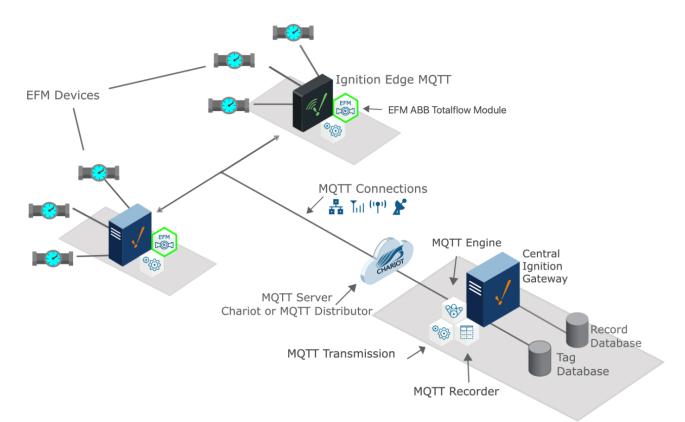
Sending ABB Totalflow Events to a Central Ignition Gateway

Prerequisites

- Knowledge of Ignition and Module installation process: Cirrus Link Module Installation
 - Install the following MQTT Modules on two Ignition systems
 - Ignition System 1 (Central Ignition Gateway)
 - MQTT Distributor
 - MQTT Engine
 - MQTT Recorder
 - Ignition System 2 (Remote/Edge Ignition Gateway)
 - MQTT Transmission
 - EFM ABB Totalflow driver module

Overview

The EFM ABB Totalflow module is capable of polling events from an ABB Totalflow device based on a specified polling rate. With MQTT Transmission, these events can be published as Sparkplug records to an MQTT server. Any client subscribed on Sparkplug RECORD messages can receive these objects. In addition, MQTT Engine when combined with MQTT Recorder can also receive these messages and store these objects in a configured Ignition database. The following drawing shows the general architecture used to do this. This tutorial outlines the process of getting events to the central Ignition gateway.



Sending ABB Totalflow Events to a Central Ignition Gateway

We must configure a total of five Cirrus Link modules on two different Ignition gateways to get event data flowing from an ABB Totalflow device to a central database. These are:

- Central Ignition Gateway
 - MQTT Distributor
 - MQTT Engine
 - MQTT Recorder
- Remote/Edge Ignition Gateway
 - MQTT Transmission

EFM ABB Totalflow

The configuration of each of these modules is covered below based on the Ignition gateway they're installed on.

Central Ignition Gateway Setup

MQTT Distributor can be left in its default configuration. Note in a production system you would likely want to set up TLS especially if MQTT connections are using the Internet.

MQTT Engine can also be left in its default configuration.

MQTT Recorder requires that a database be set up in Ignition. That can be done as described in the 'Connect to a Database' section here. Once a database is set up, MQTT Recorder can be configured. Do so by opening the Ignition Gateway Web UI and browsing to the Configure tab at the top of the screen and then selecting 'MQTT Recorder Settings' as shown in the lower left below.

Once there, select a Datasource as shown in the image below. This drop-down will be populated with any database connections set up in Ignition. Optionally, a Partition Period can be selected to segregated tables by time periods.

	Ignition - Ignition Ga	way × +			
\leftarrow	ି ଜି	0 Cocalhost:8088/web/config/mqttrecorder.settings		⊠ ☆	<u></u>
≌⁄ Ignitio	on				≗admin Log Out→
lgni	tion			Help 🕑	Get Designer
. ♠	SYSTEM	Config > > MQTT Recorder Settings			
Home	Overview	Trial Mode 1:57:28 We're glad you're test driving our software. H	lave fun.		Activate Ignition
ւհս	Backup/Restore				
Status	Ignition Exchange	General Tables			
•	Licensing	General Tables			
Config	Modules Projects				
	Redundancy	Main			
	Gateway Settings				
		Enabled In a contract of the MQTT Recorder	rmodule		
	NETWORKING	LocalMySQL	v		
	Web Server	Datasource The Datasource to use for stor			
	Gateway Network Email Settings				
	Email Settings	Partition Period None	v		
	SECURITY	The period by which tables w	ill be partitioned		
	General				
	Auditing				
	Users, Roles		Save Changes		
	Service Security Identity Providers				
	Security Levels	Note: For additional details on configuring MQTT Re	ecorder, see the		
	Security Zones	documentation here			
	Q Search				

