

SureCross Web Configurator

rev. - 2/14/2012
134421



Contents

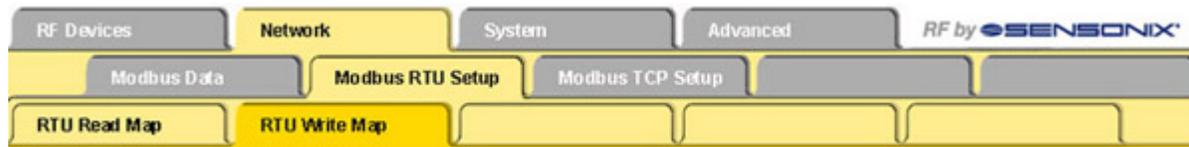
Web Configurator	3
Logging into the Web Configurator	3
Changing the Device's IP Address	4
Selecting a Host Communication Protocol	5
Get ALL	5
Change, Refresh, Send, and Update Commands	6
RF Devices Tab	6
Select Models	6
Configure Points	9
Expanded Configure Points	11
I/O Linking	17
Scaling	18
Remote I/O	19
Network Tab	25
Modbus Data Submenu	25
Modbus RTU Setup Submenu	29
Modbus TCP Setup Submenu	33
System Tab	38
Data Submenu	38
Action Rules Submenu	41
Setup Submenu	45
Advanced Tab	50
Scheduler Submenu	50
Data Logger Submenu	54
E-mail Alerts Submenu	58
Script BASIC Submenu	62
Basic Configuration Examples	64
Setting up the Devices	65
Configuring I/O	65
Linking I/O	66
Link Timeouts	67
System Network Settings	68
Advanced Configuration	69
Thresholds	70
Data and Event Logging	70
Scheduling	72
Trending Data	73
Scaling	74
Troubleshooting	75
Restoring Factory Default Settings	75
Error Codes	75

Web Configurator

The SureCross™ DX80 GatewayPro and DX83 Ethernet Bridge devices use an XML file to configure the network. To access the XML file, use any web browser and enter the device's IP address into the browser's address window:

<http://192.168.0.1>

The web configuration pages are arranged with a hierarchy of index tabs. The upper row of tabs is the top of the hierarchy and selects a broad topic. Top level tabs open related tabs on the next levels down. The middle tab selects a sub-topic, and the bottom tabs select individual pages within the sub-topic. The bottom of each page includes a Quick Help section listing usage tips or instructions specific to that page.



The XML file on any Ethernet Bridge or GatewayPro does not necessarily contain the settings for a specific wireless network. In many cases, the XML file saved in the Ethernet Bridge or GatewayPro is a default configuration file. Attaching the Ethernet Bridge or GatewayPro to the radio network does not automatically transfer network or device settings to the Ethernet Bridge or to the XML file.

When viewing real-time data returned to the browser by the connected device, the browser displays the data received when the page displayed. At this time, update data by clicking the Refresh button or the web browser's Reload or Refresh button. Each time a page update is requested, new real-time data displays.

For more information on specific SureCross components, please refer to the data sheets for the SureCross devices:

- Gateways
- Line-Powered Nodes
- FlexPower™ Nodes

Logging into the Web Configurator

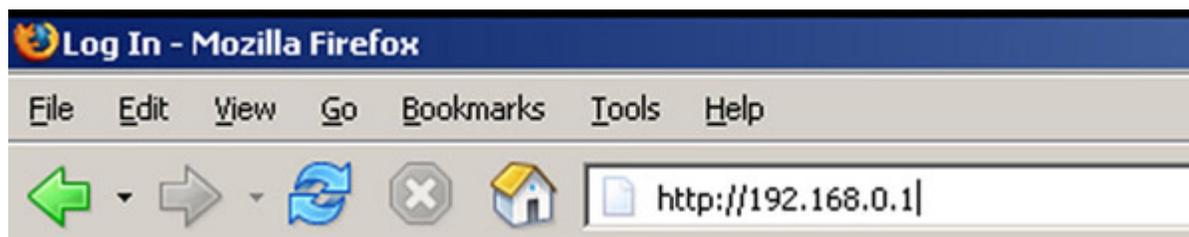
The SureCross™ Pro and DX83 Ethernet Bridge devices use an XML file to configure the network. To access the XML file, use any web browser set up for a direct connection to the Internet. If problems occur while connecting, verify the browser is not set to use a proxy server.

When connecting to the Ethernet Bridge, GatewayPro, or MultiHop Pro directly from a host computer, a crossover Ethernet cable is required; when connecting through a switch or Ethernet hub, use a standard Ethernet cable.

The factory default IP address for the devices is: **192.168.0.1**.

To change the device's default IP address, first set up the host PC with an IP address different from the Ethernet Bridge, GatewayPro, or MultiHop Pro IP addresses. (Please refer to Banner document 133116 for detailed instructions on setting up the host computer's network IP address.) For example, change the PC host IP address to: **192.168.0.2**.

After changing the host's IP address, open a web browser and log into the Ethernet Bridge, GatewayPro, or MultiHop Pro by typing the IP address in the browser location window: **<http://192.168.0.1>**.



After entering the IP address, the home web page for the SureCross device displays. To log in, click on any tab at the top of the page. To log out, close the browser.

For user-level access, enter the following as the user name and password.

- **User name: system**
- **Password: admin**



For Admin-level access, enter the following as the user name and password:

- **User name: root**
- **Password: sxi**

Admin-level access allows administrators to set up system users and their passwords. Admin-level access is also required to change the IP address of the system.

Changing the Device's IP Address

Once logged into the system, use the page tabs at the top of the page to select the path: *System > Setup > Network*. To change the Ethernet Bridge or GatewayPro's IP address:

1. Type in the new IP address
2. Click the Change IP button.
3. Cycle power to the device. The IP address change activates when the device reboots.

IMPORTANT! Verify the new IP address is correct before cycling power to the device. After the IP address changes, you must use the new IP address to access these configuration screens. Print this page and file for your records.

Selecting a Host Communication Protocol

By default the Ethernet Bridge and GatewayPro systems communicate with a host using Modbus/TCP. After establishing the IP address of the Ethernet Bridge and host, the system is set up to use Modbus/TCP.

The system can also use EtherNet/IP™. To change the system to EtherNet/IP, follow the previous instructions regarding the device and host IP address, and then:

1. Log in using the following user name and password. User name: root Password: sxi
2. At the bottom of the *System > Setup > Network* page is a checkbox to enable EtherNet/IP. Only select this box if the GatewayPro system is running on an EtherNet/IP network. This change cannot be enabled from a login other than the “root” login.
3. After selecting the EtherNet/IP Enabled checkbox, click the Set Ports button to save any changes made to the HTTP Port, Modbus Server Port, Telnet Port, or EtherNet/IP Enabled settings.
4. Cycle power to the Ethernet Bridge or GatewayPro to complete this update. After the device powers up, the changes should be registered.

Get ALL

For an existing network, perform a Get ALL for the devices and save the XML file before changing any network parameters. The default XML file stored on the Ethernet Bridge or GatewayPro may not accurately represent your configured network.

The Get ALL command retrieves the parameters on the *Configure Points* and *I/O Linking* pages. These parameters are specific to the wireless network. The Get ALL command does not retrieve parameters involving the host system or the wired network components.

1. From the *RF Devices > Select Models* screen, verify the DX80 radio devices are defined using the Models drop-down list and the device name. If you make any changes to this list, select the Change box, then click the Update button to send the new device list to the GatewayPro.
2. Select the Get ALL checkbox for each radio device in the wireless network.
3. Click the Update button to retrieve configuration information from each DX80 device.
4. The Get ALL command will take a few minutes to complete. Click on the Check Status button to review the status of the command. When all devices are "Ready," the command has finished.

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 GatewayPro, not the XML file.

Change, Refresh, Send, and Update Commands

Buttons commonly appearing on most configuration screens are the Change, Refresh, Send, and Update buttons. Each of these buttons performs a slightly different task.

Change	If you leave any Web Configurator screen without clicking the Change button to submit the changes to the Ethernet Bridge or GatewayPro, all changes are lost.	Send	Clicking the Send button transmits device and I/O parameters to the radio devices. The Send operation usually requires several second to complete.
Refresh	Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.	Update	Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

RF Devices Tab

Use the RF Devices tab to configure the radio network devices and I/O points.

Select Models

The Select Models tab displays the list of devices for the radio network. Use this screen to define the wireless network devices.

This page allows configuration of devices according to I/O point types.

DX80 Device Configuration Showing 1 to 16 of 16 Update < Prev Next >

Status: **Ready.**

Dev #	Change	Model	Get ALL	Send ALL	Device Name
0	<input type="checkbox"/>	Mixed 4DI, 4DO, 2AI, 2AO	<input type="checkbox"/>	<input type="checkbox"/>	Gateway with Indicator Light
1	<input type="checkbox"/>	Mixed 4DI, 4DO, 2AI, 2AO	<input type="checkbox"/>	<input type="checkbox"/>	Node with Buttons
2	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
3	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
4	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
5	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
6	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
7	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
8	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
9	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
10	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
11	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
12	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
13	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
14	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
15	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	

Copy From -1 To -1 Delete -1 Check Status

Defining a Device

To define the DX80 radio network devices:

1. Select the device from the drop-down list, always using device zero for the Gateway. Most device descriptions can apply to either the Gateway or the Node.
2. Name the device.
3. Select the Change checkbox.
4. Click the Update button to send this information to the Ethernet Bridge.

Using the Change checkbox and Update buttons sends the only device name and model to the Ethernet Bridge/GatewayPro device. This will not overwrite existing I/O parameter information.

After the devices are defined and named, retrieve any existing parameter configuration information from the DX80 devices and load these settings into the GatewayPro or Ethernet Bridge:

1. Select the Get ALL checkbox for each device.
2. Click the Update button.

The Get ALL command will take a few minutes to complete. Click on the Check Status button to review the command's status.

Copying a Defined Device

When setting up a radio network that includes devices with the same configuration, set up one device and copy it using the Copy button at the bottom of the screen. Copying one device's setup to another device also copies the Configure Points information. To copy device parameters, fill in the From and To boxes with the appropriate device number (listed on the left side of the table) and click the Copy button.

Submitting Parameters to the DX80 Devices

After defining the devices in the radio network, including the items from the Configure Points screen, the expanded Configure Points screen, and the I/O Linking screen, check the Send ALL box for the devices and click the Update button on the Select Models screen.

This sends the I/O point configuration information to the DX80 devices. Once the Send ALL function has begun, click the Check Status button at the bottom of the screen. A monitoring screen displays each device's progress.

Other Commands

Check Status	Click the Check Status button to watch the status of a Get ALL or Send ALL command. Sending or retrieving information from the DX80 devices can take several minutes. Use the Check Status button to verify the error status of the data transfer. When the list reads "Ready," the command has finished.	Send All	After defining and setting up the devices and I/O point parameters, select the Send ALL checkbox and click the Update button to send this information to the radio network devices.
Get ALL	Select the Get ALL checkbox and click the Update button to pull set-up parameters from the DX80 devices. These parameters will be loaded into the Web Configurator screens but will not be automatically saved into the XML file. Before modifying any existing radio network devices, always perform a Get ALL to update the Web Configurator with accurate set-up information.	Update	Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.
Prev and Next	If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.		

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 GatewayPro, not the XML file.

Model List

Select from one of the following models to define your device.

None. No device is present

Discrete 4DI, 4DO. Discrete device with four discrete in and four discrete out.

Discrete 6DI, 6DO. Discrete device with six discrete in and six discrete out.

Discrete 8DI, 4DO. Discrete device with eight discrete in and four discrete out.

Discrete 4DI, 8DO. Discrete device with four discrete in and eight discrete out.

Mixed 2DI, 2DO, 2AI, 2AO. Device with two discrete in, two discrete out, two analog in, and two analog out. The term "mixed" refers to a device with both discrete and analog I/O.

Mixed 4DI, 4DO, 2AI, 2AO. Device with four discrete in, four discrete out, two analog in, and two analog out.

Analog 4AI, 4AO. Device with four analog in and four analog out.

Flex 2DI, 2DO, 2AI. FlexPower™ Node with two discrete in, two discrete out, and two analog in.

Flex 2DI, 2DO, 4AI. FlexPower Node with two discrete in, two discrete out, and four analog in. This description also includes the Thermocouple and RTD nodes.

M-GAGE. FlexPower M-GAGE™ Node.

Other. Other model that isn't currently defined.

Configure Points

After setting up the basic model for each device, configure the I/O points. There are two ways to access the I/O points configuration screen:

1. Use the Configure Points tab; or
2. Click on the hyperlinked device number in the left column of the Select Models table to access the Expanded Configure Points page (see the Expanded Configure Points section).

Refer to the device's data sheet for factory default information.

This page allows configuration of individual I/O points.

Device Name: **Gateway with Indicator Light** Device # < Prev Next > Change Refresh Get Info

Polling Interval Sec. Max Bad Count Re-link Count Send Flags Get Flags Reset

Default output conditions: Power Up Host Link Failure Gateway Link Failure Out of Sync Node Link Failure Auto-recover Send/Get polling/flags only Status: **Ready**

I/O #	I/O Enab	I/O Selection	Sample Interval	Report Interval	Hyst	Thresh	Delta	I/O Name
1	<input checked="" type="checkbox"/>	PNP Input (10-30V) #1	0.06	0.00	0	0	0	Gateway Discrete IN 1
2	<input checked="" type="checkbox"/>	PNP Input (10-30V) #2	0.06	0.00	0	0	0	Gateway Discrete IN 2
3	<input checked="" type="checkbox"/>	PNP Input (10-30V) #3	0.00	0.00	0	0	0	Gateway Discrete IN 3
4	<input checked="" type="checkbox"/>	PNP Input (10-30V) #4	0.00	0.00	0	0	0	Gateway Discrete IN 4
5	<input checked="" type="checkbox"/>	Analog In #1, 4-20mA	0.06	1.00	2.00	10.00	0.20	Gateway Analog IN 1
6	<input checked="" type="checkbox"/>	Analog In #2, 4-20mA	0.06	1.00	2.00	10.00	0.20	Gateway Analog IN 2
7	<input checked="" type="checkbox"/>	Discrete Output (1014) #1	0.00	0.00	0	0	0	Gateway Red Light
8	<input checked="" type="checkbox"/>	Discrete Output (1014) #2	0.00	0.00	0	0	0	Gateway Yellow Light
9	<input checked="" type="checkbox"/>	Discrete Output (1014) #3	0.00	0.00	0	0	0	Gateway Discrete OUT 3
10	<input checked="" type="checkbox"/>	Discrete Output (1014) #4	0.00	0.00	0	0	0	Gateway Discrete OUT 4
11	<input checked="" type="checkbox"/>	Analog Output #1	0.00	0.00	0.00	0.00	0.00	Gateway Analog OUT 1
12	<input checked="" type="checkbox"/>	Analog Output #2	0.00	0.00	0.00	0.00	0.00	Gateway Analog OUT 2

S/N: 100323 Wr Protect: OFF Model: 045434 Prod Date: 063000
RF Ver: V10 000100129001 RF EE: 000000000 LCD Ver: V11 000100129003 LCD EE: 000000000

Note: If you leave any Web Configurator screen without clicking the Change button to submit the changes to the Ethernet Bridge or GatewayPro, all changes are lost.

Setting Up I/O Points

To set up an I/O point:

1. Select the I/O Enabled checkbox. Any active I/O point must be enabled or the I/O is ignored.
2. Select an I/O type from the I/O Selection drop-down list.
3. The Configure Points sample screen shows a Gateway defined with four discrete IN, four discrete OUT, two analog IN, and two analog OUT points. Always refer to the device data sheet to determine which discrete and which analog I/O points are active for a given device. Note, however, that the NPN and PNP settings for discrete I/O shown on the data sheet are only default configuration settings and can be changed.
4. Define any applicable parameters, e.g. sample interval, report interval, hysteresis, threshold, or any other parameter displaying on the main or expanded view screens.
5. After setting up all I/O points using either the Configure Points tab or the expanded Configure Points screen, click the Change button to submit the changes to the Ethernet Bridge or GatewayPro.
6. To send all I/O data to the devices, use the Select Models screen by selecting the Send ALL checkbox and clicking the Update button. To send the individual I/O point changes, use the expanded Configure Points screen and the Send button.

Parameters

The following parameters are set on the *Configure Points* screen.

Change If you leave any Web Configurator screen without clicking the Change button to submit the changes to the Ethernet Bridge or Gateway-Pro, all changes are lost.

Delta The delta parameter defines the change required between sample points of an analog input before the analog input reports a new value. To turn off this option, set the Delta value to 0.

Default Output Condition Flags The default output conditions are a set of checkboxes to establish device-based parameters and apply to all outputs on this device. After making changes to the flags, click the Send Flags button to submit the changes to the device.

Auto-Recover. Selecting the Auto-Recover option forces the Gateway to attempt to re-establish communications with out-of-sync nodes after a polling error condition is indicated. The Gateway polls the failing device and must successfully communicate with the failing node Re-Link Count times before the error condition is erased. This parameter is only used on the Gateway. Without the auto-recover feature selected, the user must manually reset error conditions or the host system must reset the error condition.

Gateway Link Failure. The Gateway detected a communication problem with a Node. All linked outputs of the failing device are set to the default states.

Host Link Failure. A Modbus timeout forces all device outputs to the default states. This parameter applies to every device that sets this flag.

Node Link Failure. A Node detected an RF link problem and set its own outputs to the default states.

Out of Sync. When an out-of-sync condition is detected, all Node outputs are set to the default value. This parameter applies only to the Nodes.

Power Up. All device outputs are set to the default value on initial power-up.

Get Info The Get Info button retrieves factory information for the selected device, such as the model number, serial number, and production date.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Re-refresh Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.

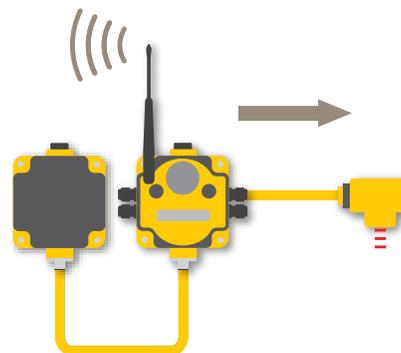
Report Interval/Rate The report rate defines how often the Node communicates the I/O status to the Gateway. Change of state reporting sets the system to report only when the value crosses the threshold setting. For FlexPower™ applications, setting the report rate to a slower rate extends the battery life.



Re-link Count The re-link count is the number of completed polling messages the Gateway receives from a Node before a lost RF link is considered re-established and normal operation resumes.

Reset The Reset button resets any error conditions displayed. Until the error message is reset, the device will not start any additional operations.

Sample Interval/Rate The sample interval, or rate, defines how often the SureCross device samples the input. For battery-powered applications, setting a slower rate extends the battery life.



I/O Enable Select the checkbox to enable the individual I/O point. If the checkbox is not selected, that I/O point is disabled, regardless of what other parameters may be defined. For efficient power usage, do not enable I/O points that are not used.

I/O Name The I/O name field is an optional text field used to assign names to the individual I/O points for easy reference. This name may appear in many other screens relating to the I/O point.

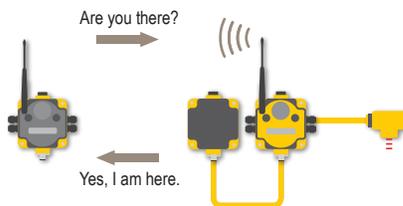
I/O Number Click on the I/O # hyperlink on the far left of the screen to access an additional screen for I/O point configuration. The expanded screen contains more I/O point parameters than is displayed on the primary page.

I/O Selection or Type Select the I/O type from the drop-down list. The drop-down list includes all options available for the entire DX80 line. Not all I/O types included in the drop-down list are applicable for any given device. Refer to the device data sheet to determine which options are available for each device.

“Other” Type #: Occasionally some newly designed and released devices will use I/O types not yet listed in the drop-down list for I/O Type. When this happens, Banner Engineering applications engineers will supply the “other” type number. Select Other from the I/O Type drop-down list and enter the I/O type number supplied by Banner Engineering into this field.

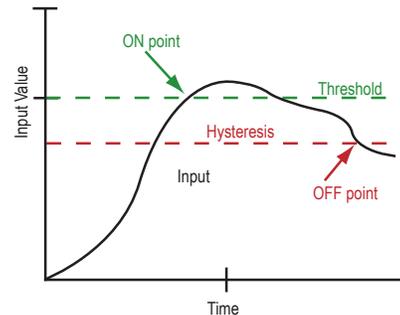
Maximum Bad Count The max bad count refers to a user-established maximum count of consecutive failed polling attempts before the Gateway considers the RF link to have failed.

Polling Interval/Rate To monitor network health, the Gateway communicates with, or polls, each Node to determine if the radio link is active. The polling rate defines how often the Gateway communicates with each Node. Polling is always initiated by the Gateway and only verifies radio signal communications.



Send Flags, Get Flags The Send Flags and Get Flags buttons refer only to the Default Output Conditions flags, not the I/O parameters.

Threshold and Hysteresis Threshold and hysteresis work together to establish the ON and OFF points of an analog input. The threshold defines a trigger point or reporting threshold (ON point) for a sensor input. The hysteresis value establishes how much below the active threshold (ON point) an analog input is required to be before the input is considered OFF. A typical hysteresis value is 10% to 20% of the unit's range.



In the example shown graphically, the input is considered on at 15 mA. To consider the input off at 13 mA, set the hysteresis to 2 mA. The input will be considered off when the value is 2 mA less than the threshold.

Expanded Configure Points

Most I/O point parameters are changed using the expanded view of the Configure Points tab.

To access this expanded view, which displays all parameters for the I/O point selected, click on the I/O number hyperlink from the Configure Points tab. Several parameters on the expanded view also appear in the standard Configure Points screen and can be modified from either screen.

After making changes to the parameters screen:

1. Click the Change button to submit the changes to the Ethernet Bridge or GatewayPro.
2. Click the Send button to update the radio devices.

Change	If you leave any Web Configurator screen without clicking the Change button to submit the changes to the Ethernet Bridge or GatewayPro, all changes are lost.
Get	Click the Get button to read all device and I/O parameters from the DX80 device and load them into the Web Configurator screens. This does not save the parameters to the XML file.
Prev and Next	If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.
Refresh	Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.

Reset	The Reset button resets any error conditions displayed. Until the error message is reset, the device will not start any additional operations.
Saving Changes to the XML File	To permanently save the changes to the XML file, go to the <i>System > Setup > Config File</i> page and click the Save button. Changes made by clicking an Update button are temporary and only submitted to the Ethernet Bridge or GatewayPro, not the XML file.
Send	Clicking the Send button transmits device and I/O parameters to the radio devices. The Send operation usually requires several seconds to complete.

I/O Selection

Default Output Value	Default output values are specific values written to output registers. For discrete outputs, this is a 1 (on) or 0 (off) value. For analog outputs the value can be any valid register value.
I/O Enable	Select the checkbox to enable the individual I/O point. If the checkbox is not selected, that I/O point is disabled, regardless of what other parameters may be defined. For efficient power usage, do not enable I/O points that are not used.

When a default condition occurs, these default output values are written to the output register.

- Hold Last State** The I/O point retains the last value recorded instead of the default output value during selected default conditions.
- Invert I/O** Selecting this checkbox inverts the digital representation of the I/O.

I/O Selection or Type Select the I/O type from the drop-down list. The drop-down list includes all options available for the entire DX80 line. Not all I/O types included in the drop-down list are applicable for any given device. Refer to the device data sheet to determine which options are available for each device.

“Other” Type #: Occasionally some newly designed and released devices will use I/O types not yet listed in the drop-down list for I/O Type. When this happens, Banner Engineering applications engineers will supply the “other” type number. Select Other from the I/O Type drop-down list and enter the I/O type number supplied by Banner Engineering into this field.

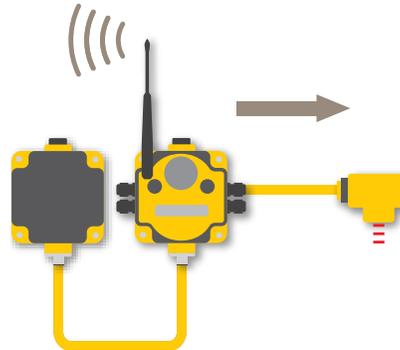
Sampling and Reporting

Report Interval/Rate The report rate defines how often the Node communicates the I/O status to the Gateway. Change of state reporting sets the system to report only when the value crosses the threshold setting. For FlexPower™ applications, setting the report rate to a slower rate extends the battery life.



