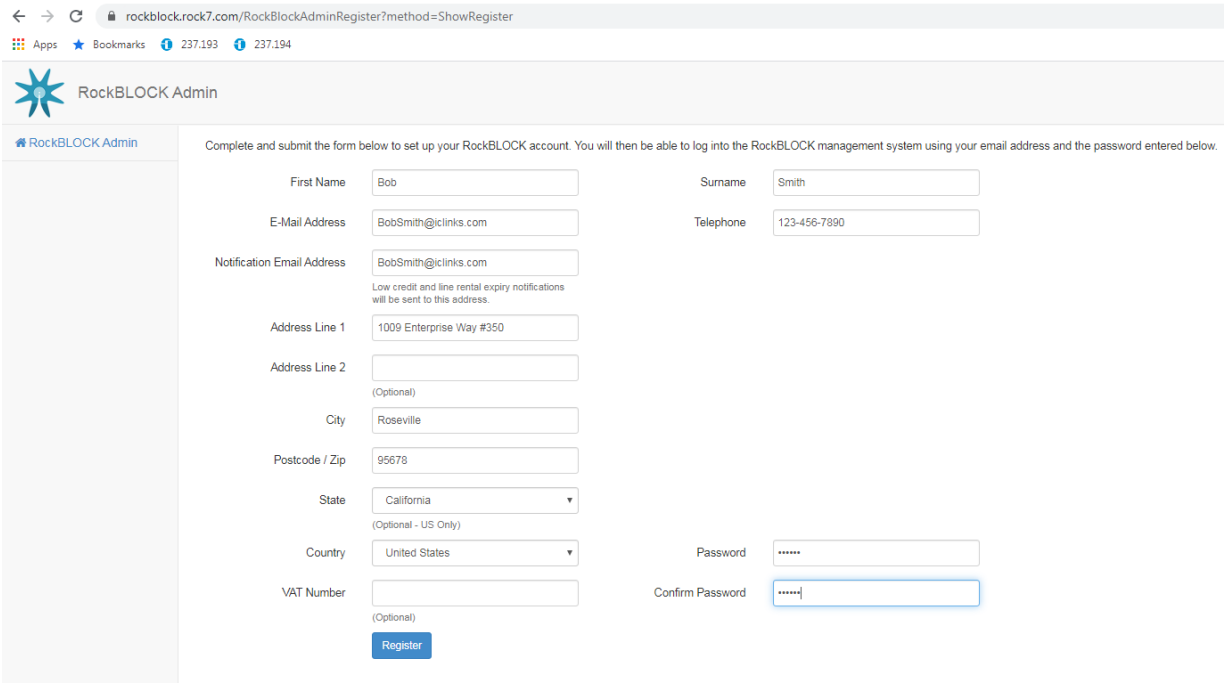
Modulus & Scadaflex M Satellite System

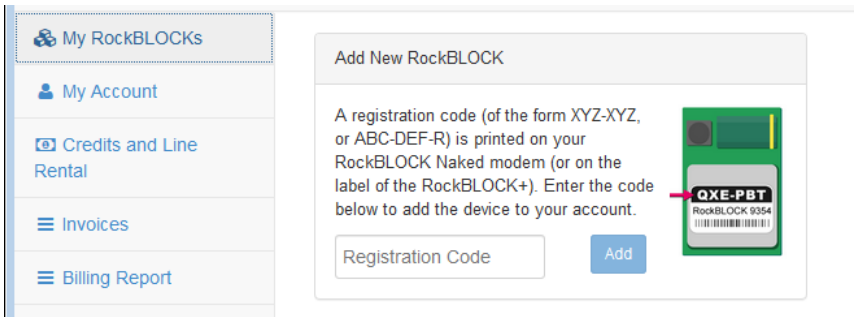
Modulus Supports communication with and between Satellite modems from Rock Seven. The Modems use the Iridium system of satellites. The system uses Short Burst Data Messages (SBD) to send data between the modem and the Server's at Rock 7. You will need an account at Rock Seven, where you can pay for credits that are worth 50 bytes of data each. If you don't have a Rock Seven account, go to www.rock7.com/register and setup an account. Just fill out this form.



