

D80 Performance Gateway and D99 Series Node – Quick Start Guide

Features

The D80 Performance Gateway provides wireless communications to a maximum of 47 Nodes. This Quick Start Guide will discuss a communications network with a maximum of 15 Nodes plus 1 Gateway.

NOTE: The D80 Performance Gateway is a 1-watt radio that must match the wattage of the Nodes it communicates with. The D99 Series Nodes offered by Electrolab are intrinsically safe and therefore 250mW. Electrolab sets the D80 Performance Gateway to 250mW at the factory by switching **Switch 1** to the *ON* position. If it is discovered that communications between a Node and a Gateway cannot be established, confirm that **Switch 1** remains in the *ON* position.

Establishing Communications Between a Node and a Gateway

Electrolab D99 Nodes power and interrogate the connected end devices only after establishing communications with a Gateway. A Gateway must be “bound” to a Node for it to effectively communicate. Follow the steps below to successfully bind a Node to a Gateway.

NOTE: Bind only one Node at a time to avoid communication conflicts.

1. Press *Push Button 2* on the Node three times. The Node will display the word “*BINDING*” and its LEDs will flash red.
2. Power the Gateway. The display will turn on.
3. Press *Push Button 2* on the Gateway three times. The Gateway will display the word “*BINDING*” and its LEDs will flash red. When the Node has been successfully bound to the Gateway, the Node’s display will briefly read “*BOUND*” and its LEDs will stop flashing.
4. After binding all desired Nodes to the Gateway, stop the binding process by pressing any button on the Gateway. *LED 1* on the Gateway will intermittently flash green to indicate successful communications.

Conducting a Site Survey Using Push Buttons

During installation, it is good practice to conduct a site survey to ensure the proposed locations of each device (Nodes and Gateway) will provide satisfactory signal.

Due to the communication retries, the quality of the communications will directly affect battery life. To conduct a site survey using push buttons, follow the steps below.

NOTE: Only the Gateway can initiate a site survey. Initiate a site survey using the User Configuration Tool (UCT) software or the push buttons on the Gateway.

1. Place the Node at the location where you will install the Gateway. Use the Gateway to assess signal strength (RSSI) at the proposed location for Node installation.
2. Enter *Site Survey* mode on the Gateway. If there is a battery pack present, do this by pressing *Button 1* until the word “*SITE*” displays. If there is no battery pack present, use the UCT software. If using UCT, see: “Conducting a Site Survey Using the User Configuration Tool (UCT)” in the lower half of this page.
3. Use the rotary switches to select the Node address for communications. The display will show “*NOD #.*”
4. Press *Button 2* once on the Gateway to enter *Site Survey* mode. After the Gateway enters *Site Survey* mode, observe the display in watch for communications and signal strength.

NOTE: The colored text on the Gateway display indicates signal strength for % of packets received and % of retries. The color legend is as follows: Green (G), Yellow (Y), Red (R), and Missed (M). Note that M = % of retries and not missed communications. For the Missed (M) category, look for numbers as close to 0 as possible. For categories Green (G) and Yellow (Y), look for higher numbers. The number scale will range 0-100. Please note that large numbers may still appear in the Missed (M) category and not be indicative of bad communications; large numbers in the Missed (M) category simply indicate a presence of retries that will affect battery life.

5. When the survey is complete, exit by pressing *Button 2* on the Gateway twice to display *NOD #.* Once completed, press *Button 2* twice again to show “*SITE.*” Finally, press *Button 1* until “*RUN*” displays.

Conducting a Site Survey Using the User Configuration Tool (UCT)

The UCT software allows users to connect and configure the D80 Performance Gateway and the D99 Series Nodes. The I/O programming parameters are input or read via the programming software. Some parameters are set by default via dip switch settings behind the display, however, the UCT software provides added programming flexibility and diagnostic data.

Download the most recent version of the UCT software from the Electrolab website by visiting the “Tech Docs” tab for the product being configured.

The UCT software and Gateway communicate at 19200N81 via RS485 Modbus RTU. The Gateway is Modbus ID 0 and the Nodes begin with ID 1 through 47. The Node address is set via the rotary switches on the front of the Node. The rotary switches on the front of the Gateway select which Node to link to and display the data received.

To conduct a site survey using the User Configuration Tool, follow the steps below. Note that the figures shown will provide a general point of reference for navigating the software, but information presented on the screen will vary depending on the user's device settings.

