Digitization of Existing Facilities

Wireless Gauge Reader Applications

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Problem: Most Plant Data is NOT Digitized

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Difficulty of Digitizing Existing Plants

Just to read a simple pressure process value:

- Run wires (power and/or signal)
- I/O panels, termination
- Break seals, leak checks, material compatibility, safety checks
- Engineering assessment, documentation
- Process downtime
- Cybersecurity concerns

There are thousands of these devices with critical process data, but it costs over $20,000 to instrument each one using conventional technology, plus cost of process downtime.

Typical traditional solution:
INVASIVE AND COSTLY

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Need for Non-Invasive Digitization Technology

Non-Invasive Sensors:

- No breaking seals, no leak checks, no wetted parts
- Lightweight, no structural impact
- No power wires, no signal wires
- Little/no engineering review/analysis
- Takes minutes to install, no plant downtime required
- No new software to install, works with existing plant infrastructure

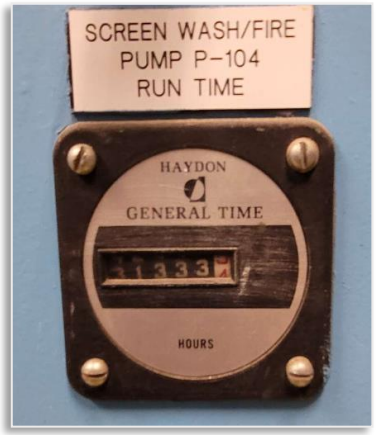
Cypress Family of Non-Invasive Digitization Solutions

Solution: Non-invasive sensors – 5 minute install

- “Electronic Eyeball” reads gauges and numeric indicators and transmits readings wirelessly
- Already approved and installed in over 30 nuclear power plants
- Non-invasive, clamp-on to existing gauges in minutes
- No downtime, no leak check, no wiring, no drawings
- Battery life of 3+ years at 15 minute sample rate
- IP56/NEMA 4 rated for outdoor use
- Various size and types of mounting adapters to fit most existing gauges

Wireless Digit Reader

- Reads numeric indicators
- Exactly same form factor as Wireless Gauge Reader
- Should not require additional engineering review/approval
- Has different firmware than WGR
- Wireless transmission duty cycle is higher - battery life about 30% of WGR. Use slower sample rate to compensate



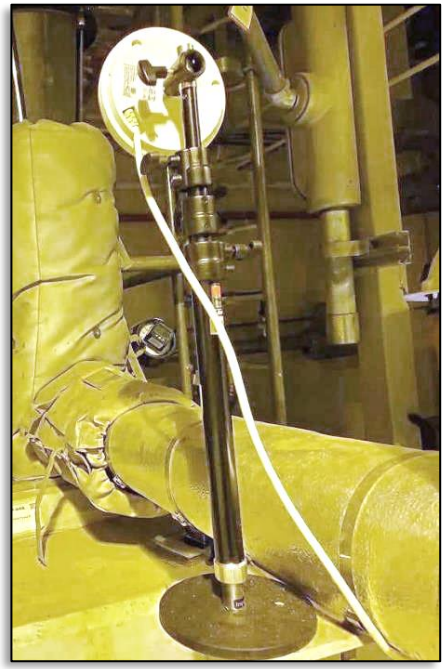
Wireless Transducer Reader

- Software configurable I/O and signal conditioning
- Enables wireless remote monitoring of virtually any analog transducer or instrument with the following outputs: 4-20mA, 0-5V, or 0-10V, RS-232, RS-485, thermocouple, thermistor, dry contacts
- 2 channels per device
- Configurable sample rates from three seconds to four hours
- Compatible with most existing flow meters, current meters, particle counters, thermocouples, weigh scales, etc.
- Battery life of 3+ years at 15 minute sample rate, also accepts 110VAC line power
- IP 67 protection
- Enables data logging to enable trend analysis, notification, or statistical process control

Wireless Humidity, Temperature, Wet Bulb Monitor

- -20 ºC to +70 ºC (-4 ºF to 158 ºF) Temperature Range
- 0 – 100% Relative Humidity Range
- Displays Temperature, Relative Humidity, and Wet Bulb Temperature (optional)
- Used for worker heat stress management, materials life tracking etc.
- Magnetic Mounting for steel walls or columns
- Adhesive Mounting for other surfaces
- Battery life of 3+ years at 15 minute sample rate
- IP56/NEMA 4 rated for outdoor use