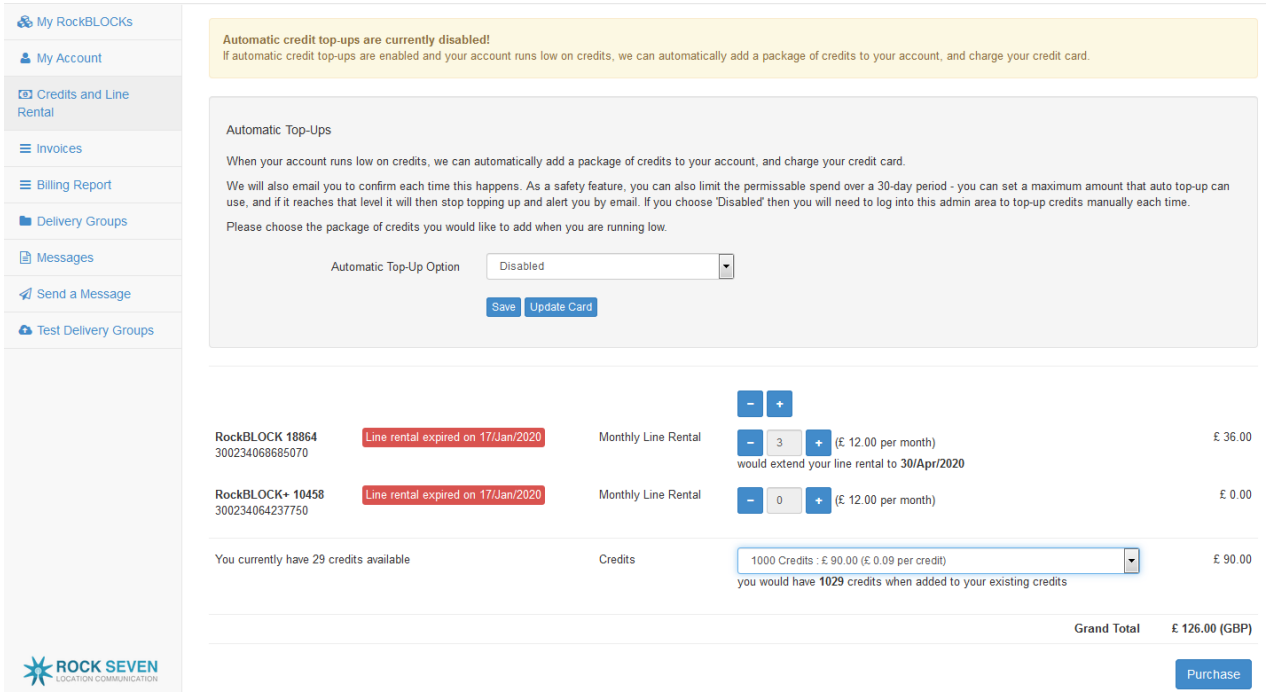
The maximum SBD message size is 270 bytes. Modulus has two different Communication Protocol's, Satellite Modem and Satellite Server.

Modulus Satellite Modem

This Protocol is used in the units that support serial communication with the Satellite modems. Com1 (Com2 on the Scadaflex II) must have its Port Mode set to "Satellite Modem" . Now the unit is ready to receive satellite messages from a server. If you want to send messages from the modem to a server or another Modem, this can be done from the Destination and Event pages, under the communication tab. Before any communication can be done make sure the modem is registered to your account and has credits. Register the modem on The Rock Seven website using the "My RockBLOCKs" page.



Enter the registration code off of the modem that you are registering.
Then head over to the "Credits and Line Rental" tab and setup the amount of credits you want and how many months you want to sign up for.



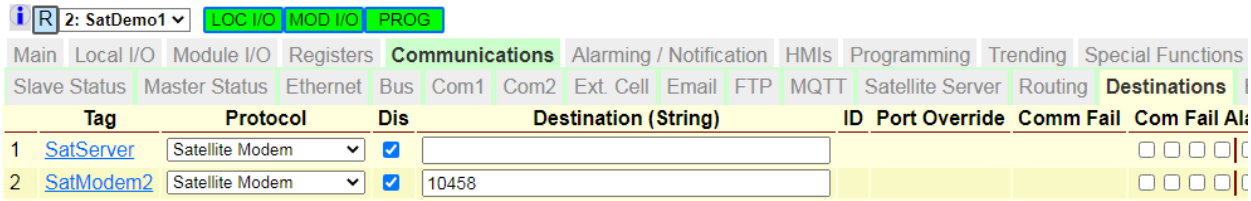
Sending a message from a Modem

There are two types of messages you can send, Publish and Write.