Report Type Select from discrete or analog format reporting types. Analog data requires sixteen bits while discrete data uses only one bit per I/O point. Selecting double from the list uses two consecutive registers, each consisting of sixteen bits.

Sample Interval/Rate The sample interval, or rate, defines how often the SureCross device samples the input. For battery-powered applications, setting a slower rate extends the battery life.



Analog Signal Conditioning

Delta The delta parameter defines the change required between sample points of an analog input before the analog input reports a new value. To turn off this option, set the Delta value to 0.

Digital Signal Conditioning

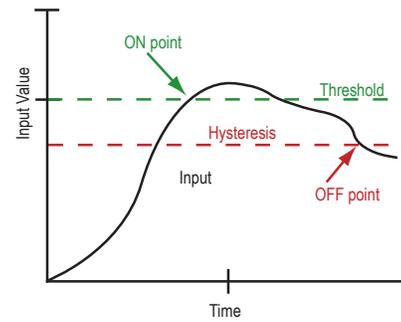
Sample High/Low (Dis- For discrete inputs, the sample high parameter defines the number of consecutive samples the input signal must be high before a signal is considered active. Sample low defines the number of consecutive samples the input signal must be low before a signal is considered low. The sam-

Threshold and Hysteresis Threshold and hysteresis work together to establish the ON and OFF points of an analog input. The threshold defines a trigger point or reporting threshold (ON point) for a sensor input. The hysteresis value establishes how much below the active threshold (ON point) an analog input is required to be before the input is consid-

create I/O) ple high and sample low parameters are used to create a filter to avoid unwanted input transitions. The default value is 0, which disables this feature. The value range is 1 through 255.

Pulse Width The pulse width determines the length of time, in seconds, that a digital output is active (1) before returning to zero. Select 0 to disable this feature.

ered OFF. A typical hysteresis value is 10% to 20% of the unit's range.



In the example shown graphically, the input is considered on at 15 mA. To consider the input off at 13 mA, set the hysteresis to 2 mA. The input will be considered off when the value is 2 mA less than the threshold.

Units Defined

The units parameter defines the range and/or type of data value associated with an input or output.

Selecting Units from within any configuration tool changes the units definition of several parameters, including threshold, hysteresis, and delta. For example, if the units are 0-20 mA, the threshold, hysteresis, and delta values are entered as milliampere values. Selecting Temp C changes the threshold, hysteresis, and delta units to degrees Celsius.

Signed values range from -32768 to +32767 and allow for the measurement of negative values. Signed values are typically used for measuring temperatures. Signed values are stored as two's complement values.

Unsigned values range from 0 to 65535 and are used to measure values that do not go below zero, such as 4 to 20 mA, distance, or a counter.

Input Units		
Units	Description	Definition
0	Raw	Displays the raw A/D conversion data with data ranges from 0 to 65535. This units type is typically used only for factory calibration. LCD: Raw A/D hex value
1	4 to 20 mA	Analog unit. Modbus register contents are scaled such that 0 represents 4 mA and 65535 represents 20 mA. LCD: 4.00mA-20.00mA
2	0 to 20 mA	Default analog input unit. Modbus register contents are scaled such that 0 represents 0 mA and 65535 represents 20 mA. LCD: 0.00mA-20.00mA
3	Discrete (ON/OFF)	Default discrete input unit. LCD: ON/OFF
4	0 to 10V (Volts)	Analog input using 0 to 10V instead of current. Modbus register contents are scaled such that 0 represents 0V and 65535 represents 10V. LCD: 0.00V-10.00V

Input Units		
Units	Description	Definition
6	Temp °C	Celsius, high resolution. Analog input for temperature devices such as thermocouples, RTD, and thermistors. In high resolution mode, temperature = (Modbus register value) ÷ 20. LCD: 0000.0C
7	Temp °F	Fahrenheit, high resolution. Analog input for temperature devices such as thermocouples, RTD, and thermistors. In high resolution mode, temperature = (Modbus register value) ÷ 20. LCD: 0000.0F
8	Temp °C (Low Res)	Celsius, low resolution. To measure a greater temperature range, use the low resolution unit. In low resolution mode, temperature = (Modbus register value) ÷ 2. LCD: 0000.0C
9	Temp °F (Low Res)	Fahrenheit, low resolution. To measure a greater temperature range, use the low resolution unit. In low resolution mode, temperature = (Modbus register value) ÷ 2. LCD: 0000.0F
10	Asynchronous Counter, 32-bit	The 32-bit counter value records counts up to 4.29 billion. LCD: 0000 0000
11	Asynchronous Counter, 16-bit	The 16-bit counter value records counts up to 65535. LCD: 0000

Output Units		
Units	Description	Definition
0	Raw	Displays the raw A/D conversion data with data ranges from 0 to 65535. This units type is typically used only for factory calibration. LCD: Raw A/D hex value
1	4 to 20 mA	Analog unit. Modbus register contents are scaled such that 0 represents 4 mA and 65535 represents 20 mA. LCD: 4.00mA–20.00mA
2	0 to 20 mA	Default analog input unit. Modbus register contents are scaled such that 0 represents 0 mA and 65535 represents 20 mA. LCD: 0.00mA–20.00mA
3	Discrete (ON/OFF)	Default discrete unit. LCD: ON/OFF
4	0 to 10V (Volts)	Analog unit using 0 to 10V instead of current. Modbus register contents are scaled such that 0 represents 0V and 65535 represents 10V. LCD: 0.00V–10.00V
5	Signed Analog, 0 to 10V	For a signed value, such as temperature, that is to be converted to a voltage out value. Use null to set the start point and span to define the range. The null value is the starting temperature to be associated with 0V. The span is the entire temperature range that is to be associated with 0 to 10V. LCD: 0.00V–10.00V

Output Units		
Units	Description	Definition
6	Signed Analog, 0 to 20 mA	For a signed value, such as temperature, that is to be converted to a mA out value. Use null to set the start point and span to define the range. The null value is the starting temperature to be associated with 0 mA. The span is the entire temperature range that is to be associated with 0 to 20 mA. LCD: 0.00mA–20.00mA
7	Unsigned Analog, 0 to 20 mA	For unsigned values, such as a counter, that is to be converted to a mA out value. Use the null to set the start point and span to define the range. The null value is the distance to be associated with 0 mA. The span is the entire distance range that is to be associated with 0 to 20 mA. LCD: 0.00mA–20.00mA
8	Signed Analog, 4 to 20 mA (A)	In older models, this units type is for degree Celsius conversions only. Use null to set the start point and span to define the range. The null value is the starting temperature to be associated with 4 mA. The span is the entire temperature range that is to be associated with 4 to 20 mA. For newer firmware models, type codes 8 and 9 are treated the same. LCD: 4.00mA–20.00mA
9	Signed Analog, 4 to 20 mA (B)	In older models, this units type is for degree Fahrenheit conversions only. Use null to set the start point and span to define the range. The null value is the starting temperature to be associated with 4 mA. The span is the entire temperature range that is to be associated with 4 to 20 mA. For newer firmware models, type codes 8 and 9 are treated the same. LCD: 4.00mA–20.00mA
10	Unsigned Analog, 0 to 10V	For an unsigned value, such as 0 to 20 mA, that is to be converted to a voltage out value. Use the null to set the start point and span to define the range. The null value is the distance to be associated with 0V. The span is the entire distance range that is to be associated with 0 to 10V. LCD: 0.00V–10.00V
11	Counter, 16-bit	The 16-bit counter value records counts up to 65535. LCD: 0000
12	Unsigned Analog, 4 to 20 mA	For an unsigned value, such as 0 to 10V, that is to be converted to a mA out value. Use the null to set the start point and span to define the range. The null value is the distance to be associated with 4 mA. The span is the entire distance range that is to be associated with 4 to 20 mA. LCD: 4.00mA–20.00mA

Battery Powered Sensor Options

Sensor Power Supply

Select a power supply for the sensor device. Select Supply 1 through 4 to indicate the external device is powered from one of the Node's supplied switch power connectors.

External. The sensor is powered from outside the Node.

Supply #1. Switched power 1 (SP1)

Supply #2. Switched power 2 (SP2)

Supply #3. Switched power 3 (SP3)

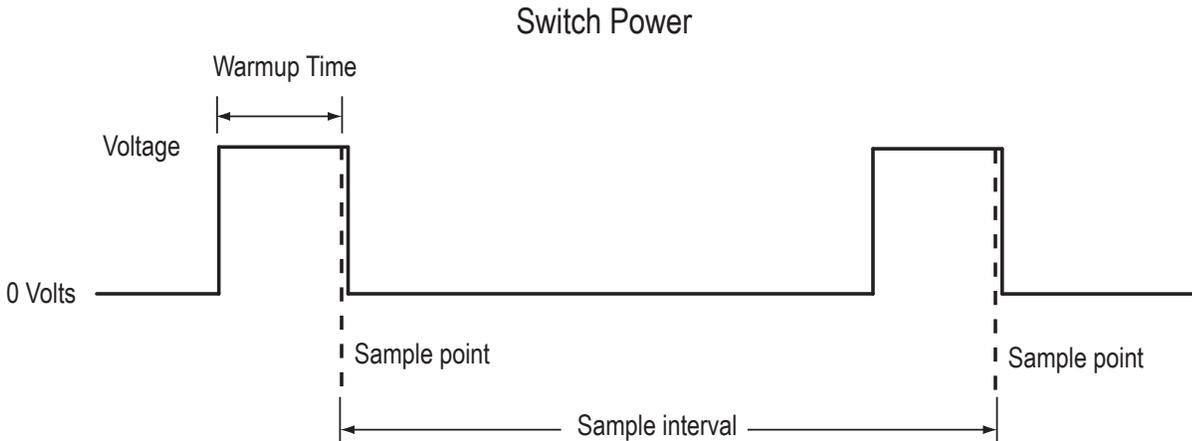
Supply #4. Switched power 4 (SP4)

Supply Output Voltage

The Supply Output Voltage sets the voltage required for the sensor device. This parameter is only applicable when using the supplied switch power option.

Supply Warmup

Supply Warmup defines the length of time the switch power should be turned on before examining the sensor's input.



I/O Linking

Each device input point can be linked or connected to any output point in the system. An output link defined as zero for the device and zero for the output point is not connected. Valid output points on all devices are nine through fourteen; valid devices are one through fifteen with zero reserved for the Gateway (or GatewayPro).

RF Devices | Network | System | Advanced | RF by **SENSONIX**

Select Models | Configure Points | **I/O Linking** | Scaling | Remote I/O

This page displays I/O links mapped by the DX80.

Device # < Prev Next > Status: **Ready** Change Refresh

Send Get Reset

Device Name	Source			Destination		
	Device #	I/O #		Device #	I/O #	Packed
Gateway with Indicator Light	0	1	→	<input type="text" value="1"/>	<input type="text" value="9"/>	<input checked="" type="checkbox"/>
Gateway with Indicator Light	0	2	→	<input type="text" value="1"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>
Gateway with Indicator Light	0	3	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	4	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	5	→	<input type="text" value="1"/>	<input type="text" value="13"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	6	→	<input type="text" value="1"/>	<input type="text" value="14"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	7	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	8	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>

In the sample screen shown, the Gateway input points can be mapped to any Node's outputs. Manually enter the device number in the Destination Device # box, then enter the I/O point number for that destination device.

After making changes to this screen:

1. Click on the Change button to send the changes to the DX83 Ethernet Bridge or the GatewayPro
2. Click on the Send button to send these changes to the device.

Change	If you leave any Web Configurator screen without clicking the Change button to submit the changes to the Ethernet Bridge or GatewayPro, all changes are lost.	Refresh	Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.
Get	Click the Get button to read all device and I/O parameters from the DX80 device and load them into the Web Configurator screens. This does not save the parameters to the XML file.	Reset	The Reset button resets any error conditions displayed. Until the error message is reset, the device will not start any additional operations.
Packed Flag	<p>Setting the Packed flag communicates discrete output point information more efficiently. Instead of sending one message for each output change, discrete values are packed into one message sent to the destination device. The packing data reduces the wireless device traffic and improves the timing in critical applications when multiple inputs from a single device are connected to outputs on one other device.</p> <p>The Packed flag only affects the output point messages, the input message communication is defined by each device I/O point. If a device I/O point Report Type parameter is defined as discrete, the input reporting messages for this point are packed into one wireless message. For greatest efficiency, all discrete inputs should be defined as a discrete Report Type.</p>	Saving Changes to the XML File	To permanently save the changes to the XML file, go to the <i>System > Setup > Config File</i> page and click the Save button. Changes made by clicking an Update button are temporary and only submitted to the Ethernet Bridge or GatewayPro, not the XML file.
Prev and Next	If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.	Send	Clicking the Send button transmits device and I/O parameters to the radio devices. The Send operation usually requires several seconds to complete.

Scaling

The Scaling screen is used for converting data.

Raw data is multiplied by the Scale and added to the Offset to produce the data appearing in the floating point register associated with the I/O point. The floating point registers start at register 1001.

RF Devices Network System Advanced RF by **SENSONIX**

Select Models Configure Points I/O Linking **Scaling** Remote I/O

This page displays node I/O scale factors. This page displays node I/O scale factors.

Device name: **Gateway with Indicator Light** Device #

I/O#	Local Register #	Scale	Offset	I/O Point Name
1	00001	0.000000	0.000000	Gateway Discrete IN 1
2	00002	0.000000	0.000000	Gateway Discrete IN 2
3	00003	0.000000	0.000000	Gateway Discrete IN 3
4	00004	0.000000	0.000000	Gateway Discrete IN 4
5	00005	0.000000	0.000000	Gateway Analog IN 1
6	00006	0.000000	0.000000	Gateway Analog IN 2
7	00007	0.000000	0.000000	
8	00008	0.000000	0.000000	
9	00009	0.000000	0.000000	Gateway Red Light
10	00010	0.000000	0.000000	Gateway Yellow Light
11	00011	0.000000	0.000000	Gateway Discrete OUT 3
12	00012	0.000000	0.000000	Gateway Discrete OUT 4
13	00013	0.000000	0.000000	Gateway Analog OUT 1
14	00014	0.000000	0.000000	Gateway Analog OUT 2
15	00015	0.000000	0.000000	
16	00016	0.000000	0.000000	

For example, thermocouple inputs are multiplied by 20 before being written to the Modbus register. To convert this register value back to a temperature reading use the Scaling screen.

The Offset value can be used to account for errors introduced into the sensor system, such as errors introduced because of wiring lengths in a thermocouple input system.

Other Commands

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Remote I/O

The Remote I/O configuration page defines up to 32 external communication registers when the DX80 Gateway is defined as a Modbus RTU Master.

This table is used only when the Gateway is a Modbus RTU master and it is communicating with Modbus slave devices, typically DX85 Expanded Remote I/O devices.

RF Devices Network System Advanced RF by **SENSONIX**

Select Models Configure Points I/O Linking Scaling Remote I/O

This page allows configuration of remote I/O points.

Device Name: **Gateway with Indicator Light** Showing 1 to 16 of 32

DX80 is Modbus TCP Client/Server (default)

DX80 is Modbus RTU Master

DX80 is Modbus RTU Slave Status: **Ready**

Master Timeout:

Map #	Local Register	Action	Remote Type	Remote Register	Slave ID	Poll Timeout mS	Active Thresh %	Hyst %
1	0	None	None	0	0	0	0	0
2	0	None	None	0	0	0	0	0
3	0	None	None	0	0	0	0	0
4	0	None	None	0	0	0	0	0
5	0	None	None	0	0	0	0	0
6	0	None	None	0	0	0	0	0
7	0	None	None	0	0	0	0	0
8	0	None	None	0	0	0	0	0
9	0	None	None	0	0	0	0	0
10	0	None	None	0	0	0	0	0
11	0	None	None	0	0	0	0	0
12	0	None	None	0	0	0	0	0
13	0	None	None	0	0	0	0	0
14	0	None	None	0	0	0	0	0
15	0	None	None	0	0	0	0	0
16	0	None	None	0	0	0	0	0

After power-up, the DX80 Gateway is a slave device (to the Ethernet Bridge) for the time defined in the Master Timeout field, defined in seconds with a 90 second minimum. During this time, the operating mode can be changed using the browser interface. To change the mode:

- Click one of the radio buttons to select how the DX80 Gateway functions.
 - Select Modbus/TCP Client/Server mode (default) when you are connecting a DX80 to an external PLC or similar equipment.
 - Select Modbus RTU Master mode if the DX80 Gateway is to be a Modbus master device communicating to other slave devices using a Modbus RS485 serial connection. The Gateway enters master mode after the Master Timeout period has elapsed.
 - Select Modbus RTU Slave if the DX80 GatewayPro or a Ethernet Bridge and Gateway pair is operating as a slave on a Modbus serial connection.
- Set the Master Timeout field, then click the Change Mode button. When the timeout expires, the DX80 Gateway begins to operate as selected. The Master Timeout determines how long the DX80 Gateway waits before changing modes.
- After making changes, click on the Change button to send the changes to the DX83 Ethernet Bridge or the GatewayPro and then click on the Send button to send these changes to the device.

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 GatewayPro, not the XML file.

Other Commands

Change If you leave any Web Configurator screen without clicking the Change button to submit the

Reset The Reset button resets any error conditions displayed. Until the error message is reset, the device will not start any additional operations.

changes to the Ethernet Bridge or GatewayPro, all changes are lost.

Get Click the Get button to read all device and I/O parameters from the DX80 device and load them into the Web Configurator screens. This does not save the parameters to the XML file.

Refresh Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.

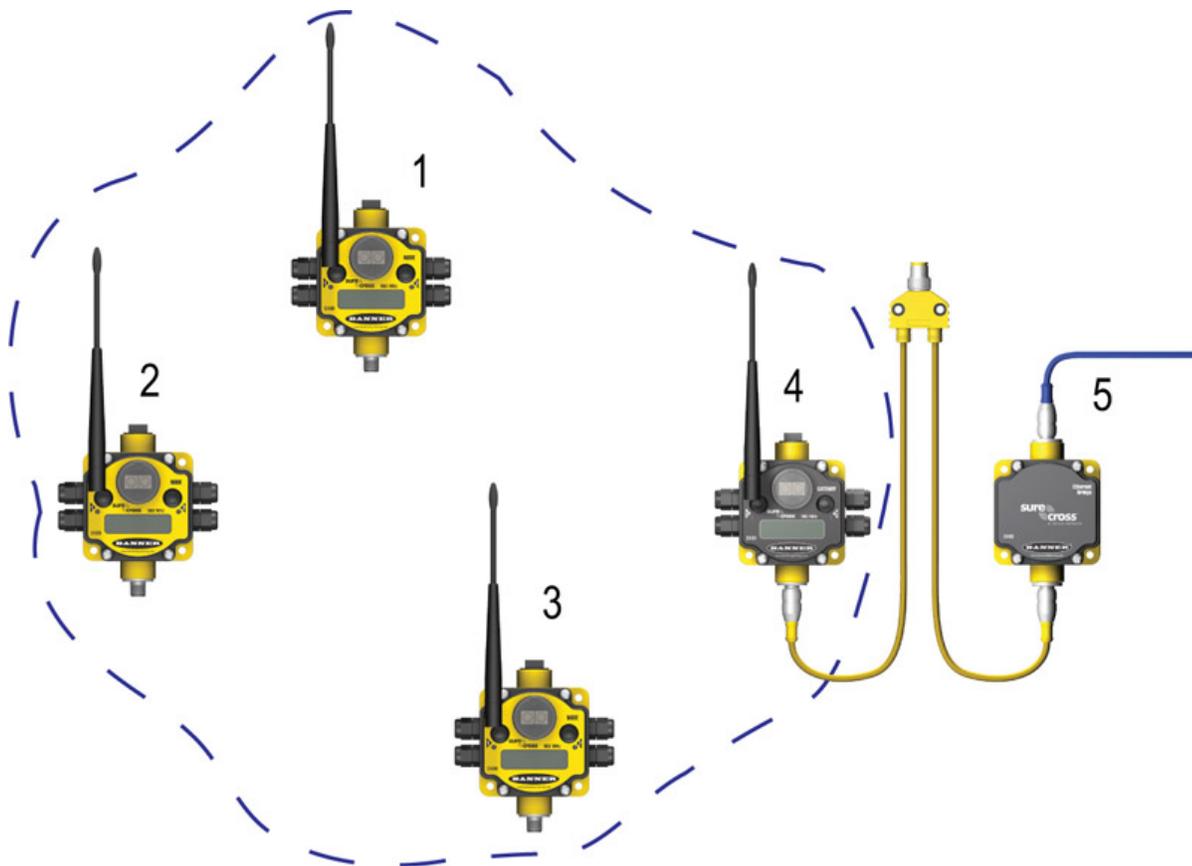
Send Clicking the Send button transmits device and I/O parameters to the radio devices. The Send operation usually requires several second to complete.

DX80 Modes

Setting	Gateway	GatewayPro	Ethernet Bridge	
DX80 is Modbus/TCP Client/Server (default)	Slave	Master	Master	Default mode. The Gateway is a Modbus slave device and the Ethernet Bridge is the master device.
DX80 is Modbus RTU Master	Master	Master	Ignored	The Ethernet Bridge can only communicate with a slave device. In this mode, any communications sent to the Bridge from the Web Configurator is ignored. To resume communications, cycle power to the Gateway. When power is cycled, the Ethernet Bridge begins again as a master device until the timeout lapses.
DX80 is Modbus RTU Slave	Slave	Slave	Ignored	Similar to the default mode, but a device other than the Ethernet Bridge acts as the Modbus master device. The Ethernet Bridge still communicates with the Gateway and can read and write to registers, but another device is the master device.

DX80 is a Modbus/TCP Client/Server (default)

The default configuration is **DX80 is Modbus/TCP Client/Server**. The DX83 Ethernet Bridge is the Modbus master device and only communicates with the device configured as Slave ID 1: the Gateway.



