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SureCross™ Radio System Specifications

900 MHz Unlicensed Spread Spectrum Radio System

General

1. Spread spectrum radios supplied under this contract must meet FCC and IC rules for unlicensed radio operation in the 902–928 MHz band. The radios must meet the following specific requirements.
2. The radio shall use the Frequency Hopping Spread Spectrum (FHSS) technique for increased reliability and interference suppression.
3. All radios must be manufactured in the United States of America and the radio manufacturer must have UL and CE test capabilities.
4. The radio must have FCC and Industry Canada certification under FCC rules Part 15 and IC RSS-210. No license will be required to operate radios under this contract.
5. The radio housing must be sealed and carry an industrial rating of IP67 or better.
6. The radios must have a model approved for operation in Class I, Division II, Groups A–D hazardous locations with or without an enclosure. The radio itself must be intrinsically safe.
7. The radio must have a method of network binding to prevent network access from other devices
8. The network system must have on-board RSSI site survey capability. The RSSI data must be accessible on a local Gateway display or through the serial/Ethernet communications.
9. The radio system must provide diagnostic capability to allow the user to identify communications and RF link issues.
10. The radio must have a MTBF of at least 24 years following the Telcordia Reliability Prediction Procedure, SR-322-Issue 1.

Data Capabilities

1. The radio shall use a time-slotted architecture for reliable data transmission. The time-slotted frame must have capacity for at least 56 Nodes and the capability to communicate with all 56 Nodes in 0.5 seconds.
2. All radio Gateways must have Half Duplex RS-485 Modbus RTU communications and be able to run in master or slave mode.
3. The radio Gateways must be able to bridge multiple Ethernet protocols. Modbus/TCP and EtherNet/IP required.
4. The radio Bridge interface must be 10/100BaseT for Ethernet and Web-enabled configuration.
5. The communication data rate must be user programmable for 9.6, 19.2, or 38.8 kbps.
6. Configuration parameters must be capable of being set from a remote location. A web-enabled system is required.
7. The radios must have a direct interface for sensor inputs. Minimum total of 12 I/O for a 10–30V dc powered Node. Minimum 8 I/O for battery powered devices.
8. The radios must have user defined sample and report rates for energy conservation.
9. The system must have a user programmable network heath polling interval with link loss and recovery limits. Notification of lost radio link via serial or discrete output is also required.
10. The radios must provide user defined default outputs conditions for each physical output. The default outputs must become active in a link loss condition and must be scalable over the entire range of an analog signal and/or each state of a discrete output.

Radio Transceiver Performance

1. The radios must provide high performance, long distance transmissions. The maximum system gain must be no less than 145 dBm, for example:

Transmit Power	21 dBm
Antenna Gain	20 dBm
Receive Sensitivity	−104 dBm
Total System Gain	145 dBm

2. The radios must be directly interchangeable with new, off-the-shelf radios without any software configuration.
3. Transmit power must be fixed to avoid errors in system gain as related to FCC compliance. The radio must be capable of hopping over at least 25 frequencies with a user-selectable hop table or a pseudo-random hop table with a bound network system.
4. The system must provide easily accessible switches for selection network and device ID.
5. Software/hardware parameters must be configurable in the field to ensure maximum radio system performance.
6. The radios must able to operate within FCC compliance with a high gain directional or omni-directional antenna.

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Power Management

1. The radio Nodes must have flexible power system capable of operating on various battery options and/or 10–30V dc.
2. Flexible power options must include:
   10–30V dc,
   3.6V dc lithium battery power
   4.8V dc NiMH rechargeable solar power systems.
3. Minimum battery life expectation of 1 year with externally powered sensors.

Radio System Specifications

General

Frequency Range	902–928 MHz
Signaling Rate	76.8 Kbps
MTBF	24 years

Radio Interface

Latency	62.5 milliseconds
Modulation Type	FSK
Connector Type	RSMA

Transmitter

Power Output	> 21 dBm
Duty Cycle	User defined
Spurious Emissions	−65 dBm
Transmitter Keying	Data activated
Channel Bandwidth	317 kHz

Receiver

Type	Zero IF Data Transceiver
Sensitivity	−104 dBm
Spurious	−65 dBm
RSSI Range	−90 to −107 dBm

I/O Types (Direct Interface)

Discrete

- Up to 8 inputs and 8 outputs
- NPN, PNP, Opto-isolated, Dry Contact

Analog

- Up to 4 inputs and 4 outputs
- 0–20 mA, 4–20 mA, 0–10V dc

Temperature

- Up to 4 inputs
- Thermocouple, RTD, Thermistor

Humidity

Serial

Differential Bridge

- Load Cell
- Strain Gauge

Data Interface (Serial)

User Interface	RS-485
Connection	Half Duplex
Byte length	10/11 bits

Data Interface (Ethernet)

User Interface	10/100BaseT
Connection	M12/RJ-45

Power

Node Voltage	10–30V or 3.6V dc
Node Current	< 10 mA
Gateway Voltage	10–30V dc
Gateway Current	60 mA @ 24V dc
Connector	M12

Environmental

Rating	IP67
Temperature	-40 to 85 deg C
Humidity	95% non-condensing
Size	80 x 80 x 60 mm
Weight	< 1 lb
Case	Polycarbonate

Security

Binding	On Commissioning
Two-way authentication	Mac based

Certifications, Radio		
900 MHz Models	FCC ID TGUDX80: This device complies with FCC Part 15, Subpart C, 15.247 IC: 7044A-DX8009	CE
2.4 GHz Models	FCC ID UE300DX80-2400: This device complies with FCC Part 15, Subpart C, 15.247 ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05) IC: 7044A-DX8024	CE
Certification (DX8*x*..C External wiring terminals)	Class I, Division 2, Groups A, B, C, D Certificate: 1921239	C SP US
Certifications (DX91, Hazardous Locations, Internal wiring terminals)	Class I, Division 2, Groups A, B, C, D Certificate: 1921239	C SP US
Certifications (DX99, Metal Housing)	Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III, Division 1; Class I, Zone 0, Group IIC Certificate: 2008243	C SP US
	Group IIC, Zone 0; Dust, Zone 20 Certificate: LCIE 08 ATEX 6098 X	Ex
Certifications (DX99, Polycarbonate Housing)	Class I, Division 1, Groups A, B, C, D; Class I, Zone 0, Group IIC Certificate: CSA 2008243	C SP US
	Group IIC, Zone 0 Certificate: LCIE 08 ATEX 6098 X	Ex

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The manufacturer does not take responsibility for the violation of any warning listed in this document.

CAUTION . . .
Make no modifications to this product.

Any modifications to this product not expressly approved by Banner Engineering could void the user's authority to operate the product. Contact the Factory for more information.

Always use lightning arrestors/surge protection with all remote antenna systems to avoid invalidating the Banner Engineering Corp. warranty. No surge protector can absorb all lightning strikes. Do not touch the SureCross device or any equipment connected to the SureCross device during a thunderstorm.

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.

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