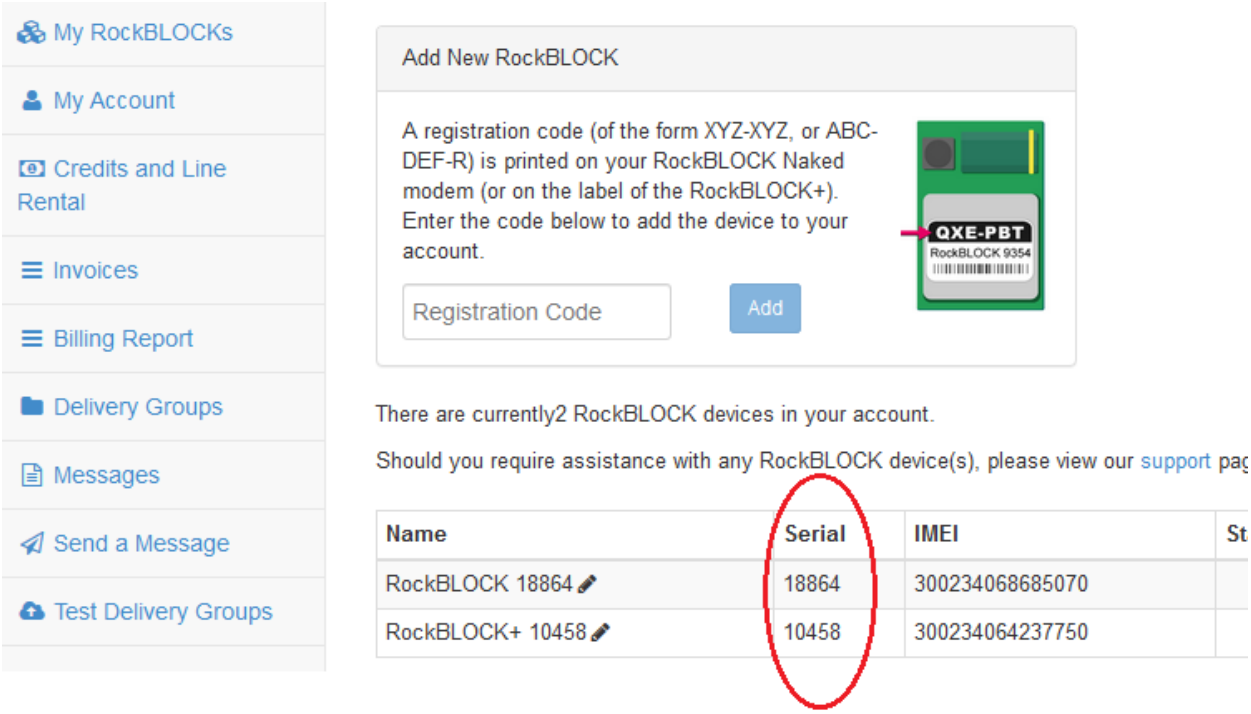
Published messages use an identifier to sync the delivery of the message to the server. The Server must have a Subscribe event with the same identifier for the message to work. These messages are the smallest and do not have any addressing information in them. The Server using the subscribe event will determine where the data should go. The identifier is a number between 1 and 127. The ID is encoded in the Event TagName for the event using a format of "S<ID Value>{optional other text}". Example's would be: "S23_TankLevel", "S100","s25_PumpRunStatus" or "s23Tank". You can only have one Subscribe event per ID, but you can have multiple Publish messages with the same ID. Though in practice there should be a one to one relationship between Publish and Subscribe.

Write messages include the data, OP code, block size and addressing for where the data is to go in the server (or other Satellite Modem). These messages are 3 bytes larger as the Remote address and Block size must be stored in the message with the data. If sending a write message to another Satellite modem there will also be a 5 byte overhead for encoding the other modems serial number.The Event TagName for these types of events can be anything you want and should not start with a S<ID Value>.

