sure cross™

wireless i/o network

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sure cross™ wireless i/o network

DX70
Point to Point

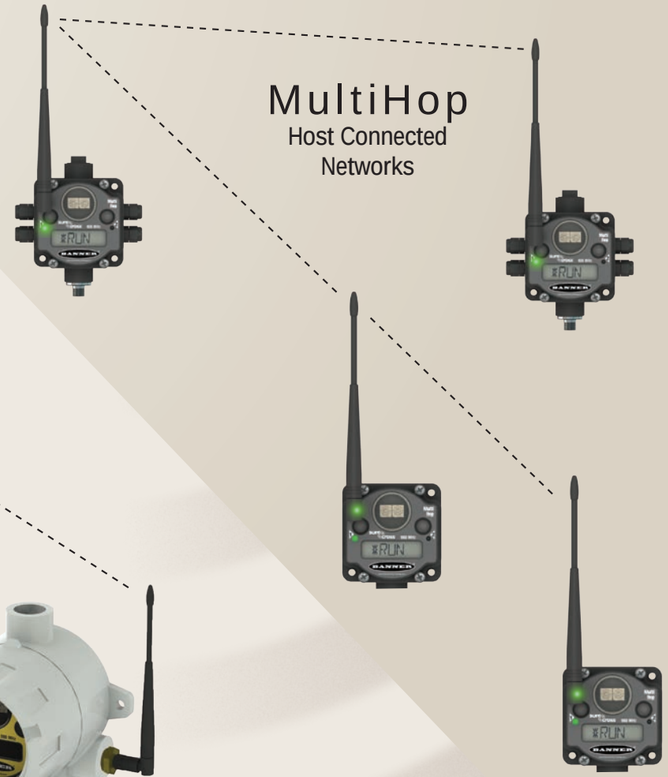
DX80
Point to Multipoint

Multiple Nodes

Performance Node
in “E” Housing

*Flex*power Node
with Battery Module

MultiHop
Host Connected
Networks



DX99 CID1
Intrinsically Safe

Configurable and Mapped I/O

Power Possibilities

Robust IP67

Multiple Signals
Digital and Analog

Bidirectional Communication

Built-in Signal Strength
for Site Survey

Multiple Network ID

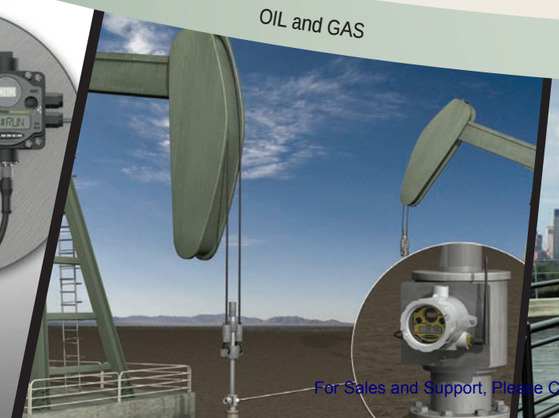
Link Loss Output

Accessories, Antennas
and Cables

Reliable Communication
FHSS

FACTORY AUTOMATION

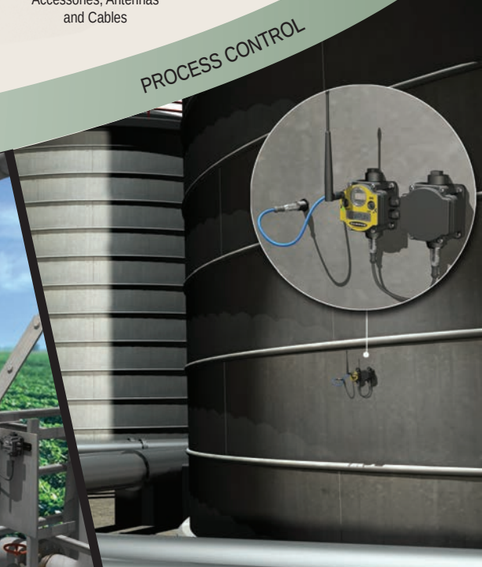
OIL and GAS



WATER and WASTEWATER

AGRICULTURE and IRRIGATION

PROCESS CONTROL



General Questions about Wireless Technology

What frequencies are used and do I need a license?

Banner's SureCross radios use the Industrial, Scientific, and Medical (ISM) bands, which do not require a license. The SureCross product line includes both 900 MHz (North America) and the 2.4 GHz (Global) models.

How do I know my data is secure and will this interfere with any of our existing wireless networks?

Banner's SureCross system does not pose a security threat to any existing networks because the SureCross system cannot physically route malicious TCP/IP packets. The SureCross protocol only carries sensor data values. It is not possible to gain access to the organization's main network through the SureCross wireless system and it is not possible for the SureCross wireless system to receive a web page or executable file over the wireless communication layer.

The SureCross protocol only carries I/O data, making it impossible for a malicious executable file to be transmitted. This protocol does not operate like an open protocol such as Wi-Fi and is not subject to the risks of an open protocol.

For more information on the security of Banner's wireless technology, refer to the Wireless Security technical note or the Frequently Asked Questions (FAQs) section of bannerengineering.com/faqs.

How far can the signal travel?

When using SureCross Performance 1 Watt radios, the signal will travel up to six miles. When using SureCross DX80 150 mW radios, the signal will travel up to three miles. Higher gain antennas or MultiHop Radios can be used to send a signal up to 10 miles per Hop. The 900 MHz Frequency Hopping Spread Spectrum (FHSS) radio technology can penetrate floors, walls and other indoor obstructions. In addition, SureCross Wireless offers an integrated Site Survey capability to evaluate radio signal strength in real-time to ensure your network will communicate reliably prior to installation—no software required.

Can I install multiple networks in my facility?

