

sure

crossTM
wireless network

sensing unplugged.

BANNER[®]

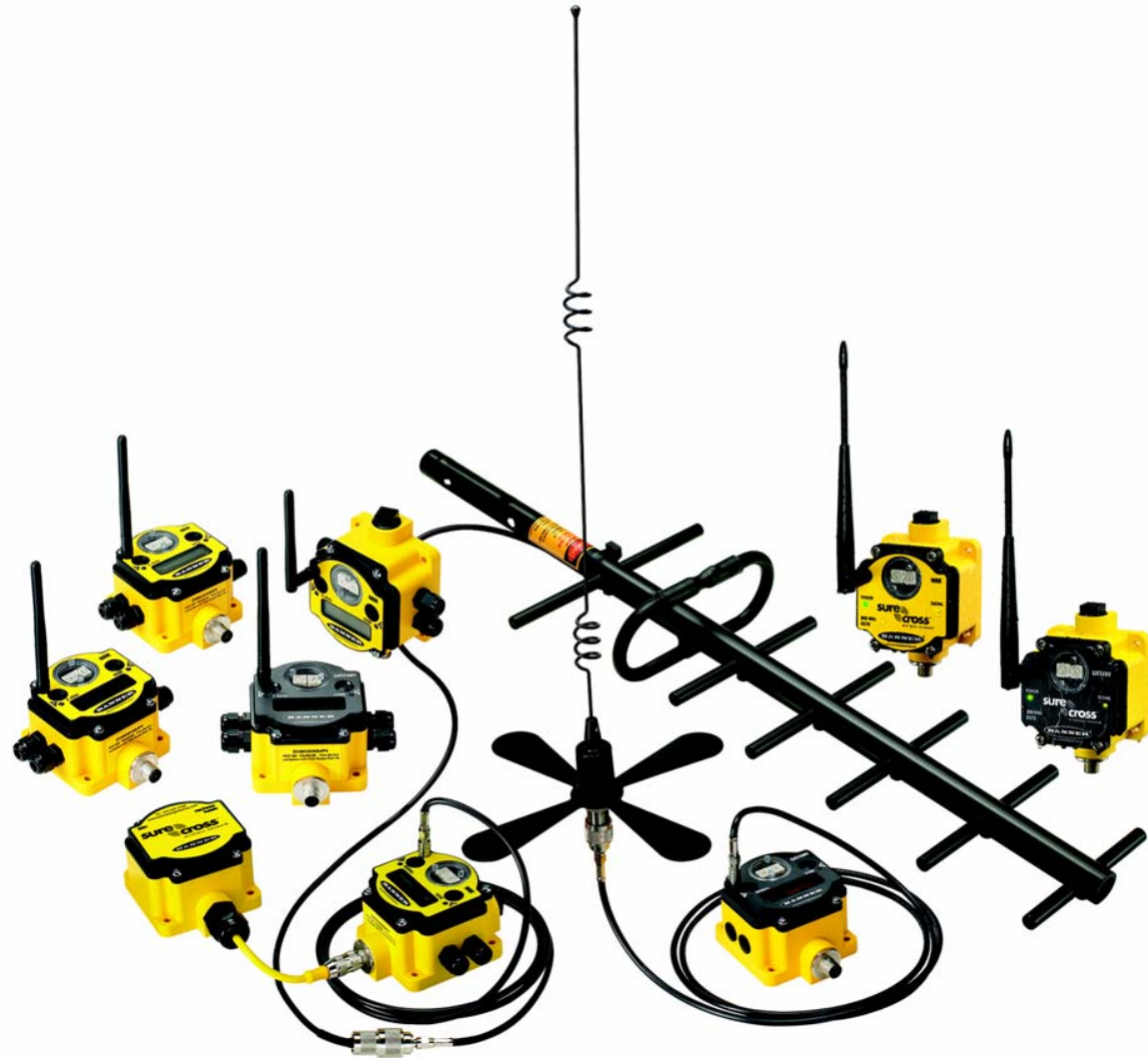
more sensors, more solutions

www.bannerengineering.com/wireless

Predictive Maintenance - Wireless Control and Monitoring



Wireless for Predictive Maintenance - Where do you need to go?



Predictive Maintenance in Municipal Environments

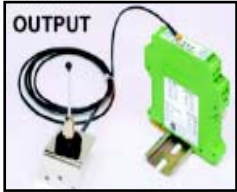


- Integrate with Existing Equipment
- Scalable Across Large Facilities
- Resistant to Interference and Harsh Environments
- Power Efficient for Remote Deployment