1. Node 1, registers 17 through 32.
2. Node 2, registers 33 through 48.
3. Node 3, registers 49 through 64.
4. Gateway, Slave ID 1, registers 1 through 16.
5. DX83 Ethernet Bridge

DX80 Gateway is Modbus RTU Master

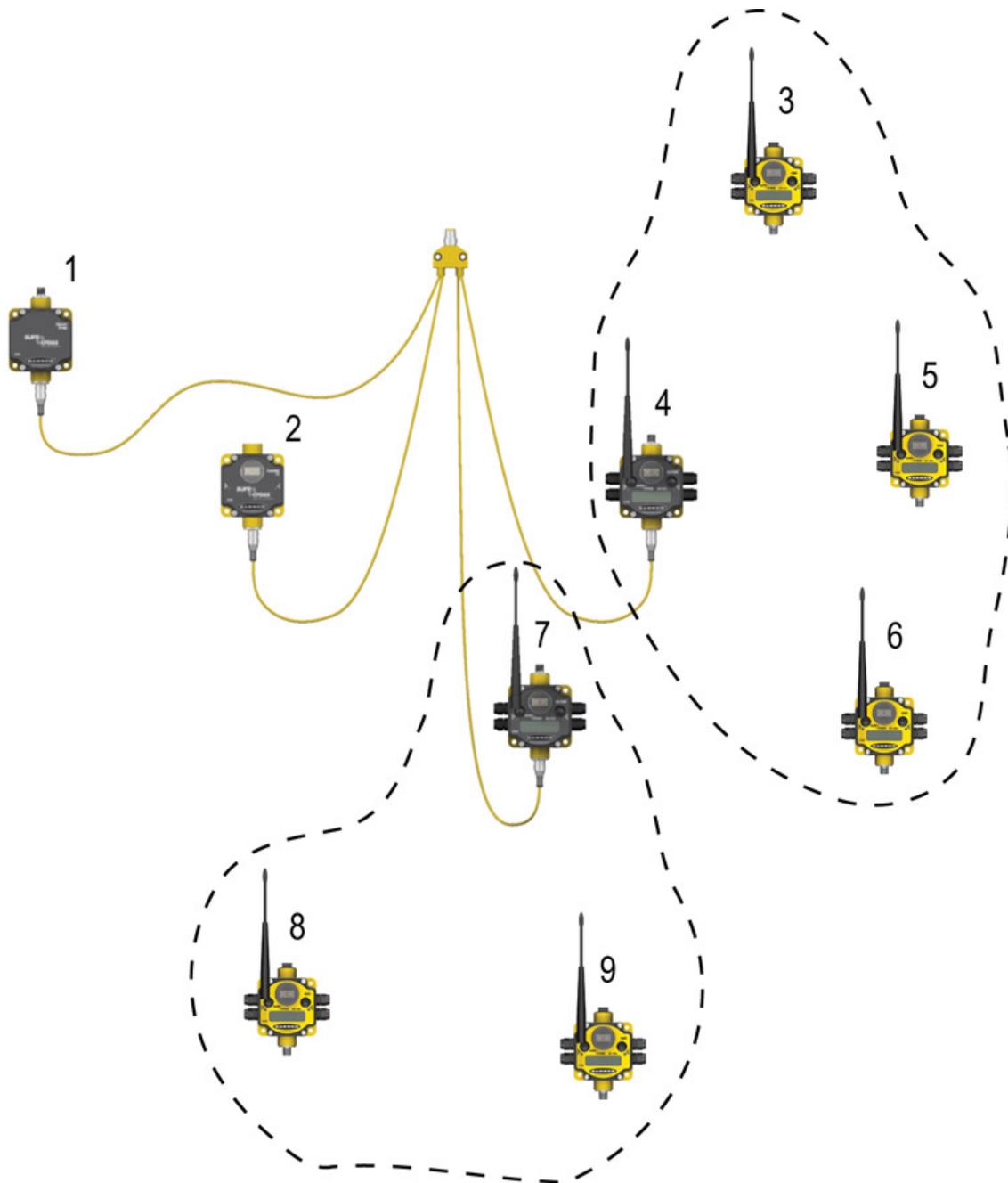
When a DX80 Gateway is set up as a Modbus RTU master device, the communication between the DX83 Ethernet Bridge (used to configure the network) and the Gateway is ignored. The Gateway acts as the Modbus RTU master device for the system, which may include other slave Gateways or DX85 Remote I/O slave devices. All communication must go through the master device.

The master table entries define the register-to-register communication for remote I/O points. Each line represents a register/point connection between the master device and a Modbus slave device with up to 32 table entries possible. For each table entry, specify the local Modbus register, action to perform, type of external point, external register number, external slave number, and a Modbus timeout value for that register access. Active threshold and hysteresis are optional parameters that may be applied to registers.

After making changes:

1. Click on the Change button to send the changes to the DX83 Ethernet Bridge or the GatewayPro.
2. Click on the Send button to send these changes to the radio devices.
3. To save the changes to the XML file, go to the *System > Setup > Config File* page and click the Save button.

This sample network shows a DX80 Gateway as the Modbus RTU Master device. Once the Gateway is set as the master, communication is ignored between the Ethernet Bridge (normally the master) and the Gateway.



1. DX83 Ethernet Bridge
2. Slave ID 2, DX85 Modbus RTU Remote I/O
3. Node 1, registers 17 through 32
4. Master Device, DX80 Gateway, registers 1 through 16.
5. Node 2, registers 22 through 48.
6. Node 3, registers 49 through 64.
7. Slave ID 5, DX80 Gateway, registers 1 through 16.
8. Node 2, registers 33 through 48
9. Node 1, registers 17 through 32.

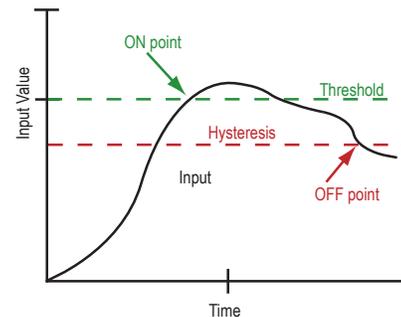
Parameters

Action	Select an action from the following: None, Reads From, or Writes To. Select None to perform no action, Reads From reads the parameter from the remote register and copies the contents into the local register, and Writes To writes the data from the local register to the remote register.
Get	Click the Get button to read all device and I/O parameters from the DX80 device and load them into the Web Configurator screens. This does not save the parameters to the XML file.
Local Register	The Local Register entry is the from register in the I/O mapping. I/O points are linked from the local register to the remote register.
Map Number	Each map entry is defined with a map number, one through 32. The master table entries define the register-to-register communication for remote I/O points. Each line represents a register/point connection to another Modbus slave device. Up to 32 table entries are possible.
Poll Timeout	The poll timeout refers to the time limit, in milliseconds, to communicate with a specific slave device. When this time limited is exceeded, the system begins communicating with the next device in the table. The Poll Timeout setting prevents the system from stopping when a slave device is not responding.
Refresh	Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.
Remote Register	The Remote Register entry is the <i>to</i> register in the I/O mapping. I/O points are linked from the local register to the remote register.
Remote Type	Select a type from the following drop-down list: none, coil (output), discrete input, input register, or holding register. DX80 device registers are all holding registers. Banner Engineering's SureCross™ slave devices use only input registers and holding registers. When using slave devices from other manufacturers, please refer to the manufacturer's documentation to determine what I/O types they use. Coil (output). 1xxxx - Other slave devices, write only, 1 bit Discrete Input. 3xxxx - Other slave devices, read only, 1 bit Input Register. 3xxxx - SureCross™ slave devices, read only, 16 bit

Reset The Reset button resets any error conditions displayed. Until the error message is reset, the device will not start any additional operations.

Slave ID The slave ID is an identifying number used for devices within a Modbus system. By default, Gateways are set to Modbus Slave ID 1. When using more than one Modbus slave, set each slave to a unique ID number.

Threshold and Hysteresis Threshold and hysteresis work together to establish the ON and OFF points of an analog input. The threshold defines a trigger point or reporting threshold (ON point) for a sensor input. The hysteresis value establishes how much below the active threshold (ON point) an analog input is required to be before the input is considered OFF. A typical hysteresis value is 10% to 20% of the unit's range.



In the example shown graphically, the input is considered on at 15 mA. To consider the input off at 13 mA, set the hysteresis to 2 mA. The input will be considered off when the value is 2 mA less than the threshold.

Holding Register. 4xxxx - SureCross slave devices, read/write, 16 bit

Selecting *None* for remote type negates the rule though it remains in the list until deleted. Unused rules at the end of the list always show None as the remote type.

DX80 is Modbus RTU Slave

The third option, DX80 is Modbus RTU Slave, sets up a Gateway and Ethernet Bridge or GatewayPro as a slave device. This selection stops the communication between the Ethernet interface and the DX80 Gateway.

DX80 is Modbus RTU Slave mode was created for special configurations of GatewayPro or Ethernet Bridge devices. Contact Banner Wireless Support for more information.

Network Tab

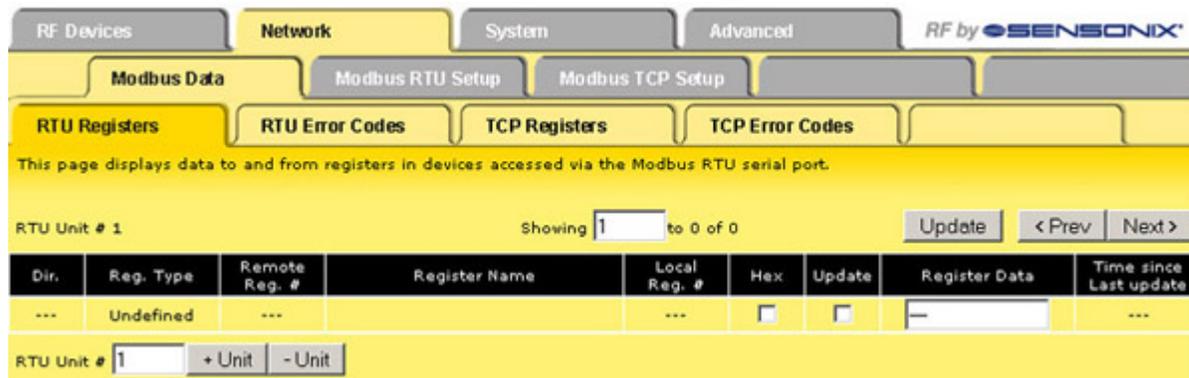
Use the Network main tab to configure the communications outside the radio network.

Modbus Data Submenu

The Ethernet processor in a GatewayPro or Ethernet Bridge can serve as a Modbus master device. The tables configured under the *Network* page define the Master communication settings for Modbus RTU and Modbus/TCP clients and servers. Use the *Modbus Data* submenu to view Modbus register data defined under the *Modbus RTU* set-up page.

RTU Registers

The *RTU Registers* screen displays the Modbus register contents for RTU slave devices defined under the *Modbus RTU* set-up page.



To change the register data:

1. Enter a new register data value
2. Select the Update checkbox.
3. Click the Update button to send the new data to the device.

Hex checkbox Select the Hex checkbox to view the data in hexadecimal form (not recommended for floating point values).

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Unit + and Unit- Scrolls through the list of RTU slave devices.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save

Showing Lists the pages of registers for the selected slave (RTU unit).

configuration information permanently to the XML file.

Update checkbox Unless the Update checkbox is selected, this register data will not be submitted to the Ethernet Bridge or GatewayPro.

RTU Error Codes

The first occurrence of read and write errors are shown along with the map number that was processing when the error occurred.

Select the Reset checkbox to the left of the error codes and click the Update button to clear the error. If more than one error is active, the next error code displays.

Unit #	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"/>	153826	19	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"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	0
13	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	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

The right four columns display a count of errors for all maps for each device. Select the Reset checkbox left of the Total Messages column and click Update to reset the counts. Click Update to view the most recent values.

RTU and TCP Error Codes (A/B Format)

Error codes (A/B format) indicate the following errors with the first number:

1. n/a for RTU (Transaction ID out of sync)
2. Exception code returned by remote device
3. Function code mismatch (bad packet)
4. Insufficient data (bad packet)
5. No response from remote device, timed out
6. CRC error in received packet

When A is code 2, indicating an exception code was returned, B indicates the exception as follows:

1. Illegal function code
2. Illegal data address (the requested register does not exist in the device)
3. Illegal data value

TCP Registers

The TCP Registers page displays data mapped by the virtual server user map defined under *Network > Modbus/TCP Setup > Server Map*.

This is a snapshot of what the remote client sees when the user map is enabled. The diagnostic info displays the connection status for each available connection. A code of A/B where A is zero is an available connection, and B indicates the reason for closing (may be normal TCP close). A value of A greater than zero and B equal to zero indicates an active connection.

This page displays data as mapped by the virtual server "user map" defined under Modbus->Setup->Server Map. This is a snap shot of what the remote client will see when the user map is enabled.

Showing 1 to 1 of 1

Map #	Mapped Register #	Register Name	Register Data
1	00000		Not found

Diagnostic Info

- 1: 0/0
- 2: 0/0
- 3: 0/0
- 4: 0/0
- 5: 0/0

TCP Error Codes

The *TCP Error Codes* page displays error codes encountered when processing Modbus Client reads and writes via the Modbus/TCP connection.

RF Devices		Network		System		Advanced		RF by SENSONIX			
Modbus Data			Modbus RTU Setup		Modbus TCP Setup						
RTU Registers		RTU Error Codes		TCP Registers		TCP Error Codes					
This page displays error codes encountered in processing Modbus Client reads and writes via the Modbus TCP connection(s).											
											Update
Device	Reset -->	Read Error	Offending Read Map #	Reset -->	Write Error	Offending Write Map #	Reset -->	Total Messages	No Responses	Exceptions	
1	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
2	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
3	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
4	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
5	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
6	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
7	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
8	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
9	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
10	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
11	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
12	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
13	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
14	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
15	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
16	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
17	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
18	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
19	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	
20	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0/0	0	<input type="checkbox"/>	0	0	0	

Resetting Error Codes

The first occurrence of read and write errors are shown along with the map number that was processing when the error occurred. Check the Reset box to the left of the error column and click the Update button to clear the error. If more than one error is active, the next error code displays.

The right three columns display an error count for all maps for each device. Check the Reset box to the left of the Total Messages column and click Update to reset the counts. Click Update to view the most recent data values.

RTU and TCP Error Codes (A/B Format)

Error codes (A/B format) indicate the following errors with the first number:

1. n/a for RTU (Transaction ID out of sync)
2. Exception code returned by remote device
3. Function code mismatch (bad packet)
4. Insufficient data (bad packet)
5. No response from remote device, timed out
6. CRC error in received packet

When A is code 2, indicating an exception code was returned, B indicates the exception as follows:

1. Illegal function code
2. Illegal data address (the requested register does not exist in the device)
3. Illegal data value

Modbus RTU Setup Submenu

The *Modbus RTU Setup* submenu contains the read and write map screens for setting up the Modbus RTU Slave option. The two screens contained within the *Modbus RTU Setup* tab apply only to the Ethernet processor on the GatewayPro or a DX83 device.

RTU Read Map

The *RTU Read Map* screen creates a map entry to read data from one or more remote Modbus RTU serial devices. Click on the map number in the left column to view more detail and to insert or delete maps.

Maps entered on the *RTU Read Map* page only read data from remote devices into local registers. To write data to those remote devices, go to the *RTU Write Map* tab.

This screen displays an abbreviated list of maps. Any parameter shown may be changed. To view and/or modify the complete set of parameters, click on the map number shown in the left column and use the expanded *RTU Read Map* page. To submit changes, click the Update button.

For each remote register to be read, enter the register type, remote register format, register number, remote unit number, and local register number.

Map #	Remote Type	Remote Register Format	Remote Register #	Remote Unit #	Swapped	Scale	Local Register #	Name
1	None	Integer	0	0	<input type="checkbox"/>	0.00000	0	

Local Register Number After the remote register is read and the data multiplied by the scale factor, the data is written to the Local Register number.

Name The name is optional and used only for display purposes. The name acts as an identifier for a specific register map. Type in the name in this screen.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Remote Register Format Select the format of the remote register from integer, unsigned, double, float, or bit. An integer is a 16-bit (signed) number, an unsigned format is a 16-bit unsigned number, a double refers to a double precision (32-bit) value, a floating value is a floating point number, and a bit value is a single bit that can either be a 0 or a 1 (discrete value.)

Remote Register Number The Remote Register entry is the register being read.

Remote Type Select a type from the following drop-down list: none, coil (output), discrete input, input register, or holding register. Banner Engineering's SureCross™ slave devices use only input registers and holding registers. When using slave devices from other manufacturers, please refer to the manufacturer's documentation to determine what I/O types they use.

- Coil (output). 1xxxx - Other slave devices, write only, 1 bit
- Discrete Input. 3xxxx - Other slave devices, read only, 1 bit
- Input Register. 3xxxx - SureCross™ slave devices, read only, 16 bit
- Holding Register. 4xxxx - SureCross slave devices, read/write, 16 bit

Selecting None for remote type negates the rule even though it continues to appear in the list until deleted. Unused rules at the end of the list always show None as the remote type. To prevent these from displaying, reduce the number of maps enabled.

Scale The raw data in the remote register is multiplied by the scale factor to produce the data appearing

Remote Unit # (Slave ID) The Remote Unit number is the slave ID of the remote unit to be read. The value in this register is then written to the local register listed.

in the floating point register associated with the I/O point.

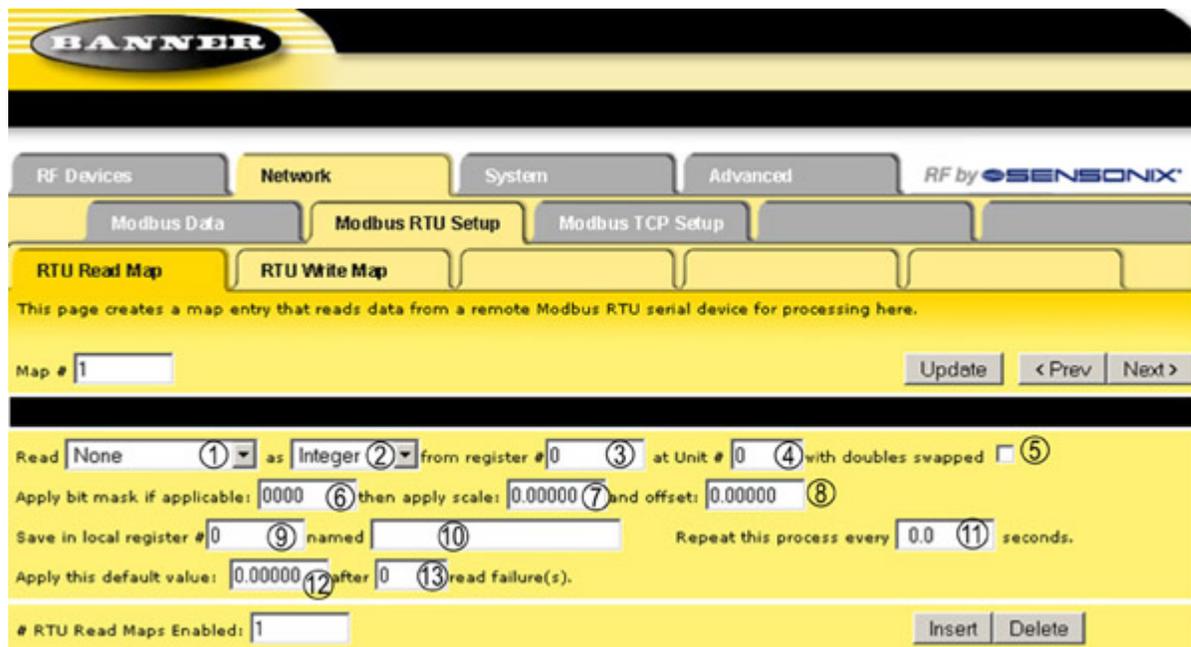
Swapped Check the Swapped box to swap the byte orientation.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Expanded RTU Read Map

The expanded view of the RTU Read Map contains the same parameters as on the original page in addition to a few more parameters.

For each remote register to be read, enter the register type, remote register format, remote register number, and device number (remote unit number). Referring to the screen image, the following parameters may be set using this screen:



	Parameter			Parameter
1	Register type		8	Offset
2	Remote register format		9	Local register number
3	Remote register number		10	Name
4	Device number (remote unit number)		11	Periodic poll time
5	Doubles swapper		12	Default value
6	Bit mask		13	Read fail count
7	Scale			

When the remote register is read, data may be manipulated before being written to the local register. If a bit mask is entered (in hexadecimal), and the remote register type is signed or unsigned (16-bit data), the mask will be bit-wise logical AND-ed with the data, and the

retained bits will be right justified in the result. The result is multiplied by the scale factor and added to the offset. The final result is written to the local register number selected.

- Delete and Insert** Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.
- Periodic Poll Time** Determines how often the Gateway Pro or Gateway/Ethernet Bridge pair read the remote registers of the Modbus slave device. Setting the periodic poll time to zero sets the Gateway Pro or Gateway/Ethernet Bridge pair to read the remote registers continually.
- Prev and Next** If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

- Read Fail Count** When the read fail count is not zero, the default value is stored in the local register after the given number of read failures. Setting the read fail count to zero disables the default and the register retains the most recent value.
- Register Type** Selecting None for register type negates the map though it remains in the list until deleted. Unused maps always show None as the type. If the displayed maps are used and more are needed, increase the RTU Read Maps Enabled number.
- Update** Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

RTU Write Map

The *RTU Write Map* page creates a map entry that writes data to one or more remote Modbus RTU serial devices.

Maps on the *RTU Write Map* page only write data from the local register to the remote register listed. Use the *RTU Read Map* page to read data from those remote devices.

Any parameters shown may be changed and submitted by clicking the Update button, but this screen displays only an abbreviated list of the map parameters. To view and/or modify the complete set of parameters, click on the hyperlinked map number in the left column and use the expanded *RTU Write Map* page.

For each local register, enter the register number, scale, remote type, remote register format, remote register number, and remote unit number (device).

Map #	Local Register #	Scale	Remote Type	Remote Register Format	Remote Register #	Remote Unit #	Swapped	Name
1	0	0.00000	None	Integer	0	0	<input type="checkbox"/>	

- Delete and Insert** Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/

- Remote Type** Select a type from the following drop-down list: none, coil (output), discrete input, input register, or holding register. Banner Engineering's SureCross™ slave devices use only input registers and holding registers. When using slave devices from other manufacturers, please refer to the manufacturer's documentation to determine what I/O types are used.

rule to the bottom of the list, increase the number of rules or maps enabled.

- Local Register** The data in the local register is multiplied by the scale factor, then written to the remote register.
- Name** The name is optional and used only for display purposes. The name acts as an identifier for a specific register map. Type in the name in this screen.
- Prev and Next** If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.
- Remote Register Format** Select the format of the remote register from integer, unsigned, double, float, or bit. An integer is a 16-bit (signed) number, an unsigned format is a 16-bit unsigned number, a double refers to a double precision (32-bit) value, a floating value is a floating point number, and a bit value is a single bit that can either be a 0 or a 1 (discrete value.)
- Remote Register Number** The Remote Register entry is the register being written to in the map.
- Remote Slave ID (Unit #)** The Remote Unit number is the slave ID of the remote unit to be written to.

- Coil (output). 1xxxx, Other slave devices, write only, 1 bit
- Discrete Input. 3xxxx, Other slave devices, read only, 1 bit
- Input Register. 3xxxx, SureCross™ slave devices, read only, 16 bit
- Holding Register. 4xxxx, SureCross slave devices, read/write, 16 bit

Selecting None for remote type negates the rule though it remains in the list until deleted. Unused rules at the end of the list always show None as the remote type. To prevent these from displaying, reduce the number of maps enabled on the expanded view screen.

- Scale** The raw data in the local register is multiplied by the scale factor to produce the data written to the remote register.
- Swapped** Check the Swapped box to swap the byte orientation.
- Update** Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Expanded RTU Write Map

Like the *RTU Read Map* expanded view, the *RTU Write Map* expanded view contains some of the same parameters as the *RTU Write Map* primary view in addition to a few more parameters.

Refer to the *Expanded RTU Read Map* section for more information about these parameters ([GUID-5EBD5A53-1BF9-4F16-B92D-60E91D2E058C.xml](#)).

The screenshot shows the 'RTU Write Map' configuration screen. At the top, there are navigation tabs: 'RF Devices', 'Network', 'System', and 'Advanced'. Below these are sub-tabs: 'Modbus Data', 'Modbus RTU Setup', and 'Modbus TCP Setup'. The 'RTU Write Map' sub-tab is selected. The main content area has a yellow background and contains the following elements:

- A header: "This page creates a map entry that writes data to a remote Modbus RTU serial device from data contained here."
- A "Map #" input field with the value "1" and "Update", "< Prev", and "Next >" buttons.
- A "Read local register #0" input field with a "named" dropdown menu.
- A "Write remote register" section with checkboxes for "any time local register has changed by 0.00000" and "when 0. seconds elapse with no change".
- An "Otherwise write remote register unconditionally, applying local register data as follows:" section with input fields for "Apply scale: 0.00000", "and offset: 0.00000", "Then if applicable, apply bit mask: 0000", and "and bit fill: 0000".
- A "Write None" dropdown menu, "as Integer" dropdown menu, "to register #0" input field, "at Unit # 0" input field, and a "with doubles swapped" checkbox.
- A "Repeat this process" section with radio buttons for "at least" and "no more than every 0.0 seconds".
- A "# Client Write Maps Enabled: 1" input field and "Insert" and "Delete" buttons.

Modbus TCP Setup Submenu

Use the Modbus TCP Setup pages to specify the network address and optional device parameters of a remote Modbus/TCP device. Example remote Modbus/TCP devices may include another Gateway device or any remote device using Modbus/TCP to communicate.

Devices

Use the *Devices* page to set up the network address and optional device parameters for a remote Modbus/TCP device that is linked to for remote input and/or output.

Map the remote Modbus/TCP device's input and/or output using the Client Read and Client Write Maps.