IP Camera Monitoring Automation



- Capture images from 3rd party IP Cameras
- Use GBC machine vision engine to automatically convert to digital value and store for history, trending, alarming
- No need for human operator to always check camera feed
- Leverage existing approved data architecture

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Vibration Monitoring

HONEYWELL
VERSATILIS TRANSMITTER

Multi-Variant Sensing

Honeywell Versatilis™ Transmitter is a multi-variant sensing platform based on the latest LoRaWAN® protocol communication technology. Its inherently low-power compact design coupled with quick & easy installation, and commission helps manufacturers to deploy them at scale with the lowest CAPEX and negligible OPEX. These sensors are designed to monitor and predict the health of rotating equipment like motors, pumps, blowers, fans, compressors, and gearboxes. In addition, they can be deployed to remotely monitor the position of manual valves, the health of steam traps, and the surface temperature of static process equipment. They can also be deployed to monitor environmental conditions in life science facilities.

Figure 1– Honeywell Versatilis Transmitter

MEASUREMENT PARAMETERS:

Surface Temperature	Ambient Humidity	Ambient Pressure
Vibration	Audio Acoustics	Ambient Temperature

SENSORS AND COMMUNICATIONS:

The Honeywell Versatilis platform contains a suite of sensors encompassing versatile sensing parameters such as pressure, temperature, humidity, triaxial accelerometer, and audio acoustics MEMS to provide insightful measurements. Sensors on the platform are selected to cover a broad frequency spectrum enabling adequate sensing coverage of process and physical phenomena. Sensor fusion analysis on the acquired measurements can be performed. Any specific parameter is customizable in either software or hardware according to the requirement of a specific application. Each measured parameter contributes a unique dimension thereby augmenting the system into a multi-dimension sensing platform. Sensor data can be transferred over the LoRaWAN® network which is protected through secure key authentication. The Honeywell Versatilis Transmitter can be configured to notify the application through Event Triggers and FFT (Fast Fourier Transform) Triggers.

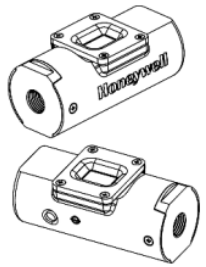

Figure 2– Assembly

Honeywell

Honeywell Versatilis™ Transmitter Technical Specification Honeywell Proprietary

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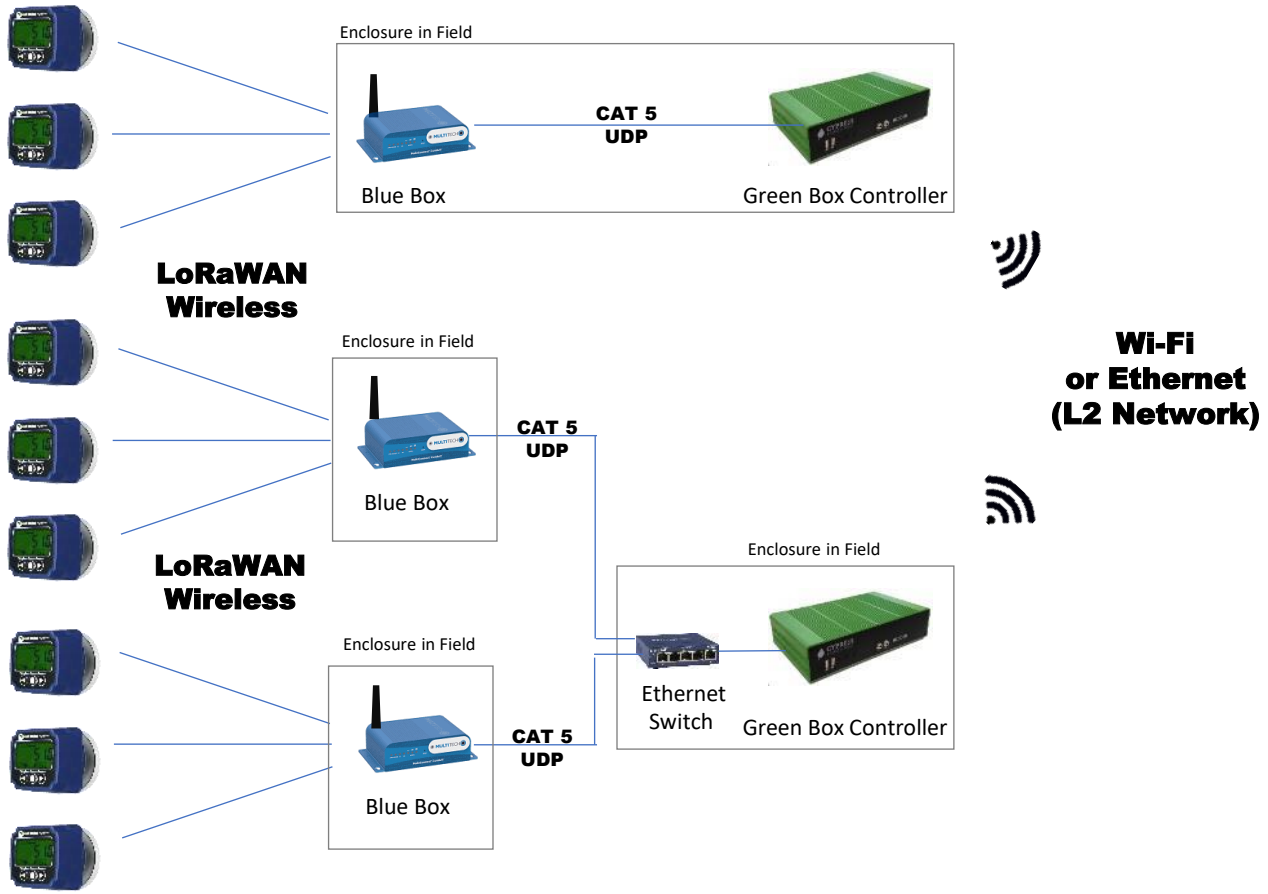
Wireless Steam Trap/Pipe Wall Temp Monitor