At this point, the Central Ignition Gateway with MQTT Distributor, MQTT Engine, and MQTT Recorder is fully configured and ready to receive MQTT Sparkplug messages from the Remote/Edge Ignition Gateway. MQTT Distributor listens on TCP port 1883 by default for inbound MQTT connections. Make sure the Operating System's Firewall, Antivirus, and Malware protection services allow inbound connections on port 1883/TCP before proceeding.

Remote/Edge Ignition Gateway Setup

With the Central Ignition Gateway ready to receive MQTT/Sparkplug RECORD objects, the EFM ABB Totalflow and MQTT Transmission modules can be configured on the Remote/Edge Ignition Gateway.

Start by configuring the MQTT Transmission module. Do so by opening Ignition Designer and creating a tag structure similar to what is shown below.

• • •		- Ignition-Mac	Book-Pro.local - Ignition Designer	
H H ← → 次 4 = 祝 1	11			
Project Browser	ē _ ×			OPC Browser OPC Browser
Q- Filter	Project Properties 🔏	Scripting	🛄 Learn more 🛛 🖾 Gateway St	tatus
Alarm Notification Pipelines	^	scripting		tatus 👻 🚆 Ignition OPC UA Server
🚠 Sequential Function Charts				- 🗁 [ABB-TF G4 Sim]
- 📃 Scripting	E		Create a New Script	→
Service Perspective Image: Transaction Groups			create a new script	► 💼 SUAGA3-2
Given Groups Section Groups			Name of the script	► SUAGA7-2
	∨			P Server
Tag Browser	ē_×		Create	
+- Q G default	▼ :•			
Tags	UDT Definitions Value			
Tag ▼ - 🚈 Edge Nodes	Value			
- 🗁 G1				
↓- → E1 ↓- → Totalflow G4 Sim				
AGA3-1				
► 💼 AGA7-1				
SUAGA3-2				
► 💼 SUAGA7-2				
	J			169 / 1024 mb
				133 / 1024 Hib g

Note this structure is based on usage of the 'Default Transmitter' in MQTT Transmission. So, the directory structure is very important. Note the structure.

• tag provider/Edge Nodes/[Group ID]/[Edge Node ID]/[Device ID]/...

In the example below this implies the following definitions:

- [Group ID] = G1
- [Edge Node ID] = E1
- [Device ID] = Totalflow G4 Sim

These exact values will be used for the EFM ABB Totalflow connection Sparkplug parameters to tell the EFM ABB Totalflow which MQTT Transmission Transmitter configuration to use and, in turn, which MQTT connection to use to send the history data on.

Next the MQTT Transmission server configuration must be modified to point to the Central Ignition Gateway we set up earlier. To do so, in the Ignition Gateway Web UI browse to the Configure tab on the top and then to MQTT Transmission Settings in the lower left as shown below.

In the MQTT Transmission Settings configuration, click the Servers tab. Then click 'edit' on the Chariot SCADA MQTT Server definition. Modify the URL to match the URL of the Central Ignition Gateway. In this example, MQTT Distributor is installed on a Central Ignition Gateway at the IP address of 192.168.1.2. Once the URL is modified to match the configuration, there should be a '1 of 1' in the Connected column as shown below.