Some Current Wireless Options



OUTPUT

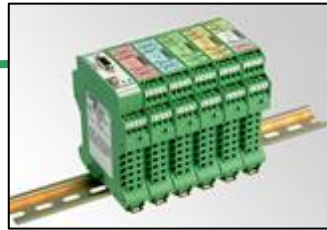


DIN Rail Versions

Start with a radio
having little or no
I/O



Panel Mount Versions

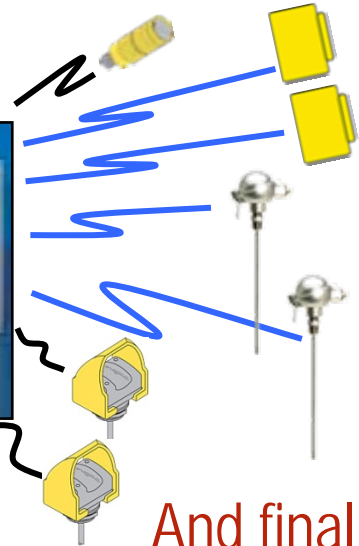


Add: DIN Rail
Some I/O
Terminal strips

Mount all
your stuff



Stick it in a box and
then install the box



And finally...
Wire your I/O

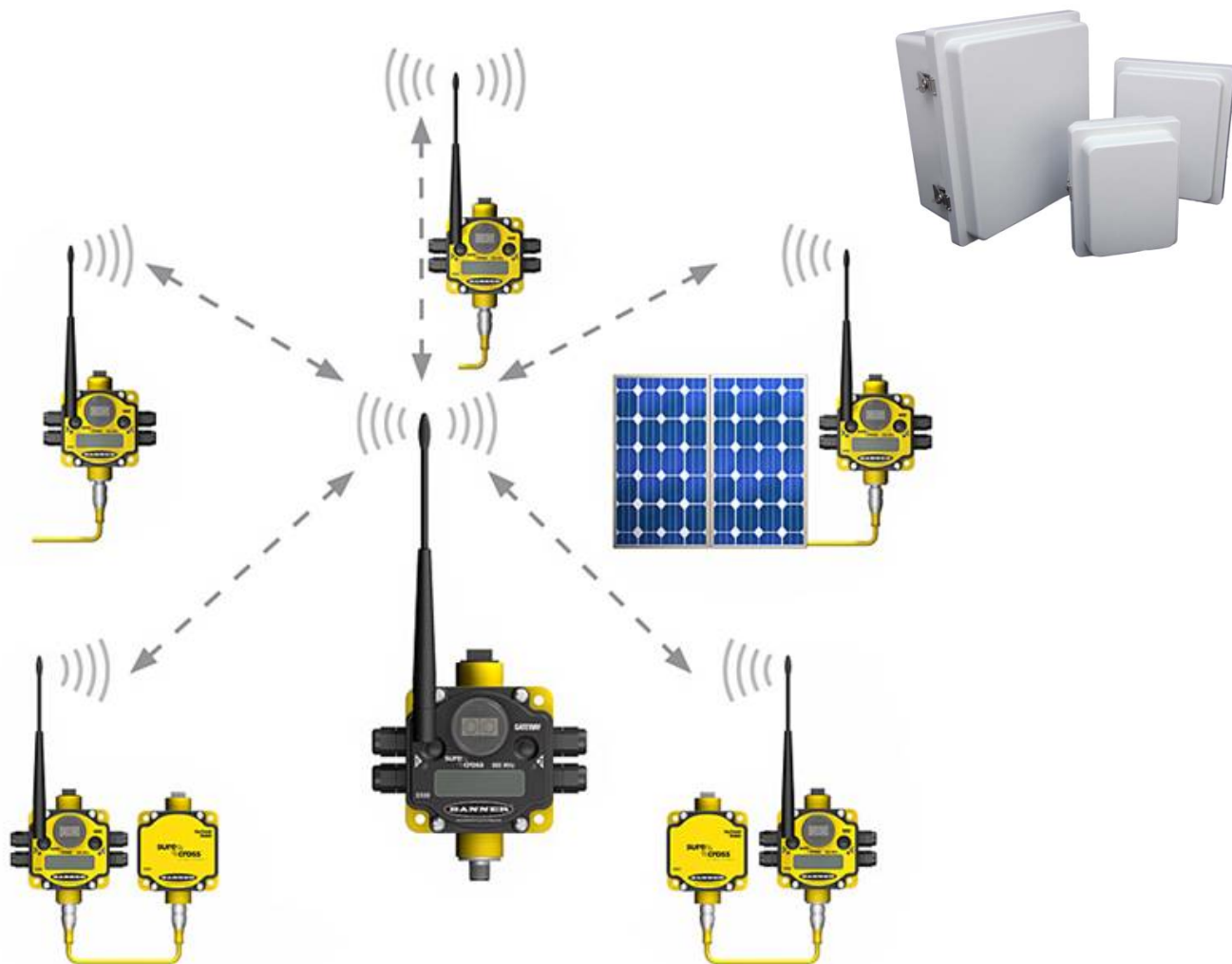
Wireless for Predictive Maintenance - Flexibility in I/O