Leaking Traps Waste Energy

Typical Steam Trap

- Traps are a necessary part of the steam distribution system, usually hundreds of units per site
- 15-20% average failure rate; leaks steam
- Failed traps lose $5,000 per year (1/8” orifice)
- Manual inspection typically done annually – labor intensive, do not catch problems in timely manner
- Solution: Wireless steam trap monitor detects faults and alarms on error, avoiding expensive leak loss
- Non-invasive installation: no breaking seals, wireless, integrates with BMS
- Battery life of 3+ years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- One year payback on investment

Typical Deployment Architecture – Option 1



Wi-Fi
or Ethernet
(L2 Network)

Connection via RESTful API, OPC UA, or OPC DA

OSI PI / R*Time Historian

3rd Party App

Web Application Clients HTTPS using browser

Laptop

Smartphones/
Tablets

Wireless Gauge Reader

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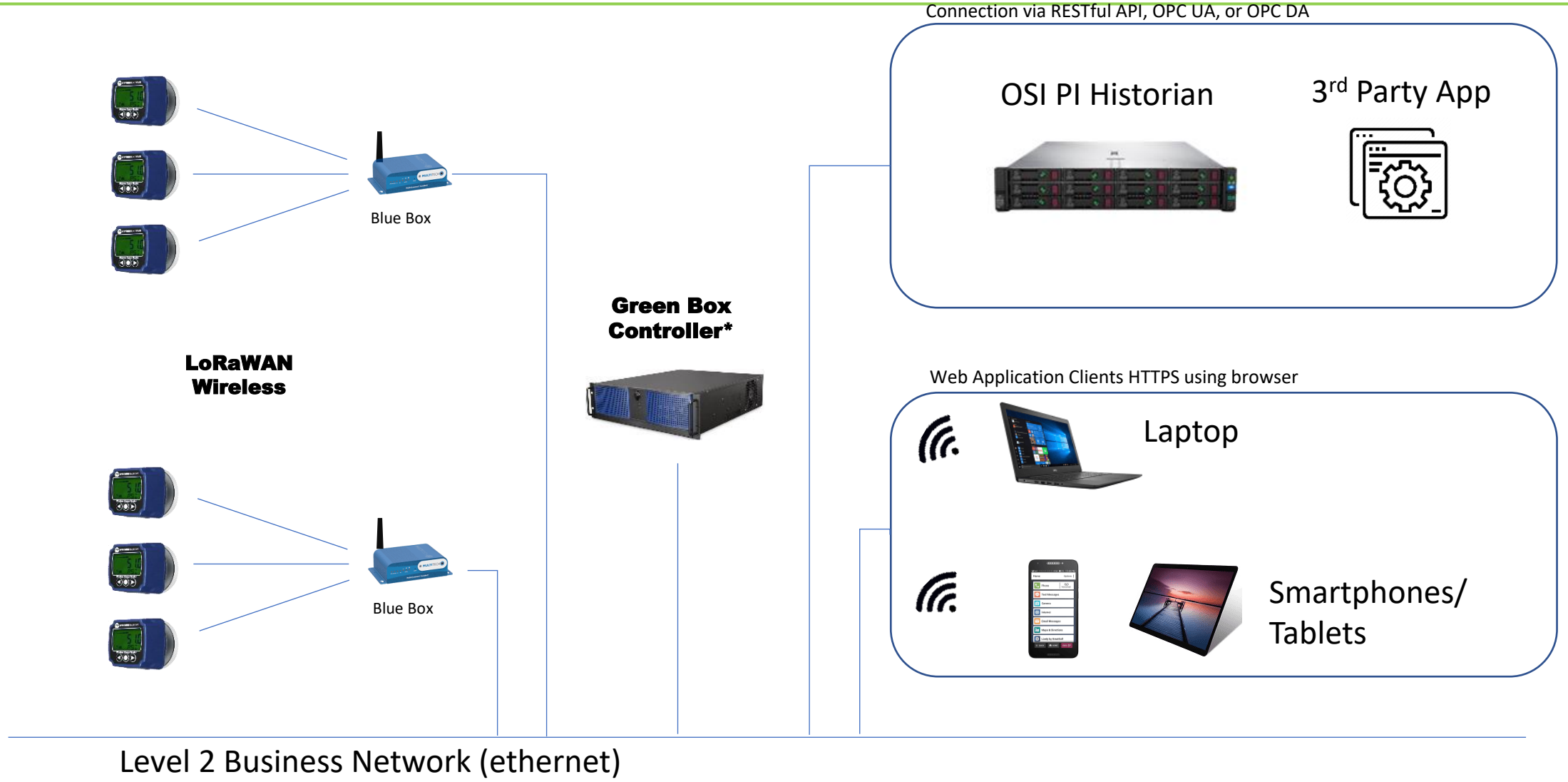
Typical Deployment Architecture – Option 2



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Cypress network:
Open System to Integrate with 3rd LoRaWAN sensors

Integration of 3rd Party LoRaWAN devices

MultiTech Reveal™ Wireless Proximity Sensors

MultiTech Reveal™ LoRaWAN Wireless Proximity Sensors detect contact between two wires, proximity detection with a magnet, range with an ultrasonic signal, while the Reveal UltraSonic Level Sensors provide high accuracy proximity detection and ranging in air.

MultiTech Reveal™ Wireless Push Button Sensors

