

Using a DX83 Ethernet Bridge as a Modbus Master within a MultiHop System

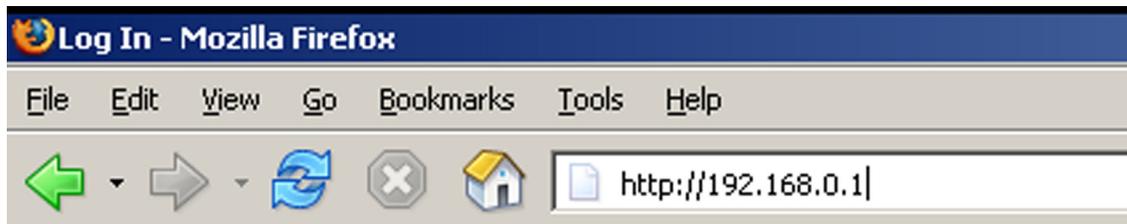
OVERVIEW

Banner's SureCross DX83 Ethernet Bridge can be set up to manage data as a Modbus Master device. As a Modbus master, the DX83 reads or writes any register at any Modbus slave address.



CONFIGURING THE DX83

1. Connect the DX83 to a computer using the Industrial Ethernet connection. Power the DX83.
2. Using any Web browser, enter 192.168.0.1 (or the address of your DX83 device) into the browser's address window.



3. Click on the Network tab and enter your login and password. The default login is SYSTEM; the default password is ADMIN.



CONFIGURING THE READ AND WRITE MAPS

The RTU Read/ Write maps define which registers to read or write in a Modbus network. Data read from remote slave registers are stored in the DX83 local register pool (1-999). Data written to slave devices comes from the local register pool.

To set up the DX83 as the Modbus Master, follow these steps:

ON THE RTU READ MAP

The RTU Read Map screen shows a list of the registers being read from Modbus slave devices to the DX83 registers (1 through 999).

1. On the RTU Read Map screen, enter the MultiHop Radio ID (Remote Slave #) and register to be read.
2. Enter the local register in which to store the register values.

In the sample shown, register 1 of MultiHop Radio ID 12 (Remote Slave

12) is read. MultiHop Radio IDs and Modbus Slave IDs are the same ID and are set using the MultiHop Radio's rotary dials.

3. Select the Polling Only checkbox.
4. Click the Update button to save these changes. If you leave this screen without clicking the Update button, your changes will be lost.
5. Click on the Map # link to expand the screen to see the full definition of the read map entry.

In the example screen shots shown, Map 1 defines is a holding register that is read from Slave ID 12 (MultiHop Radio ID 12), register 1.

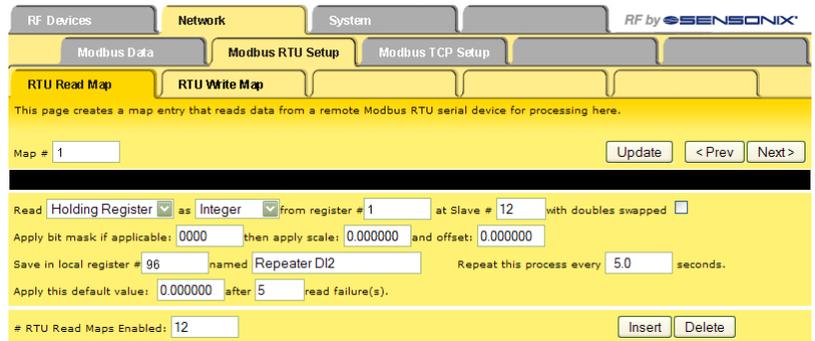
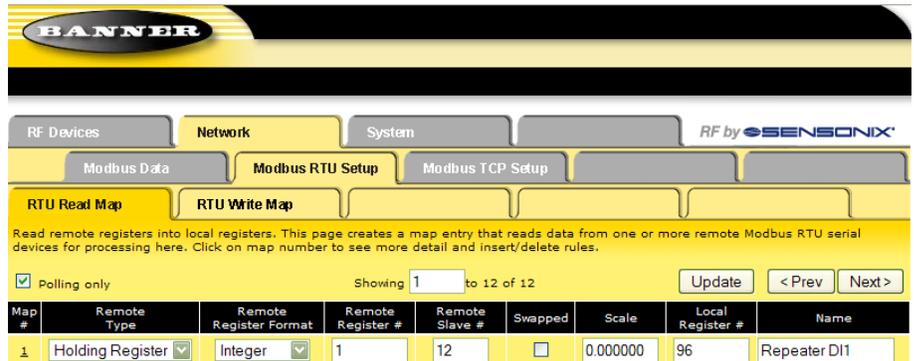
This register is stored in the DX83 at local register 96. The register is read every five seconds. If the DX83 cannot read the register, the DX83 writes a substitute default value of zero after five failed read attempts.