1. For simplicity, use the RS485 programming cable (EL# ELD-UCT-006) to program the Gateway. This cable uses USB power to power 10-30 volts to the Gateway and provides 2-wire RS485 communications.
2. Connect the brown wire to V+ and the blue wire to V- for power. Connect the white (TX) and black (RX) wires for RS485 (TX is + and RX is -). Other RS485 converters can be used but will require that the Gateway be powered separately.
3. Connect the device for configuration and launch the UCT software and select *Device* from the menu bar (A). A drop-down menu will open. Select *Connect Settings* (B).

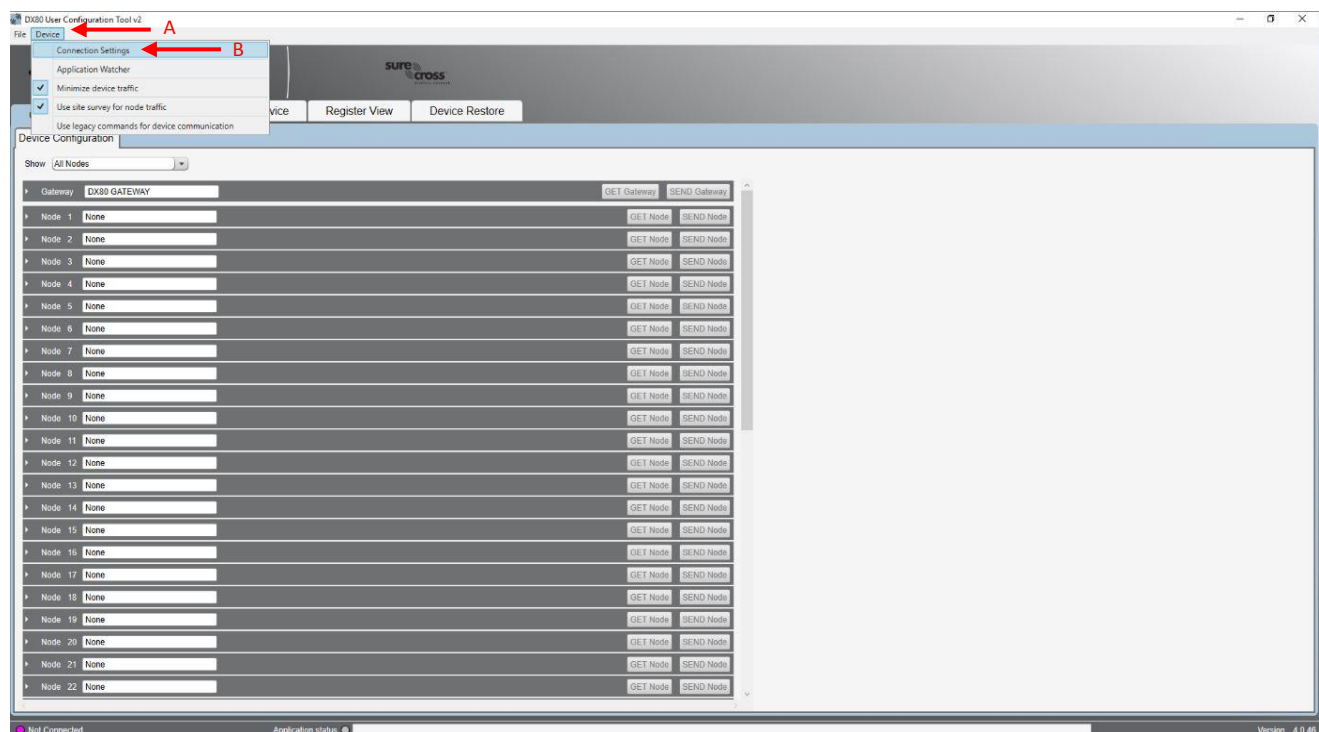


Figure 1- Navigating "Device" options

4. After *Connection Settings* has been selected, a window for connection settings will open. Navigate to the “Comm Port” option and use the drop-down menu to select the communication port for use (A). After selecting a communications port, select *Connect* (B).