Multiple Types of I/O

- Digital
- Analog
- Thermal
- Communication
- Transparent Serial

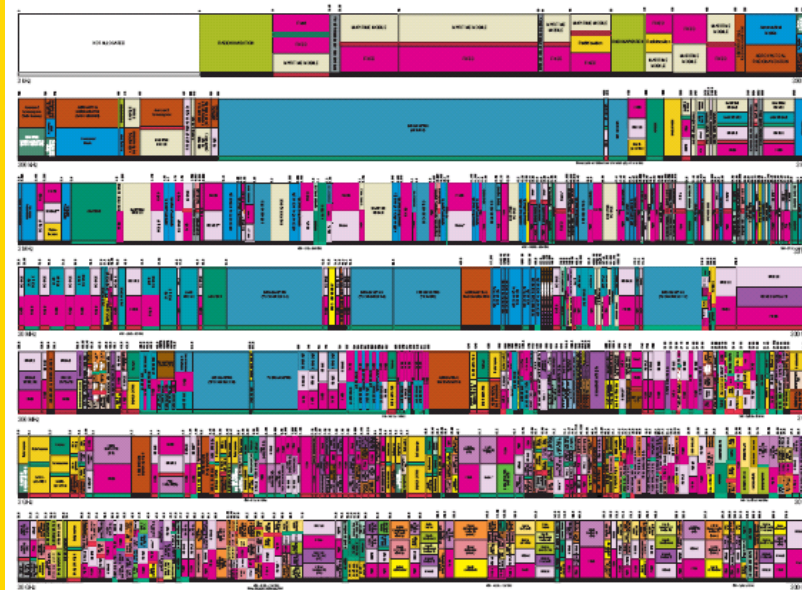


Wireless for Predictive Maintenance - One Package



Wireless for Predictive Maintenance - Robust Radios

- Bidirectional Transceiver Broadcasting in Industrial, Scientific, Medical (ISM) Band:
 - 902-928 MHz ISM Band
 - 2.4 GHz ISM Band
 - No license required (but, it is certified by the FCC)

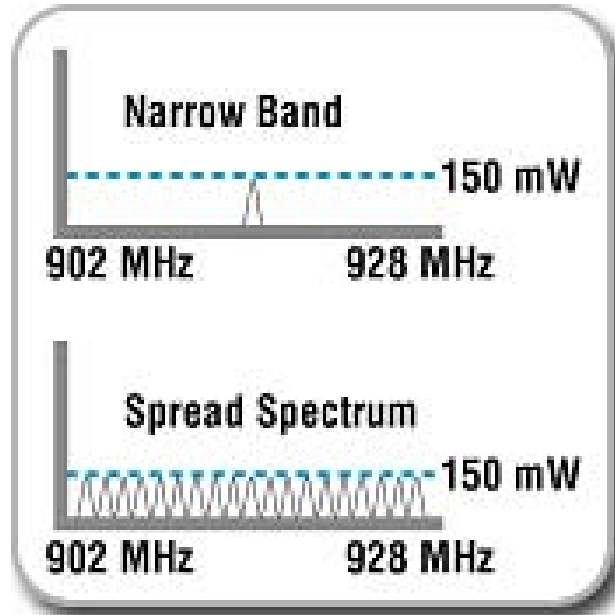


Mega-Hertz = 1×10^6 cycles/sec.

Giga-Hertz = 1×10^9 cycles/sec.

Wireless for Predictive Maintenance - Robust Radios

Frequency Hopping Spread Spectrum (FHSS)