ightarrow C $rightarrow$	Iocalhost:8088/w	/eb/config/mqtttransmi	ssion.settings?42				ເ ☆	<u>↓</u> ≫
nition-MacBook-Pro.local								Log Out
nition							Help 🛿	Get Designer
SYSTEM	Config > Mqtttransmissi	on > MQTT Transmissio	on Settings					
Overview	Trial Mode 1:35:05 W	e're glad you're test driving ou	ır software. Have fun.					Activate Ignitic
Backup/Restore								
^S Ignition Exchange								
Licensing	General	Servers Sets	Transmitters	Records	Files			
g Modules								
Projects	Settings	Certificates						
Redundancy	octings	certificates						
Gateway Settings								
NETWORKING	Name	URL		Server Set	t Userr	name Connected		
Web Server	Chariot SC	ADA tcp://192	2.168.1.14:1883	Default	admii	n 1 of 1	delete	edit
Gateway Network								
Email Settings	→ Create ne	ew MQTT Server						
SECURITY	Note: For ad							
General	documentat	-		ion, see the				
Auditing								
Users, Roles								
Service Security								
Identity Providers								
Security Levels								
Security Zones								
Q Search								

The next step is configuring the ABB Totalflow module. This is done as described in the ABB Totalflow Configuration manual. In going through the basic setup and configuration for Events configuration the following steps must be performed:

- Define the global Array-Registers definitions available for all ABB Totalflow devices in this Ignition instance.
 ^o This step can be skipped if not configuring the driver to poll for AAR data.
- Upload the Periodic Mappings for all ABB Totalflow devices in this Ignition instance.
 This step can be skipped if default mapping provided by the driver is ok.
- Create the base device connection to the ABB Totalflow device.
- Specify the subset of global Array-Register definitions that this specific ABB Totalflow device uses.
- This step can be skipped if not configuring the driver to poll for AAR data.
- Reconfigure device connection to enable polling for events.

As en example, let's configure the driver to poll for Event records and disable polling for Alarms and History. This can be done in two ways:

The first way to do it is to configure scan rates as shown below:

- Alarm Scan Rate
 - Set to -1 to disable polling for Alarms. If Alarms are not needed, it is the best practice to set the 'Alarm Scan Rate' to -1. With this setup, alarm records are not going to be pushed to the rs_efm_meter_alarm database table regardless of the alarm source setting (i.e. PERIODIC_HISTORY or ALARM_LOG_RECORDS).
 - If the 'Alarm Source' is set to the 'ALARM_LOG_RECORDS' and the 'Record Info Scan Rate' is set to -1, the 'Alarm Scan Rate' can be set to 0. With this setup, the AlarmPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- Event Scan rate
 - Set to a positive number to launch the EventPoller with specified poll rate.
- Periodic History Scan Rate
 - Set to -1 to disable polling for Periodic History records.
 - If the 'Record Info Scan Rate' is set to -1, the 'Periodic History Scan Rate' can be set to 0. With this setup, the PeriodicHistoryPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- Daily History Scan Rate
 - Set to -1 to disable polling for Daily History records.
 - If the 'Record Info Scan Rate' is set to -1, the 'Daily History Scan Rate' can be set to 0. With this setup, the DailyHistoryPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- Record Info Scan Rate
 - Set to -1 to disable the RecordInfoPoller so that there will be no notifications to Alarm, Events and History pollers on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

$ ightarrow$ C' \bigstar	D localhost:8088/we	b/config/opcua.devices?72 😶 🔽	<u>↓</u> ≫
	Config > Opcua > Devic	es	
	Trial Mode 1:23:07 We're	e glad you're test driving our software. Have fun.	ctivate Igni
5	Records		
3	Alarm Source	PERIODIC_HISTORY_RECORDS Alarm Source Selector (i.e. Periodic History or Alarm Log record), (default: PERIODIC_HISTORY_RECORDS)	
	Alarm Scan Rate	-1 The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: -1)	
	Event Scan Rate	60 The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scan (default: 0)	ner.
	Periodic History Scan Rate	-1 The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the Record Info' scanner. (default: 0)	ne
	Daily History Scan Rate	-1 The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Rec Info' scanner. (default: 0)	ord
	Record Info Scan Rate	-1 The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for shot 'Record Info' poll. (default: -1)	one-
	Max Records To Read	100 Maximum number of records to read in one poll. (default: 100)	
	Periodic Mapping	Meter Periodic Mapping	

