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THE WORLD'S CONDITION MONITORING CONFERENCE

POWERED BY MOBIUS INSTITUTE

Wireless Considerations for Asset Data Collection

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Before we start...

- Have you ever considered a wireless condition monitoring program?
 - No, I never considered it
 - Yes I have considered it but never tested it
 - Yes I have and started deploying it

There is no right answer in a vacuum.

Everything has tradeoffs.

"It depends."

—Typical Design Engineer Response

Start with your goals

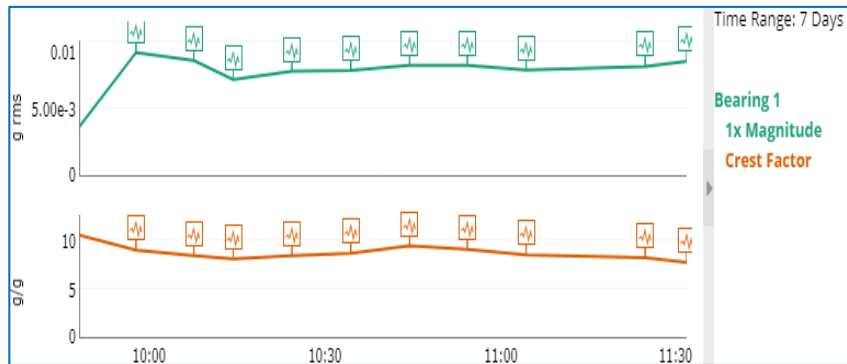
EXAMPLES:

- Go from catching 90% of failures to 99.99%
- Maintain reliability while reducing operating expense
- Improve reliability given the same maintenance team size
- . . .

Instrumentation and data needs should cascade from your goals.

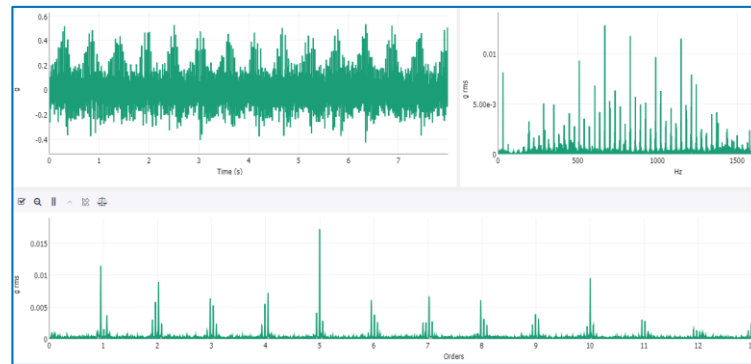
Measurement Output

Features



- Reduce/prioritize routes
- Some failure indications (based on features calculated)
 - Probably still going to use a portable instrument

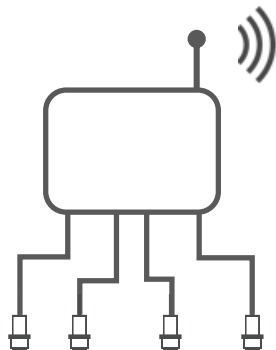
Waveform Sensor Output



- Remote diagnostics
- Adjust features calculated in software
- More demanding of technology

Device Styles

Tethered Device



- Typically higher sensor density
- Good for hard to access sensor points
- Connect to standard sensors

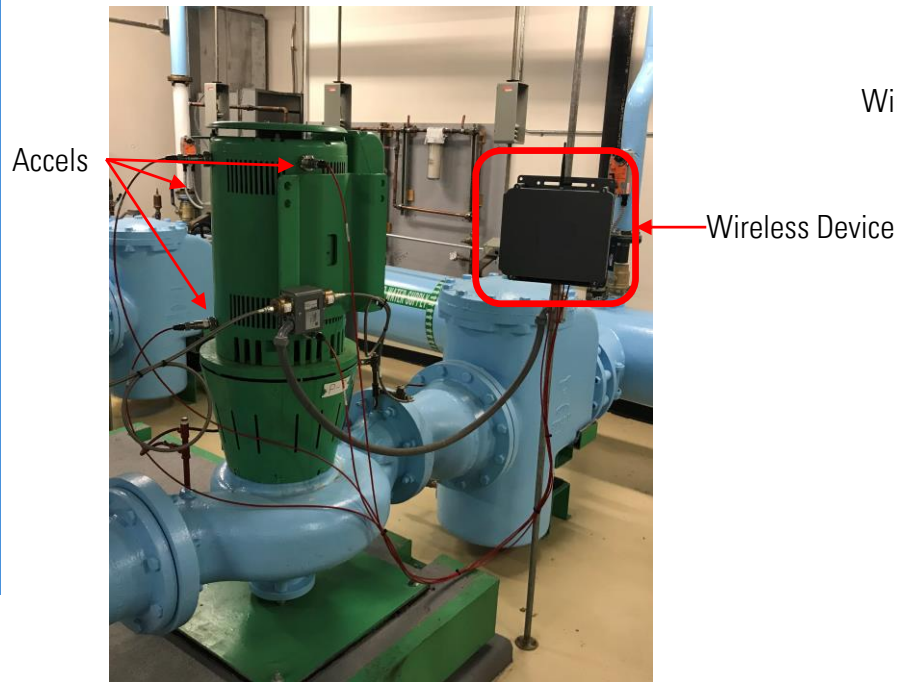
Integrated "Node"