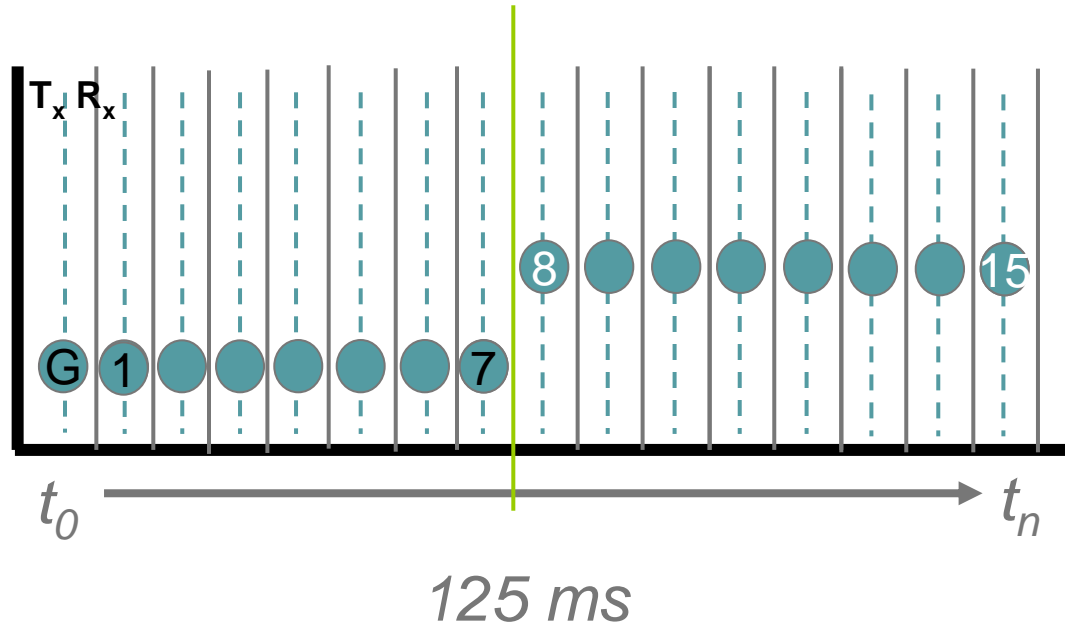


- Allows for many radios to operate in confined spaces

150 mW or 1 Watt Radios

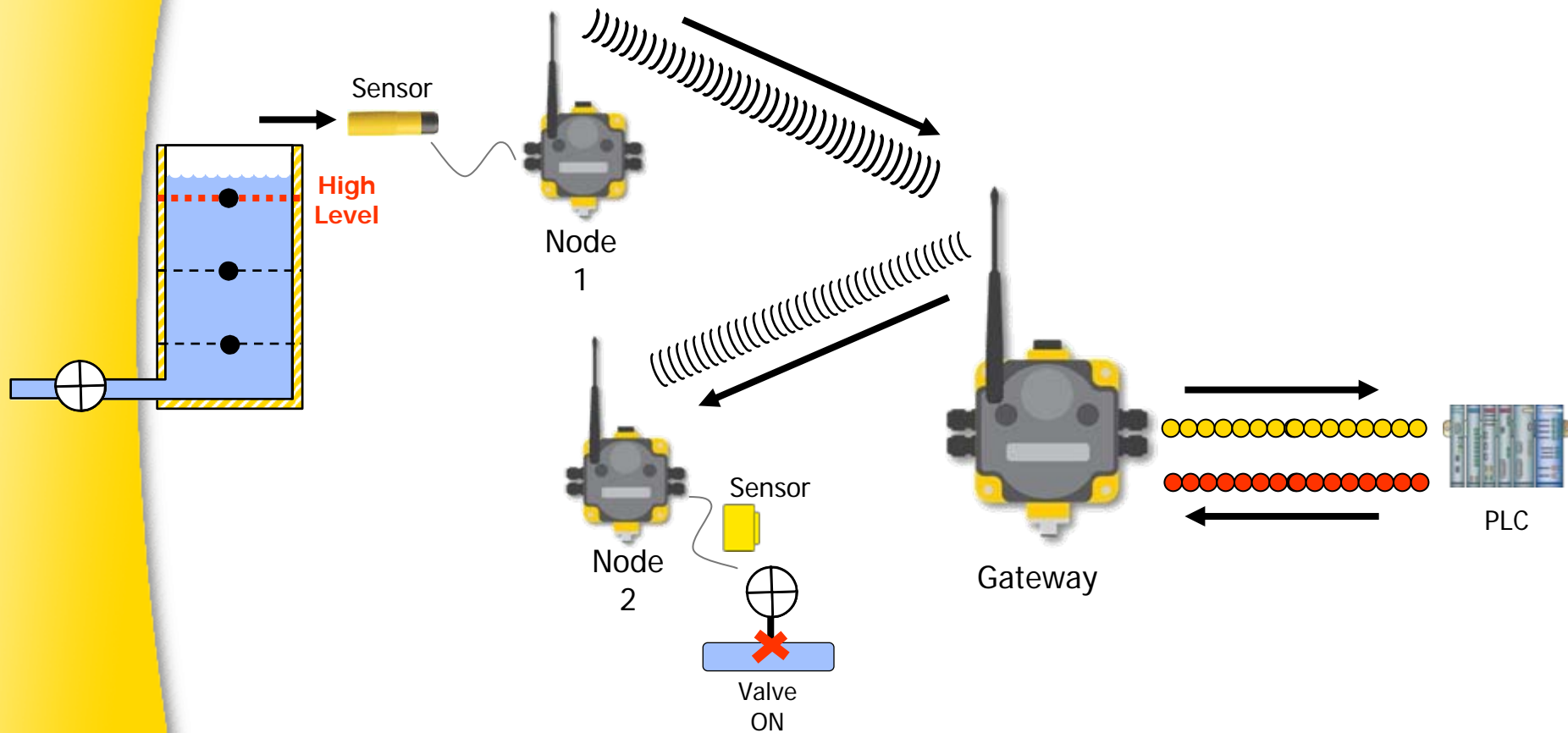
Wireless for Predictive Maintenance - Robust Radios