Yes. To prevent networks from interfering with each other, the Gateway and all its Nodes exchange a binding code that prevents radios outside the network from communicating with the Gateway. This is similar to "pairing" your wireless headset to your phone, but is more secure.

What are the advantages of a deterministic system?

Our deterministic system defines how network endpoints behave during the loss of communications. The network identifies when the communications link is lost and sets relevant outputs to user-defined conditions. Once the radio signal is re-established, the network returns to normal operation.

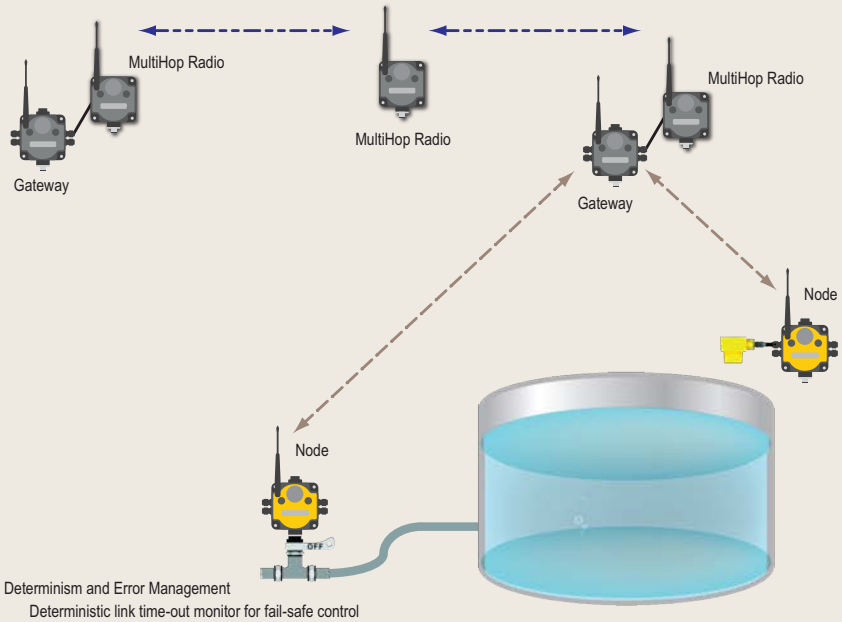
How long will the battery power last in a *Flex*Power application?

Banner's efficient power management technology enables a single battery power supply to provide continuous power to the radio but intermittent power to a sensor and offers a multi-year battery life. Our *Flex*Power technology also enables a SureCross device to be powered by solar or 10–30V dc. Different sensors can be evaluated for battery life.

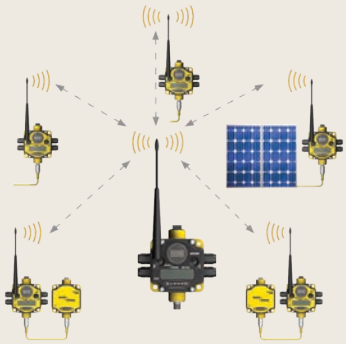
How do I choose between DX80 Point to Multi-Point and DX80 MultiHop?

The DX80 Point to Multi-Point family consists of a central Gateway and up to 47 remotely located Nodes. This stand-alone system allows for easy expansion of the network with direct mapping of inputs to outputs, whether digital, analog, thermocouple or signals from hazardous locations.

The DX80 MultiHop family is a good choice in applications where terrain or long distances require the use of a true repeater. The MultiHop family of radios must be used with a host controller such as a DX83 Ethernet Bridge, a PLC or an HMI.

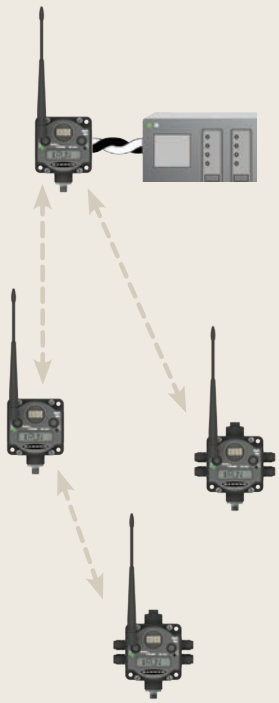


What's Inside?



This brochure provides an overview of our SureCross product family in the 900 MHz ISM frequency band. Banner's product line also includes equivalent radio options in the 2.4 GHz ISM frequency band for wireless I/O applications around the world. Many SureCross products offer simple configuration capabilities that allow users to select options on-site.

For new products or custom solutions, contact the factory at bannerengineering.com/wireless.



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SureCross Performance, 1 Watt Radios

SureCross Performance Gateways with Integrated Modbus RTU

The master radios of Banner's SureCross star architecture wireless network, Performance Gateways operate at 1 Watt and offer up to six mile network range

Model Number	Discrete I/O		Analog I/O			Datasheet
	Inputs	Outputs	Inputs	Outputs	Type	
DX80G9M2S-P	—	—	—	—	—	142679
DX80G9M6S-P2	4**	4 PNP	2	2	Universal*	155861
DX80G9M2S-P7	6 NPN	6 NMOS	—	—	—	155285
DX80G9M6S-P8	6 PNP	6 PNP	—	—		158214

SureCross Performance GatewayPro and DX83 Protocol Converters

Adds the ability to connect to an Ethernet network for running Modbus/TCP or EtherNet/IP™ protocols

Model Number	Device Type	Power	Type	Datasheet
DX83T	Ethernet Bridge	10–30V dc	EtherNet/IP & Modbus	131934
DX83A			Modbus	
DX80P9T6S-P	GatewayPro		EtherNet/IP & Modbus	131933
DX80P9A6S-P			Modbus	

Ethernet Cables
BWA-E2M M12/RJ45 Straight—2 m
BWA-EX2M M12/RJ45 Crossover—2 m

SureCross Performance Nodes

The end points of Banner's SureCross network typically transmit sensor data back to the Gateway for logging