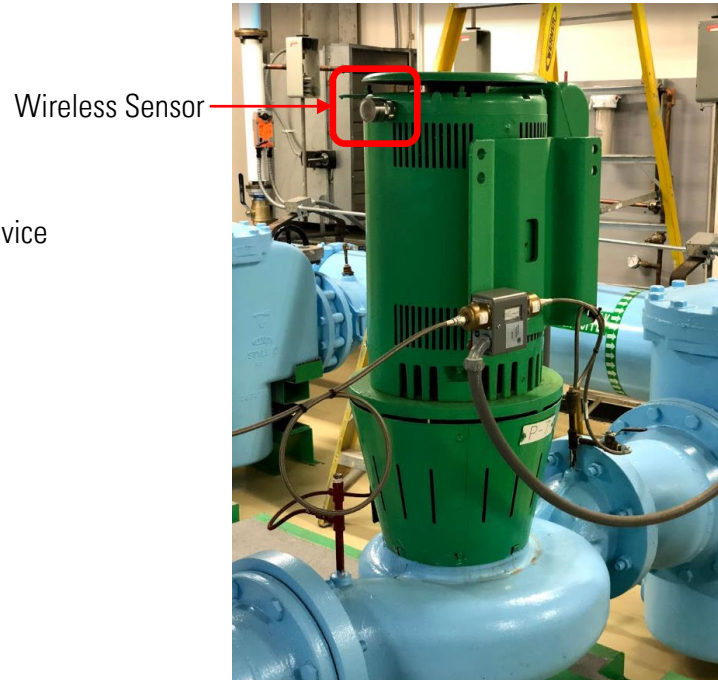
- Typically 1 or 3 axis MEMS, can be Piezo
- Easy install (one unit, no cables)
- MEMS will typically have lower FMAX

Device Styles

Tethered Device



Integrated "Node"



Data Housing / Leasing Models

On Premises



- Can be 100% in-house controlled
- Good for remote locations that have back-haul bandwidth issues

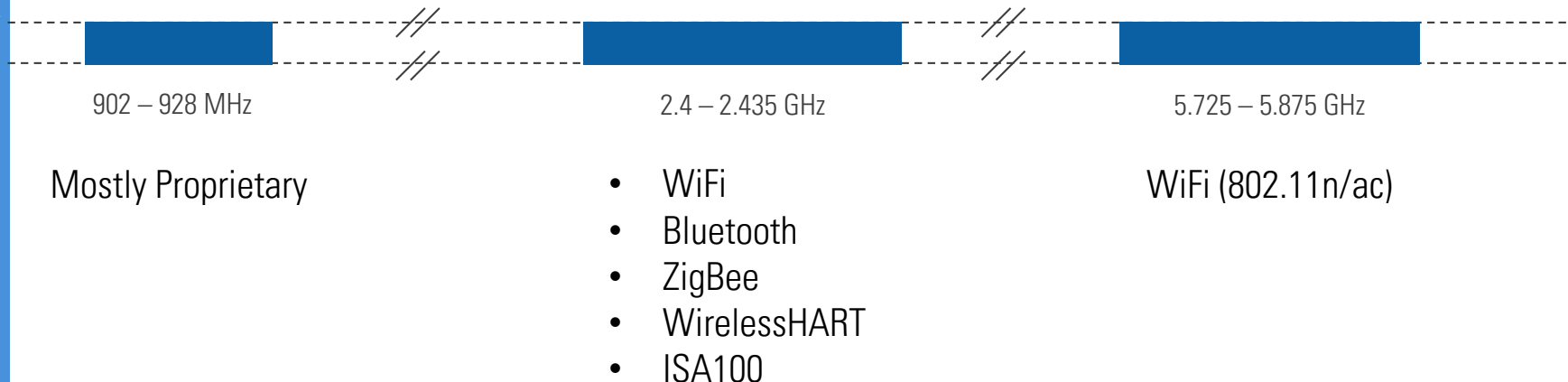
Cloud



- Can be in-house or 3rd party controlled
- Sometimes bundled with analytics

Protocols and Standards

Industrial, Scientific, and Medical (ISM) Bands



Which one was designed for asset health data in industrial plants?