To read the register as fast as possible, set the "Repeat this process every N seconds" parameter to 0 (zero).

Click the Update button to save your changes locally. If you leave this screen without clicking Update, your changes will be lost.

To display more than one map on the main RTU Read Maps screen, follow these steps:

1. Click on the Map # link to expand the screen to see the full definition of the read map entry.
2. Add or delete the necessary number of entries by entering a number in the # RTU Read Maps Enabled box and clicking the Insert button.
3. Click on the RTU Read Map tab to return to the table view of the read maps.



WHEN USING ETHERNET/IP

EtherNet/IP registers are blocked in groups of 16, with the first 8 in the group being dedicated to inputs and the second 8 registers being dedicated to outputs. To ensure that the register values are mapped to the appropriate EtherNet/IP register, assign the registers carefully.

In the example shown, the first MultiHop's inputs begin at register 96, because this is a group of EtherNet/IP input registers. The second MultiHop radio's inputs begin at 112 because that is the next block of input registers available.

ON THE RTU WRITE MAP

Create the Write map entries similar to the Read map entries.

Click the Update button to save these changes locally. If you leave this screen without clicking the Update button, your changes will be lost.

Click on the Map# link to view the full definition of the Write Map entry. In the screen shot shown, Map 2 is expanded.

This write map entry will take the contents of the DX83 local register 104 (Repeater DO1) and write it continuously to holding register 501 on Modbus Slave (Remote Slave) 12. The write map can be configured to write only when the local register has changed or periodically or both.

After making any changes to a Map#, click the Update button to save your changes to the device. If you leave any screen without clicking the Update button, your changes will be lost.

Click the RTU Write Map tab to go back to the table view of write map entries.

The screenshot shows the 'RTU Write Map' configuration page. At the top, there are tabs for 'RF Devices', 'Network', 'System', and 'RF by SENSONIX'. Below these are sub-tabs for 'Modbus Data', 'Modbus RTU Setup', and 'Modbus TCP Setup'. The 'RTU Write Map' sub-tab is selected. The page contains a table with the following data:

Map #	Local Register #	Scale	Remote Type	Remote Register Format	Remote Register #	Remote Slave #	Swapped	Name
1	104	0.000000	Holding Register	Integer	501	12	<input type="checkbox"/>	Repeater DO1
2	105	0.000000	Holding Register	Integer	502	12	<input type="checkbox"/>	Repeater DO2

The screenshot shows the expanded configuration for Map # 1. It includes the following fields and options:

- Map # 1
- Read local register # 104 named RepeaterDO1
- Write remote register any time local register has changed by 0.000000 or when 0.0 seconds elapse with no change.
- Otherwise write remote register unconditionally, applying local register data as follows:
- Apply scale: 0.000000 and offset: 0.000000 Then if applicable, apply bit mask: 0000 and bit fill: 0000
- Write Holding Register as Integer to register # 501 at Slave # 12 with doubles swapped
- Repeat this process: at least no more than every 0.0 seconds.
- # Client Write Maps Enabled: 12

SAVING CHANGES TO THE XML FILE

To permanently save the changes to the XML file, go to the *System > Setup > Config File* page and click the Save button. Changes made by clicking an Update button are temporary and only submitted to the Ethernet Bridge or Gateway Pro, not the XML file.