Model Number	Power	Discrete I/O		Analog I/O			Datasheet
		Inputs	Outputs	Inputs	Outputs	Type	
DX80N9X2S-P1	*Flex*Power	2**	2 NMOS	2	—	Thermistor, Universal*, Switch Power	155748
DX80N9X1S-P1E	Internal Battery						
DX80N9X6S-P2	10–30V dc	4**	4 PNP	2	2	Universal*	155862
DX80N9X2S-P3	*Flex*Power	2**	1 NMOS	4	—	Thermocouple	155863
DX80N9X1S-P3E	Internal Battery						
DX80N9X2S-P4	*Flex*Power	—	—	4	—	RTD	155864
DX80N9X1S-P4E	Internal Battery						
DX80N9X2S-P5	*Flex*Power	4 NPN	2 NMOS	4	—	Universal*	156047
DX80N9X2S-P7	*Flex*Power	6 NPN	6 NMOS	—	—	—	155286
DX80N9X6S-P8	10–30V dc	6 PNP	6 PNP	—	—	—	158215

NOTE: All models listed in this brochure are 900 MHz radios. For 2.4 GHz radios replace 9 in the model number with 2 (example, DX80N2X2S-P1).

* Universal analog inputs can be configured in the field to be either 0–20 mA or 0–10V. Analog outputs are 0–20 mA only.

** Discrete inputs can be selected to be either PNP and NPN

***Flex*Power Sensors** are optimized for use with battery-powered SureCross devices.

QT50ULBQ6-75390
Ultrasonic, QT50U,
200 mm to 8 m range

QS30WEQ (Emitter),
QS30WRQ (Receiver)
WORLD-BEAM, QS30,
Range up to 100 feet

K50LGRYPPB1Q
Indicators with multiple colors and flashing frequencies

SureCross DX80, 150 mW Radios

DX80 Gateways and Nodes with Analog I/O

Model Number	Device	Analog Inputs	Analog Outputs	Type	Datasheet
DX80G9M6S0P0M4M4	Gateway	4	4	0–20 mA	134302
DX80G9M6S0P0V4V4				0–10V dc	136325
DX80N9M6S0P0M4M4	Node			0–20 mA	134322
DX80N9M6S0P0V4V4				0–10V dc	136326

DX80 Nodes with Counter Inputs

Model Number	Power	Discrete IN	Discrete OUT	Counter IN	Datasheet
DX80N9X2S4A2	*Flex*Power	2*	2 NMOS	2 Event or Rate	136348
DX80N9X1S2A1	Internal Battery	1*	1 NMOS	1 Event or Rate	136972

DX80 Nodes with Temperature and Humidity Inputs

Model Number	Power	Other I/O	Datasheet
DX80N9X2S2S	*Flex*Power	2 Temperature and Humidity Inputs	136971
DX80N9X1S1S	Internal Battery	1 Temperature and Humidity Input	137322

Temperature and Humidity *Flex*Sensors	
M12FTH1Q Temperature and relative humidity sensor ±2%	
M12FTH2Q Temperature and relative humidity sensor ±3.5% (Both offer NIST traceability)	

DX99 Intrinsically Safe Nodes

Certified for use in Class I, Division 1 environments with an integrated battery for radio and external sensor power

Model Number	Switch Power	Discrete Inputs	Analog Inputs	Type	Datasheet
DX99N9X1S2N0M2X0D2	18V	2*	2	0–20 mA	142497
DX99N9X1S2N0M2X0D1	10V				
DX99N9X1S2N0V2X0D2	18V	2*	2	0–10V	
DX99N9X1S2N0V2X0D1	10V				
DX99N9X1S2N0T4X0D0	—	2*	3	Thermocouple	142681
DX99N9X1S0N0R4X0D0	—	—	4	RTD	142682
DX99N9X1S2N0B2X0D0	—	—	2	Bridge	151611

Antenna Feedthroughs
BWA-HW-016 Stainless steel, 1/2″ NPT
BWA-HW-017 Stainless steel, 3/4″ NPT

DX70 Point-to-Point Gateway and Node Kits

Provides a point-to-point wireless I/O network configured at the factory for simplified installation

Model Number	Discrete I/O		Analog I/O			Datasheet
	Inputs	Outputs	Inputs	Outputs	Type	
DX70K9M6EM1	4*	4 PNP	2	2	0–20 mA	133214
DX70K9M6ED1**	8*	4 PNP	—	—	—	

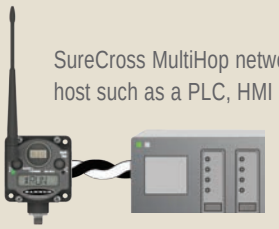
NOTE: All models listed in this brochure are 900 MHz radios. For 2.4 GHz radios replace 9 in the model number with 2 (example, DX70K2M6EM1).
* Discrete inputs can be selected to be either PNP and NPN
** I/O description listed here is for the Node, the Gateway offers the inverse I/O or 8 outputs and 4 inputs

The SureCross Wireless product family offers a wide range of Wireless I/O devices. This brochure provides an abbreviated list of models to simplify the specification process.

For a complete list of SureCross DX80 (150 mW) Nodes and Gateways go to bannerengineering.com/wireless.

The DX80…C housing is certified for use in Class I, Division 2 areas. Go to bannerengineering.com/hazarea for a complete list of all SureCross Nodes certified for use in hazardous areas.