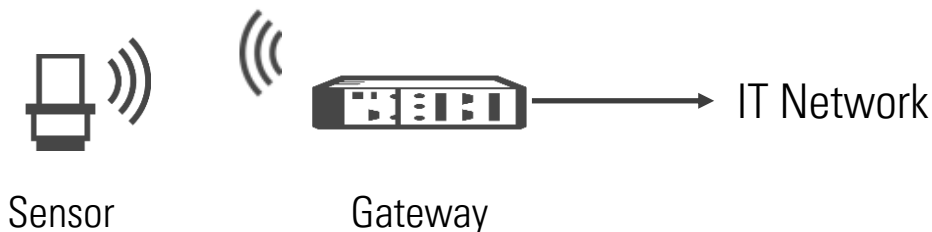
Is this really a consideration?

Protocols and Standards

When does the standard or protocol matter?

- Plant policies
- Working with IT [SECURITY]

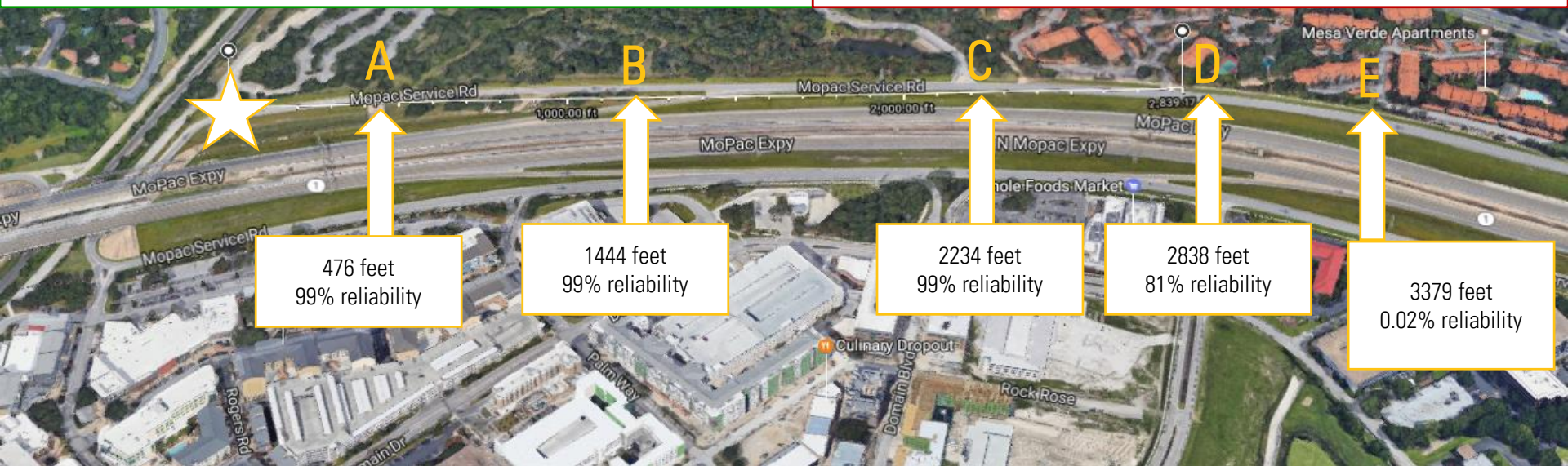
Gateways are, among other things, protocol translators.