The second way to do it is to configure scan rates as shown below:

- Alarm Scan Rate
 - Set to -1 to disable polling for Alarms.
- Event Scan rate
 - 0 Scan on notification form the 'Record Info' poller.
- Periodic History Scan Rate

 Set to -1 to disable polling for Periodic History records.
- Daily History Scan Rate Set to -1 to disable polling for Daily History records.
- Record Info Scan Rate
 - Set to a positive number to launch the RecordInfoPoller with specified poll rate. With this setup, EventPoller will be notified on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

\rightarrow C' $$	Iocalhost:8088/we	b/config/opcua.devices?78 🖸 🏠									
	🌣 Config > Opcua > Devi	ces									
2	Trial Mode 1:22:03 We'n	e glad you're test driving our software. Have fun.									
s	Records	Records									
g	Alarm Source	PERIODIC_HISTORY_RECORDS Alarm Source Selector (i.e. Periodic History or Alarm Log record). (default: PERIODIC_HISTORY_RECORDS)									
	Alarm Scan Rate	-1 The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: -1)									
	Event Scan Rate	0 The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)									
	Periodic History Scan Rate	-1 The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)									
	Daily History Scan Rate	-1 The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)									
	Record Info Scan Rate	60 The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for one- shot 'Record Info' poll. (default: -1)									
	Max Records To Read	100 Maximum number of records to read in one poll. (default: 100)									
Q Search	Periodic Mapping	Meter Periodic Mapping T The mapping of Totalflow LOG_PERIOD and DAILY structures to Flowcal Meter Periodic Transactions.									

At this point, the EFM ABB Totalflow driver is configured and is polling for Events at the rate specified in the EFM ABB Totalflow device configuration.

MQTT Transmission is connected to the MQTT Server and as a result MQTT Engine is receiving tag change events. In addition, because an EFM ABB Totalflow device has been created and configured with the same Sparkplug Group ID, Edge Node ID, and Device ID, history data will also be pushed to the MQTT server as Sparkplug RECORD objects. When new history data is polled by the EFM ABB Totalflow driver, they will be published to the MQTT server, consumed by MQTT Engine, passed on to MQTT Recorder, and then inserted into the specified database. Below is a view of some events records using a third party database viewing tool.