SureCross MultiHop, 1 Watt Radios



SureCross MultiHop networks require a Modbus host such as a PLC, HMI or Controller

MultiHop Data Radios

Offer 1 Watt transmit power and up to six mile network range

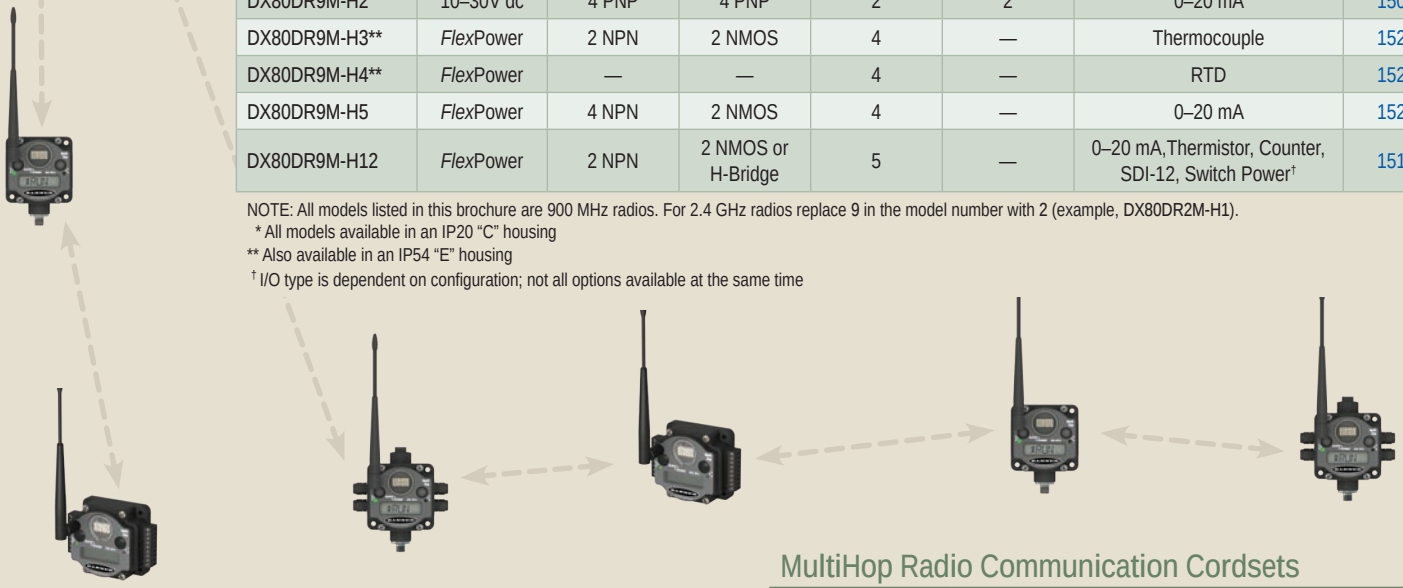
Model Number	Frequency	Power	Datasheet
DX80DR9M-H	900 MHz	*Flex*Power	148345

MultiHop Radios with I/O

Use one master radio and many repeater or slave radios to create a self-forming and self-healing wireless network

		Discrete		Analog			
Model Number*	Power	Inputs	Outputs	Inputs	Outputs	Type	Datasheet
DX80DR9M-H1**	*Flex*Power	4 NPN	2 NMOS	4	—	0–20 mA,Thermistor, Counter, Switch Power	148947
DX80DR9M-H2	10–30V dc	4 PNP	4 PNP	2	2	0–20 mA	150249
DX80DR9M-H3**	*Flex*Power	2 NPN	2 NMOS	4	—	Thermocouple	152414
DX80DR9M-H4**	*Flex*Power	—	—	4	—	RTD	152415
DX80DR9M-H5	*Flex*Power	4 NPN	2 NMOS	4	—	0–20 mA	152416
DX80DR9M-H12	*Flex*Power	2 NPN	2 NMOS or H-Bridge	5	—	0–20 mA,Thermistor, Counter, SDI-12, Switch Power†	151365

NOTE: All models listed in this brochure are 900 MHz radios. For 2.4 GHz radios replace 9 in the model number with 2 (example, DX80DR2M-H1).
* All models available in an IP20 "C" housing
** Also available in an IP54 "E" housing
† I/O type is dependent on configuration; not all options available at the same time



MultiHop Radio Communication Cordsets

Model Number	Typical Uses
CSB-M1240M1241	Use this cable to provide a hardwired connection between a MultiHop Radio and a SureCross Gateway for Wireless I/O applications requiring a long-range backhaul
BWA-DRSPLITTER	Use this cable to connect a MultiHop Radio to power and a 9-pin serial port on a computer or other industrial control device

DX85 Modbus RTU Remote I/O

Expands your SureCross network's inputs and outputs

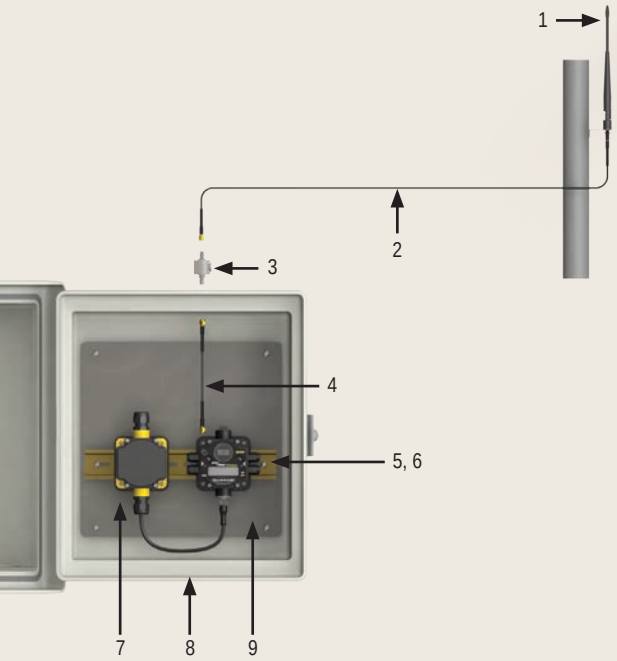
	Discrete		Analog			
Model Number	Inputs	Outputs	Inputs	Outputs	Type	Datasheet
DX85M4P4M2M2	4 PNP	4 PNP	2	2	0–20 mA	131629
DX85M6P6	6 PNP	6 PNP	—	—	—	131599
DX85M8P4	8 PNP	4 PNP	—	—	—	134324
DX85M4P8	4 PNP	8 PNP	—	—	—	134325
DX85M0P0M4M4	—	—	4	4	0–20 mA	138371