Time Division Multiple Access (TDMA)



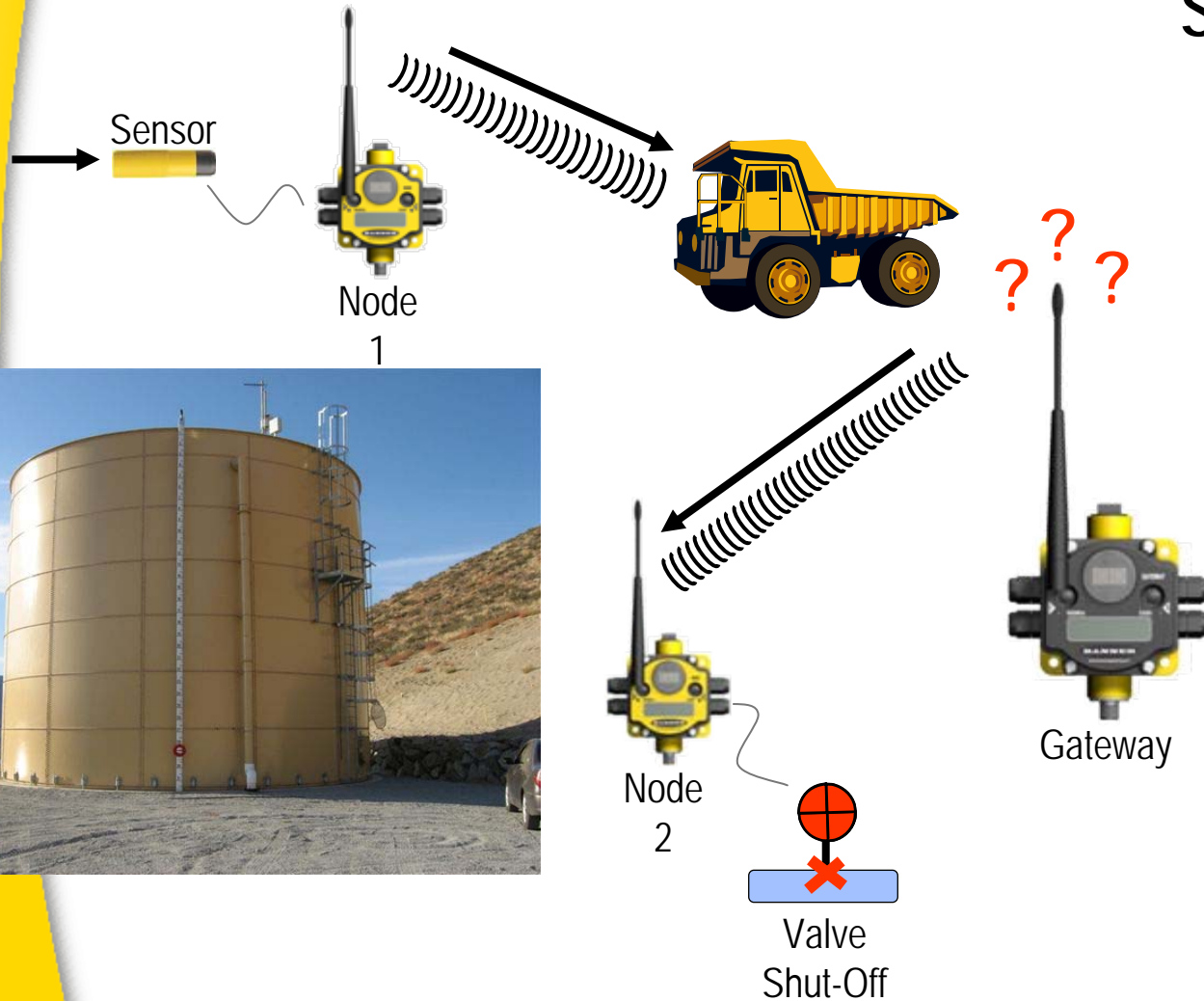
- Every Transmitter & Receiver is Guaranteed a time slot
- Minimizes possibility of packet collisions
- Contention Approach – Different? Better?

