Veris Aerospond Wireless Sensors: Received Signal Strength Indicator (RSSI)

Introduction

The Received Signal Strength Indicator (RSSI) value is part of the data packet transmitted by all Veris Aerospond sensor units. It is intended as means to obtain a relative indication of the quality of connection that exists between the sensor unit and the access point it is connected to on the wireless network. In order for this to be a useful tool in determining the quality of the connection, there are a few principals that need to be understood about what the RSSI value means.

Signal Strength

Signal strength is based on a number of factors, including the output power of the transmitter (the original strength of the signal), the sensitivity of the receiver (how well the receiving device can hear weak signals), the gain of the antennae at both ends of the path, and the path loss, or attenuation of the signal as it travels through the air from the transmitter to the receiver. Signal strength is expressed in units of decibels (dB). Due to the low power levels and the attenuation of free space, an RSSI value is expressed as a negative number. The more negative the number, the weaker the signal strength; conversely the closer the number is to zero, the stronger the signal.

Sensor RSSI

The RSSI value is an indication of how well the sensor hears the signal being transmitted by the access point. It does not indicate how well the access point is hearing the Aerospond unit, as that information must be attained directly from the access point itself and is not typically available. Since Aerospond units typically transmit with lower power than most access points, it is reasonable to assume that the Aerospond unit sees a slightly stronger signal from the access point than the access point sees from the Aerospond unit. This normally does not pose any problems unless the sensor is on the very fringe of the access point's range. It should also be noted that RSSI values are a relative indication of signal strength, not an absolute measurement. It is normal to see RSSI values fluctuate several dB between readings. If a sensor is in range of multiple access points, it is also normal to see the unit occasionally switch between them, even though one access point may have a much higher RSSI value than the other.

As a general rule of thumb, the following RSSI ranges can be used for Aerospond sensors:

RSSI Range	Signal Quality
Better than -40 dB	Exceptional
-40 dB to -55 dB	Very Good
-55 dB to -70 db	Good
-70 dB to -80 dB	Marginal
-80 dB and beyond	Intermittent to No Operation

Signal levels down to -70 dB or slightly lower normally produce consistent operation, although lost data packets may become more prevalent at lower signal levels. The sensitivity threshold of the Wi-Fi module is -83 dB. Obstructions in the path between the access point and the sensor, as well as sensor/antenna orientation, can impact RSSI values. If low RSSI values are encountered, examine the location for obstructions, correct orientation of the unit or antenna, or try another sensor at the location. In some cases low signal level can be corrected with these simple measures. If these measures do not result in signal level improvements, or if an area of the building generally has low signal levels, additional access points may be required.

The decibel scale is logarithmic, so every 10 dB variation results in a tenfold change in signal level. If an RSSI level can be improved from -60 dB to -50 dB, the Wi-Fi receiver sees a signal that is ten times stronger. The reverse is also true; a signal decrease from -50 dB to -60 dB results in a signal at the receiver that is 10 times weaker. Moderate improvements in RSSI values can result in substantial improvements in signal quality.

For more information about the Veris Aerospond products, see VWP15, VWP16, and VWP17.