LEDs will flash red and green. Once you have identified which device you are working with, click the button again to put the LEDs back into running mode.
- Configure the size of the log through the Log Configuration.
- Bring the device back to its last power up settings.
- Bring the device back to its original manufacturing defaults.
- Remove the Configuration File and Flash Files within the gateway.

Revisions	
	Listing of Revisions
File List	E 1.11.
	File List
Identify Device	
	Start Flashing LED's
o	
Set Up Log	Log Configuration
	Log Configuration
Revert To Last Powerup	
	Revert to Last Powerup
Revert All	
	Revert to Manufacturing Defaults
Reformat Flash	
	Reformat Flash
	,