Ethernet Data Radios, 125 mW

Model Number	Frequency	Power	Datasheet
DXER9	900 MHz	10–30V dc	140371

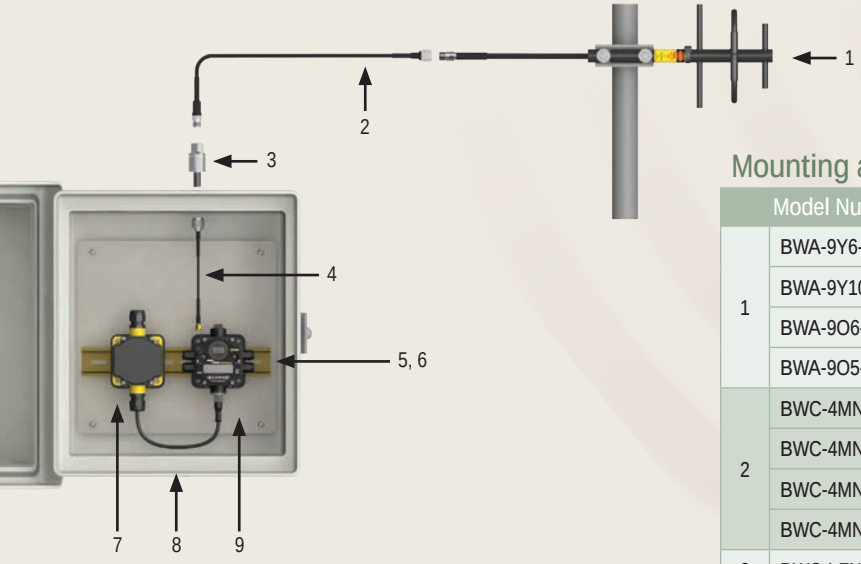
Accessories

For a complete list of SureCross wireless accessories, refer to the Antenna and Accessory Specifier's Guide on bannerengineering.com/accessories



Mounting an RP-SMA Antenna Remotely

	Model Number	Description
1	BWA-9O2-C	Antenna, Omni, 900 MHz, 2 dBi, Rubber Swivel, RP-SMA Male
	BWA-9O5-C	Antenna, Omni, 900 MHz, 5 dBi, Rubber Swivel, RP-SMA Male
2	BWC-1MRSFRSB02	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 0.2 m
	BWC-1MRSFRSB1	RP-SMA TO RP-SMA Female Bulkhead, 1 m
	BWC-1MRSFRSB2	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 2 m
	BWC-1MRSFRSB4	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 4 m
3	BWC-LMRSFRPB	Surge Suppressor, Bulkhead, RP-SMA Type, 900 MHz/2.4 GHz
4	BWC-1MRSFRSB02	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 0.2 m
	BWC-1MRSFRSB1	RG58 Cable, RP-SMA TO RP-SMA Female Bulkhead, 1 m
	BWC-1MRSFRSB2	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 2 m
	BWC-1MRSFRSB4	RG58 Cable, RP-SMA TO RP-SMA Female, Bulkhead, 4 m



Mounting an N-Type Antenna Remotely

	Model Number	Description
1	BWA-9Y6-A	Antenna, Yagi, 900 MHz, 6.5 dBd, N Female
	BWA-9Y10-A	Antenna, Yagi, 900 MHz, 10 dBd, N Female
	BWA-9O6-A	Antenna, Omni, 900 MHz, 6 dBd, Fiberglass, N Female
	BWA-9O5-B	Antenna, Omni, 900 MHz, 5 dBd, With ground plane, N Female
2	BWC-4MNFN3	LMR400 Cable, N-Male to N-Female, 3 Meters
	BWC-4MNFN6	LMR400 Cable, N-Male to N-Female, 6 Meters
	BWC-4MNFN15	LMR400 Cable, N-Male to N-Female, 15 Meters
	BWC-4MNFN30	LMR400 Cable, N-Male to N-Female, 30 Meters
3	BWC-LFNBMN-DC	Surge Suppressor, Bulkhead, N-Type, 900 MHz/2.4 GHz
4	BWC-1MRSMN05	LMR200 Cable, RP-SMA to N-Male, 0.5 Meters
	BWC-1MRSMN2	LMR200 Cable, RP-SMA to N-Male, 2 Meters

BWA-SOLAR-001
Rechargeable *Flex*Power Solar Supply

BWA-BATT-001
DX81 Replacement Battery

	Model Number	Description
5	DIN-35-105	DIN Rail section, 105 mm long, 35 mm design
6	SMBDX80DIN	Bracket Assembly, DIN Rail, for DX80
7	DX81	DX81 *Flex*Power Battery Supply Module
	DX81P6	DX81P6 *Flex*Power Battery Supply 6-Pack
	PS24DX	Power Supply, 24V dc, 200 mA
	PS24DXSR	Power Supply, 24V dc, 200 mA, Solid State Relay
8	BWA-EF14128*	Fiberglass enclosure, 14″ x 12″ x 8″
9	BWA-PA1412*	Internal panel, 14″ x 12″