Radio Design: Wireless Control



Wireless for Predictive Maintenance - Robust Radios

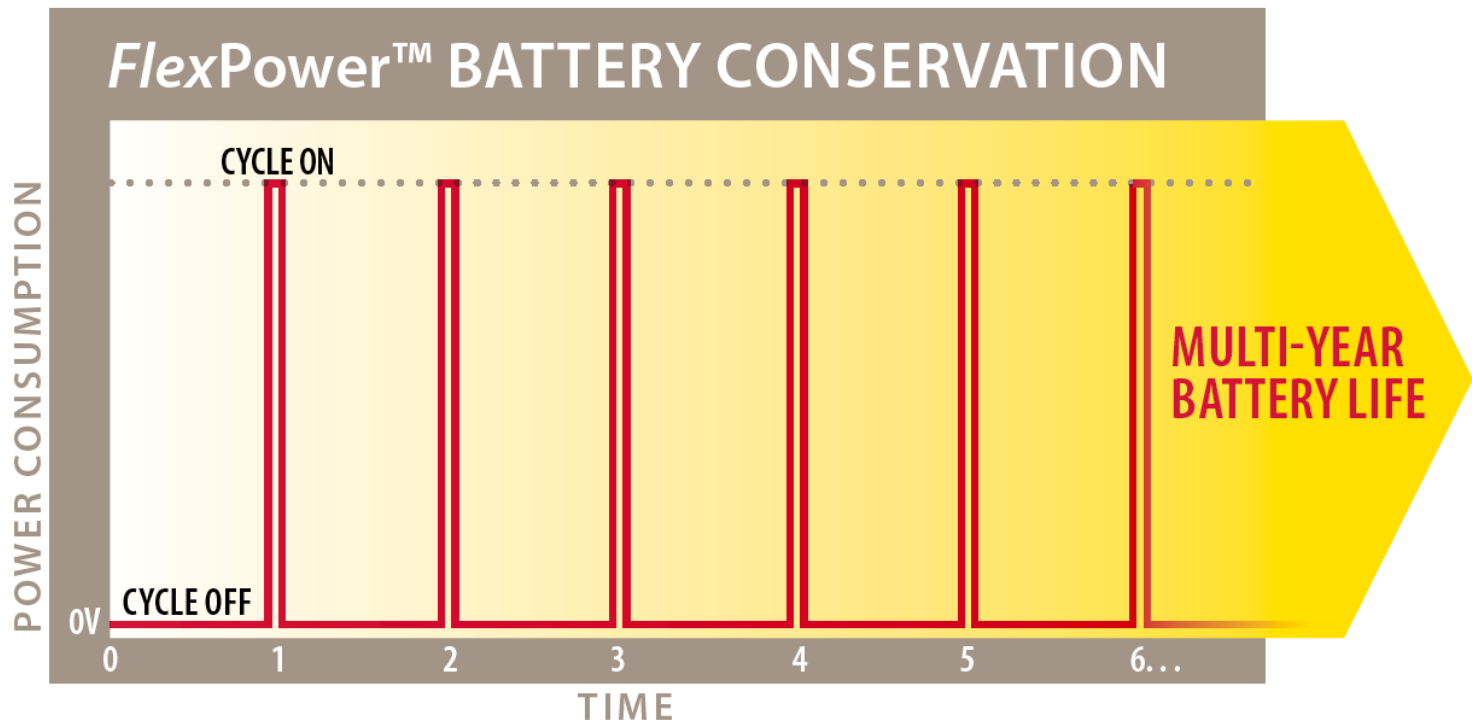
Safe Harbor Scenario



Banner's Solution

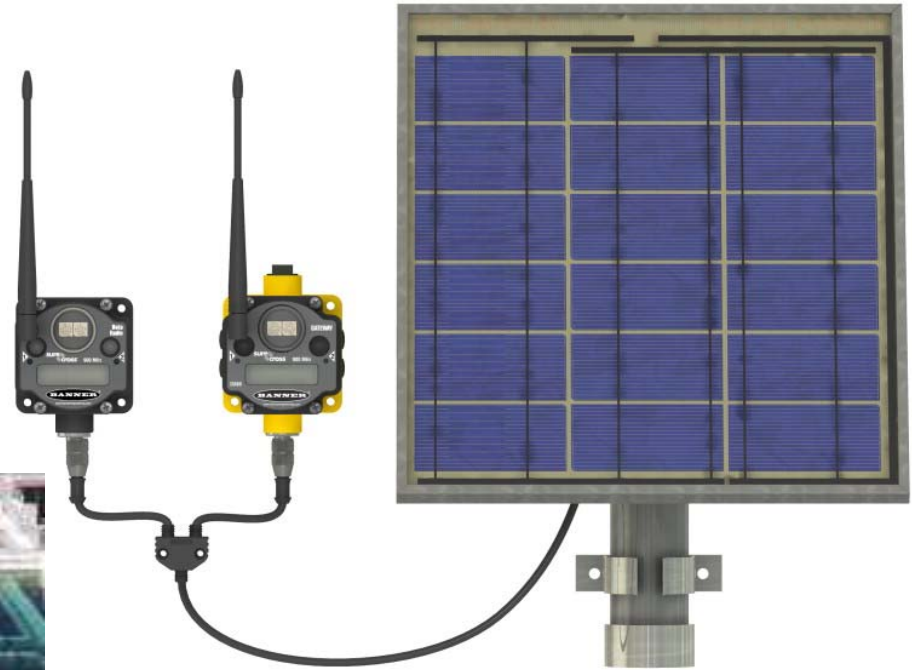
- Small Battery 3.6V
- Big Punch
- Lots of Endurance
- External Battery Box

Gives Us the Peel-n-Stick Solution



Power Design: "Peel-n-Stick"

- Flexible and Mobile
- No Hassle Installation
- Unlimited Expandability
- No Software Required
- Access Remote Locations



Wireless Solutions - Predictive Maintenance and Facilities



Predictive Maintenance – Temperature, Vibration, & Current

- Mission Critical Component Monitoring
 - Motors, Fans, Pumps, Etc.
 - Many customers monitor them in a temporary fashion
 - Many want to monitor the same, additional or remote equipment continuously
 - What stops them?
 - You need special software (\$\$\$\$)?
 - Too costly to “get” the information?
 - Need to use special equipment (like their temporary monitoring methods)?



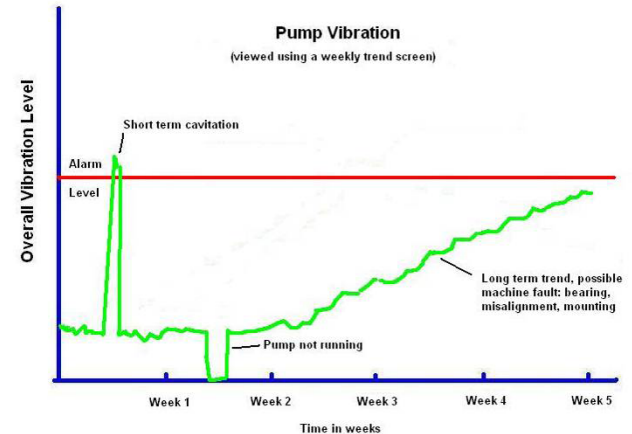
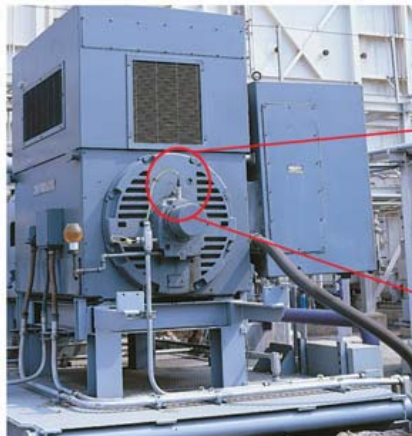
Predictive Maintenance – Temperature, Vibration, & Current

- Temperature (Motors, Bearings, Rooms, etc.)
 - Direct Contact
 - Thermistor, Thermocouple or RTD
 - Low cost sensors, very simple
 - Thermocouple or RTD Nodes
 - Great battery solution
 - Non-contact
 - Infrared (T-GAGE M18T)
 - Higher cost sensors, tough applications
 - Mixed I/O Node or Analog Nodes
 - Good battery solution