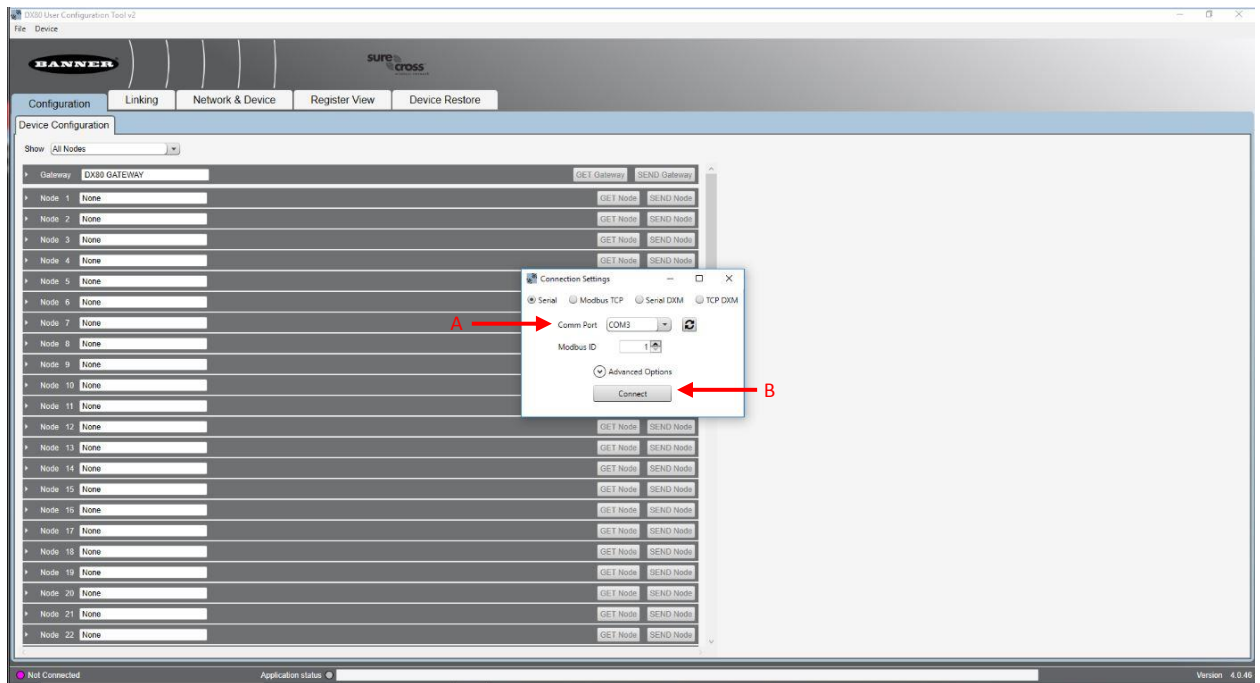


Figure 2- Navigating "Connection Settings" options

- After *Connect* has been selected and the Gateway has established a connection with the UCT, the UCT software will revert to its main menu and the “Applications Status” indicator at the bottom of the screen will turn green.