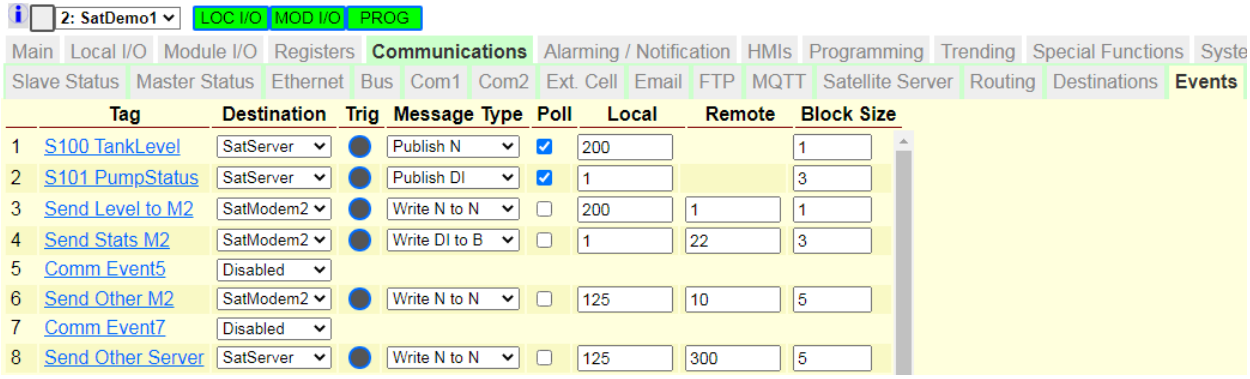
Before setting up events, the destination must be set up. Go to the “Communications | Destinations” page. Pick an unused destination, and change its TagName to something useful. Select “Satellite Modem” from the Protocol list. If this destination is going to be to another modem, you will need to enter the modems serial number in the “Destination (String)” field. If the destination is the server, leave it blank. It is possible to have multiple destinations with the Satellite Modem, maybe one to the Server and one or more to other Satellite Modems.



The Modems Serial Number is a 5 digit number that is written on the bottom of the modem, it is also obtainable from the Rock Seven server under the “MyRockBLOCKs” tab.



Now go to the “Communications | Events” page to start setting up events. If sending messages to a Server you should use Publish Commands, but if sending to another Modem you MUST use write commands. If events are contiguous and to the same destination, they will be combined into one message.

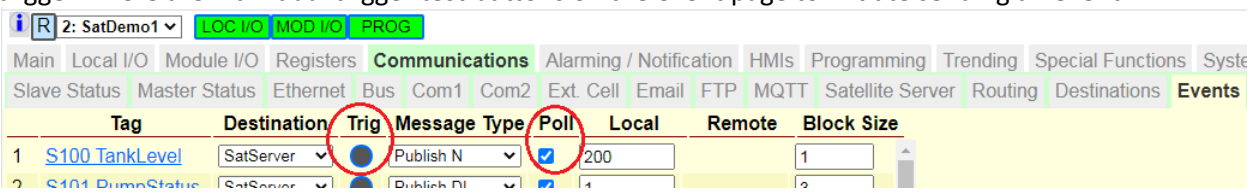


Here is a list of Message types for a Satellite Modem

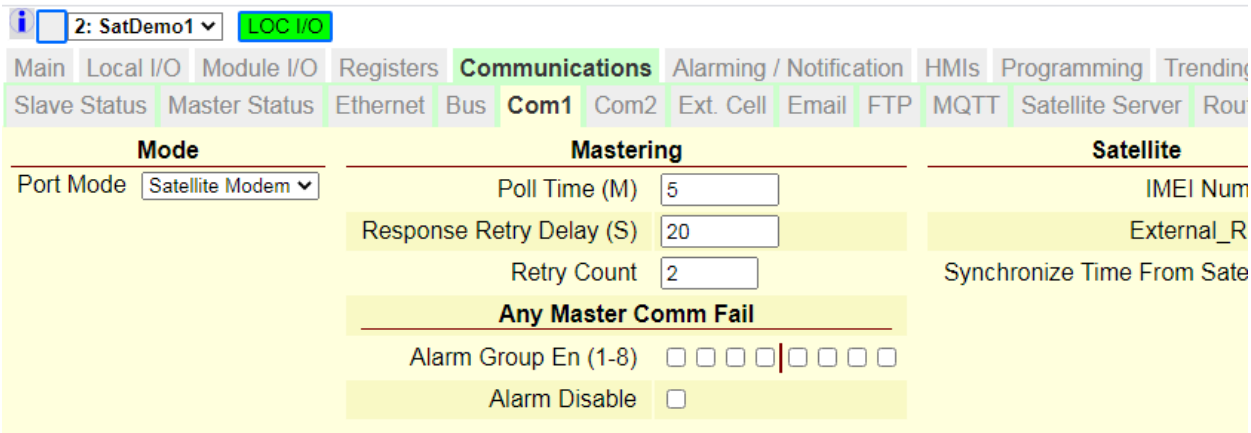
Message Type	Destination	Byte Count	OP Code
Publish N	Server Only	2 + (BlockSize*2)	none
Publish B	Server Only	2 + (BlockSize / 8)	none
Publish DI	Server Only	2 + (BlockSize / 8)	none
Publish DO	Server Only	2 + (BlockSize / 8)	none
Publish AI	Server Only	2 + (BlockSize*2)	none
Publish AO	Server Only	2 + (BlockSize*2)	none
Write N to N	All	5 + (BlockSize*2) **	80h
Write B to B	All	5 + (BlockSize/8) **	81h
Write DI to B	All	5 + (BlockSize/8) **	82h
Write DO to B	All	5 + (BlockSize/8) **	83h
Write AI to N	All	5 + (BlockSize*2) **	84h
Write AO to N	All	5 + (BlockSize*2) **	85h
Write N to AO	All	5 + (BlockSize*2) **	88h
Write B to DO	All	5 + (BlockSize/8) **	89h
Write DI to DO	All	5 + (BlockSize/8) **	8Ah
Write AI to AO	All	5 + (BlockSize*2) **	8Ch