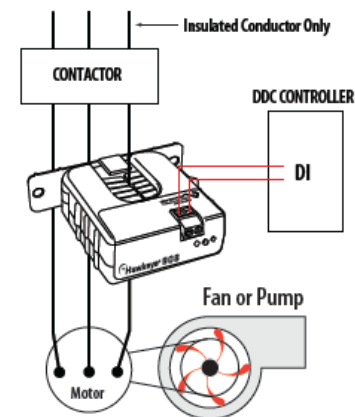
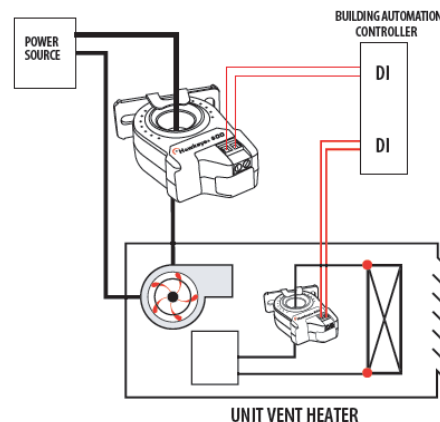
Predictive Maintenance – Temperature, Vibration, & Current

- Vibration
 - Many manufacturers available
 - Numerous styles (RMS, True RMS, Peak, etc.)
 - Example Tested: Wilcoxon Research PC420VP
 - 30 second warm-up, 10 min. Sample/Report
 - Estimated Battery Life
 - DX81 = 0.75 Years
 - DX81P6 = 4.5 Years
 - Use Standard DX80 Mixed I/O or Analog Node



Predictive Maintenance – Temperature, Vibration, & Current

- Current
 - Many manufacturers available
 - Numerous styles (RMS, True RMS, Peak, Fixed etc.)
 - Example Tested: Veris Industries Hawkeye (4-20 mA)
 - 2 second warm-up, 10 min. Sample/Report
 - Estimated Battery Life
 - DX81 = 3.7 Years
 - DX81P6 = 22 Years
 - Use Standard DX80 Mixed I/O or Analog Node (0-10 Vdc?)



Predictive Maintenance – Temperature, Vibration, & Current

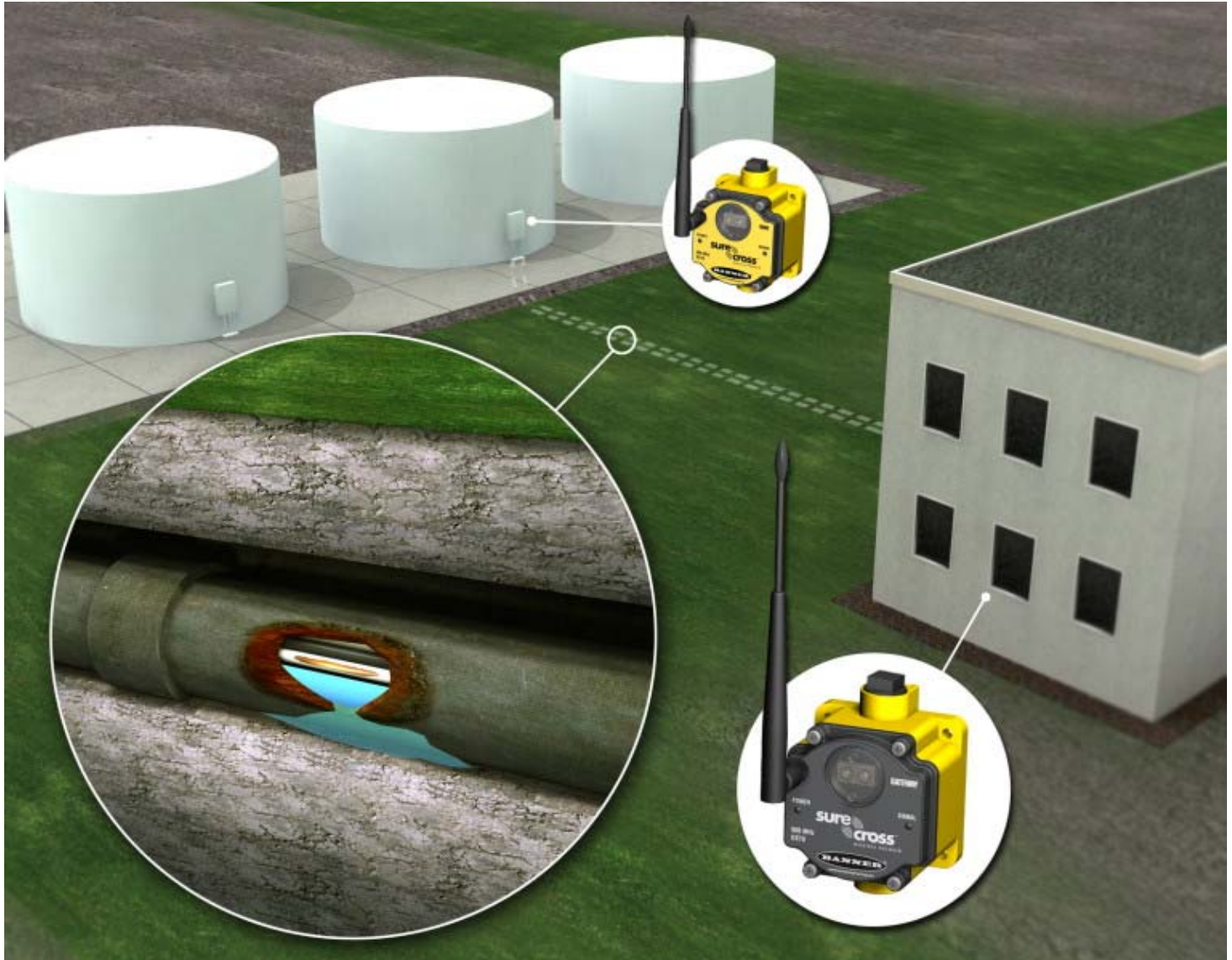
- Mission Critical Component Monitoring
 - Wireless is the least costly method for “getting” the information on temporary or constant installations
 - Battery Powered helps you with a standard solution for temporary or constant monitoring applications
 - No need for specialty software...monitor the critical component in their existing controllers...set thresholds, alarms, etc.
 - Use radios with your temporary/portable probes (most are producing a 4-20 mA signal)
 - Use one radio Node for monitoring multiple criteria (current, vibration, temperature)



