

The three most critical concerns regarding wireless I/O systems are:

- Network Security
- Data Security
- Data Integrity and Control Reliability

The Banner SureCross wireless systems were designed from the ground up with these issues at the forefront. The SureCross wireless I/O systems provide a level of security, data integrity, and reliability far exceeding most wireless systems on the market today.

This technical note describes the concepts of network isolation, binding, setting a default output state, frequency hopping, restricted access, generic data transfer without context, and link health monitoring. These concepts, built within a proprietary protocol, provide a high level of security and data reliability. The SureCross system is an ideal choice for secure data monitoring and reliable control.

Network Security

There is no way for a malicious executable file or virus to enter your Ethernet network through a Banner SureCross wireless system.

Network security is an important issue for most organizations. No system can allow a hacker access to the company's internal information network. The Banner SureCross wireless systems are designed to completely eliminate all Internet Protocol (IP) based security threats.

Open protocols such as Wi-Fi can, if not managed correctly, provide hackers unfettered access to your organization's most critical data. Malicious TCP/IP packets and programs can cause grave security breaches and could cause the loss or theft of critical information. This is because standards-based network components such as Wi-Fi access points have the potential to route any and all data packets, which is why these systems use encryption, passwords, firewalls, and antivirus software.

Banner's SureCross systems, however, do not pose a security threat to the network 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. Only I/O data is transmitted in the wireless layer.

The use of a proprietary protocol, pseudo-random frequency hopping, and generic data transfer without context provides a high level of data security.

Data Security

Data security is defined as reliably protecting your SureCross network sensor data from interception by hackers. Banner achieves data security by using a proprietary protocol, pseudo-random frequency hopping, and generic data transfer.

The proprietary protocol alone provides a high level of security. Data security is far more of a concern when using open protocols. With an open protocol and no security encryption, anyone using that protocol can intercept and monitor your data. Widely used open protocols such as Wi-Fi have serious security issues. Even a high degree of encryption may not protect your data. It is common for new encryption schemes to be hacked within months of implementation. Proprietary systems are actually less likely to be hacked than open standards.

The second level of data security protection is the pseudo-random frequency hopping table. Each time a message is sent a new frequency is chosen, which makes it almost impossible for any system listening at a given frequency to hear more than a few messages out of hundreds. In addition to providing data security, frequency hopping technology also provides noise immunity.

Finally, and most importantly, the SureCross wireless system uses a concept of generic data transfer without context. Even if a hacker managed to crack the data packet format, all they would see is a set of 16-bit numbers with no reference as to what the numbers meant. No information describing the network layout or what the sensors are monitoring is ever sent wirelessly. A hacker, if they managed to receive Banner's Wireless data, would only see the actual sensor data, not what the sensor was reading or what role the sensor played within the wireless I/O network.

To guarantee the highest possible levels of data integrity the SureCross wireless system employs binding, CRC checks, link health monitoring, and a preset default output state.

Data Integrity and Control Reliability

In a control or monitoring application it is unacceptable to have data lost, corrupted, or changed in any way. To guarantee the highest possible levels of data integrity, the SureCross wireless system employs binding, cyclic redundancy check (CRC), link health monitoring, and a preset default output state.

Binding the radios to each other adds an additional layer of security to an already secure platform. Binding locks radios to a specific master radio by teaching the radios the master radio's access code. After devices are bound, the radios only accept data from that master radio and the master radio only accepts data from those specific radios bound to it.

When the data is transmitted, a CRC algorithm ensures that the data arrives intact. If the CRC algorithm fails, the corrupt data packet is discarded and the data is automatically retransmitted using a new frequency during the next communication cycle.

The SureCross wireless system continuously monitors the health of all wireless links in the system. A "link" is defined as the real-time connection between two radios. If any link is lost, the inputs and outputs associated with the radio are set to a predefined value. When a radio drops out of the network, from a lightning strike for example, the master radio detects the link has been lost and reports the loss to the control or monitoring application. At the same time, the master radio sets the inputs and outputs of the radio to predefined data values, resulting in predictable network behavior during a communications error.