** Add 5 bytes if sending to another Modem

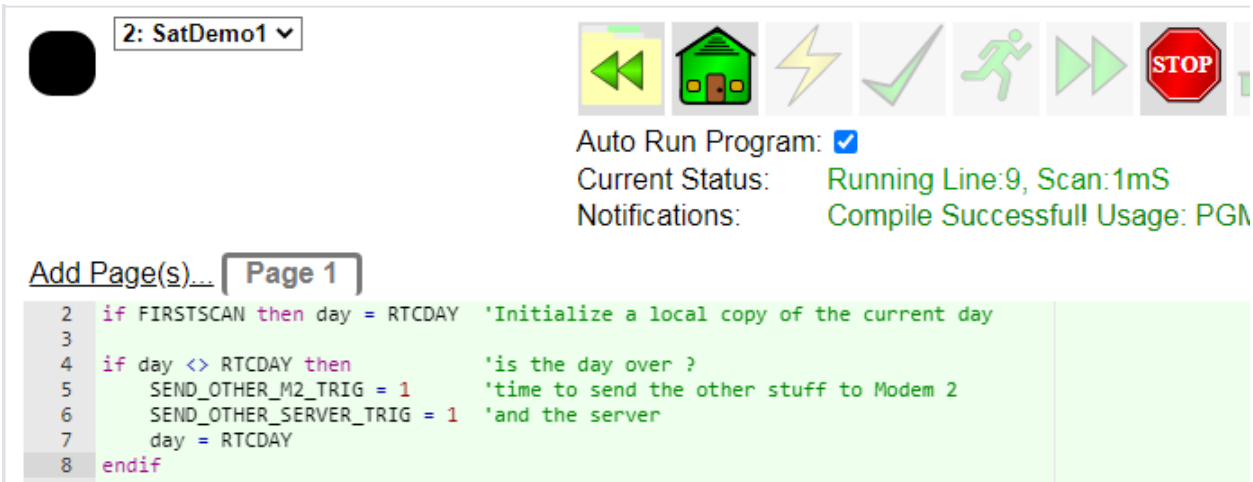
Events can be fired by trigger or by poll. Each event has a checkbox that can be set to allow the event to be fired using the polling timer. Keep this unchecked if you only want the event to be fired from a trigger. There are individual trigger test buttons on the event page to initiate sending an event.



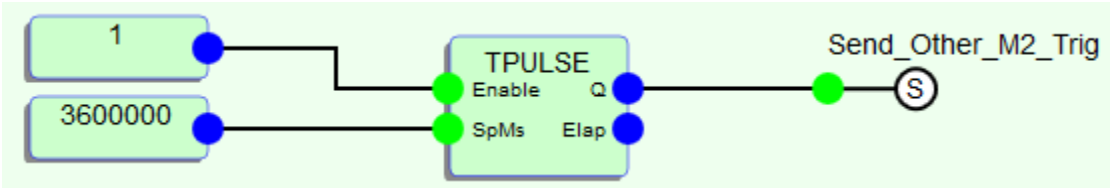
The polling parameters can be set from the Com1 (Com2 on the Scadaflex II) page. The Polling Time determines how frequently the module attempts to initiate a message with the Satellite. If the modem can't get a hold of the Satellite the request will error out.
The Response Retry Delay and Retry Counts can be used to hold off and try again. This might be necessary if the view to the satellite is not perfect and you need to wait for one to come into view. This retry functionality is used for both triggered and polled events.



Triggers can be fired from programming. The example below will send the "other" info once a day.