Connection Status. Connection status displays a non-zero error code when a socket error occurs. Possible errors include:

- 104 - Connection reset by peer
- 111 - Connection refused
- 113 - Connection aborted
- 114 - Network is unreachable
- 116 - Connection timed out
- 118 - Host is unreachable
- 119 - Connection in progress (connect unsuccessful and still trying)
- 205 - Could not get host IP by name

Default Poll Period	The polling period defines how often, in seconds, this device (GatewayPro or Ethernet Bridge) contacts the device listed and solicits data.
Domain Name	The system may also look up an IP address when given a domain name. If the IP address is set to zero, the system attempts to find the host by name.
IP Address	Specify the IP address of the remote Modbus/TCP device.
Local Name	The local name is an optional field and is used to refer to this device in other Web Configurator pages.
Port	If port is left set to zero, port 502 is used. To use a non-standard port number, enter the number.

Swap Double Registers

The term swapped applies only to double or float formats. Modbus registers are, by definition, 16 bits of data per register. Access to 32-bit data, either 32-bit integer (double) or IEEE 754 floating point (float), is supported using two consecutive registers. Modbus protocol is inherently "big endian," therefore Modbus defaults to having the high order register first for double and float formats. If the low order register comes first on the accessed device, check the Swapped box.

If you have Swapped incorrectly, check the data. When floating point data is reversed, a 1.0 becomes 2.2779508e-41, which rounds to zero. A floating point 1.1 becomes negative 107609184. If 32-bit integer data is reversed, 1 becomes 65536.

Unit (Optional) The unit or device number is an optional parameter and used primarily for organizational purposes.

Client Read Map

Use the *Client Read Map* tables to create maps that read data from the Modbus/TCP devices defined in the *Devices* page.

Maps entered on the *Client Read Map* page only read data from remote devices. To write data to those devices, go to the *Client Write Map* page. For each remote register to be read, enter the register type, remote register format, register number, remote device, scale, and local register number.

Any parameters shown may be changed and submitted by clicking the Update button, but this screen displays only an abbreviated list of the map parameters. To view and/or modify the complete set of parameters, click on the hyperlinked map number in the left column and use the expanded *Client Read Map* page.

Map #	Remote Type	Remote Register Format	Remote Register #	Remote Device	Scale	Local Register #	Name
1	None	Integer	0	None	0.00000	0	

Prev and Next

If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Local Register Number

After the remote register is read and the data multiplied by the scale factor, the data is written to the Local Register number.

Name

The name is optional and used only for display purposes. The names are defined in the Devices page using the local name field.

Remote Device

The local names from the Devices tab are listed in this drop-down list.

Remote Register Format

Select the format of the remote register from integer, unsigned, double, float, or bit. An integer is a 16-bit (signed) number, an unsigned format is a 16-bit unsigned number, a double refers to a double precision (32-bit) value, a floating value is a floating point number, and a bit value is a single bit that can either be a 0 or a 1 (discrete value.)

Remote Register Number

The Remote Register entry is the register number being read in the mapping.

Remote Type

Select a Remote Type from the following drop-down list: none, coil (output), discrete input, input register, or holding register. Banner Engineering's SureCross™ slave devices use only input registers and holding registers. When using devices from other manufacturers, please refer to the manufacturer's documentation to determine what I/O types are used.

- None
- Coil (output). 1xxxx - Other slave devices, write only, 1 bit
- Discrete Input. 3xxxx - Other slave devices, read only, 1 bit
- Input Register. 3xxxx - SureCross™ slave devices, read only, 16 bit
- Holding Register. 4xxxx - SureCross slave devices, read/write, 16 bit

Selecting *None* for remote type negates the rule though it remains in the list until deleted. Unused rules at the end of the list always show *None* as the remote type. To prevent these from displaying, reduce the number of maps enabled on the expanded view.

Scale

The raw data in the remote register is multiplied by the scale factor to produce the data appearing

in the floating point register associated with the I/O point.

Update

Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Expanded Client Read Map

Like the *RTU Read Map* expanded view, the *Client Read Map* expanded view contains some of the same parameters as the *Client Read Map* primary view, in addition to a few more parameters.

Refer to the *RTU Read Map* expanded view section for more information about these parameters ([GUID-5EBD5A53-1BF9-4F16-B92D-60E91D2E058C.xml](#)).

Client Write Map

Use the *Client Write Map* page to create a map entry that writes data from a local register to a remote Modbus/TCP server.

Maps on the *Client Write Map* page only write data from the local register to the remote register listed. Use the *Client Read Map* page to read data from those devices.

Any parameters shown may be changed and submitted by clicking the Update button, but this screen displays only an abbreviated list of the map parameters. To view and/or modify the complete set of parameters, click on the hyperlinked map number in the left column and use the expanded *Client Write Map* page.

Data from the local register is multiplied by the scale factor, then written to the remote register. For each remote register, enter the register type, format, number, and location (device).

Map #	Local Register #	Scale	Remote Type	Remote Register Format	Remote Register #	Remote Device	Name
1	0	0.00000	None	Integer	0	None	

Local Register

The data in the local register is multiplied by the scale factor, then written to the remote register.

Name

The name is optional and used only for display purposes. Names are defined on the Devices page, local name field.

Prev and Next

If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Remote Device

The local names from the Devices tab are listed in this drop-down list.

Remote Register Format

Select the format of the remote register from integer, unsigned, double, float, or bit. An integer is a 16-bit (signed) number, an unsigned format is a 16-bit unsigned number, a double refers to a double precision (32-bit) value, a floating value is a floating point number, and a bit value is a single bit that can either be a 0 or a 1 (discrete value.)

Remote Register Number

The Remote Register entry is the register number being written to in the mapping.

Remote Type

Select a Remote Type from the following drop-down list: none, coil (output), discrete input, input register, or holding register. Banner Engineering's SureCross™ slave devices use only input registers and holding registers. When using slave devices from other manufacturers, please refer to the manufacturer's documentation to determine what I/O types are used.

- None
- Coil (output). 1xxxx - Other slave devices, write only, 1 bit
- Discrete Input. 3xxxx - Other slave devices, read only, 1 bit
- Input Register. 3xxxx - SureCross™ slave devices, read only, 16 bit
- Holding Register. 4xxxx - SureCross slave devices, read/write, 16 bit

Selecting None for remote type negates the rule, though it remains in the list until deleted. To prevent unused rules from displaying, reduce the number of maps enabled on the expanded view.

Scale

The raw data in the local register is multiplied by the scale factor to produce the data appearing in the floating point register associated with the I/O point.

Update

Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Expanded Client Write Map

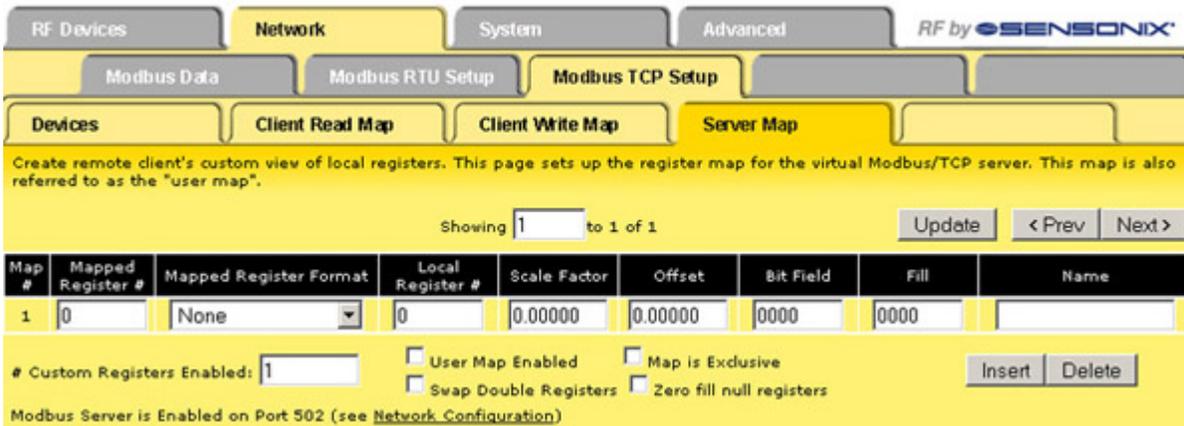
Like the *RTU Read Map* expanded view, the *Client Write Map* expanded view contains some of the same parameters as the *Client Write Map* primary view, in addition to a few more parameters.

Refer to the *RTU Read Map* expanded view section for more information about these parameters ([GUID-5EBD5A53-1BF9-4F16-B92D-60E91D2E058C.xml](#)).

Server Map

The *Server Map* page sets up the register map for a virtual Modbus/TCP server, allowing a custom view of remote registers.

Use the *Server Map* page to set up a copy of various remote register data to a specific, unused block of Modbus registers. For example, copy the data in register 8 from all devices to a Modbus register block. This map is also referred to as the user map.



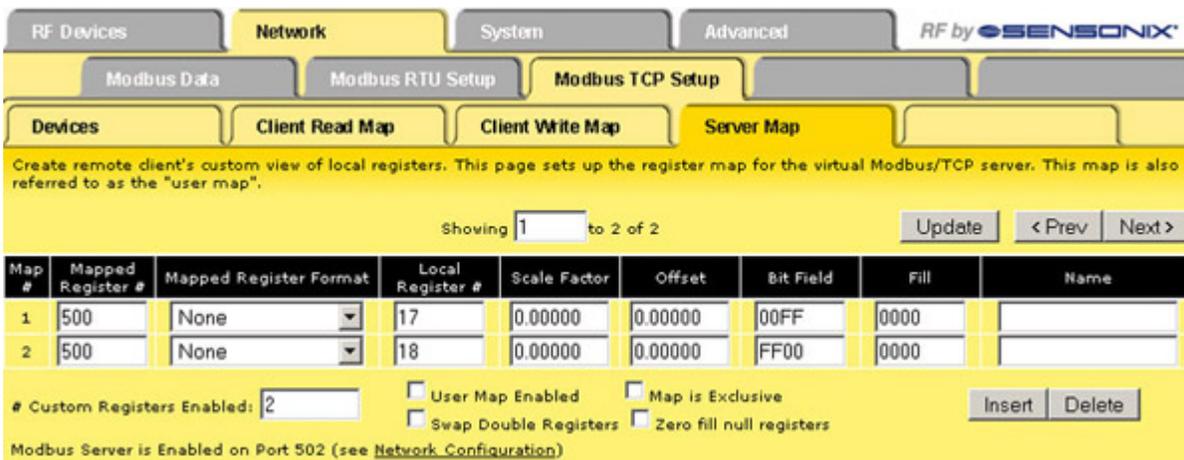
Bit Field and Fill. Defining the Bit field allows the compiling of register contents derived from multiple sources. The source data is limited to the number of bits represented in the bit field (a hexadecimal value) and is shifted into the position represented by '1' bits in the field.

Fill bits are logically OR'ed into the result before the server presents the data. Consecutive server map entries that reference the same server address are OR'ed together and presented at that address. Duplicate map entries referencing the same server address but not listed in consecutive order following the first instance are skipped. No special bit field processing occurs if the bit field is set to zero. Bit fields apply to 16-bit integer or unsigned integer server registers only.

For example, a bit field entered as 00FF indicates a need for eight bits of the Local Register, mapped to the lower portion of the Mapped Register Number. A bit field of FF00 still indicates a need for the lower 8 bits of the Local Register, but mapped to the upper portion of the Mapped Register Number. For example:

Local Register Contents	Bit Field	Result Copied to Mapped Register
005A	0FF0	05A0
005A	F0F0	00A0
005A	00FF	005A
005A	FF00	5A00
1234	0F0F	0204

A second example is given below, using the *Server Map* screen.



The example screen image shows two local registers using the bit field to be copied to one mapped register. The result of the bit field mapping when register 17 contains 005A and register 18 contains 003C is to map the results, 3C5A to register 500.

Custom Registers Enabled	The Custom Registers Enabled parameter controls how many maps are enabled and displayed.	Name	The name is optional and only used for display purposes.
Delete and Insert	Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.	Prev and Next	If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.
Exclusivity	Enter the number of Modbus registers available in your customized register mapping and select the User Map Enabled checkbox to begin using a customized map. Select the Map is Exclusive checkbox if the access to registers outside this map is prohibited. If the Map is Exclusive checkbox is not selected, all local registers not overlapped by the custom map will be accessible to the remote client.	Scale Factor and Offset	Optional fields, the Scale Factor and Offset value work together to convert register data. The source data is multiplied by the scale factor and added to the offset to produce the data in the mapped server register.
Local Register Number	The Local Register Number is the source of the data.	Swapping	By default, double registers in the DX80 are “big endian;” the most significant bytes are in the first register and least significant bytes are in the second register. If remote clients accessing this server at this IP address expect “little endian,” select the Swap Double Registers checkbox. Modbus protocol by definition is “big endian” within each register, but the “endian” order of the registers for 32-bit values is less standardized.
Mapped Register Format	Select the mapped register format: integer, unsigned, double, float, or bit. An integer is a 16-bit (signed) number, an unsigned format is a 16-bit unsigned number, double refers to a double precision (32-bit) value, a floating value is a floating point number, and a bit value is a single bit that can either be a 0 or a 1 (discrete value.) Selecting None for the register format negates the rule even though it continues to appear in the list until deleted. Unused rules at the end of the list always show None as the mapped register format.	Update	Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.
Mapped Register Number	The mapped register number is the destination register for the data to be copied to.	Zero Fill	Normally an attempt to read an undefined register returns an exception (error) code. To enable reading of large data packets without nuisance errors, zero filling null registers so that reading an undefined register between valid defined registers returns zero data rather than an error.

System Tab

The System tab contains system-wide settings and functions including system-level register information, data manipulation and calculations, and network set up instructions.

Data Submenu

The *Data* submenu accesses system-level register information.

Local Registers

The *Local Registers* tab displays the data in the local registers maintained by the GatewayPro or Ethernet Bridge.

RF Devices		Network		System		Advanced		RF by 	
Data		Action Rules		Setup					
Local Registers		Thresholds		Trend Data					
This page displays data as presently found in the local registers maintained by this device.									
Device # 1 Gateway with Indicator Light				Showing registers from <input type="text" value="1"/>		Update		< Prev Next >	
Local Register #	Register Name	Hex	Update	Register Data	Unsigned	Register Type	Default Data	Server Timeout (S)	
00001	Gateway Input #1	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00002	Gateway Input #2	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00003	Gateway Input #3	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00004	Gateway Input #4	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00005	Gateway Analog IN 1	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00006	Gateway Analog IN 2	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00007		<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00008		<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00009	Gateway Output #1	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00010	Gateway Output #2	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00011	Gateway Output #3	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00012	Gateway Output #4	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00013	Gateway Analog OUT 1	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00014	Gateway Analog OUT 2	<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00015		<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	
00016		<input type="checkbox"/>	<input type="checkbox"/>	0	<input type="checkbox"/>	Integer	0.000000	0.0	

Default Data When the Server Timeout value is set to a non-zero value, the default data is stored into the local register when the server times out.

Hex Checkbox Select the Hex checkbox to view or enter values in hexadecimal (not recommended for floating point).

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Register Data Displays the register data or can be used to change the register data. To change the register contents, enter a new value, select the Update checkbox, and click the Update button.

Server Timeout When the Server Timeout value is set to a non-zero value, the default data is stored into the local register when the server times out. A server timeout occurs when the timeout value elapses without a remote server writing to this register. A remote server writes to this register when the DX80 device is acting as a Modbus slave device.

Showing Registers Displays the beginning of the register range currently displayed. To jump to a specific register, enter the register number in the Showing Registers box and click the Update button.

Unsigned Checkbox Integers are 16-bit registers that may be signed or unsigned. Unsigned values range from 0 through 65,535 and signed values range from -32,767 through +32,767. This checkbox only affects the way register information is displayed on the screen, not the way the data is stored in the register. Select the Unsigned checkbox to treat the register as unsigned. For floating point registers, which start at register 1001 on the Gateway, the unsigned/signed option is ignored.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Update Checkbox Select the Update checkbox and click the Update button to update the value.

Thresholds (Data Submenu)

The status of the threshold action maps displays on this Thresholds tab. The Threshold tab only displays information; no parameters are changed here.

The true/false status may not reflect the correct result of the test. Because the indicated result is qualified by hysteresis and on-time or off-time before taking effect, the anticipated result may be delayed.

Rule #	Event Name	Local Register #	Register Data	Test Criteria	Test Value	Result *
1	RedLightOn	00017	0.000000	Equal to	1.000000	FALSE
2	YellowLightOn	00018	0.000000	Equal to	1.000000	FALSE

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Trend Data

The Trend Data tab displays the trending for all tracked registers.

Click the Graph link to view the last 250 data points recorded by trend tracking and stored in the Flash file system. When there are no errors to report, the Graph status is normally zero. When errors occur, a negative number appears, referring to one of the codes in the error code list.

Check the Reset box and click the Update button to reset the trend data, clear the graph, and reset the minimum and maximum tracking.

Tracked Reg #	Register Name	Average Value	Min. Value	Max. Value	Reset	Graph Status	Graph
0		0.000000	0.000000	0.000000	<input type="checkbox"/>	0	Graph

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Action Rules Submenu

The Action Rules submenu contains the rules regarding data manipulation and calculations.

Thresholds (Action Rules Submenu)

The main *Threshold* tab only displays the rules.

Click on the hyperlinked rule number in the left column to view the expanded threshold rule screen and to make changes to the rule.

Rule #	Event Name	Source Register #	Test Criteria	Test Value	Result Register #	True Value	False Value
1	RedLightOn	00017	Equal to	1.000000	00000	0.000000	0.000000
2	YellowLightOn	00018	Equal to	1.000000	00000	0.000000	0.000000

Expanded Thresholds (Action Rules Submenu)

Referring to the screen image, the following parameters may be set using this screen:

Description	Description
1 Source register	8 Hysteresis OFF time
2 Event name	9 Local destination register
3 Condition/qualification	10 Register to log the ON time to
4 Comparison fixed value	11 TRUE fixed value
5 Comparison local register	12 Local register
6 Hysteresis	13 FALSE fixed value
7 Hysteresis ON time	14 Local register

Read local source register # 17 (1) for this event named RedLightOn (2)

Event is TRUE if the value is Equal to (3) this value: 1.000000 (4) this local register: 0 (5)

Qualified by this hysteresis value: 0.00000 (6) this minimum On Time: 0:00:00 (7) this minimum Off Time: 0:00:00 (8)

Set local destination register # 0 (9) as follows below while logging on-time to register # 0 (10)

(true) To a value which is same as the source this value: 0.000000 (11) from local register # 0 (12)

(false) Otherwise to a value which is same as the source this value: 0.000000 (13) from local register # 0 (14)

Rules Enabled: 2

Threshold rules trigger actions based on events. The event occurs when a source register meets the criteria defined by the rule. The result of the event can be setting another register to a value as indicated in the rule template, sending an e-mail notification, sending a text message to a cell phone, or logging an event or data to a log file.

Comparison Fixed Value / Comparison Local Register	Enter either the comparison fixed value or comparison local register number to compare to. Qualifications are optional and enabled only when values are nonzero.	Hysteresis ON and OFF Time	The hysteresis ON time and hysteresis OFF time, if specified, determine how long the condition must be true (ON time) or false (OFF time) before the true or false response is actually taken. Times are given in HH:MM:SS format (hours, minutes, seconds).
Condition/Qualification	Select a condition/qualification test by dropping down the list and selecting how to compare. Selecting Changed By in the condition/qualification drop-down list selects a rate of change test. If the source register has changed by the value specified as the comparison fixed value or the value contained in the local register, the test is true. The minimum ON time on the following line applies. The test is true if the source register has changed by the specified amount in this time period. The ON time is used this way only for the Changed By test. Normally the ON time is used as previously described. The absolute value of the change found in the local register is tested, so the specified value (or delta) to test against should always be a positive number.	Local Destination Register	To define the response, select which local register, or destination register, to apply the response to. Typically the destination register links to an output. It isn't necessary to apply the result to any destination register when only reporting the event via a trap or e-mail message. Leave the destination register set to zero and ignore the last two lines on the screen. The test result is processed as true or false without the destination register specified. The first line after the local destination register number is the response when the condition is true, and the following line is the response when the condition is false. Either the source register is copied, a TRUE fixed value is applied, or another register is used to provide the data written to the destination register.
Delete and Insert	Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.	Source Register	To begin defining a new rule, enter in a source register. Entering zero as a source register negates the rule even though it remains in the list until deleted. Unused rules at the end of the list always show zero as the source register. To prevent these from displaying, reduce the number of rules enabled. If the displayed rules are used and more are needed, increase the enabled number.
Event Name	The event name is optional and used only for display and/or identification purposes.	Update	Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.
Hysteresis	How hysteresis is applied depends on the comparison. If a greater than test returns a 'true,' the test does not return to false until the local register is less than the test value by a margin of at least this hysteresis value. If a less than test is 'true,' it will not return to false until the local register is greater than the test value by a margin of at least this hysteresis value.		

Trending

Use the *Trending* tab to set up statistical tracking of specific registers.

To track a register:

1. Enter the register number to be tracked in the Tracked Register # field.
2. Select destination registers for the Average Register, Min Register, and Max Register, by entering unassigned register numbers in the supplied fields. Unassigned integer and floating point registers are listed at the bottom of the screen. To automatically assign the result registers, click the Auto Allocate button. The default starting registers are the first registers not allocated to I/O points.
3. Select how often to reset the statistics from the drop-down list. The reset values can be when logged, daily, or hourly. Selecting when logged resets the calculations when the values are logged to a file.
4. Enter the time period for the data sampling and the number of slices, or samples, within that time period.
5. Click the Update button to submit the changes.

When tracking any registers, the average, minimum and maximum registers must be assigned. Do not leave these values set to zero unless no registers are tracked.

The trend data is updated at the period entered and this period is divided into the number of slices, or samples. A sliding window average of this number of slices is maintained and this filtered value is processed as the trend data. The minimum data value is the average lowest value for each period sampled. The maximum data value is the average highest value over each period sampled.

All result registers for a given tracked register are reset when any one of the result registers is logged if when logged is selected for reset. However, all resets are performed after the entire log record has been compiled for the given log cycle to avoid logging partial results.

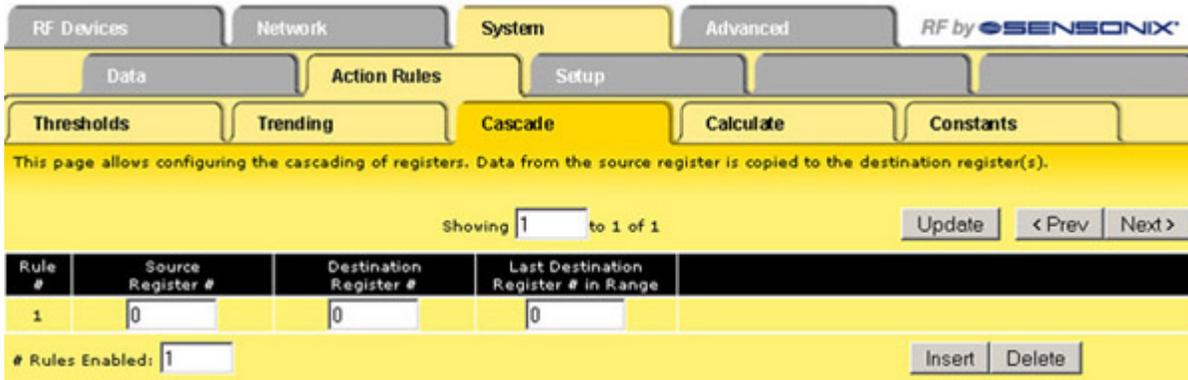
Delete and Insert Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Cascade

Use the *Cascade* tab to configure the cascading of the registers: data from the source register is copied to the destination register(s)



Enter the single destination register or a range of destination registers to copy the source register to. If no last destination register is entered, only a single destination register is used.

Do not use the same source register more than once in the cascade rules. To copy a register's contents to multiple, non-consecutive registers, only use the primary source register once. To copy the same contents to additional registers, use the previous destination register as the second rule's source register and 'daisy-chain' the register contents. For example, do not create three rules to copy register 5's contents to register 6, 14, and 18. Instead, create one rule to copy register 5's contents to register 6, a second rule to copy register 6's contents to register 14, and a third rule to copy register 14's contents to register 18.