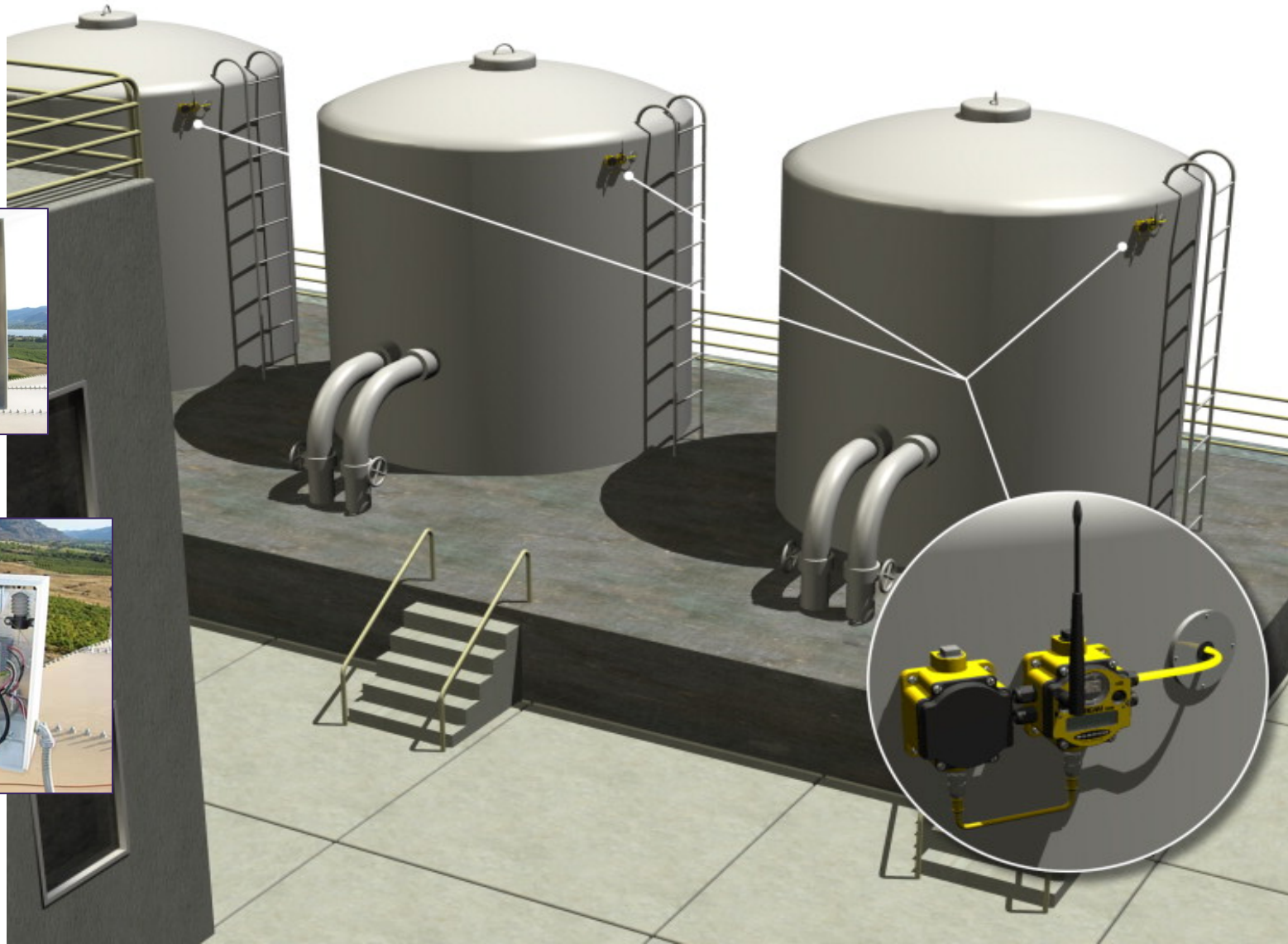
Winning the Maintenance Battle with Wireless



Wireless Solutions: Failed Conduit



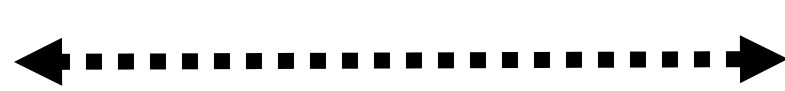
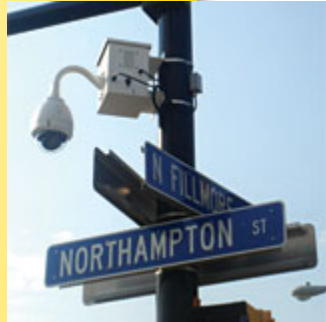
Wireless Solutions: External/Remote Tank Monitoring



Wireless Solutions: Preventative Maintenance



Wireless Solutions: Video Monitoring



sure

crossTM
wireless network

sensing unplugged.

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more sensors, more solutions

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