The screenshot shows the 'Config File' management page. It includes the following sections:

- Load/Save configuration File:**
 - Local file directory: BootConfig.xml
 - New file name: [input field]
 - Startup configuration: BootConfig.xml
 - Buttons: Load, Save, Save As, Startup, Delete, Confirm, Restart
- Upload Configuration File:**
 - Buttons: Upload, Browse...

TIME-OUT SETTINGS

Some multiple level MultiHop networks or networks configured to conserve power (run slower) may require you to change the timeout parameter.

To eliminate timeout errors from the DX83's read/write map entries, change the timeout setting for the DX83 Read/Write maps for MultiHop radios by manually editing the XML configuration file. To adjust the timeout settings:

1. Save the XML file from the DX83 device to the computer using the *System > Setup > Config File* screen.
2. Open the XML file in a text editor and edit the XML file timeout parameter as shown below.

```
<rtu_device>
  <dev baud="19200" timeout=" 2.00" parity="0" thisUnit="1"/>
</rtu_device>
```

3. Upload the updated XML file back to the DX83 by clicking on the Browse button to select the edited XML file, then clicking the Upload button to upload the new version.
4. Click the Load button to execute the XML settings.

DEBUG TOOLS

Some Web Configuration screens can be used to debug the setup and communications of the DX83 Read/Write maps.

Under the *Network > Modbus Data > RTU Registers* tab, each slave register displays the results of the read/write maps.

The last column shows the last time this register was updated.

Dir.	Reg. Type	Remote Reg. #	Register Name	Local Reg. #	Hex	Update	Register Data	Time since Last update
From	Holding Reg	00001	Repeater DI1	00096	<input type="checkbox"/>	<input type="checkbox"/>	0	5024.850
From	Holding Reg	00002	Repeater DI2	00097	<input type="checkbox"/>	<input type="checkbox"/>	0	5024.880
From	Holding Reg	00003	Repeater DI3	00098	<input type="checkbox"/>	<input type="checkbox"/>	0	5024.950
From	Holding Reg	00004	Repeater DI4	00099	<input type="checkbox"/>	<input type="checkbox"/>	0	5024.990
From	Holding Reg	00005	Repeater AI1	00100	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.030
From	Holding Reg	00006	Repeater AI2	00101	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.090
To	Holding Reg	00501	Repeater DO1	00104	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.120
To	Holding Reg	00502	Repeater DO2	00105	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.150
To	Holding Reg	00503	Repeater DO3	00106	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.230
To	Holding Reg	00504	Repeater DO4	00107	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.270
To	Holding Reg	00505	Repeater AO1	00108	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.310
To	Holding Reg	00506	Repeater AO2	00109	<input type="checkbox"/>	<input type="checkbox"/>	0	5025.350

The *Network > Modbus Data > RTU Error Codes* screen displays the total message count and transmission errors for read/write map entries.

Use this information to help determine the overall health of a particular Modbus slave connection, either wireless or hardwired.

For example, errors listed in the No Responses column (shown) may indicate a DX83 read/write map timeout. Increase the timeout to eliminate this problem

Slave #	Reset -->	Read Error	Offending Read Map #	Reset -->	Write Error	Offending Write Map #	Reset -->	Total Messages	No Responses	CRC Errors	Exceptions
1	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	10004	10004	0	0
2	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
3	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
4	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
5	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
6	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
7	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
8	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
9	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
10	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
11	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
12	<input type="checkbox"/>	5/0	1	<input type="checkbox"/>	5/0	1	<input type="checkbox"/>	6907	6907	0	0
13	<input type="checkbox"/>	5/0	7	<input type="checkbox"/>	5/0	7	<input type="checkbox"/>	6787	6787	0	0
14	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
15	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0