Entering a zero as a source register negates the rule even though it remains in the list until deleted. Unused rules at the end of the list always show zero as the source register. To prevent these from displaying, reduce the number of rules enabled.

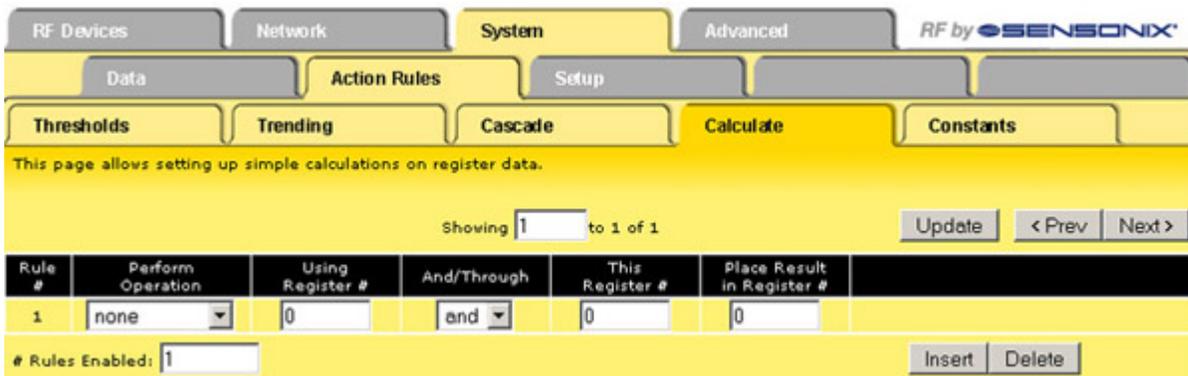
Delete and Insert Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Calculate

Use the *Calculate* tab to set up simple calculations on the register data.

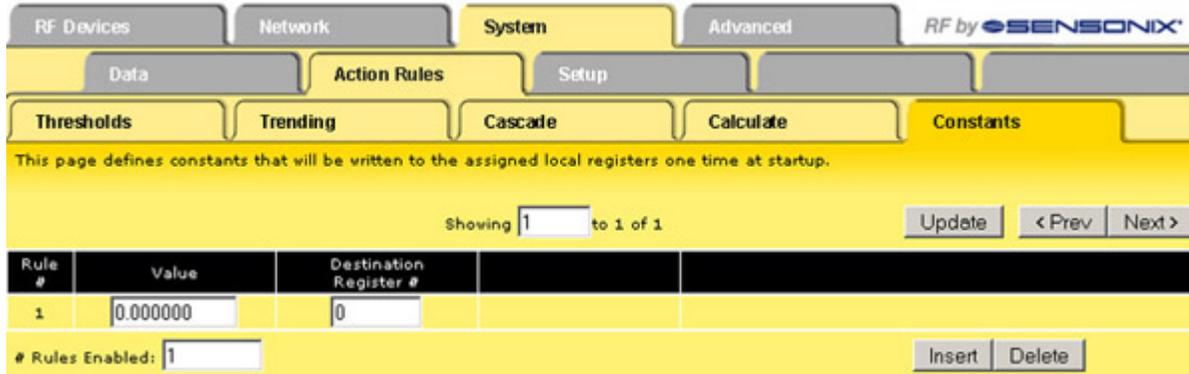


Entering none as the operation negates the rule even though it remains in the list until deleted. Unused rules at the end of the list always show none as the operation. To prevent these from displaying, reduce the number of rules enabled.

To establish calculations, select the operation from the drop list. All operations except logical NOT operations require two operands. Enter the register numbers as applicable. Some operations are valid for ranges of registers. Select and or thru to select two registers or multiple registers in a range. Average, sum, and logic operations are valid for ranges of multiple registers.

Constants

Use the *Constants* tab to define values written once to the assigned registers when the device starts up.



Enter the value and the local register number to which the constant should be written. Each constant writes to the selected register only once at startup.

Entering zero as the value negates the rule even though it remains in the list until deleted. Unused rules at the end of the list always show zero as the value. To prevent these from displaying, reduce the number of rules enabled.

Delete and Insert Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Setup Submenu

Tabs under the *Setup* submenu control general system parameters.

Config File

The *Config File* tab manages the configuration files.

All configuration changes are lost the next time power cycles if you did not click the Save or Save As buttons to write those change to the XML file in non-volatile memory (Flash file).

When the flash memory updates, there is a delay of several seconds.

If you upload a file, make changes to the parameters on your PC, and re-upload the same file, the browser displays the old cached file. Find the option among the browser settings to delete cached files from the PC and re-upload the file. In some cases, exit and restart the browser.

Browse Selects a file for upload from the PC. Once selected, click the Upload button to complete the process.

Confirm and Re-start Select the Confirm checkbox and click the Restart button to re-boot the system. Power is not cycled to the hardware, but the processor re-boots as if the power cycled. One example use of this function is to remotely change a device's IP address and force a reboot (only the root user can do this). Upon restart, because the IP address was changed and the device updated, this page will not reload and the HTTP connection is lost.

Delete Removes the file listed in the Local file directory drop-down list from the directory. Clicking the Delete button does not bring up a file list and does not ask if you are sure you want to delete the file.

Load Loads the selected file in the local file directory into the local memory. Settings within the web pages reload from the file and take effect immediately. This does not send any data to the DX80 radio devices. Any parameters changed within the web pages but not saved to the XML file are lost.

Save Stores the current Web Configurator contents to a flash memory file. The configuration overwrites the selected file in the local file directory.

Save As Stores the Web Configurator contents to a new flash memory file as defined next to the Save As button. When naming the file, include the .xml file extension because this interface will not add the file extension automatically. Do not use more than 16 characters in the file name (excluding the .XML extension) and use only alphanumeric characters.

Start-up Selects a different start-up configuration file. The selected file is the flash memory file automatically loaded during power-up. Before setting a file as the startup file, first verify the XML file properly loads.

View Displays the selected file. The file should be an XML file, and the browser recognizes it as such if the file is properly formatted.

Network

The Network tab contains the IP address set-up information. Use this page to change the IP address of the device or to enable EtherNet/IP.

To change the IP address of this device, enter the address, subnet mask, and gateway, then click the Change IP button. This change takes effect after the next reboot.

Set the IP address to 255.255.255.255 to use Dynamic Host Configuration Protocol (DHCP) to obtain an IP address upon power-up. The IP address change takes effect on the next power cycle or when the Restart button is clicked on the Config File page. After changing the IP address of the DX80 device, print this page for your records.

The Refresh button only updates the information shown on this page, it does not submit a DHCP renewal request. DHCP renewal is automatic.

The default port for web page serving is 80. To change this port, enter the port number and click the Set Port button. This change takes effect on the next power-up. If the port is anything other than 80, the port number must be included in the URL. For example, if `http://10.0.0.101/` is normally used to access the Configurator when the port is set to 80 and the port is changed to 8215, use `http://10.0.0.101:8215/` to access the Configurator. (Note: The port change is accepted only by the root login, not the system login.)

- **User name:** root
- **Password:** sxi

If the **Modbus and Telnet** services are not used, disabling these ports improves network security. Disable these ports by entering zero as the port. The HTTP port cannot be disabled - if set to zero, it will revert back to the default value of 80.

To use **domain names** instead of a static IP address, supply the IP address of at least one DNS server (**Static DNS1 or 2**). The DNS server must be at a static IP address. These changes take effect immediately. Note: If you are using DHCP, set the Static DNS1 and DNS2 addresses to 0.0.0.0 because the DHCP supplies the DNS addresses.

The numbers shown to the right of the input windows are the actual numbers in the system. For example, entering an IP address of 255.255.255.255 causes the system to acquire a dynamic IP address via DHCP. The IP address shown to the right is the currently leased IP address. When DHCP is used, static DNS entries are ignored and the actual DNS entries provided by DHCP are shown.

When using a Dynamic DNS service to keep track of this device on the Internet, select the service type, enter the host name the service uses for this device, and enter the user name and password associated with the update service. Click the Apply DNS button to register this information. Save the configuration file to retain this data.

DDNS status should normally show *OK* or *No update needed*. It may show *Local IP not checked yet* for a short time after booting up. If it shows *Tentative* and a reply of *nochg*, an update was forced with no changes to actually register. Repeated *nochg* occurrences is regarded as abuse by the dynamic DNS service(s), and a third occurrence is treated as a local error condition.

Any occurrence of a serious error puts the DDNS update in the Suspended state. If this occurs, resolve the problem and restart the system or click Reset DNS. DO NOT click Reset DNS without knowing the problem is resolved. Repeated attempts to update DNS inappropriately may result in your host name being blocked. Clicking Reset DNS results in an immediate IP verification and attempt to re-update DNS. The DNS server considers repeated updates resulting in no change (*nochg* reply) to be abuse. Repeated IP verification (more frequently than once every 10 minutes) is also considered abuse.

Connection errors are internal network related errors and include:

- 2001 - General socket error
- 2005 - Could not reach local DNS to look up remote host
- 2006 - HTTP client aborted a web session
- < 200 - Unexpected network errors. Contact Banner Engineering if these errors occur.

Error messages that may be returned by the dynamic DNS service(s), noted as *last reply*, include:

- badauth - The user name and/or password does not match the host name
- nohost - The host name specified does not exist
- notfqdn - The host name is not a fully qualified domain name (not in the form of name.domain.com)
- !yours - The host name does exist, but not under the user name given
- abuse - The host name given is blocked for abuse.

Error messages returned by the dynamic DNS service(s) that require the attention of Banner Engineering include:

- badsys - The sycodestem is not valid
- badagent - The user agent is not specified or is blocked for non-conformance to specifications
- !donator - Invalid option specified
- numhost - Too many or too few hosts found

Error messages indicating a DDNS server error will be either *dnserr* or 911. In both cases, wait a minimum of one hour before restarting the system and/or contact the DDNS service to see when the problem will be resolved.

EtherNet/IP

By default the Ethernet Bridge and GatewayPro systems communicate with a host system using Modbus/TCP.

HTTP Port (default 80) Disallow HTTP Query

Modbus Server Port (default 502)

Telnet Port (default 23)

Ethernet/IP Enabled

The system can also use EtherNet/IP. To enable the system to use EtherNet/IP, you must be logged in as the "root" user.

1. Log in using the following user name and password. User name: root; Password: sxi.
2. At the bottom of the *System > Setup > Network* page is a checkbox to enable EtherNet/IP. Only select this box if the GatewayPro system is running on an EtherNet/IP network. This change cannot be enabled from a login other than the "root" login.
3. After selecting the EtherNet/IP Enabled box, click the Set Ports button to save any changes made to the HTTP Port, Modbus Server Port, Telnet Port, and EtherNet/IP Enabled checkbox.
4. Cycle power to the Ethernet Bridge or GatewayPro to complete this update. After the device powers up, the changes should be registered.

Sequence Numbers

The Omron PLC requires using sequence numbers within the Ethernet/IP packets. When using an Omron PLC, set the radio button selection at the bottom of the configuration page to "Always Increment."

Sequence Number Null Always increment

User

The User page changes the log-on password.

The current user's name is displayed. To change the password, enter the old password, the new password, and confirm the new password by entering it again. Click the Accept button to submit the change. This change takes effect immediately.

This page allows you to change your logon password.

User Name: **system**

Old Password:

New Password:

Confirm:

Accept

Admin - Root Login

This second view of the User screen shows the screen when logging on using the admin/root login. Only the root user can enter user names and passwords, change the privilege levels, and set IP address filters.

- **User name:** root
- **Password:** sxi

If the IP filter is a non-zero valid IP address, the user may only log in from that IP address. After making changes to this screen, select the Confirm Change checkbox, then click the Change button to submit the changes.

This page allows you to change your logon password.

Change

User Name	Password	Privilege Level	IP Filter	Confirm Change
system	*****	Maximum	0.0.0.0	<input type="checkbox"/>
		Minimum	0.0.0.0	<input type="checkbox"/>
		Minimum	0.0.0.0	<input type="checkbox"/>
		Minimum	0.0.0.0	<input type="checkbox"/>
		Minimum	0.0.0.0	<input type="checkbox"/>
root	***	Maximum	0.0.0.0	<input type="checkbox"/>
root confirm				

Time and Date

Use the *Time and Date* page to change the system's internal clock and calendar.

Click the Refresh button to view the current time. Enter a new time and click the Change button to set the clock/calendar. Use the same string format observed when changing time/date.

To apply Daylight Saving Time:

1. Select the rules as needed.
2. Select the 'Is in effect now' checkbox if Daylight Saving Time is currently in effect and select the Is enabled checkbox to enable Daylight Saving Time.
3. Click the Update button.

The time and date are maintained in the battery-backed real-time clock chip. Daylight saving time settings are saved in the configuration file. To retain the daylight saving time settings through a power cycle, save the configuration file.

The scheduler may reference the astronomical clock instead of time of day. To set the astronomical clock, set local time and enter the location information. North is positive for latitude, and east is positive (west is negative) for longitude.

Time zone is offset from GMT, 0 through 24, moving west around the world. As an example, Chicago is at latitude +41.83, longitude -87.75, time zone +6. Time zones for the Banner devices are set up with west of GMT as positive numbers.

Sunrise and sunset calculations are typically within one to two minutes of those calculated by the US Naval Observatory. Go to the <http://geonames.usgs.gov/pls/gnispublic/> (US Geological Survey website) to look up the latitude and longitude of almost any US location.

Advanced Tab

The *Advanced* tab contains options for scheduling, logging data, and setting up automatic alerts.

Scheduler Submenu

The *Scheduler* page contains the pages for setting up weekly schedules, on demand schedules, and any holidays requiring special schedules.

Weekly Schedule

Use the *Weekly Schedule* page to manage weekly activities.

Before setting any schedules, verify the system's time and date are accurately set in the *System > Setup > Time and Date* tab.

During the On Time, the On Value is applied to the given register. The remainder of the time, the register is set to the Off Value. The On and Off Values are applied once at the start of the On Time, when the system is rebooted, and when the system clock is changed (*System > Setup > Time and Date* screen).

Astronomical Clock

The astronomical clock will not work unless latitude, longitude, and time zone are set in the *Time and Date* tab.

To reference the astronomical clock instead of fixed time of day, enter DAWN or DUSK in place of the HH:MM:SS on and off times. An offset in minutes may also be included. To specify one half hour after sunrise, enter dawn+30. To specify one half hour before sunset, enter dusk-30, etc. Upper/lower case is ignored, but do not include any spaces in the dawn/dusk string.

Duplicating and Schedule

Instead of duplicating a schedule entry to activate multiple outputs, make a single schedule entry that applies to a single register then cascade that register to any number of other registers with cascade rules set up on the *System > Action Rules > Cascade* page.

Weekly Schedule, Holidays Expanded View

Access the holiday expanded view by clicking the Holidays link on the main *Weekly Schedule* page.

The schedule entry affected shows on the first line. The remainder of the page allows you to add and remove defined holidays from this schedule event.

Excluding Holidays

To exclude holidays from the scheduled event:

1. Select a holiday from the Available Holidays list.
2. Click the Add button.
3. Click on the Exclude radio button.

Once a holiday is added to the schedule, the scheduled event that normally happens on the selected days will not occur if one of the selected days falls on one of the excluded holidays.

In the example screen shown below, six holidays are excluded from the scheduled event #1 when they fall on a weekday.

This page allows you to manage weekly schedules.

Showing 1 of 1 Update <Prev Next>

#	S...M...T...W...T...F...S	On Time	Off Time	Register Number	"On" Value	"Off" Value	Register Name
1	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	6:00:00	20:00:00	121	0.00000	1.00000	

Available Holidays: New Year's Day, Good Friday, Easter Sunday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Thanksgiving Friday, Christmas Eve, Christmas Day

Selected Holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Thanksgiving Friday, Christmas Day

Exclude
 Include

Including Holidays

To include holidays in the scheduled event:

1. Select a holiday from the Available Holidays list.
2. Click the Add button.
3. Click on the Include radio button.

If the selected Holiday falls on a day not selected with the checkboxes, selecting the Include button includes that Holiday in the schedule regardless of the day of the week it falls on.

Ignoring Holidays

To perform the scheduled event regardless of holidays, remove the holiday from the Selected Holidays field. To remove:

1. Click on the desired holiday.
2. Click the Remove button. The Remove button does not remove the holiday from the list. The Remove button only tells the system to disregard a particular holiday and process the schedule event normally.

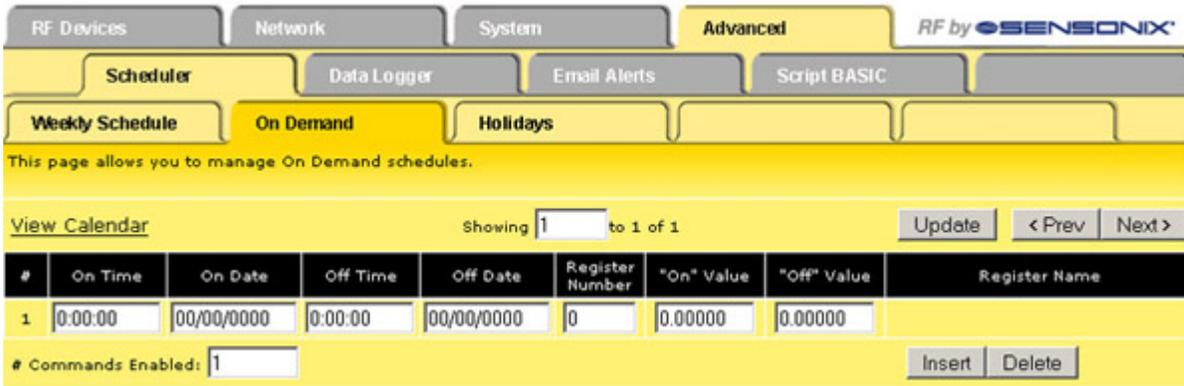
Other Commands

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

On Demand

Use the *On Demand* page to set up scheduled events that occur only once instead of daily.



The starting time and date (ON Time/Date) determine when the ON Value is applied to the given register. The ending time and date (OFF Time/Date) determine when the ON period ends. The OFF Value is applied at the end of the ON Time.

After an On Demand event has passed, it should be removed from the list. The expired event remains included in the list until it is deleted, serving as a record of a past event.

To reference the astronomical clock instead of fixed time of day, enter DAWN or DUSK in place of the HH:MM:SS on and off times. An offset in minutes may be included. To specify one half hour after sunrise, enter dawn+30. To specify one half hour before sunset, enter dusk-30, etc. Upper and lower case is ignored, but do not include any spaces in the dawn/dusk string. The astronomical clock will not work unless latitude, longitude, and time zone are set in the *System > Setup > Time and Date* tab.

Delete and Insert Clicking the Delete button removes the rule or map number shown in the Rule # or Map # box. Clicking the Insert button inserts a new map ahead of the map number shown. It is not necessary to use the Insert button to add maps to the bottom of the list or to define any rule with None as the register type. To add a map/rule to the bottom of the list, increase the number of rules or maps enabled.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Prev and Next If there are more than 16 devices or rules/maps, use the Prev and Next buttons to display the next screen of information.

Holidays

Use the *Holidays* page to define the holidays appearing in the expanded Weekly Schedule list.

After holidays are established, use the holidays and the *Weekly Schedule* page to create exceptions to weekly schedules.

RF Devices		Network		System		Advanced		RF by SENSONIX	
Scheduler			Data Logger		Email Alerts		Script BASIC		
Weekly Schedule			On Demand		Holidays				
This page helps you to manage weekly schedules.									
View Calendar								Update	
#	Holiday Name	On Time	On Date	Off Time	Off Date				
1	New Year's Day	0:00:01	01/01/2008	23:59:59	01/01/2008				
2	Good Friday	0:00:01	03/21/2008	23:59:59	03/21/2008				
3	Easter Sunday	0:00:01	03/22/2008	23:59:59	03/22/2008				
4	Memorial Day	0:00:01	05/26/2008	23:59:59	05/26/2008				
5	Fourth of July	0:00:01	07/04/2008	23:59:59	07/04/2008				
6	Labor Day	0:00:01	09/01/2008	23:59:59	09/01/2008				
7	Thanksgiving Day	0:00:01	11/27/2008	23:59:59	11/27/2008				
8	Thanksgiving Friday	0:00:01	11/28/2008	23:59:59	11/28/2008				
9	Christmas Eve	0:00:01	12/24/2008	23:59:59	12/24/2008				
10	Christmas Day	0:00:01	12/25/2008	23:59:59	12/25/2008				
11		0:00:00	00/00/0000	0:00:00	00/00/0000				
12		0:00:00	00/00/0000	0:00:00	00/00/0000				

For example, if the office doors should be opened automatically at 8 a.m. every weekday, use a holiday schedule to override the normal schedule on Christmas and New Year's Day to keep the office locked.

To create a holiday:

1. Enter the holiday name.
2. Enter an on time, on date, off time, and off date. Set the on time to begin the holiday one second after the day begins and end the holiday one second before the day ends.
3. Click the Update button to submit the information to the Ethernet Bridge. Once saved, the holiday will be listed in the holidays list on the Weekly Schedule page.

As with any changed parameters, to 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 until the changes are saved permanently into the configuration file.

**Up-
date** Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Data Logger Submenu

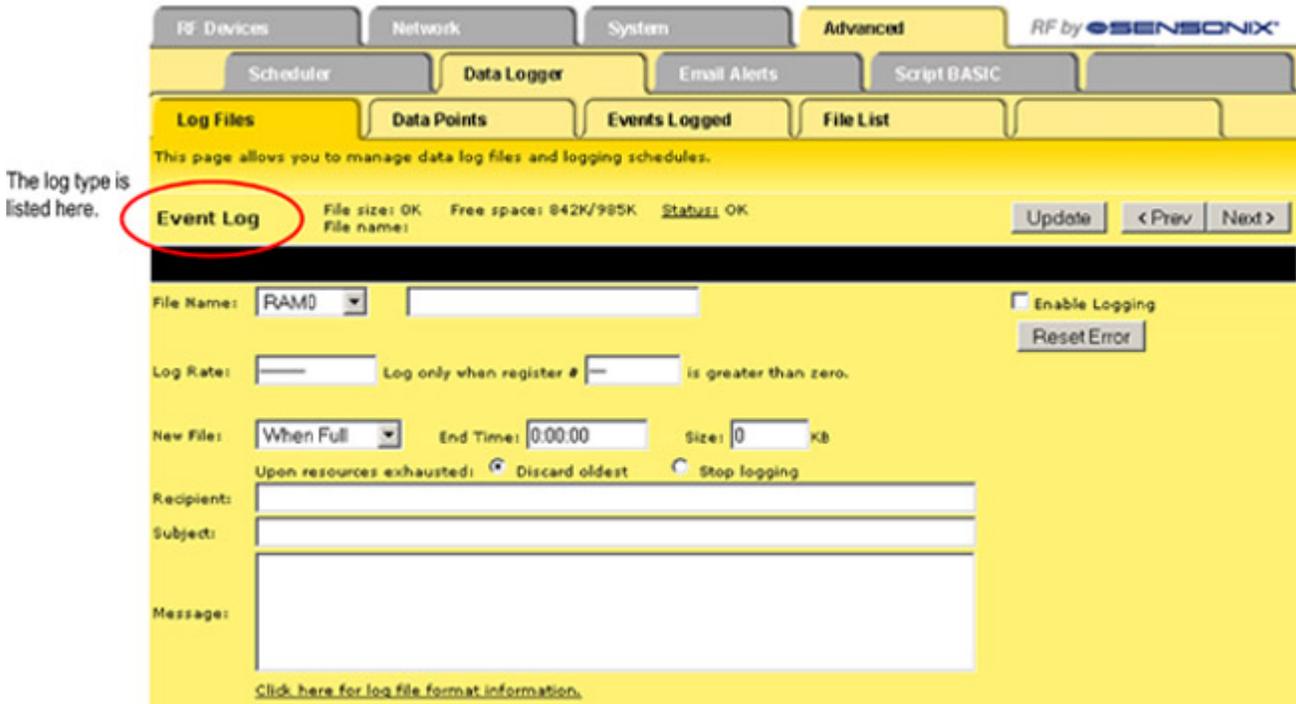
The *Data Logger* submenu contains the tabs used to create log files, establish events to log, and maintain the log files.