* Other sizes are available

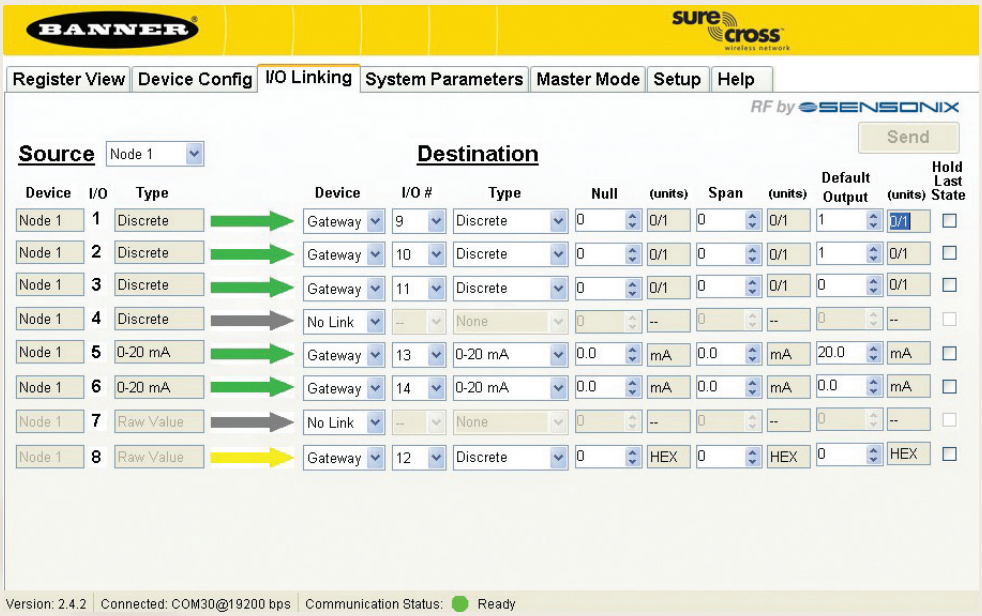
The User Configuration Tool, or UCT, is free software that allows the user of star architecture radios to configure device parameters on any DX80 device in the network including:

- I/O linking ("mapping")
- Individual I/O parameters
- System behavior

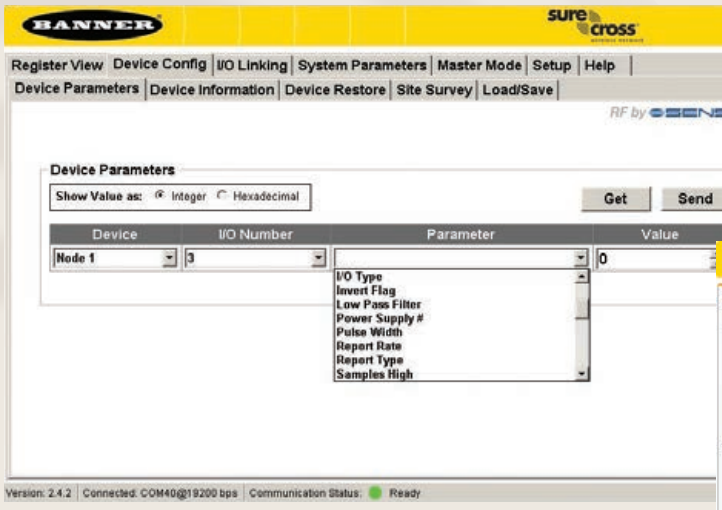
The UCT software is typically used when a host system (HMI, PLC, or other supervisory control element) is not part of the SureCross Wireless Network.

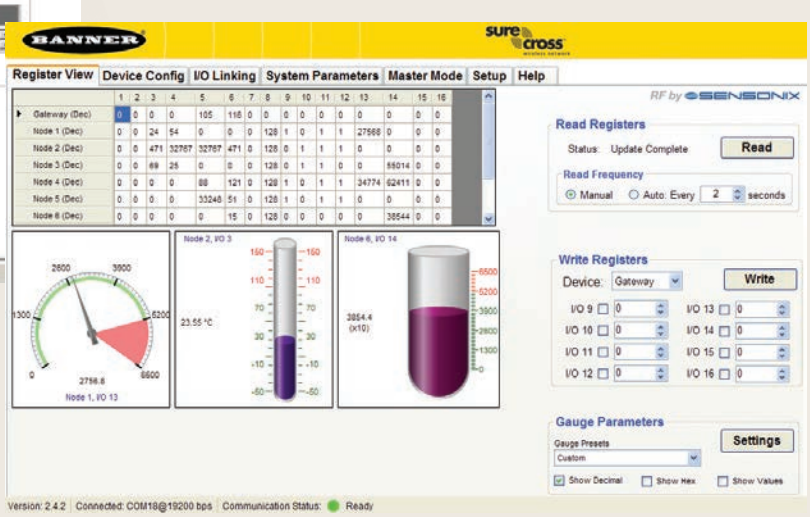
Download the latest version at bannerengineering.com/uct.

I/O Linking allows you to easily map one device's inputs to another device's outputs with an intuitive, easy-to-understand graphical interface.



Device Parameters enables customization of specific I/O parameters such as units, report interval, threshold, etc. for each radio in the network.





Use the **Register View** screen to monitor and graphically display Node I/O values in real time. Up to three I/O point values can be tied to gauges to aid in troubleshooting the network.