• • •				(.0.1/testdb/rs_efm_meter_even					
testdb Select Database			1. Outer								Table History Users Co
ILES	Structure Content Relations										
III rs_efm_meter_alarm	Search: rs_id) (=	0) e [Q								Filter
rs_efm_meter_event	rs_id rs_type	rs_group rs_e	dge_node rs_device	mtr_id	rs_record_time	rs_recorder_time rs_fields	val	event old_val	seq	timestamp ^	
rs_efm_meter_history_daily	1 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591737030000	1596671332398 mtr_id 12,	. NULL	650 NULL	0	1591737030	
rs_erm_meter_history_daily	67 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591737030000	1596671335649 mtr_id 12,	. NULL	650 NULL	0	1591737030	
rs_erm_meter_nistory_periodic	138 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591737030000	1596671338947 mtr_id 12,	. NULL	650 NULL	0	1591737030	
	204 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591737030000	1596671342396 mtr_id 12,	. NULL	650 NULL	0	1591737030	
	2 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591737204000	1596671332399 val 12,old	1591737204	652 0	2	1591737204	
	3 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591737204000	1596671332399 val 12,old	0	651 1591737204	1	1591737204	
	68 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591737204000	1596671335650 val 12,old	1591737204	652 0	2	1591737204	
	69 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591737204000	1596671335650 val 12,old	0	651 1591737204	1	1591737204	
	139 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591737204000	1596671338947 val 12,old	1591737204	652 0	2	1591737204	
	140 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591737204000	1596671338947 val 12,old	0	651 1591737204	1	1591737204	
	205 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591737204000	1596671342396 val 12,old	1591737204	652 0	2	1591737204	
	206 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591737204000	1596671342396 val 12,old	0	651 1591737204	1	1591737204	
	4 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591862585000	1596671332399 val 12,old	1591862585	652 0	4	1591862585	
	5 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591862585000	1596671332399 val 12,old	0	651 1591862585	3	1591862585	
	70 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591862585000	1596671335650 val 12,old	1591862585	652 0	4	1591862585	
	71 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591862585000	1596671335650 val 12,old	0	651 1591862585	3	1591862585	
	141 EFM METER EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591862586000	1596671338947 val 12,old	1591862585	652 0	4	1591862586	
	142 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591862586000	1596671338947 vall12.old	0	651 1591862585	3	1591862586	
	207 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591862586000	1596671342396 val 12,old	1591862586	652 0	4	1591862586	
	208 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591862586000	1596671342396 vall12.old	0	651 1591862586	3	1591862586	
	6 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591865654000	1596671332399 vall12.old	1591865654	652 0	6	1591865654	
	7 EFM METER EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591865654000	1596671332399 val 12.old	0	651 1591865654	5	1591865654	
	72 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591865654000	1596671335650 vall12.old	1591865654	652 0	6	1591865654	
	73 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591865654000	1596671335650 val 12.old	0	651 1591865654	5	1591865654	
	143 EFM METER EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591865654000	1596671338947 vall12.old		652 0	6	1591865654	
	144 EFM METER EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591865654000	1596671338947 val 12,old		651 1591865654	5	1591865654	
	209 EFM METER EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591865654000	1596671342396 vall12.old		652 0	6	1591865654	
	210 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591865654000	1596671342396 val 12,old		651 1591865654	5	1591865654	
	74 EFM METER EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591870871000	1596671335650 val 12,old		138 14.73	7	1591870871	
	75 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591870881000	1596671335650 val 12,old		138 14.75	8	1591870881	
	76 EFM METER EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591871509000	1596671335650 val 12.old		138 11.22	9	1591871509	
	77 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591871517000	1596671335650 val 12,old		138 12.33	10	1591871517	
	78 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591871531000	1596671335650 val 12,old		138 14.55	11		
	8 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591883483000	1596671332399 val 12,old		652 0	8	1591883483	
EINFORMATION	9 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591883483000	1596671332399 val 12,old		651 1591883483	7	1591883483	
	79 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591883483000	1596671335650 val 12,old		652 0	13	1591883483	
created: 8/5/20	80 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA3-1	1591883483000	1596671335650 val 12.old		651 1591883483	12	1591883483	
updated: 8/7/20	145 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591883483000	1596671338947 val 12,old		652 0	8	1591883483	
engine: InnoDB	146 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA3-2	1591883483000	1596671338947 val 12.old		651 1591883483	7	1591883483	
rows: 277	211 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2	1591883483000	1596671342396 val 12,old		652 0	8	1591883483	
size: 80.0 KiB	212 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	SUAGA7-2 SUAGA7-2	1591883483000	1596671342396 val 12.old		651 1591883483	7	1591883483	
encoding: latin1	10 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1	1591883776000	1596671332399 val 12,old		652 0	10	1591883776	
auto_increment: 278	11 EFM_METER_EVENT	G1 E1	Totalflow G4 Sim	AGA7-1 AGA7-1	1591883776000	1596671332399 val 12,old		651 1591883776	10	1591883776	
\$- C 🗉	+ - + C E			/////-1	13318837760000	1550011551333 Vai 12,010		051 1391003770	,	1331003773	

Additional Resources

- Inductive Automation's Ignition download with free trial
 <u>https://inductiveautomation.com/downloads/</u>
- Azure Injector download with free trial
 - https://inductiveautomation.com/downloads/third-party-modules
- Questions about this tutorial?
 - Check out the Cirrus Link Forum: https://forum.cirrus-link.com/
 - Contact support: support@cirrus-link.com
- Sales questions

 Email: sales@cirrus-link.com
 Phone: +1 (844) 924-7787

 About Cirrus Link

 - - https://www.cirrus-link.com/about-us/