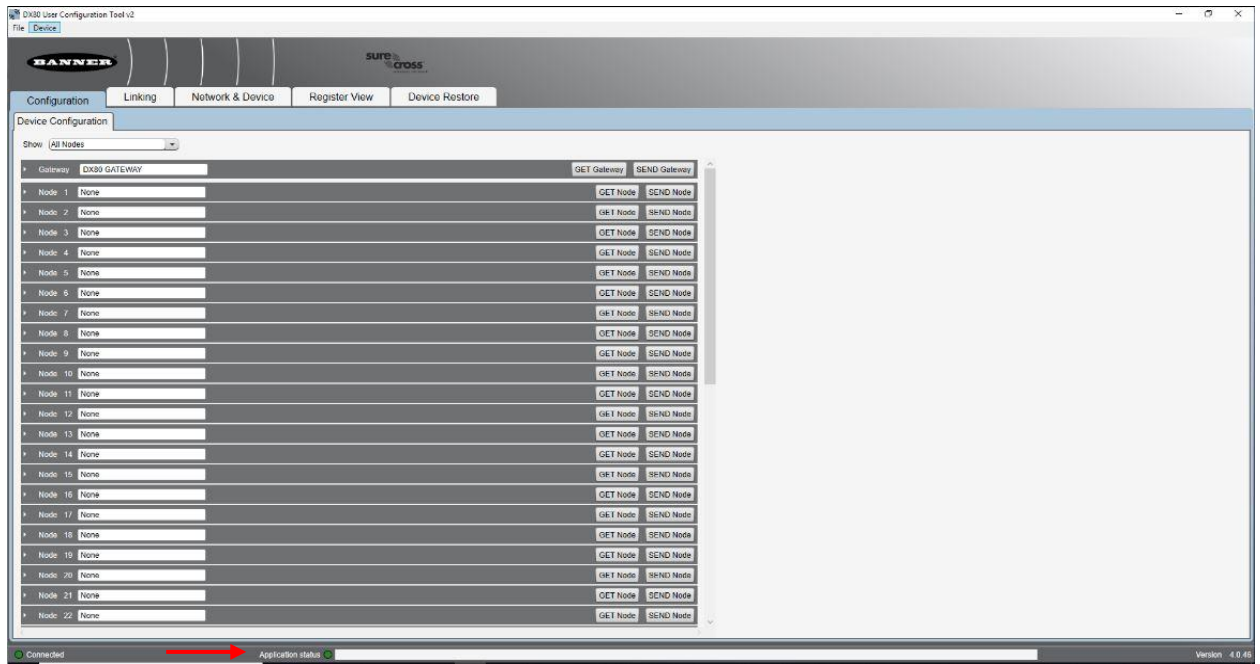


Figure 3 - "Applications Status" indicator

- Use the *Configuration* tab to open view the *Device Configuration* sub-tab and read configurations from the Gateway and Nodes (the user can read only one Gateway and Node configuration at a time). The *Get Gateway* tab retrieves all I/O parameters and device configurations.

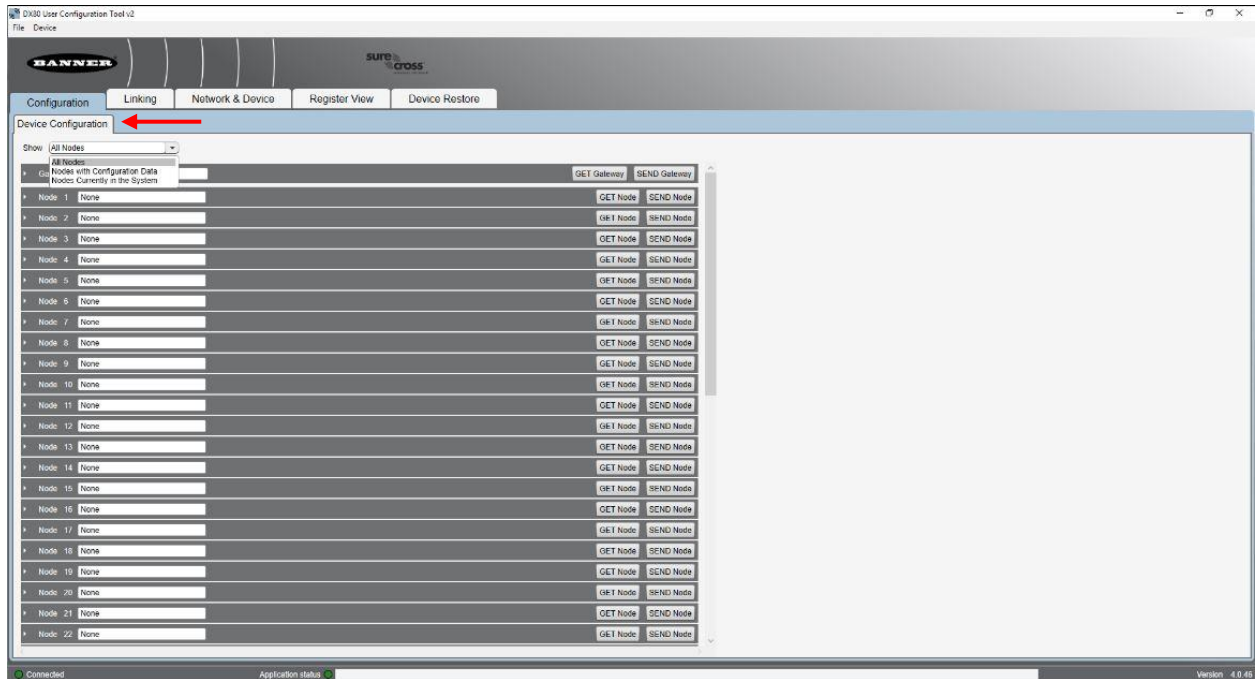


Figure 4 - Navigating "Device Configuration"

- Click the arrow to the left of *Gateway* to reveal a drop-down menu (A). The Gateway configuration will display for editing. The user will not need to edit default values except for the *Devices in System* option (B), which the software presets to 16. This number represents the number of radios in the communications rotation (including the Gateway) and can be set in increments of 8, 16, 32, and 48. The larger the number, the longer it will take to search for all possible Node connections in the communications cycle (see: Table 1).