Log Files

Use the *Log Files* page to select a directory location (RAM0 or FLASH0) and file name for the log file. The system allows a fixed number of log files. Use this page to assign a location and name to each log file used.

Log files are a CSV formatted text file with one line per data record. The first record is a header record naming all the registers contained in the subsequent records. All remaining records are a set of data points, one value per register selected on the *Data Points* page, per line in the file. Another line is added to the file for each logging of data per the rate set in the *Log Files* page.

One event log and three data logs may be created. The event log saves events based on changes occurring in defined registers. The data logs store register data based on a periodic rate defined by the user. Select the event log or one of the three data logs using the Next and Prev buttons.



Enable Logging Select the checkbox to turn on the data logger.

File Name The file name must contain no more than eight characters and include the file extension .txt. Only alpha-numeric characters are allowed in the file name.

Log Rate The data logger logs at the rate given in HH:MM:SS (hours, minutes, seconds). Logging is disabled if the rate is zero. To activate continuous logging, set the log only when register number is zero, the Enable Logging box is selected and the rate is not zero. To tie data logging to a schedule, select the Enable Logging checkbox and verify the log only when register number contains a valid local register number with content greater than zero.

Prev and Next Scrolls through the log file types. The system allows for one event log and three data logs.

Reset Errors Resets status error messages or conditions.

Status Displays a complete list of error conditions. For a list of error codes, refer to Appendix B, Error Codes.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

File Names and Storage

The file name entered is the first part of the generated name. The file creation date in the format YYYYMMDD is appended to the supplied name, allowing multiple files with the same user-supplied name to have unique file names. If the name is changed after data is logged with the old name, manually delete the old files from the File List page. The Discard Oldest option only finds files with the same name listed under the File Name.

Log files are saved to either RAM or FLASH memory. Log files stored in RAM are lost when the system power cycles. The RAM area is directory RAM0 with a capacity of 1000KB (1 Megabyte). The FLASH area is directory FLASH0 with a capacity of 256KB. This FLASH0 area is shared with configuration files and program files.

Resource Allocation

To avoid filling a log file and losing data, allocate the system resources. A new log file may be started daily, weekly, or when the existing data file reaches a specified size. When a log file is filled, have the data log file automatically e-mailed as an attachment or use FTP to retrieve the file. To have the completed log file automatically e-mailed, enter a recipient's e-mail address (myname@myplace.com) and optional subject and message.

Discarding the Oldest Files

To automatically discard the oldest data logs when system resources are exhausted, check the discard oldest radio button. This discards the oldest file with the name shown in the File Name box. This rule applies independently for each log file rule set.

The specific rules for resource management are as follows:

If a file is full (i.e. its size setting is met), disregard the schedule, e-mail the file to the listed recipients, and request a new file. Until the file fills, check the schedule. If the log file should be e-mailed now because of daily schedule settings, e-mail the file and request a new file. The e-mail command only applies if e-mail is configured, but the new file request always applies.

When a new file is requested, check the discard oldest or stop logging setting. If discard oldest is selected, add up all log file sizes. If this much free space is not available, delete the oldest file with a name prefix matching the log configuration requesting a new file. If there is only one (or fewer) older file, revert to stop logging rules. If stop logging is selected (by configuration or by default), verify there is room for 50% of this file. If so, create the file. If not, disable this log.

Data Points

Use the Data Points page to select which local registers are logged by each of the available data loggers.

All the available local registers are listed on this page. Select the appropriate checkbox to include this data in one of the three log files.

This page allows you to manage data log files and logging schedules.

Device #1 Gateway with Indicator Light Showing registers from 1 Update < Prev Next >

Register #	Register Name	Log to File 1	Log to File 2	Log to File 3
00001	Gateway Input #1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00002	Gateway Input #2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00003	Gateway Input #3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00004	Gateway Input #4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00005	Gateway Analog IN 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00006	Gateway Analog IN 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00007		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00008		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00009	Gateway Output #1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00010	Gateway Output #2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00011	Gateway Output #3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00012	Gateway Output #4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00013	Gateway Analog OUT 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00014	Gateway Analog OUT 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00015		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
00016		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Include time/date per record		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Clear All Set All

Clear All and Set All Selecting one or more of the checkboxes directly to the right of the Clear All button and clicking the Clear All button clears all selected checkboxes in that column. Similarly, clicking the Set All button sets all checkboxes in the column checked next to the buttons. Only named registers may be checked or unchecked; unnamed registers are assumed to be unused. After a Set All or Clear All command, any checkboxes may be individually selected or deselected as needed.

Include Time/Date Per Record Select the Include time/date per record checkbox to include a time and date stamp for each record logged to the log files.

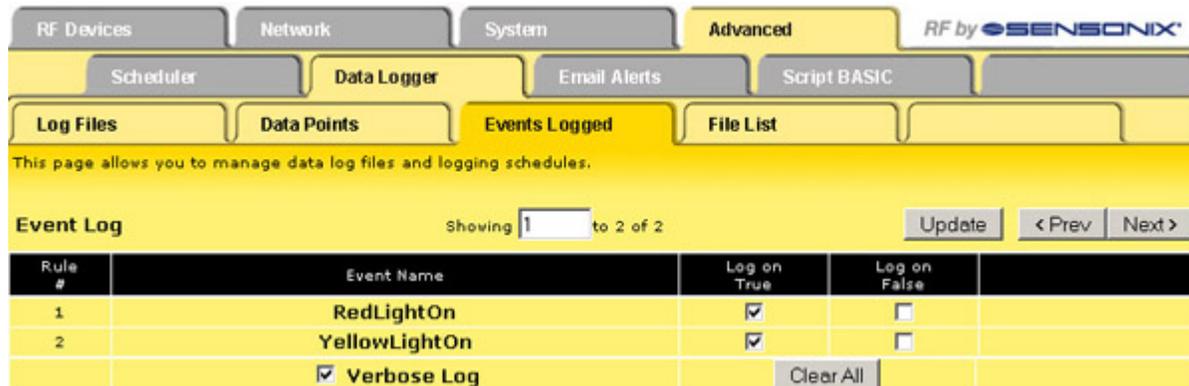
Prev and Next Scrolls through the registers of the device listed to the left of the Showing box.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

Events Logged

Use the *Events Logged* page to select which events are logged to a file.

Events are established in the list of rules found in *System > Action Rules > Thresholds* tab. Use the *Thresholds* page to establish the test criteria that defines true and false. It is not necessary to set a destination register to any particular value in a threshold rule.



The result records to the event logger regardless of any other action taken as a result of the action or threshold rule. The list shown on this page reflects the defined threshold rules.

Event records are stored in a CSV format text file. Each record includes time/date, event number, and true/false active state. If the Verbose Log checkbox is selected, the records also include the event name string, register number, register value, test type, and test value.

Prev and Next Scrolls through the threshold events established on the *System > Action Rules > Thresholds, Expanded View* page.

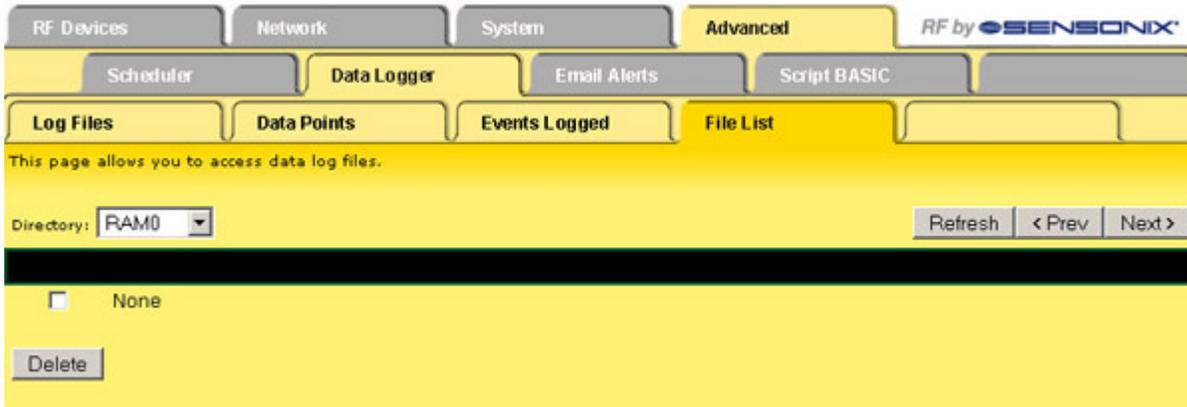
Verbose Log Selecting a Verbose log sets the records to include the event name string, register number, register value, test type, and test value.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

File List

The File List tab lists the saved data and event log files.

To copy a data log file from this page, right click on the file name link and select Save As in the web browser. The files save in CSV format text files that may be imported into MS Excel.



Delete To delete the files, select the checkbox for the unwanted file then click the Delete button.

Prev and Next Scrolls through the pages of event and log files.

Refresh Click the Refresh button to refresh the screen image. This updates any information on the screen that may have changed on the device.

E-mail Alerts Submenu

Use the E-mail Alerts submenu to set up e-mail alerts, recipients lists, and the mail servers configuration pages.

Recipients

Use the *Recipients* page to define the e-mail recipients and to select the message format: e-mail or cell phone text message.

Three recipients lists can be generated using this screen. E-mail messages (or cell phone messages) are triggered by events selected using the *Events* screen. These events are set up using the *System > Action Rules > Thresholds* screen.

As shown in the Showing box, only three recipient/subject line groups can be created for e-mail and text message alerts. To send the same message to multiple people, separate the e-mail addresses with semicolons.

Checking the Include Standard Message box includes either the Default E-Mail Message or Cell Phone Message (whichever is selected). Select the Include Custom Message checkbox to include a custom message along with the default message.

The standard auto-generated cell phone message is limited to 160 characters. Selecting both the standard cell phone message and a custom message will exceed this limit. To send a custom cell phone message, exclude the standard message to keep within the typical 160 character limit.

Prev and Next Use the Prev and Next buttons to scroll through the three groups of e-mail recipients.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

E-Mail Messages

Because only three groups of recipients can be created, more than one e-mail address can be listed in the Recipients box if the names are separated by semicolons. To differentiate the messages each group receives, click the Next button to enter another e-mail address and select another type of message notification. Each name should be in the form of myname@mycompany.com.

Cell Phone Text Messages

To send a text message to a cell phone, enter the e-mail address in the following format: 10DigitNumber@CellCarrierDomain.com for SMS-to-text capable cell phones. The domains for common cell phone carriers are:

- **Alltel.** @message.alltel.com
- **AT&T.** @txt.att.net
- **Nextel.** @messaging.nextel.com
- **Sprint.** @messaging.sprintpcs.com
- **SunCom.** @tms.suncom.com

- **T-Mobile.** @tmomail.net
- **VoiceStream.** @voicestream.net
- **Verizon.** @vtext.com

Click the Send Test button to send a message to the defined recipient, testing the settings defined for the POP3/SNMP servers as well as the DNS server. The most common problem is usually the e-mail user and password setup or the system contact. Contact your network administrators for questions concerning access to outside providers.

Sample Message

An example of a default auto-generated message is:

- This is an automated e-mail alert originating from 'Cooler System' at 'Winky's Kitchen' at 14:45:10 02/23/2006.
- The event named 'Freezer Failure' with a test criteria of 'Greater than or equal to' a value of 28.0000 tested true for register 44, 'Freezer Temperature' with a value of 33.0000.
- Additional comments are as follows:
- Somebody needs to call Chilly's Freezer Service right away.

The equivalent auto-generated cell phone message is:

- Cooler System/Winky's Kitchen/Freezer Temperature/33.0000=Freezer Failure

The "report on false" version of the sample auto-generated cell phone message is:

- Cooler System/Winky's Kitchen/Freezer Temperature/27.0000#Freezer Failure

The true condition is indicated by (=) while the false or event resolved condition is indicated by (#) between value and event name. Only the first 30 characters of each name field are included in the message.

Error Codes

Error codes usually occur after briefly attempting to send an e-mail instead of right away. For a list of possible error codes indicated by "Status," refer to Appendix B - Error Codes.

Events

All threshold rules defined under *System > Action Rules > Thresholds* are listed on the Events page.

E-mail notification may be selected for each threshold on the occurrence of a true, false, or both. Use the checkboxes to select which of the three recipients groups to notify. In the sample screen shot, e-mail recipient 1 will be notified when the system starts up.

Carefully evaluate analog data before enabling automatic e-mail generation. A threshold without hysteresis and/or minimum times may generate several e-mails per second when the measured parameter hovers near the threshold limit.

Rule #	Event Name	Notify on True	Notify on False	Email Recip 1	Email Recip 2	Email Recip 3	Expect Ack	Repeat Time DD,HH:MM
1	RedLightOn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0,0:00
2	YellowLightOn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0,0:00
	System Start-Up	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0,0:00

E-mail Acknowledgement. Selecting the Expect Ack checkbox allows the DX80 device to check incoming e-mail for a reply to the event notification e-mail. Replies must contain an acknowledgement code in the message. When the acknowledgement is received, e-mail repeating is cancelled to all recipients.

The expected acknowledgement code is included in the outgoing notification e-mail. A typical notification code may look like !08052012R1! and must be included in the reply in exactly the same form, including the exclamation points. Replying and sending the e-mail from within the e-mail program is sufficient as long as the e-mail reply includes the original message.

Repeat Time. The Repeat Time is the rate at which the e-mail is repeated and is given as D,HH:MM for days, hours:minutes. There should be no embedded spaces between days and hours, only a comma. If set to zero, and a single 0 will suffice, repeating is disabled. E-mails are only repeated for Notify on True. Notify on False messages are not repeated unless the threshold rule goes true, then false again.

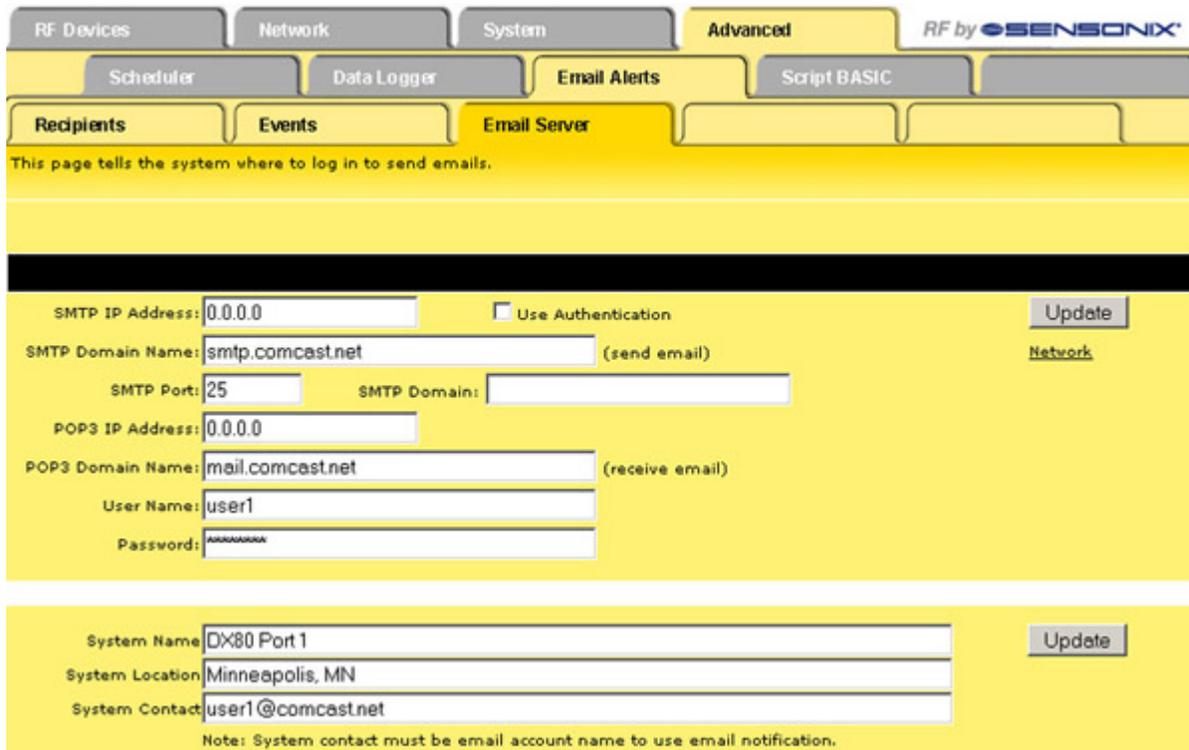
System Start-Up. Notification on System Start-Up is a pre-defined event and only repeats if Expect Ack is checked. If unacknowledged, it will not be repeated and the repeat time is disregarded.

Prev and Next Use the Prev and Next buttons to scroll through the list of events if the events list requires more than one page.

Update Clicking the Update button sends information to the Ethernet Bridge or GatewayPro or retrieves information depending on which checkboxes are selected: Change or Get/Send All. Updating information does not save configuration information permanently to the XML file.

E-mail Server

Before the DX80 devices can send e-mail, the e-mail server and account information must be entered in the *E-mail Server* page.



This page tells the system where to log in to send emails.

SMTP IP Address: 0.0.0.0 Use Authentication

SMTP Domain Name: smtp.comcast.net (send email)

SMTP Port: 25 SMTP Domain:

POP3 IP Address: 0.0.0.0

POP3 Domain Name: mail.comcast.net (receive email)

User Name: user1

Password:

System Name: DX80 Port 1

System Location: Minneapolis, MN

System Contact: user1@comcast.net

Note: System contact must be email account name to use email notification.

The information entered on this page represents the e-mail's origin, not destination. The User Name refers to the account login name assigned to this Ethernet Bridge or GatewayPro device. The System Contact must be the e-mail name assigned to the account (for example, myemail@mycompany.com).

When using a DNS server on the Network tab, use Domain Names as shown in the example below. Otherwise, enter the IP addresses of the SMTP and POP3 servers. Click the Update button on that section of the screen. Fill in the System Name, System Location, and System Contact information. The System Contact MUST be the e-mail account name. Click the Update button on the lower section of the screen to submit the changes.

SMTP IP Address. The SMTP IP address is used if the SMTP server (outgoing e-mail) is at a static IP address. If the SMTP server is known only by domain name and its IP address may change, use the domain name and verify the Network tab uses a DNS server. Set

the IP address to zero if a domain name is used. If the IP Address is not zero, the IP address is used and the name ignored. A typical SMTP server domain name looks something like smtp.mycompany.com. The default SMTP port number is 25.

POP3. The POP3 IP address is used if the POP3 server (incoming e-mail) is at a static IP address. If the POP3 server is known by domain name, use the name instead and set the IP address to zero.

The system name and location are included in the default e-mail message to identify the e-mail's origin.

Script BASIC Submenu

Use the pages under the Script BASIC menu to create, edit, and manage BASIC programs. The BASIC programs are typically created to manipulate register contents.

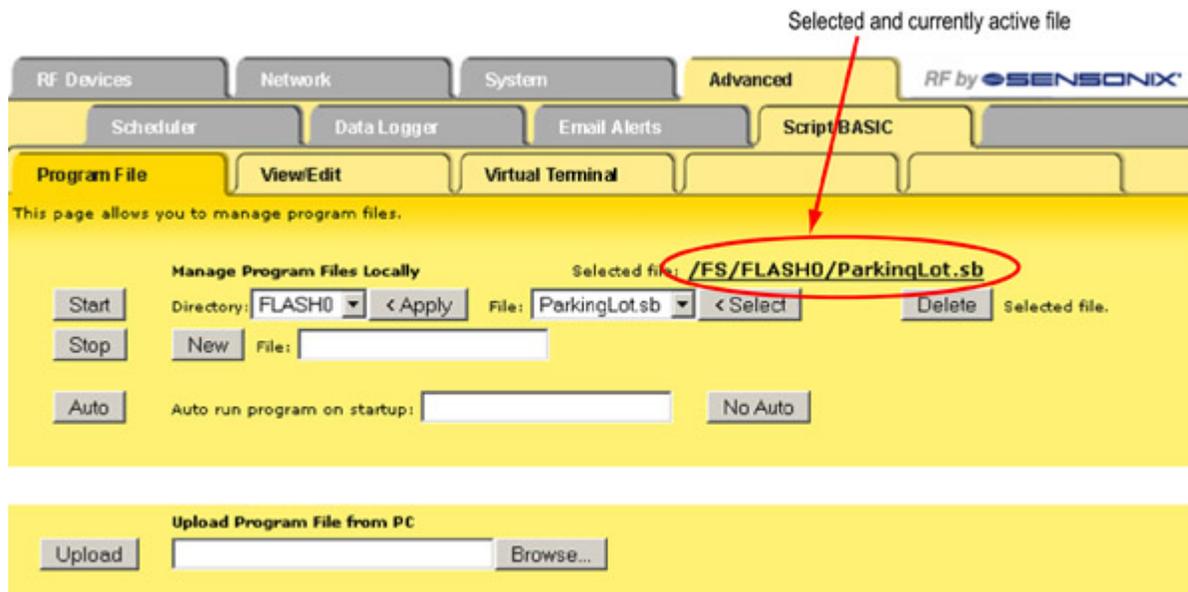
Program File

The *Script BASIC > Program File* screen allows the user to create, manage, save, and delete Script BASIC programs.

Begin by selecting the appropriate directory (RAM0 or FLASH0), then click the Apply button. RAM0 is a volatile directory space. Files stored in RAM0 are lost when power is turned off. The FLASH0 directory is in a non-volatile area.

To create a new Script BASIC program:

1. Type in filename.sb next to the New button.
2. Click on the New button. The Script BASIC program appears in the File drop-down menu.
3. Click the Select button when the appropriate file is shown in the File select window.



When a file is selected, the filename.sb is shown as a link above the Select button. Click on this link to download the file to the PC. To upload a file from the PC, use the Browse and Upload buttons. Use the following buttons to create and manipulate files.

Apply	Changes the directory and refreshes the file list from that directory. Only .sb files appear in this list.	No Au- to	Click the No Auto button to remove the listed file from the auto-run list. The No Auto button also stops the program if it is running.
Auto	Selects the file to start automatically at startup. Clear the text window and click the Auto button to disable previously selected auto-run programs. This file name is saved in the boot configuration file, so save the configuration file to retain this auto-run file name through a power cycle.	Select	Selects the program file. This selection applies to the Start button and also to the View/Edit and Virtual Terminal pages.
		Start	Runs the selected program in the background. If the same file is also selected to auto run at start-up, clicking the Start button will run two copies of

Browse Click the Browse button to find a file to upload from the PC. Once the file is selected, click the Upload button to load the file.

Delete Removes the selected file from the local file directory.

New Creates a new file with the name entered into the text window.

the program. Do not run two copies of the same program.

Stop Terminates the running program if it enters an endless loop. If you are implementing a control loop, you will want the program to be an endless loop.

Upload Uploads the file selected using the Browse button.