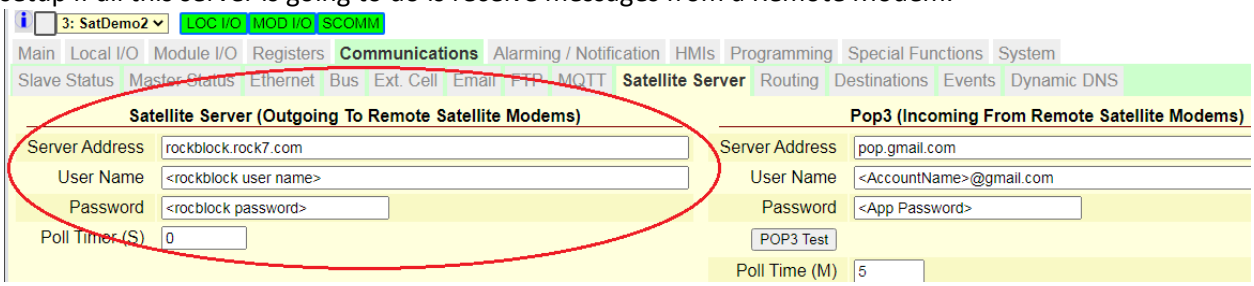
The example below will send the "other" info once an hour to Modem 2.



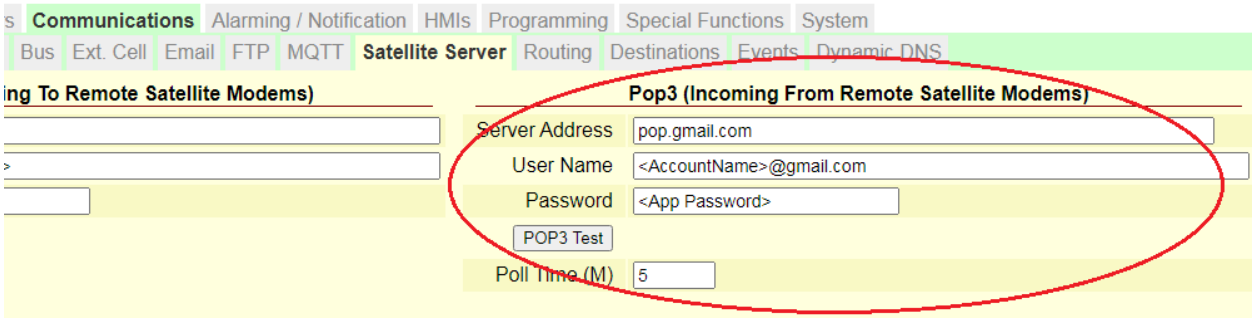
Modulus Satellite Server

This Protocol is used on Modulus units that will be communicating with the Rock Seven Servers that receive and transmit messages to remote Satellite Modems.

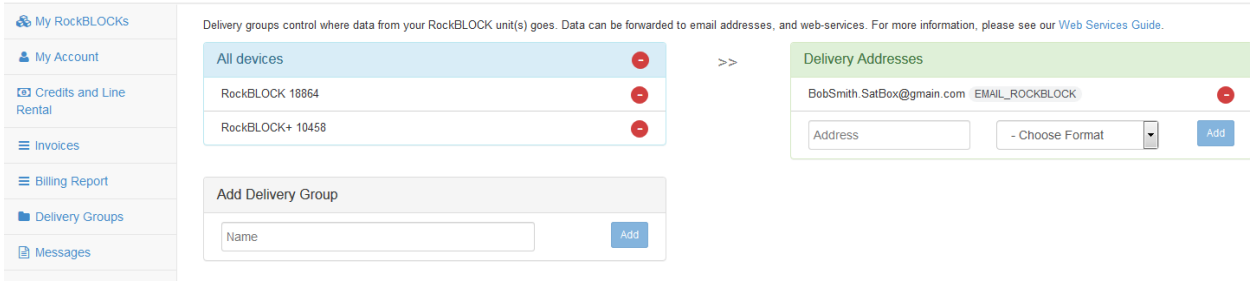
Sending messages to remote Satellite Modems requires the Outgoing server to be setup on the "Communications | Satellite Server" page. Use your Rock Seven Account info to set this up. The Polling Timer determines how frequently the module sends events to the Server. This does not need to be setup if all this server is going to do is receive messages from a Remote Modem.



Receiving messages is done over email. You will need to setup an email account for this to work. The POP3 setup can be done from the "Satellite Server" or "email" tab. This does not need to be setup if the server is going to only send messages to a Remote Modem.