The MultiTech Reveal™ LoRaWAN Wireless Push Button Sensor transmits on a button press event. They can be used as a panic button wearable device, personal emergency response system (PERS), remote control or other remote push button applications. When the button is pressed, an alert is sent to the wireless network.

MultiTech Reveal™ Wireless Movement Sensors

MultiTech Reveal™ LoRaWAN Wireless Movement Sensors use an ultra sensitive internal accelerometer to detect movement of a critical asset. When movement is detected that exceeds a certain threshold, an alert is sent over the wireless network. Reveal Tilt Sensors detect transitions between horizontal and vertical orientation, as well as reporting the angle of the tilt.

MultiTech Reveal™ Wireless Leak Detection Sensors

MultiTech Reveal™ LoRaWAN Wireless Leak Detection Sensors use a water probe to detect the presence of water or other liquids. When the presence of water or another liquid is detected, an alert is sent over the wireless network to prevent a potentially catastrophic event.

- Integrate devices with Cypress Gateway and GBC
- Same wireless network infrastructure
- Same cyber security approval
- Same OSI PI connectivity

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Integration of 3rd Party Sensors

3rd party LoRaWAN sensor

Enclosure in Field

Blue Box

CAT 5
UDP

Green Box

Plant Wi-Fi or Ethernet (L2 Network)

Connection via RESTful API, OPC UA, or OPC DA

OSI PI Historian

3rd Party App

Web Application Clients HTTPS using browser

Laptop

Smartphones/ Tablets

CYPRESS ENVIROSYSTEMS™

Integration of 3rd Party IP Cameras

3rd party
IP camera

Ethernet

Green Box

Plant Wi-Fi or Ethernet (L2 Network)

Connection via RESTful API, OPC UA, or OPC DA

OSI PI Historian

3rd Party App

Web Application Clients HTTPS using browser

Laptop

Smartphones/
Tablets