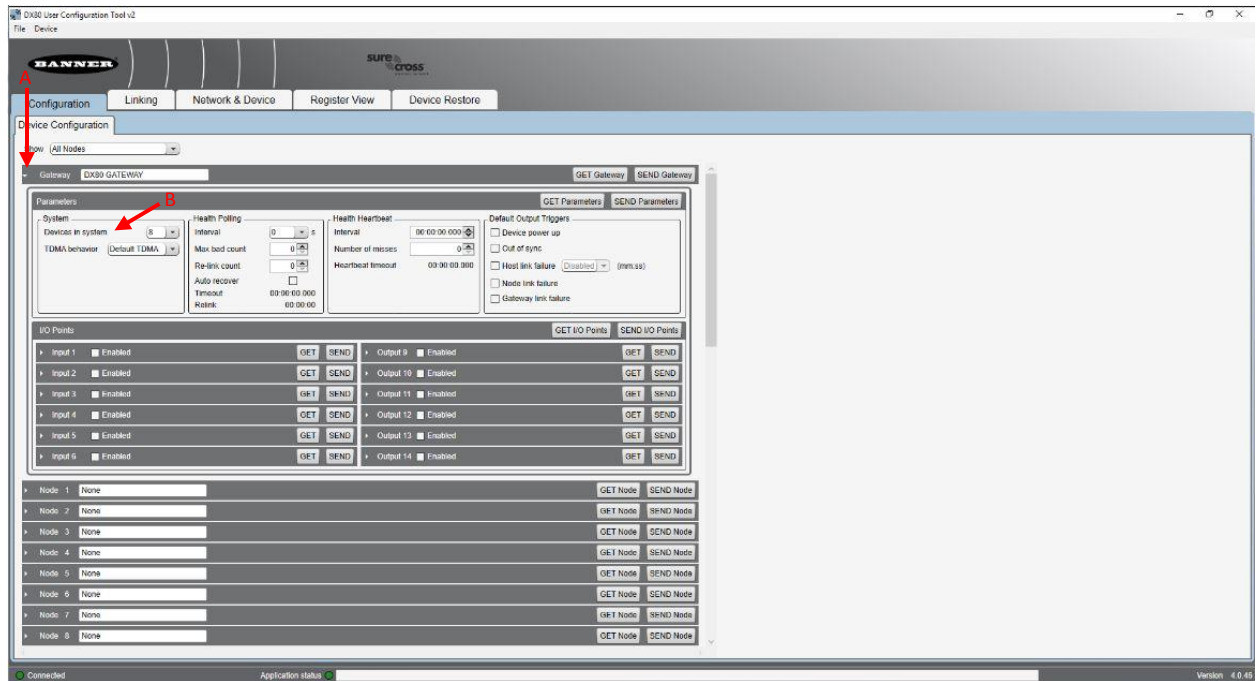


Figure 5 - Navigating "Gateway" options

8. Navigate to the *Network & Device Information* tab (A). Navigate to the “Node” option and select the drop-down menu to choose the Node to survey (B). Select *Start Site Survey* to initiate the survey (C).