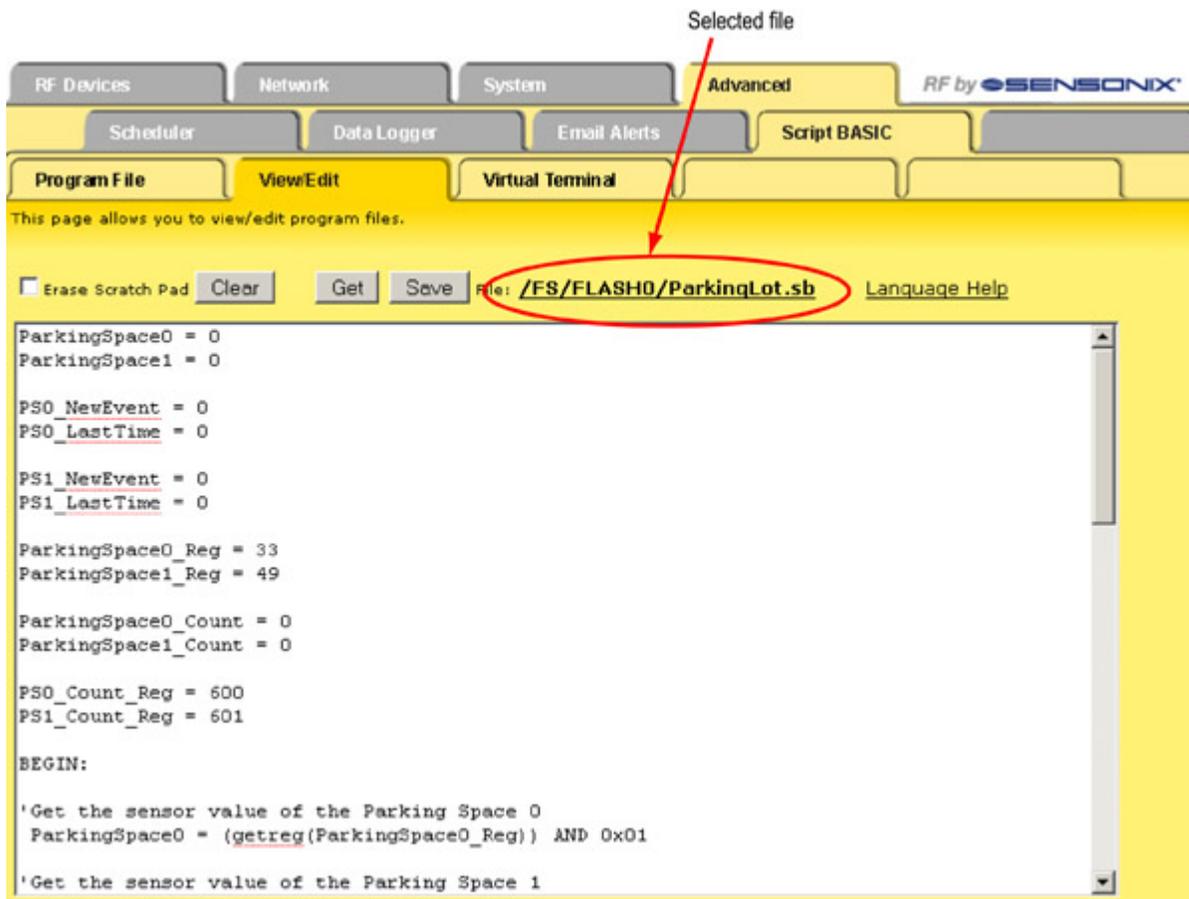
To save a copy of the selected program back to the PC, right-click on the selected file link (upper right) and select save link as or save target as (varies by browser). There may be a several second delay while flash memory updates.

Browsers may cache files. It is possible to view a file, make configuration changes, save the file, then view the file again and see the old file cached by the browser. To see the updated file, go to Internet Options in the web browser's Tools menu and delete temporary Internet files (or delete cache files).

View/Edit

Use the *View/Edit* page to view and edit small Script BASIC program files.

The files are selected using the *Script BASIC > Program File* page. Click the Get button to view the program file. Because this editor is very simple, use a PC-based editor for program files larger than 4 KB.



Clear Clears the scratch pad when the Erase Scratch Pad checkbox is selected.

Get Loads the source code for the selected program on the Program File screen into the scratch pad. Edit

Erase Scratch Pad To erase the scratch pad, select the Erase Scratch Pad checkbox and click the Clear button.

the code using standard text editing commands such as cut, copy, paste, etc.

Save Saves changes back to selected file listed on the Program File page.

Creating a New Program File

To create a new program file, use the *Program File* page. The new file is empty until the contents of the scratch pad are saved to it.

The scratch pad is only useful for a program file of up to 4K bytes in size. HTML cannot process files larger than 4K as a single text buffer. For larger programs, edit the source code on a PC and upload the program in the *Program File* page.

Virtual Terminal

The Virtual Terminal page acts as a simple debugging tool, emulating terminal I/O interaction with a BASIC program. Terminal I/O is discarded when the program auto-runs on startup.

Select the program file using the *Script BASIC > Program File* page. The file name displays next to the Start button. Start the program by clicking the Start button. While running, input typed into the input window is made available to the program when the Enter button is clicked. Click the Refresh button to update the output window with output generated by the program since the last time the Refresh button was clicked.

Use the Clear button to discard old output.

Note that the Enter and Refresh buttons both act as submit buttons. Input present in the input box is submitted when any button is clicked.

RF Devices Network System Advanced RF by SENSONIX

Scheduler Data Logger Email Alerts Script BASIC

Program File View/Edit Virtual Terminal

This page allows you to interact with your program using text input and output. This is primarily useful in debugging and/or when online. Terminal I/O will be discarded when offline, and is also discarded in auto-run.

Start None. Stop

Input to your program: Enter

Output from your program: Clear Refresh

Basic Configuration Examples

Basic configuration of a SureCross™ I/O network begins with the *RF Devices > Select Models* page.

Use this page to select the type of devices and the device names. After making changes, go to the *System > Setup > Config* screen to save the settings displayed on the web pages to an XML file stored in flash memory.

Setting up the Devices

In the sample screen shown, two devices are set up in the network: a Gateway (device 0) and one Node (device 1). To define the devices:

1. Always set up the Gateway as device 0 and the Nodes as devices 1 through 15.
2. Select the correct model from the drop-down list as this determines which I/O types are available for use.
3. Optional: Enter a device name for each DX80 device. Giving the Gateway and Node unique names allows them to be easily identifiable in subsequent set-up screens.
4. Select the Change checkbox and click the Update button to submit changes to the Ethernet Bridge.

The screenshot shows the 'RF Devices' configuration page. At the top, there are tabs for 'RF Devices', 'Network', 'System', and 'Advanced'. Below these are sub-tabs for 'Select Models', 'Configure Points', 'I/O Linking', 'Scaling', and 'Remote I/O'. The main content area is titled 'DX80 Device Configuration' and shows a table with 16 rows. The first two rows are highlighted in yellow. The first row (Device 0) has a 'Change' checkbox checked, a model of 'Mixed 4DI, 4DO, 2AI, 2AO', and a device name of 'Gateway with Indicator Light'. The second row (Device 1) also has a 'Change' checkbox checked, the same model, and a device name of 'Node with Buttons'. The remaining rows (Devices 2-15) have 'Change' checkboxes unchecked and a model of 'None'. At the bottom of the table, there are buttons for 'Copy', 'Delete', and 'Check Status', along with input fields for 'From' and 'To'.

Dev #	Change	Model	Get ALL	Send ALL	Device Name
0	<input checked="" type="checkbox"/>	Mixed 4DI, 4DO, 2AI, 2AO	<input type="checkbox"/>	<input type="checkbox"/>	Gateway with Indicator Light
1	<input checked="" type="checkbox"/>	Mixed 4DI, 4DO, 2AI, 2AO	<input type="checkbox"/>	<input type="checkbox"/>	Node with Buttons
2	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
3	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
4	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
5	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
6	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
7	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
8	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
9	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
10	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
11	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
12	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
13	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
14	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	
15	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	

After defining the devices, but before modifying any settings on a configured network, select the Get ALL checkbox for all network devices and click the Update button. This retrieves all settings from the devices and displays them in the Web Configurator. Because sending or retrieving information from the DX80 devices can take several minutes, use the Check Status button to view the status of the data transfer.

Save these settings by going to *System > Setup > Config File* and clicking the Save or Save As button. This ensures that the configuration file contains the most recent information stored on the SureCross devices.

Configuring I/O

Use the Configure Points page to select the I/O type and settings for each SureCross™ device. The Configure Points page can be accessed using either the Configure Points tab or by clicking the device number in the left column of the Select Models page. Use the Prev and Next buttons to scroll through the devices.

In the sample shown, I/O points 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, and 14 are set up on the Gateway because this Gateway is a four discrete in, four discrete out, two analog in, and two analog out model. To define your device:

1. Select the I/O Enable checkbox. If the checkbox is not enabled, that I/O point is active and is ignored.
2. From the I/O Selection drop-down list, select the appropriate I/O configuration. Refer to the device data sheet to determine which discrete and which analog I/O points are active for a given device. (NPN and PNP settings for discrete I/O shown on the data sheet are default settings only and can be changed.)
3. Give the I/O points descriptive names to make future register configuration easier.
4. Because sample and reporting intervals apply only to inputs, only set the intervals for the inputs. Hysteresis, threshold, and delta values apply only to analog inputs.
5. Set the Polling Interval, Max Bad Count, and Re-link Count as needed.
 - a. The polling interval defines how often the Gateway polls each Node to verify the radio link is operating. A typical setting is 16 seconds.
 - b. The maximum bad count refers to the maximum count of consecutive failed polling attempts before the Gateway considers the radio link to be broken. The failed polling attempts must be consecutive failed attempts.
 - c. The re-link count is the number of completed polling messages the Gateway receives back from a previously failed Node before the radio link is re-established.
6. Set the default output conditions for each SureCross device. In the example shown, the default output conditions apply during a Node link failure or a Gateway link failure. Selecting the Auto-recover option sets the Gateway to auto-recover with out-of-sync Nodes by polling and successfully communicating with the failed Node four times (re-link count setting) before erasing the error condition.

Click the Get Info button to retrieve the device serial number, model number, product date, RF version, and other information that might be helpful for technical support.

For detailed definitions of all parameters on this and the expanded view screen, please refer to [GUID-D1E8C0DC-4C97-449D-B088-47E7B1E8C625](#).

This page allows configuration of individual I/O points.

Device Name: **Gateway with Indicator Light** Device # < Prev Next >

Polling Interval Sec. Max Bad Count Re-link Count

Default output conditions: Power Up Host Link Failure Gateway Link Failure Out of Sync Node Link Failure Auto-recover Send/Get polling/flags only Status: **Ready**

I/O #	I/O Enab	I/O Selection	Sample Interval	Report Interval	Hyst	Thresh	Delta	I/O Name
1	<input checked="" type="checkbox"/>	PNP Input (10-30V) #1	0.06	0.00	0	0	0	Gateway Discrete IN 1
2	<input checked="" type="checkbox"/>	PNP Input (10-30V) #2	0.06	0.00	0	0	0	Gateway Discrete IN 2
3	<input checked="" type="checkbox"/>	PNP Input (10-30V) #3	0.00	0.00	0	0	0	Gateway Discrete IN 3
4	<input checked="" type="checkbox"/>	PNP Input (10-30V) #4	0.00	0.00	0	0	0	Gateway Discrete IN 4
5	<input checked="" type="checkbox"/>	Analog In #1, 4-20mA	0.06	1.00	2.00	10.00	0.20	Gateway Analog IN 1
6	<input checked="" type="checkbox"/>	Analog In #2, 4-20mA	0.06	1.00	2.00	10.00	0.20	Gateway Analog IN 2
9	<input checked="" type="checkbox"/>	Discrete Output (1014) #1	0.00	0.00	0	0	0	Gateway Red Light
10	<input checked="" type="checkbox"/>	Discrete Output (1014) #2	0.00	0.00	0	0	0	Gateway Yellow Light
11	<input checked="" type="checkbox"/>	Discrete Output (1014) #3	0.00	0.00	0	0	0	Gateway Discrete OUT 3
12	<input checked="" type="checkbox"/>	Discrete Output (1014) #4	0.00	0.00	0	0	0	Gateway Discrete OUT 4
13	<input checked="" type="checkbox"/>	Analog Output #1	0.00	0.00	0.00	0.00	0.00	Gateway Analog OUT 1
14	<input checked="" type="checkbox"/>	Analog Output #2	0.00	0.00	0.00	0.00	0.00	Gateway Analog OUT 2

S/N: 100323 Wr Protect: OFF Model: 045434 Prod Date: 063000
 RF Ver: V10 000100129001 RF EE: 000000000 LCD Ver: V11 000100129003 LCD EE: 000000000

Linking I/O

Use the I/O Linking page to establish input to output linking between devices. Our simple example uses a Gateway and only one Node. Notice that only the inputs are shown for any given device. Only inputs are mapped to another device's outputs.

RF Devices | Network | System | Advanced | RF by **SENSONIX**

Select Models | Configure Points | **I/O Linking** | Scaling | Remote I/O

This page displays I/O links mapped by the DX80.

Device # < Prev Next > Status: **Ready** Change Refresh

Send Get Reset

Source			Destination			
Device Name	Device #	I/O #		Device #	I/O #	Packed
Gateway with Indicator Light	0	1	→	<input type="text" value="1"/>	<input type="text" value="9"/>	<input checked="" type="checkbox"/>
Gateway with Indicator Light	0	2	→	<input type="text" value="1"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>
Gateway with Indicator Light	0	3	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	4	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	5	→	<input type="text" value="1"/>	<input type="text" value="13"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	6	→	<input type="text" value="1"/>	<input type="text" value="14"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	7	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Gateway with Indicator Light	0	8	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>

RF Devices | Network | System | Advanced | RF by **SENSONIX**

Select Models | Configure Points | **I/O Linking** | Scaling | Remote I/O

This page displays I/O links mapped by the DX80.

Device # < Prev Next > Status: **Ready** Change Refresh

Send Get Reset

Source			Destination			
Device Name	Device #	I/O #		Device #	I/O #	Packed
Node with Buttons	1	1	→	<input type="text" value="0"/>	<input type="text" value="9"/>	<input checked="" type="checkbox"/>
Node with Buttons	1	2	→	<input type="text" value="0"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>
Node with Buttons	1	3	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Node with Buttons	1	4	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Node with Buttons	1	5	→	<input type="text" value="0"/>	<input type="text" value="13"/>	<input type="checkbox"/>
Node with Buttons	1	6	→	<input type="text" value="0"/>	<input type="text" value="14"/>	<input type="checkbox"/>
Node with Buttons	1	7	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>
Node with Buttons	1	8	→	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="checkbox"/>

The Device # field shows which device is displayed. Use the Prev and Next buttons to scroll through the devices.

In the sample screens shown, device 0, I/O point 1 (Gateway Discrete IN 1) is mapped to device 1, I/O point 9 (Node Discrete OUT 1). Each of device 0's input points 1, 2, 5, and 6 are mapped to the corresponding outputs on device 1. Similarly, device 1's inputs 1, 2, 5, and 6 are mapped to device 0's outputs 9, 10, 13, and 14.

Banner Engineering does not recommend linking multiple inputs to a single output on any SureCross device. The result will not be "Logic OR" of the multiple inputs; rather, the output will respond to any input state changes as they occur. This will result in unpredictable and/or undesirable network behavior.

After making changes to any screen, click the Change button to submit these changes to the Ethernet Bridge then click the Send button to submit the I/O linking changes to the DX80 radio devices. If you make changes to a page and leave the page without submitting those changes to the Ethernet Bridge, the changes are lost.

To 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 or Change button are temporary until the changes are saved permanently in the configuration file.

Link Timeouts

The Link Timeout parameters control how the wireless network devices behave during an RF communications failure.

A link timeout is a failure in the radio communications between the Gateway and a Node. A link is timed out when the Gateway has polled a Node and failed Maximum Bad Count times consecutively. In the sample shown, the Gateway must poll and fail to communicate with a Node seven times before the link is considered to be timed out.

This page allows configuration of individual I/O points.

Device Name: **Gateway with Indicator Light** Device # < Prev Next > Change Refresh Get Info

Polling Interval Sec. Max Bad Count Re-link Count Send Flags Get Flags Reset

Default output conditions: Power Up Host Link Failure Gateway Link Failure Out of Sync Node Link Failure Auto-recover

Send/Get polling/flags only Status: **Ready**

A radio link is recovered when the Gateway polls and successfully communicates with the failed Node Re-link Count times before the Max Bad Count is reached. Successful communications do not have to be consecutive to reach the Re-link count number.

Set the Default Output Conditions checkboxes to establish when the default output conditions are applied.

- Auto-Recover. Selecting the auto-recover option forces the Gateway to attempt to re-establish communications with out-of-sync nodes after a polling error condition is indicated. The Gateway polls the failed Node and must successfully communicate with the Node Re-Link Count times before the error condition is erased. This parameter is only used on the Gateway. Without the auto-recover feature selected, the user must manually reset error conditions or the host system must reset the error condition.
- Gateway Link Failure. The Gateway detected an RF communication problem with a Node. All outputs on other devices that are linked to inputs on the failed device are set to the default states.
- Host Link Failure. A Modbus timeout forces all device outputs to the default states. This parameter applies to every device that sets this flag.
- Node Link Failure. A Node detected an RF link problem and set its own outputs to the default states.
- Out of Sync. When an out-of-sync condition is detected, all Node outputs are set to the default value. This parameter applies only to the Nodes.
- Power Up. All device outputs are set to the default value on initial power-up.

In the sample shown, the default output conditions are applied when the Gateway detects the failed link and when the Node detects the failed link. Also selected is the auto-recovery option.

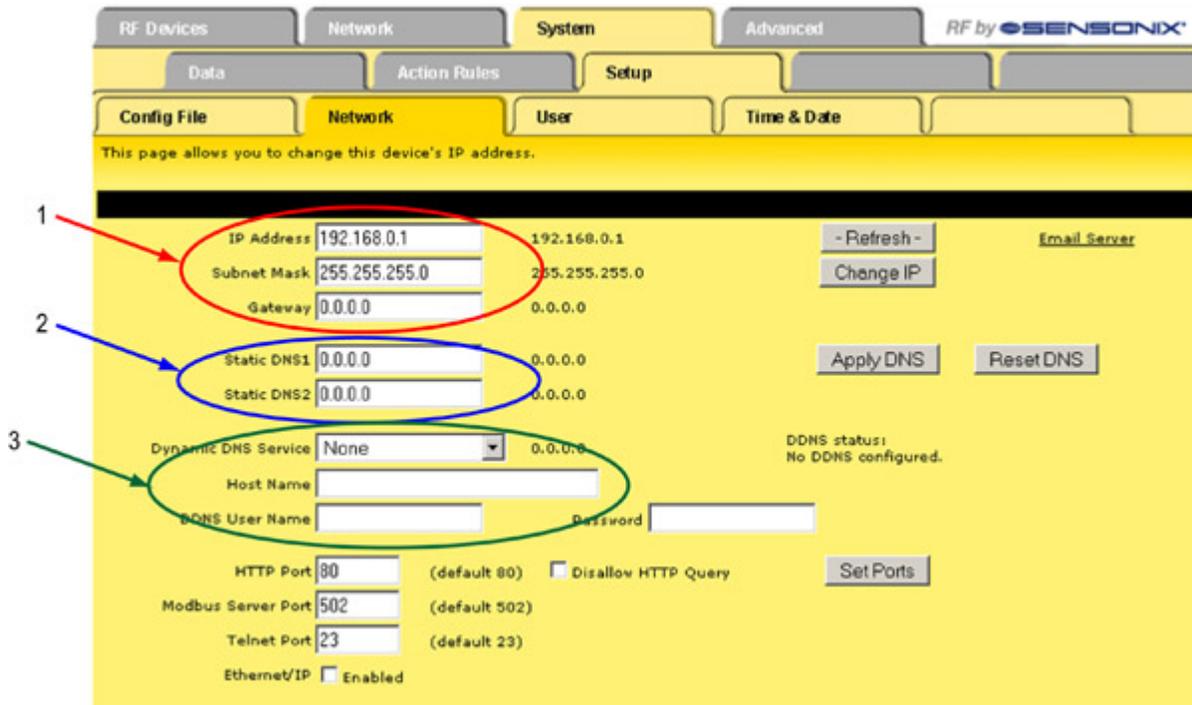
To decrease the time to determine a link timeout, decrease the Polling Interval. Reducing the Max Bad Count parameter will also detect a link failure quicker, but will potentially cause more false time-out conditions.

To increase the time to determine a link timeout, increase the Polling Interval or the Max Bad Count. For radio networks extended to the limits of the transmission range, increasing the Max Bad Count may help reduce the link timeout errors.

Click the Send Flags button to submit changes to the flags to the devices. Use the Prev and Next buttons to scroll to the next SureCross™ device.

System Network Settings

Using the *System > Setup > Network* screen, set up the DX80 device by defining the IP address, subnet mask, and gateway. Click on the Change IP button and reboot the system for the new IP settings to take effect.



1: The DX80 device IP address, subnet mask, and gateway.

2: When using an SMTP domain name in the e-mail setup page instead of an SMTP IP address, enter at least one static DNS server IP address. The DNS server addresses are supplied by an Internet Service Provider (ISP) or network administrator.

3. Select a dynamic DNS service and enter in the device's host name, the DDNS user name, and password.

DNS Server

To use domain names instead of a static IP address, supply the IP address of at least one DNS server (Static DNS1 or DNS2). The DNS server, at a static IP address, is a service that keeps track of every Internet domain name and what IP address is associated with each domain. Changes to the DNS server address take effect immediately.

DHCP

Set the IP address to 255.255.255.255 to use Dynamic Host Configuration Protocol (DHCP) to obtain an IP address upon power-up. The IP address change takes effect on the next power cycle or when the Restart button is clicked on the Config File page. When using DHCP, set the DNS1 and DNS2 addresses to 0.0.0.0 because the DHCP supplies the DNS addresses.

Dynamic DNS

Dynamic DNS allows the domain name data held in a name server to be updated when IP addresses change. For example, the Internet domain name www.bannerengineering.com can be assigned to a computer with a dynamic, or changing, IP address. Instead of every computer on the Internet tracking all IP address changes, a Dynamic DNS service tracks the changes and directs Internet traffic to the correct IP address. Most consumer ISPs use dynamic IP addresses. The Dynamic DNS settings are required when using a dynamic IP address for your connection to the Internet.

Reboot the system if the Change IP button was clicked.

Advanced Configuration

The following are some more advanced setup features and examples.

Thresholds

Thresholds are set to trigger actions based on events. The event occurs when a source register value meets criteria defined by a threshold rule. The result of the event can include setting another register to a specific value, sending an e-mail or text message notification, or logging an event or data to a log file.

The screenshot shows the 'Thresholds' configuration page in the SureCross Web Configurator. The page is titled 'Thresholds' and includes a navigation menu with 'System' selected. The 'Action Rules' sub-menu is active, and the 'Thresholds' sub-sub-menu is selected. The main content area displays a configuration form for Rule #1. The rule is named 'RedLightOn' and is based on reading local source register #17. The event is triggered when the value is 'Equal to' 1.000000. The rule is qualified by a hysteresis value of 0.000000, with minimum on-time and off-time of 0:00:00. The action is to set local destination register #0 to the same value as the source (0.000000) when true, and to 0.000000 when false. The number of rules enabled is 2.

Threshold rules are created using the *System > Action Rules > Thresholds > Thresholds - Expanded View* page. In the example shown, a threshold rule has been set up to track when Node 1's I/O point 1 (Modbus register 17) is on. Node 1's I/O point 1 is a discrete input wired to an on/off switch. Once saved, this threshold rule can be chosen as an event to log in the data log and event log pages (*Advanced > Data Logger*).

After making changes to any screen, click the Update button to submit these changes to the device. Also go to the *System > Setup > Config File* page and click the Save or Save As buttons to save the configuration changes.

If you leave a page after making changes and have not submitted those changes to the device, the changes are lost.

Data and Event Logging

Event and data logging is defined using the *Advanced > Data Logger* pages.

Once the Data Logger tab is selected, there are four pages used to set up data and event logging:

Log Files. Sets up the event log and data log files. One event log and three data log files are available for logging. Use the Prev and Next buttons to move between the Event Log, Data Log 1, Data Log 2, and Data Log 3 set-up screens.

Data Points. Displays a list of the device registers. Select which registers to log to Data Log 1, Data Log 2, or Data Log 3.

Events Logged. Displays the list of events established in the *System > Action Rules > Thresholds* page. The events may be logged when True or False.

File List. Displays the list of log files created.

Log Files

To set up a data log file, follow these steps:

1. From the *Log Files* page, select the file location (RAM0 or FLASH0) and enter a file name. The file name must be eight characters or less and the extension must be .txt. An example file name is DataLog1.txt. Files saved in RAM0 will be lost when the power cycles to the device. Files saved in FLASH0 are saved until they are deleted. The name entered in the File Name field is a prefix. The system appends this file name with a date and time stamp. When the first log file is filled, a second log file using the same prefix and a new date and time stamp is created.
2. Select the Enable Logging checkbox.