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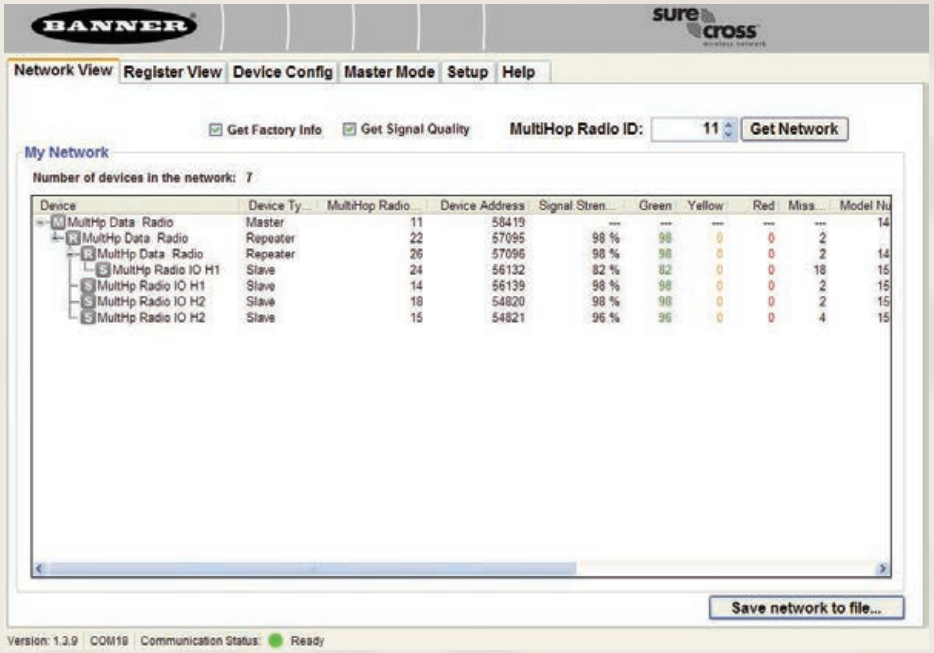
BWA-UCT-900
Adapter cable, USB to RS485 and external power for use with the UCT and MHCT software

The MultiHop Configuration Tool, or MHCT, is free software that enables the user to configure unique device parameters on any MultiHop radio in the network including:

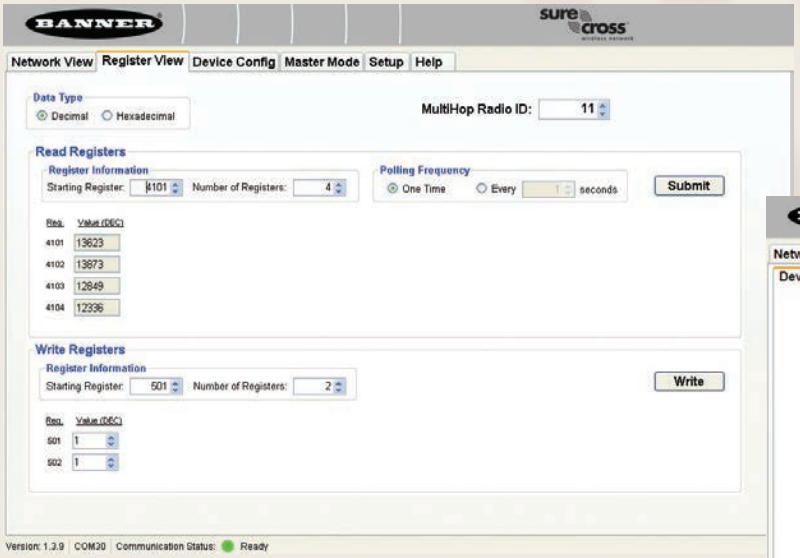
- Individual I/O parameters
- System behavior
- Application testing

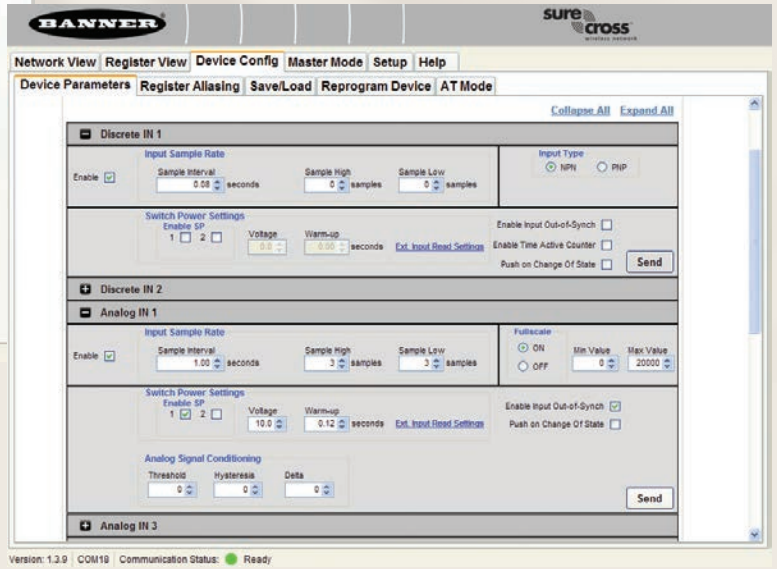
Download the latest version at bannerengineering.com/mhct.



Network View provides a table of the MultiHop network formation and allows you to see how repeaters and slaves are communicating back to the master radio. It also provides Site Survey results.

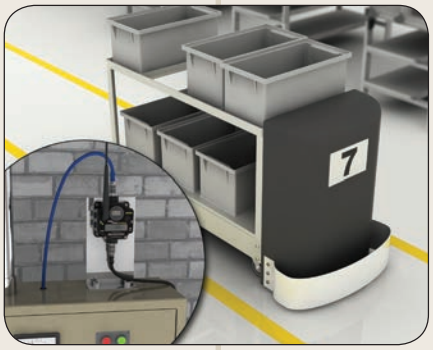
Register View offers visibility of all I/O data in the network and allows the user to manually control values to test an application.





Device Parameters enables the user to configure specific I/O points for every device in the MultiHop network.

Applications by Industry



AGC Control
An automatically guided cart (AGC) delivers new assemblies between the off-line area and the main production line; along the route there are stop points that require I/O controls. The SureCross Wireless I/O network simplifies the AGC control system.