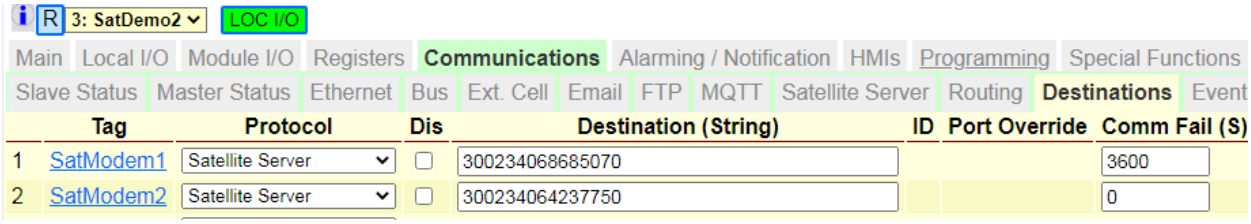
You will also need to setup a "Delivery Group" on the Rock Seven server for this email address.



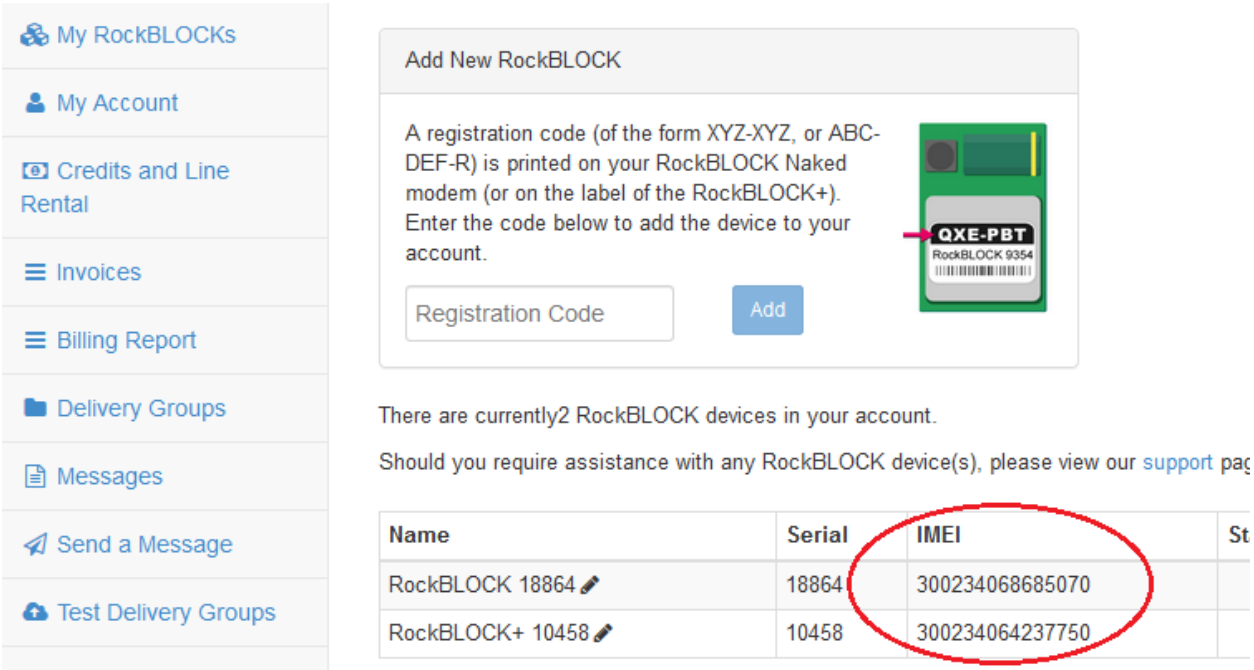
Receiving Published Events from a remote Satellite Modem

Subscribe events are used to receive Published events from a remote Modem. The event name is the same “S<ID Value>{optional other text}” format as described in the Publish section. Since there is no size or type information in the Published message, it’s up to the receiving Subscribe event to decide where and how many items we are decoding. If there is not enough data in the message to fill out the subscribe event, 0’s will be used in place. If the message is bigger, then it will be clipped to fill out the subscribe event.