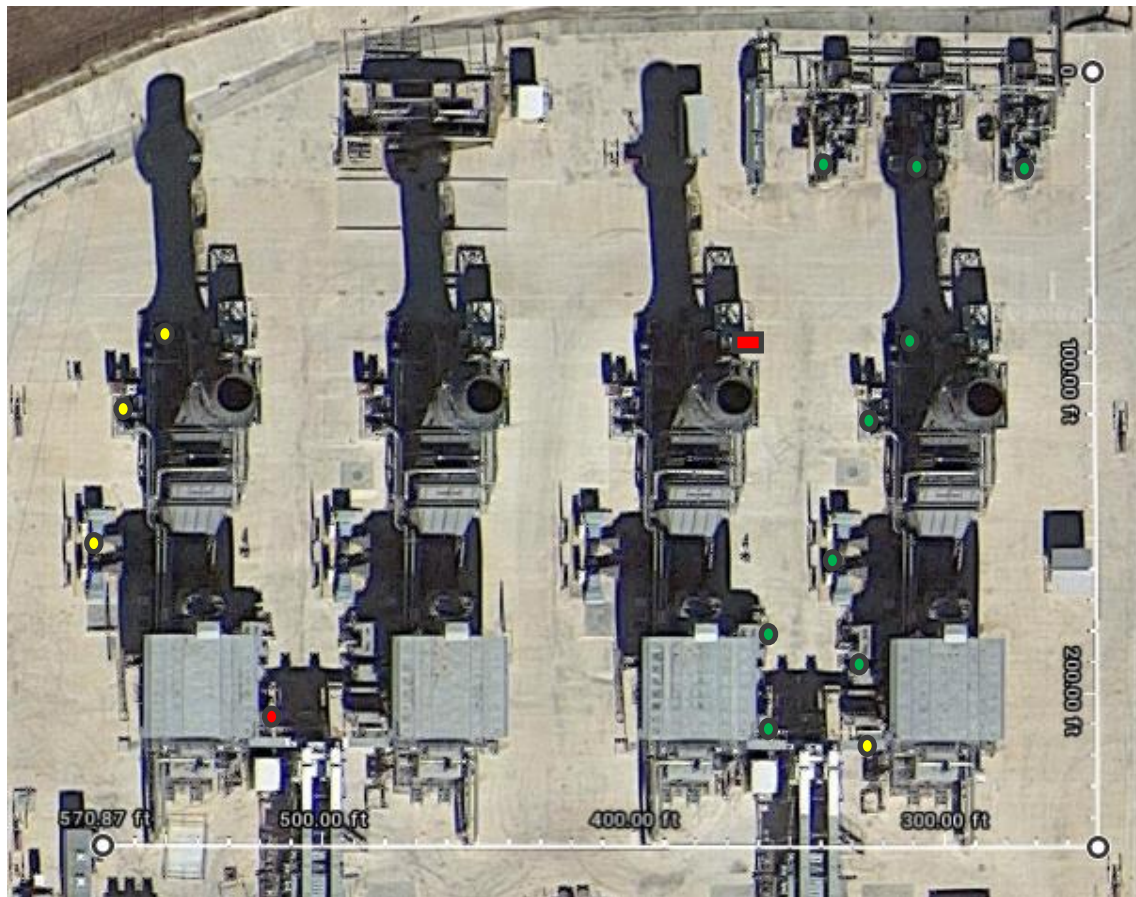
Range Example: Line of Site by a Freeway

Line of sight
to transmitter

No Line of sight
to transmitter



Range Example: Peaking Units



Wireless Gateway



Signal Strength (RSSI)

● >-65db

● <-65db

● No Signal

Reading Datasheet Features

Feature	Impacted By	Impacts
Range	<ul style="list-style-type: none">•Frequency band•Radio/Antenna design•Transmission power by design•Transmission power by regulations•Obstructions•RF interference	<ul style="list-style-type: none">• Up-front cost (cost of install) – may vary plant to plant.

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Battery	<ul style="list-style-type: none">• Temperature• Data transmission frequency• Data payload size• Size of battery• Channel count	<ul style="list-style-type: none">• Ongoing cost of ownership• Outage planning

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Mesh vs. Star Topology	<ul style="list-style-type: none">• Underlying technology• Vendor design	<ul style="list-style-type: none">• Up-front cost (cost of install)• Performance (bandwidth vs routing)• Battery life

Other Hardware Considerations

- User serviceable batteries
- Plug-in power option to eliminate battery servicing
- Additional Sensor Types (3-Axis accelerometer and temp are pretty common)
 - Tach/Prox-Probe
 - Flow meter (pulse)
 - Voltage Input | $\pm 10V$, $\pm 30V$
 - Current Input | 4-20mA
- Direct ad-hoc connection in the field for spot check

How flexible/open is the solution?

- Can you mix **hardware**? Examples:
 - Use 900 MHz systems to go through concrete and 2.4 GHz systems for better diagnostics on assets in the open
 - Combine higher-end monitoring units for critical equipment with wireless monitoring units for BOP
- Can you share data in **software** (feature and/or waveform) with...
 - Data historians
 - Analytics packages, APR, etc.
 - In-house experts for custom analysis
 - 3rd party analysts
 - SCADA/DCS data
 - Different measurement types for cross diagnosis

Considerations Recap

- Measurement Output
- Device Styles
- Data Housing
- Are Protocols and Standards a Consideration?
- Range/Battery/Topology
- Flexibility

Remember to start with your goal.

Questions?

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