3. Enter in a log rate in the format of HH:MM:SS. For data logs, leaving the log rate set to zero disables logging. Because event logs trigger when an event occurs, the log rate is not used for event logs.
4. Select the criteria for beginning a new file. Choose between When Full, a specific day of the week, or Daily. Choose to begin a new file at a specific time or a specific file size. Once the file fills up, a new file is created.
5. Select the option to discard the oldest files with the listed file prefix or to stop logging completely when the system resources are filled. If the Discard Oldest option is selected, only the oldest files with the listed file prefix are deleted.
6. To e-mail the completed file, fill in an e-mail recipient and enter an optional subject and message.
7. Click the Update button to submit these changes to the SureCross™ device. After making any changes to a page, click the Update button to submit that data to the SureCross device. If you leave a page without clicking the Update button, the changes are lost.
8. Go to the Data Points page and select which registers to record to each data log file set up in the Log Files page. Use the Prev and Next buttons to move between network devices. Click the Update button to submit these changes to the SureCross device. The register names are taken from the I/O Names entered in the RF Devices > Configure Points page.
9. Go to the Events Logged page to select which events to log to the event log files set up in the Log Files page. Click the Update button to submit these changes to the SureCross device. The events listed are the events set up in the System > Action Rules > Thresholds page.

Once data logging begins, the log files are listed in the File List page. Click on the file name to view the text file contents. To save this text file, either right-click on the file link and select *Save Link As* or click on the file name to view it, then go to *File, Save Page As*. Use the browser's Refresh button to show the latest entry or entries recorded into the Log file. To delete files, select the checkbox in front of the unnecessary files and click the Delete button.

The sample shown below depicts data logging occurring every five seconds with the data written to a data log file called DataLog1.txt. When this file is 2 Kb in size, a new file will be started. Because the data log files are written to the RAM0 area, these files are not saved when power cycles to the device.

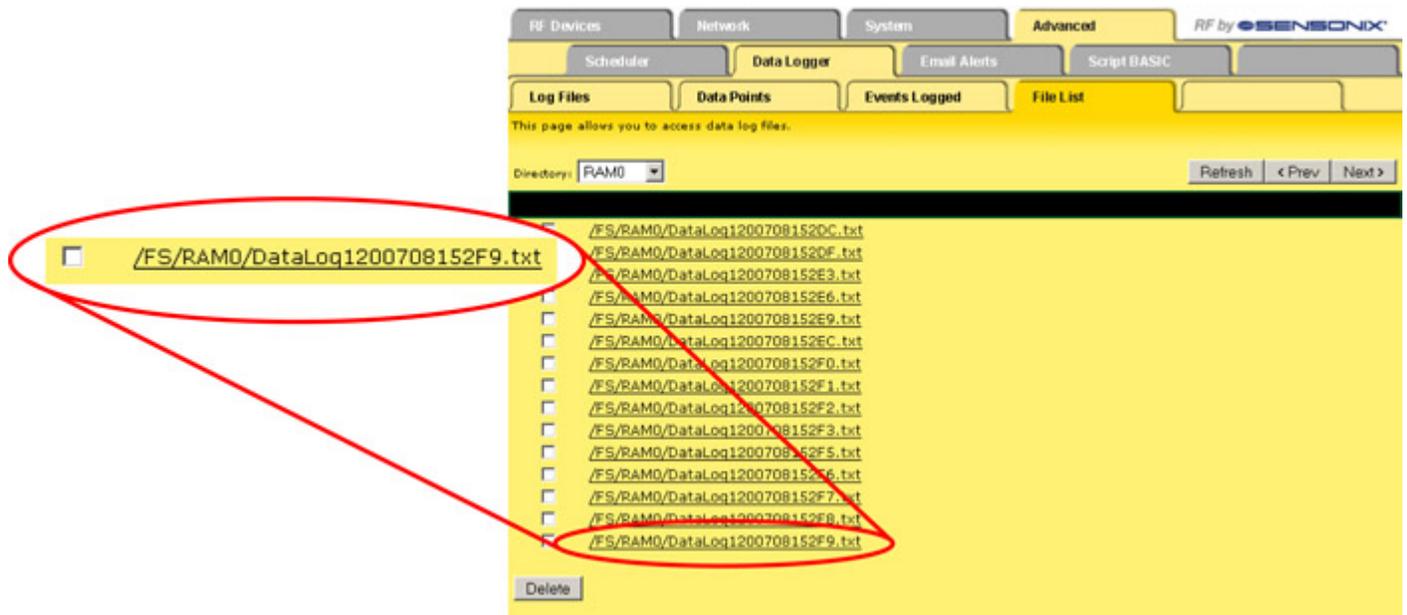
The current file name is displayed on the top section of the screen, along with the current file size and the free space in the RAM0 area.

The File List page lists the log files created and stored in RAM. The file names begin with the file name entered in the Log Files page. The second part of the file name, shown below as ...20070815... is a date stamp indicating the date the file was first created. The last three digits, shown in the sample below as 2F9, are a hexadecimal representation of the minutes past midnight. Converted to decimal, 2F9 is 761, indicating this file was created 761 minutes past midnight on 15 Aug 2007, or at 12:41 pm.

Because the last three digits of the file name represent the time in minutes, set the maximum file size and log rate so that two files are not created within the same minute, causing an error -70 (Duplicate Directory Entry Error).

In the sample shown, 16 register entries logged every second to a maximum file size of 1 Kb fills up the file in less than a minute.

The screenshot shows the 'Log Files' configuration page for 'Data Log 1'. At the top, there are navigation tabs: RF Devices, Network, System, Advanced, and RF by OSENSONIX. Below these are sub-tabs: Scheduler, Data Logger, Email Alerts, and Script BASIC. The 'Log Files' sub-tab is active. A summary bar shows: 'Data Log 1', File size: 2K, Free space: 778K/985K, Status: Email error 15, File name: DataLog1200708152CD.txt, and buttons for Update, < Prev, and Next >. The main configuration area includes: File Name: RAM0 (dropdown) and DataLog1.txt (text input); Log Rate: 0:00:05 (text input) with a note 'Log only when register # 0 is greater than zero.'; New File: When Full (dropdown), End Time: 0:00:00 (text input), Size: 2 KB (text input); Upon resources exhausted: Discard oldest (selected radio button) and Stop logging (radio button); Recipient, Subject, and Message (text input fields); and buttons for Enable Logging (checked), Reset Error, and a link for log file format information.



Scheduling

To schedule specific events or actions, use the *Advanced > Scheduler* pages. Use the *Weekly Schedule* page to manage weekly activities and the *On Demand* page to set up one time only events.

To exclude or include specific holidays from weekly events, set up the holidays in the list. In the screen shot shown, eight single-day holidays are set up to start one second after midnight and end one second before midnight that night. One two-day holiday, Thanksgiving, is included in the list.

Any holiday set up on the *Holidays* page may be included or excluded from the *Weekly Schedule*.

To set up a weekly schedule:

1. Select the checkbox for the days of the week this schedule is to be active.
2. Enter a start and end time (On Time and Off Time) in HH:MM:SS format.
3. Enter the register number to write the On or Off Values to.
4. Enter the On and Off Values.
5. To exclude or include holidays to this event, select the holiday and click the Add button to add it to the list.
6. Click the Exclude or Include button depending on if this holiday list is to be excluded from the weekly event or included.
7. When finished, click the Update button to submit these changes to the Ethernet Bridge or GatewayPro.

#	Holiday Name	On Time	On Date	Off Time	Off Date
1	New Year's Day	0:00:01	01/01/2008	23:59:59	01/01/2008
2	Good Friday	0:00:01	03/21/2008	23:59:59	03/21/2008
3	Easter Sunday	0:00:01	03/22/2008	23:59:59	03/22/2008
4	Memorial Day	0:00:01	05/26/2008	23:59:59	05/26/2008
5	Fourth of July	0:00:01	07/04/2008	23:59:59	07/04/2008
6	Labor Day	0:00:01	09/01/2008	23:59:59	09/01/2008
7	Thanksgiving	0:00:01	11/27/2008	23:59:59	11/28/2008
8	Christmas Eve	0:00:01	12/24/2008	23:59:59	12/24/2008
9	Christmas Day	0:00:01	12/25/2008	23:59:59	12/25/2008
10		0:00:00	00/00/0000	0:00:00	00/00/0000
11		0:00:00	00/00/0000	0:00:00	00/00/0000
12		0:00:00	00/00/0000	0:00:00	00/00/0000

The screen shots shows a sample weekly event occurring Monday through Friday, excepting the specific holidays listed on the right. This event starts at 6:00 am and ends at 8:00 pm and writes a value of 0 during that time to register 121. During the off times, a value of 1 is written to register 121.

Register 121 controls an automated lock for the front door of a business that is typically open Monday through Friday from 6:00 am until 8:00 pm. These doors remain locked on Saturdays, Sundays, and any holiday in the list to the right occurring on the selected days.

An *On Demand* event is set up similarly, except that it occurs only once on a specified date.

#	S...M...T...W...T...F...S	On Time	Off Time	Register Number	"On" Value	"Off" Value	Register Name
1	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	6:00:00	20:00:00	121	0.00000	1.00000	

Available Holidays

- New Year's Day
- Good Friday
- Easter Sunday
- Memorial Day
- Fourth of July
- Labor Day
- Thanksgiving
- Christmas Eve
- Christmas Day

Selected Holidays

- New Year's Day
- Memorial Day
- Fourth of July
- Labor Day
- Thanksgiving
- Christmas Eve

Exclude
 Include

Trending Data

Trending data calculates average, low, and high values within a specified time period. Use the *System > Action Rules > Trending* tab to set up statistical tracking of specific registers.

To track a register:

1. Enter the register number in the Tracked Register # field.
2. Select the destination registers for the calculated values using the unassigned registers listed at the bottom of the screen.

In the sample screen shown, register 1, Gateway IN 1, is tracked in one minute increments with 10 samples taken each minute. The resulting average value is stored in register 257. The minimum value for the minute is stored in register 258 and the maximum value in register 259.

As time passes, this register is continuously tracked and 10 sample values are acquired for each minute of operation. The average, minimum, and maximum values change with the additional information. As more time periods are sampled, the minimum and maximum values become averages of the lowest and highest values within each time period.

This page allows setup of min/max/average tracking of selected registers.

Showing 1 to 1 of 1

Tracked Register #	Register Name	Average Register	Min. Register	Max. Register	Reset	Period HH:MM	Slices
1	Gateway Input # 1	257	258	259	Hourly	0:01	10

Trends Enabled: 1

First integer register for saving results: 257

First float register for saving results: 1513

Scaling

Use the *RF Devices* > *Scaling* page to convert data stored in the I/O point register.

The converted data is written to the floating point register associated with that I/O point (see table below). Register values are multiplied by the Scale and added to the Offset to product the data written to the floating point registers.

One example of scaling is to convert thermocouple inputs into temperature readings. Thermocouple inputs are multiplied by 20 before being written to registers. To convert back to a temperature, enter 0.05 as the scale for that register. The value written to the floating point register for that I/O register is the temperature.

This page displays node I/O scale factors.

Device name: Gateway with Indicator Light

Device # 0

I/O#	Local Register #	Scale	Offset	I/O Point Name
1	00001	0	0.000000	Gateway Discrete IN 1
2	00002	0.000000	0.000000	Gateway Discrete IN 2
3	00003	0.000000	0.000000	Gateway Discrete IN 3
4	00004	0.000000	0.000000	Gateway Discrete IN 4
5	00005	.05	0.000000	Gateway Analog IN 1
6	00006	0.000000	0.000000	Gateway Analog IN 2

Floating Point Registers

The floating point registers associated with each I/O point are assigned based on the following equation: $1000 + I/O\# \times 2 - 1$. For example,

I/O Point	Floating Point Register
1	1001, 1002
2	1003, 1004
3	1005, 1006
4	1007, 1008
5	1009, 1010

Troubleshooting

Restoring Factory Default Settings

Restoring the factory default settings resets the settings for:

- IP Address: 192.168.0.1
- Root Login: root
- Root Password: sxi
- HTTP Port: 80
- Modbus Server Port: 502
- Telnet Port: 23
- EtherNet/IP Protocol: Disabled

To restore these settings, leave the device powered up and running and follow these steps:

1. Open the DX80 Gateway Pro or DX83 Ethernet Bridge housing to access the board
2. Install the initialization (init) jumper on the pins shown
3. Wait 30 seconds
4. Remove the jumper
5. Cycle power to the device

Using the configuration web page, verify the parameters have returned to the factory defaults listed.



Error Codes

The following are the error codes associated with the Web Configurator.

Data Logger Error Codes

The following Status messages may appear for an event or data log file.

OK . The system is operating normally.

Error: -n. A file system error has occurred. Refer to the file system error codes listed below.

Record size overflow. Too much information per record is being logged. As this time, the record size is a maximum of 1000 characters.

Illegal file name. File names must use alphanumeric characters only and may have no embedded spaces. The suffix must be .txt for event and data log files.

E-mail error: -n. There is a problem attempting to e-mail a log file. The error codes are listed below.

Unknown x/y. A status x with code y has not been enumerated for the web page. Please contact Banner technical support and provide the values of x and y.

File System Error Codes

The file system errors are listed in the following table. One commonly occurring code is -5, referring to a full volume (a "disk full" error if it was a disk). Duplicate or not found errors are also common error messages. A DIR_ENTRY error refers to an invalid file name.

Error Code	Description		Error Code	Description
0	NAFS_SUCCESS		-51	NAFS_INVALID_FILE_NAME
-1	NAFS_INVALID_VOLUME_NAME		-52	NAFS_IO_REQUEST_CB_BUSY
-2	NAFS_INVALID_BLOCK_NUMBER		-53	NAFS_FILE_CB_BUSY
-3	NAFS_SERVICES_NOT_READY		-54	NAFS_DIR_PATH_CB_BUSY
-4	NAFS_BLOCK_NOT_MAPPED		-55	NAFS_IO_REQUEST_CB_NOT_INITIALIZED
-5	NAFS_NO_FREE_BLOCKS		-56	NAFS_SEND_IO_REQUEST_FAILED
-6	NAFS_WRITE_FAILED		-57	NAFS_MSG_QUEUE_FULL
-7	NAFS_INVALID_BLOCK		-58	NAFS_INVALID_ROOT_DIR_INODE
-8	NAFS_DELETE_FAILED		-59	NAFS_INVALID_DIR_NAME_LENGTH
-9	NAFS_NULL_POINTER		-60	NAFS_INODE_TYPE_MISMATCH
-10	NAFS_INVALID_RAM_VOLUME		-61	NAFS_INVALID_INODE_DIR_SIZE
-11	NAFS_INVALID_FLASH_VOLUME		-62	NAFS_INODE_DATA_SIZE_MISMATCH
-12	NAFS_UNKNOWN_FLASH		-63	NAFS_INVALID_USER_PERMISSIONS
-13	NAFS_MALLOC_FAILED		-64	NAFS_INVALID_GROUP_ID
-14	NAFS_ALREADY_INITIALIZED		-65	NAFS_NO_WRITE_PERMISSION
-15	NAFS_INVALID_WRITE_OPTION		-66	NAFS_NO_READ_PERMISSION
-16	NAFS_BLOCK_SCAN_FAILED		-67	NAFS_DIR_ENTRY_TYPE_MISMATCH
-17	NAFS_NO_TRANSFER_SECTOR		-68	NAFS_NULL_DIR_ENTRY_NAME
-18	NAFS_READ_FAILED		-69	NAFS_NO_FREE_INODES
-19	NAFS_SEMAPHORE_CREATE_FAILED		-70	NAFS_DUPLICATE_DIR_ENTRY
-20	NAFS_THREAD_CREATE_FAILED		-71	NAFS_DIR_ENTRY_NOT_FOUND
-21	NAFS_IBLOCK_ARRAY_ENTRY_INCONSISTENT		-72	NAFS_INVALID_FILE_OFFSET
-22	NAFS_IBLOCK_ARRAY_ENTRY_NOT_FOUND		-73	NAFS_INVALID_BYTES_TO_READ

Error Code	Description		Error Code	Description
-23	NAFS_END_OF_FILE		-74	NAFS_INVALID_BYTES_TO_WRITE
-24	NAFS_SUPER_BLOCK_CORRUPTED		-75	NAFS_INVALID_SS_TABLE_INDEX
-25	NAFS_DATA_CORRUPTED		-76	NAFS_INVALID_MAX_OPEN_DIRS
-26	NAFS_SERVICES_TABLE_FULL		-77	NAFS_INVALID_MAX_OPEN_FILES
-27	NAFS_INVALID_VOLUME_NAME_LENGTH		-78	NAFS_INVALID_FILE_HANDLE
-28	NAFS_VOLUME_NAME_MISMATCH		-79	NAFS_RENAME_DIR_ENTRY_FAILED
-29	NAFS_IO_INTF_TABLE_FULL		-80	NAFS_FILE_IS_OPEN
-30	NAFS_IO_INTF_ENTRY_NOT_FOUND		-81	NAFS_DIR_HAS_OPEN_FILES
-31	NAFS_DUPLICATE_VOLUME_NAME		-82	NAFS_DIR_TABLE_FULL
-32	NAFS_INVALID_MEDIA_TYPE		-83	NAFS_FILE_TABLE_FULL
-33	NAFS_INVALID_BLOCK_SIZE		-84	NAFS_DIR_NOT_EMPTY
-34	NAFS_INVALID_STACK_SIZE		-85	NAFS_BLOCK_COUNT_MISMATCH
-35	NAFS_INVALID_MSG_QUEUE_SIZE		-86	NAFS_INVALID_DIR_ENTRY_BUFFER_SIZE
-36	NAFS_QUEUE_CREATE_FAILED		-87	NAFS_REMOVE_VOLUME_FAILED
-37	NAFS_INVALID_BUFFER_POOL_SIZE		-88	NAFS_SERVICES_CB_NOT_ALLOCATED
-38	NAFS_MEDIA_TYPE_MISMATCH		-89	NAFS_VOLUME_NOT_INITIALIZED
-39	NAFS_MEDIA_CB_VOLUME_TABLE_FULL		-90	NAFS_THREAD_DELETE_FAILED
-40	NAFS_INVALID_DIR_PATH_LENGTH		-91	NAFS_THREAD_TERMINATE_FAILED
-41	NAFS_DIR_PATH_LENGTH_MISMATCH		-92	NAFS_SEMAPHORE_DELETE_FAILED
-42	NAFS_MEDIA_CB_ALREADY_INSTALLED		-93	NAFS_FLASH_VOLUME_SECTORS_MISMATCH
-43	NAFS_MEDIA_CB_NOT_INSTALLED		-94	NAFS_SERVICES_CB_NOT_INITIALIZED
-44	NAFS_BUFFER_POOL_ALREADY_INSTALLED		-95	NAFS_INODE_NUMBER_MISMATCH
-45	NAFS_INVALID_PATH_NAME		-96	NAFS_SHUTDOWN_MODE
-46	NAFS_MEDIA_TYPE_INTF_MISMATCH		-97	NAFS_THREAD_GET_INFO_FAILED
-47	NAFS_BUFFER_POOL_EMPTY			
-48	NAFS_INVALID_FILE_NAME_LENGTH			
-49	NAFS_INVALID_FILE_TYPE			
-50	NAFS_INVALID_FILE_ACCESS_TYPE			

E-mail Error Codes

E-mail error codes are listed in the following tables.

The missing recipient error should not occur because no send is attempted when no recipient is defined. The most likely error is a server error, referring to an error with the connection to the e-mail server. Check the SMTP address, e-mail login, and password.

E-mail error codes are positive or negative numbers depending on when the error occurs. If the error occurs in the e-mail client after the data logger creates the message, it is a negative code. If the message never got to the e-mail client, the error code is positive.

Positive Error Codes

Positive error codes are detected prior to the attempt to send the e-mail. These are detected primarily in preparation to send.

Other than a missing recipient address, the most common error code is (+15) NoDNSAddress. This error indicates the system could not find the mail server's IP address using DNS host lookup. The nameserver might not be accessible or the host name is incorrect.

- 0: eSendMail_Success
- 1: eSendMail_NoAccessLogin
- 2: eSendMail_ServerBusy
- 3: eSendMail_ServerNotReady
- 4: eSendMail_MissingRecipient
- 5: eSendMail_MissingSender
- 6: eSendMail_ServerError
- 7: eSendMail_ErrorRecipient
- 8: eSendMail_TooManyRecipients
- 9: eSendMail_ErrorCc
- 10: eSendMail_TooManyCc
- 11: eSendMail_ErrorAttachment
- 12: eSendMail_TooManyAttachment
- 13: eSendMail_ErrorSend
- 14: eSendMail_BodyFull
- 15: eSendMail_NoDNSAddress

Negative Error Codes

Negative error codes are detected after the send process has begun. The most common error code, (-13), has the least useful name (General Error). However, it often means the login name and/or password were not accepted by the mail server or they do not match the sender's e-mail address. In general, it means the DX80 was unable to log into the mail server for any of a variety of possible reasons related to an invalid login or broken connection.

Error code (-9) occurs when there is an attempt to send an e-mail before the previous e-mail has completed the send process. Error code (-15) indicates the data log file that the DX80 was attempting to attach to an e-mail could not be accessed.

- 0: NMAILC_OK
- -1: NMAILC_MISSADDRESS
- -2: NMAILC_INVALIDBODY
- -4: NMAILC_NOSERVER
- -5: NMAILC_NOMAILBOX
- -6: NMAILC_TCPERROR
- -7: NMAILC_CANCELLED
- -8: NMAILC_SYNTAXERROR
- -9: NMAILC_MAILBOXBUSY
- -13: NMAILC_GENERALERROR
- -14: NMAILC_BUFFERFULL
- -15: NMAILC_FILESYSTEMERROR
- -16: NMAILC_INVALIDFILE

- -17: NMAILC_NOATTACHFILENAME
- -18: NMAILC_NOATTACHDATA
- -19: NMAILC_INVALIDATTACHSIZE
- -20: NMAILC_TOOMANYATTACH
- -21: NMAILC_INVAILDMAILID
- -22: NMAILC_INVALIDUSERNAME
- -23: NMAILC_INVALIDAUTHTYPE
- -24: NMAILC_INVALIDLENGTH
- -25: NMAILC_NOMEMORY
- -26: NMAILC_NOTCONNECTED

Floating Point Registers

The floating point registers associated with each I/O point are assigned based on the following equation: $1000 + I/O\# \times 2 - 1$. For example:

I/O Point	Floating Point Register
1	1001, 1002
2	1003, 1004
3	1005, 1006
4	1007, 1008
5	1009, 1010

Connection Status

Connection status displays a non-zero error code when a socket error occurs.

Possible errors include:

- 104. Connection reset by peer
- 111. Connection refused
- 113. Connection aborted
- 114. Network is unreachable
- 116. Connection timed out
- 118. Host is unreachable
- 119. Connection in progress (connect unsuccessful and still trying)
- 205. Could not get host IP by name

RTU and TCP Error Codes (A/B Format)

Error codes (A/B format) indicate the following errors with the first number:

1. n/a for RTU (Transaction ID out of sync)
2. Exception code returned by remote device
3. Function code mismatch (bad packet)
4. Insufficient data (bad packet)
5. No response from remote device, timed out
6. CRC error in received packet

When A is code 2, indicating an exception code was returned, B indicates the exception as follows:

1. Illegal function code
2. Illegal data address (the requested register does not exist in the device)
3. Illegal data value

Network Connection Errors

Connection errors are internal network related errors and include:

- 2001 General socket error
- 2005 Could not reach local DNS to look up remote host
- 2006 HTTP client aborted a web session
- < 200 Unexpected network errors. Contact Banner Engineering if these errors occur.

Error messages that may be returned by the dynamic DNS service(s), noted as last reply, include:

- badauth The user name and/or password does not match the host name
- nohost The host name specified does not exist
- notfqdn The host name is not a fully qualified domain name (not in the form of name.domain.com)
- !yours The host name does exist, but not under the user name given
- abuse The host name given is blocked for abuse.

Error messages that could be returned by the dynamic DNS service(s) that require the attention of Banner Engineering include:

- badsys The sycodestem is not valid
- badagent The user agent is not specified or is blocked for non-conformance to specifications
- !donator Invalid option specified
- numhost Too many or too few hosts found

Error messages indicating a DDNS server error will be either *dnserr* or *911*. In both cases, wait a minimum of 1 hour before restarting the system, or contact the DDNS service to see when the problem will be resolved.

Index

P

polling messages 10

R

re-link count 10