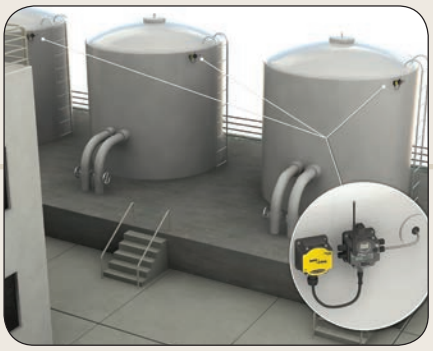
Call for Parts
As the needs of the production operators change, the wireless call-for-parts system is easy to move and reinstall.

Remote HVAC Controls
A Node installed on each production line monitors machine status. As each production line shuts down, the associated cooling units are also turned off to conserve energy and money.

Factory Automation

Fill Level and Pump Control
A bottling plant monitors the level and pressure inside each rotary filler to determine when to activate the inflow into the filler tank.

Emergency Shower Notification
When the shower is activated, the *Flex*Power Node sends a signal to notify security that a shower is engaged at a specific location.



Tank Level Management
Accurately measure tank levels, pressure or flow rates with a *Flex*Power Node and an external sensor.

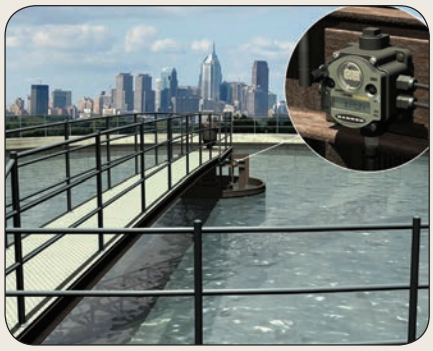
Industrial Process Control

Predictive Maintenance
*Flex*Power Nodes equipped with Thermocouples or RTDs are mounted near motors and automatically alert maintenance if predetermined temperatures are exceeded.

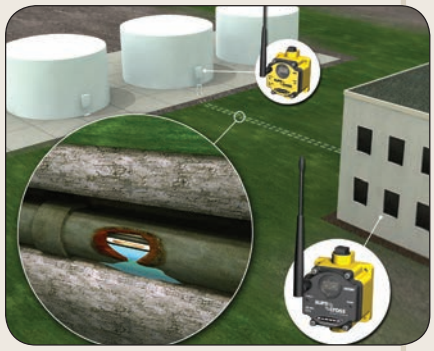
Temperature and Humidity Control
A SureCross *Flex*Power Node and temperature and humidity sensor helps maintain important environmental conditions.

Compost Windrow Temperature Monitoring
With accurate temperature measurements and data logging, users can determine the optimum time to turn the windrows for quicker compost production.

Water and Wastewater



Wastewater Analysis
Monitoring multiple data points including fill level, pH, conductivity, temperature, or flow is simplified using a single *Flex*Power Node with analog inputs.



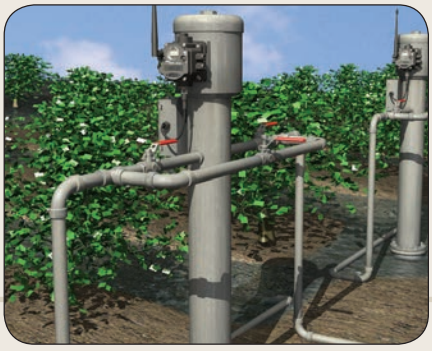
Failed Conduit Replacement
DX70 Point-to-Point radio devices are simple wire replacement radios that are easy to install and do not require special programming.

Retention Pond Monitoring
Using a Wireless system to monitor retention pond levels eliminates the need for someone to drive to each location and manually collect measurements.

Water Tower Level and Alarm
Using an ultrasonic sensor connected to a *Flex*Power Node ensures the levels are constantly monitored. When water levels fall, pumps move more water from the reservoir to the tower.

Predictive Maintenance on Grain Elevators
The Node transmits temperature data to a control location for logging and analysis. When the bearing temperature rises, maintenance can be scheduled before any motors burn out or equipment is damaged.

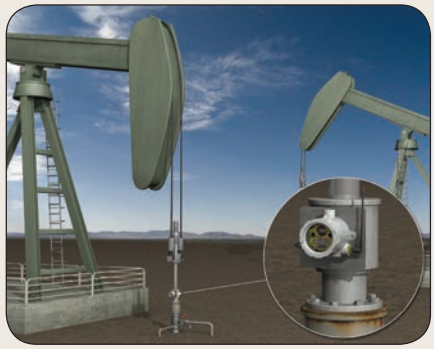
Center Pivot Irrigation
Every motor along the center pivot arm is monitored to ensure all sections are rotating properly and that all crops are being irrigated.



Agriculture and Irrigation

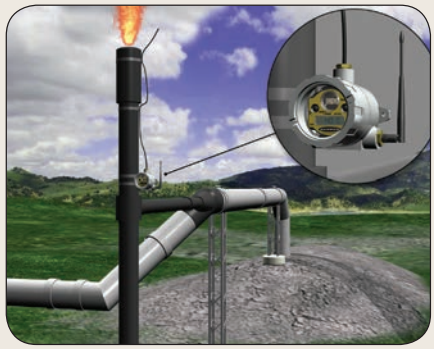
Reservoir Level Management
Submersible pressure sensors monitor the depth of a series of reservoirs. When a reservoir level is low, a wireless signal turns on pumps to add water to the reservoir and maintain a consistent water supply.

Oil and Gas



Wellhead Pressure Monitoring
Pressure transducers are connected to a DX99 IS Node with an integrated battery to monitor pressure at the wellhead.

Pipeline Flow Measurement
To measure total flow, the rate at the source is wirelessly transmitted back to the office to be compared with the gas flow rate at the destination.



Flare Stack Temperature Alarm
A pressure transducer detects pressure or vacuum within the methane production system. Thermocouples connected to Nodes detect the heat of an active flame to verify the combustion of methane.

Pump Jack Rod Detection
Load cell sensors detect if a connection is under tension or if part of the pump jack is broken and wirelessly transmits this information back to a control location.

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