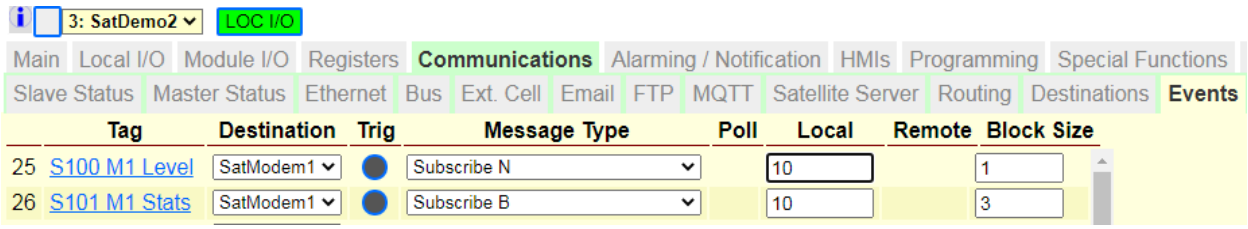
Before setting up events, the destination must be set up. Go to the “Communications | Destinations” page. Pick an unused destination, and change its TagName to something useful. Select “Satellite Server” from the Protocol list. Next, you will need to enter the modems IMEI number in the “Destination (String)” field.
The Destination can also be configured to go into Comm Fail if it doesn’t see any messages within a specified time. If this functionality is not needed then keep this setting at 0.



The Modems IMEI Number is a 15 digit number that is obtainable from the Rock Seven server under the “MyRockBLOCKs” tab .



Now go to the “Communications | Events” page to start setting up events. You can subscribe to B, N, DO & AO’s.

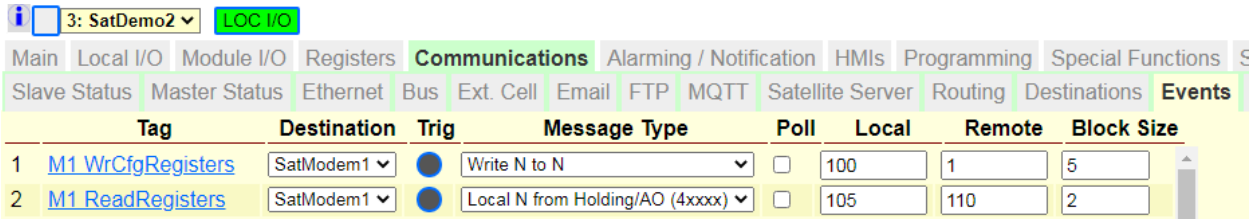


In the example above: “S100” was the Tank Level from N200 of the remote unit 1 and we are going to write it into N10. “S101” was the first three DI’s of the remote unit and we are going to write them into B10-B12.

Sending Messages to a remote Satellite Modem

Write events include the data, OP code, block size & addressing for where the data is to go in the remote Satellite Modem unit. If events are contiguous and to the same destination, they will be combined into one message.

Read events (Local x from Y) include the data type, block Size, remote address and the return address for where the returned data will be placed. The remote Satellite modem unit will send back the data in a “write” event message using the return address & block size.



In the example above event 2 is requesting N10 & N11 from the remote, the returned data will be saved into the local N105 & N106 registers.

Write “RAW” messages have just the data in them and can be used to send data to some other device besides a Modulus.

Read “RAW” messages are used to receive data from another product besides Modulus. Only one Read Raw can be applied to a destination, as anything coming in will be diverted to the destination that this event dictates.

Here is a list of Message types for a Satellite Server

Message Type	Byte Count	OP Code
Subscribe N	2 + (BlockSize*2)	none
Subscribe B	2 + (BlockSize / 8)	none
Subscribe DO	2 + (BlockSize / 8)	none
Subscribe AO	2 + (BlockSize*2)	none
Write N to N	5 + (BlockSize*2)	80h
Write B to B	5 + (BlockSize/8)	81h

Write DI to B	5 + (BlockSize/8)	82h
Write DO to B	5 + (BlockSize/8)	83h
Write AI to N	5 + (BlockSize*2)	84h
Write AO to N	5 + (BlockSize*2)	85h
Write N to AO	5 + (BlockSize*2)	88h
Write B to DO	5 + (BlockSize/8)	89h
Write DI to DO	5 + (BlockSize/8)	8Ah
Write AI to AO	5 + (BlockSize*2)	8Ch
Write String to Dest	5 + (length of string)	86h
Write Raw from N	BlockSize * 2	none
Write Raw from B	BlockSize / 8	none
Write Raw from String	length of string	none
Read Raw to N	BlockSize * 2	none
Read Raw to B	BlockSize / 8	none
Read Raw to String	length of string	none
Local B from Status/DI	8	C2h
Local B from Coil/DO	8	C3h
Local N from Input/AI	8	C4h
Local N from Holding/AO	8	C5h