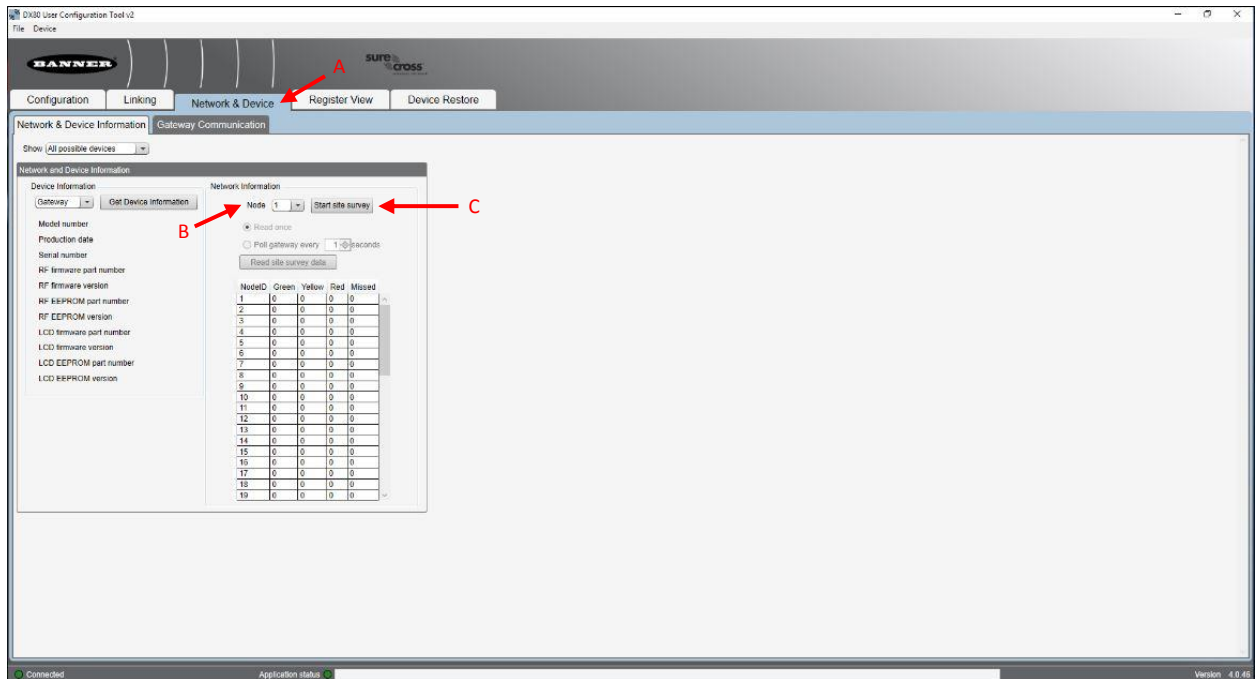


Figure 6 - Navigating "Network & Device" options

9. Select the radio button option for *Poll Gateway Every x Seconds* (A). Next, select *Read Site Survey Data* (B). Observe the RSSI data for the selected Node.

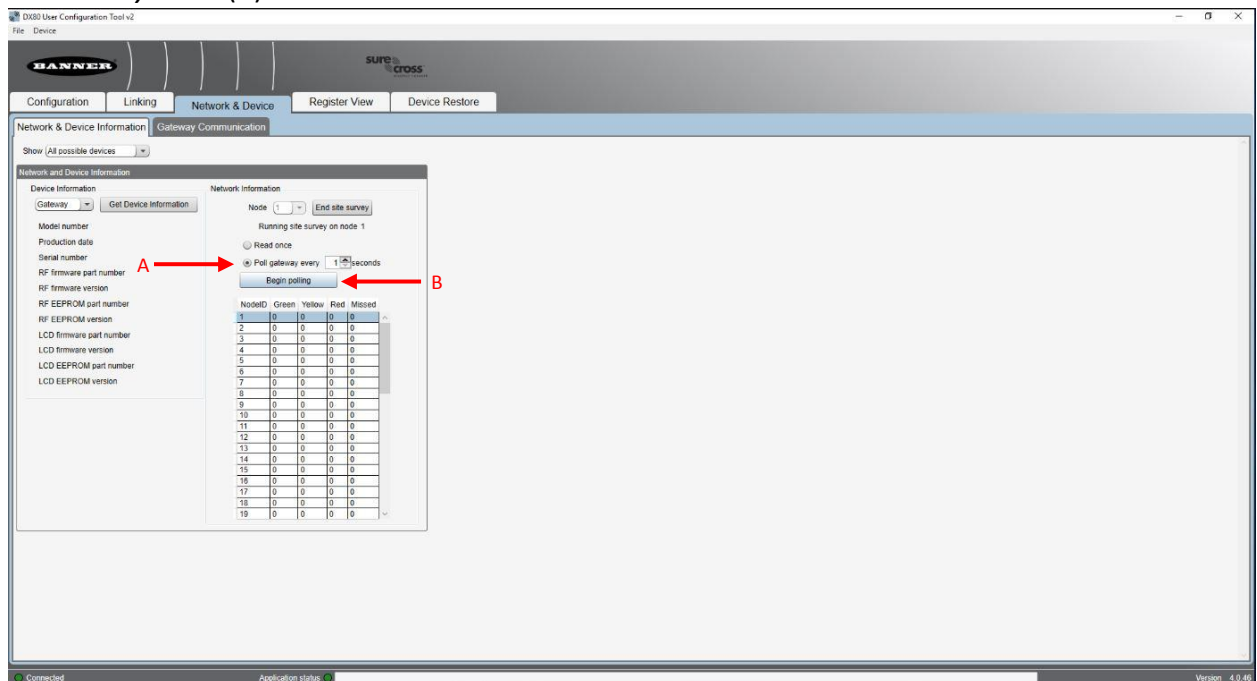


Figure 7 - Polling options

10. To exit survey mode, select *End Site Survey*.

Understanding the Modbus Registers

Each Gateway and Node have sixteen Modbus registers for reporting. The first eight registers are for I/O data, with Register 7 reserved and Register 8 being a status register. A value of 128 in Input 8 represents good Node communications; a value of 0 represents a loss of communications; and a value of 13569 represents communications without valid/updated data (usually when a battery is dying). The format of Modbus registers is consistent across all Gateways and Nodes (see: Table 1). More information on each Node model's Modbus Register Tables is found in their respective manuals.

The typical Modbus registers that a user will use are Inputs 1 through 8. Registers 1 through 6 represent data from end devices in decimal form (0, 1, 0-65535). In Discrete Mode, 0 = *OFF* and 1 = *ON* (you can invert these values through programming, if necessary). The values 0-65535 represent 0 to full scale.

Example: a raw value of 32756 is interpreted as full scale [*volts or mA/65535*32755*] or [*10v/65535*32765=4.999v*]. This is a full-scale raw data reading for a 0-5v or 1-5v signal. Input 7 is reserved and Input 8 represents communications status. Interpreted data will appear on the display of the Node (i.e., *ON, OFF, 14.32mA, 3.65v*, etc. as opposed to raw data).

Device Configuration

Click on the arrow to the left of the *Node #* on the *Device Configuration* tab to reveal the dropdown menu that shows the *Node #* configuration.

Get Parameters

Select *Get Parameters* to retrieve the Node's parameters and I/O configuration. Each Node comes pre-configured for the intended usage. Example: the D99 Model 2100 Node (EL# ELD99V2D4) is configured to read the DLS Modbus registers for level, temperature, errors, warnings and DI at specified intervals, and store data in specified registers.

Other Nodes will have Inputs enabled, but will require onsite programming dependent on the end device connected, the input connection point, and any voltage/warm-up timing requirement. Selecting too long of a warm-up time will reduce battery life.

I/O Configuration

Clicking on the arrow to the left of *Input #* will reveal another dropdown menu that allows the user to configure the input. For most applications, only the *I/O Configuration* and *Switched Power Options* should be adjusted. Make changes if necessary and press *Send* to write the new configurations into the Node.

Register View

Use the *Register View* tab to view the data in each register corresponding to each Node (see: Table 1).

Use the dropdown menu in *Read Registers* to select the Node to request data from. The table will fill with the registers related to the Node address selected, which will directly relate to the registers in Table 1. Sixteen registers will display, but only the first eight Inputs are necessary to view the data from the Node.

Select the *Read Registers* option for an instantaneous read or select *Enable Polling* to poll the registers continuously. The table will fill with the registers related to the selected Node address, which directly relates to the registers in Table 1. The data present is the data in the Gateway only and remains on a radio schedule to receive data from the Nodes (see table on next page).

TABLE 1

Modbus Registers from Slave ID 1 - DX80 Gateway

MAXN (Maximum Node Number)

Cycle	48 = 500 ms															
Cycle	32 = 250 ms															
Cycle	16 = 125 ms															
Cycle	8 = 62.5ms															
	GATEWAY	Node														
Device #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
In 1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
In 2	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
In 3	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
In 4	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
In 5	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
In 6	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
In 7	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
In 8	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
Out 1	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
Out 2	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
Out 3	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
Out 4	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
Out 5	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
Out 6	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
Out 7	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
Out 8	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256