WCI End User Conference

ISA100 Oil & Gas Use Cases:
- Upstream
- Midstream
- Downstream

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Cost Reductions Driving Increased O&G Wireless Use

- Cost Savings
  - Eliminate labor and material costs related to wiring remote, difficult to reach or moving monitoring points
  - Simplify creation and maintenance of construction drawings
  - More easily accommodate changes including late changes
  - Reduced operating costs through elimination of manual reads
- Enables some condition based monitoring application to extend asset life / avoid product loss due to failure

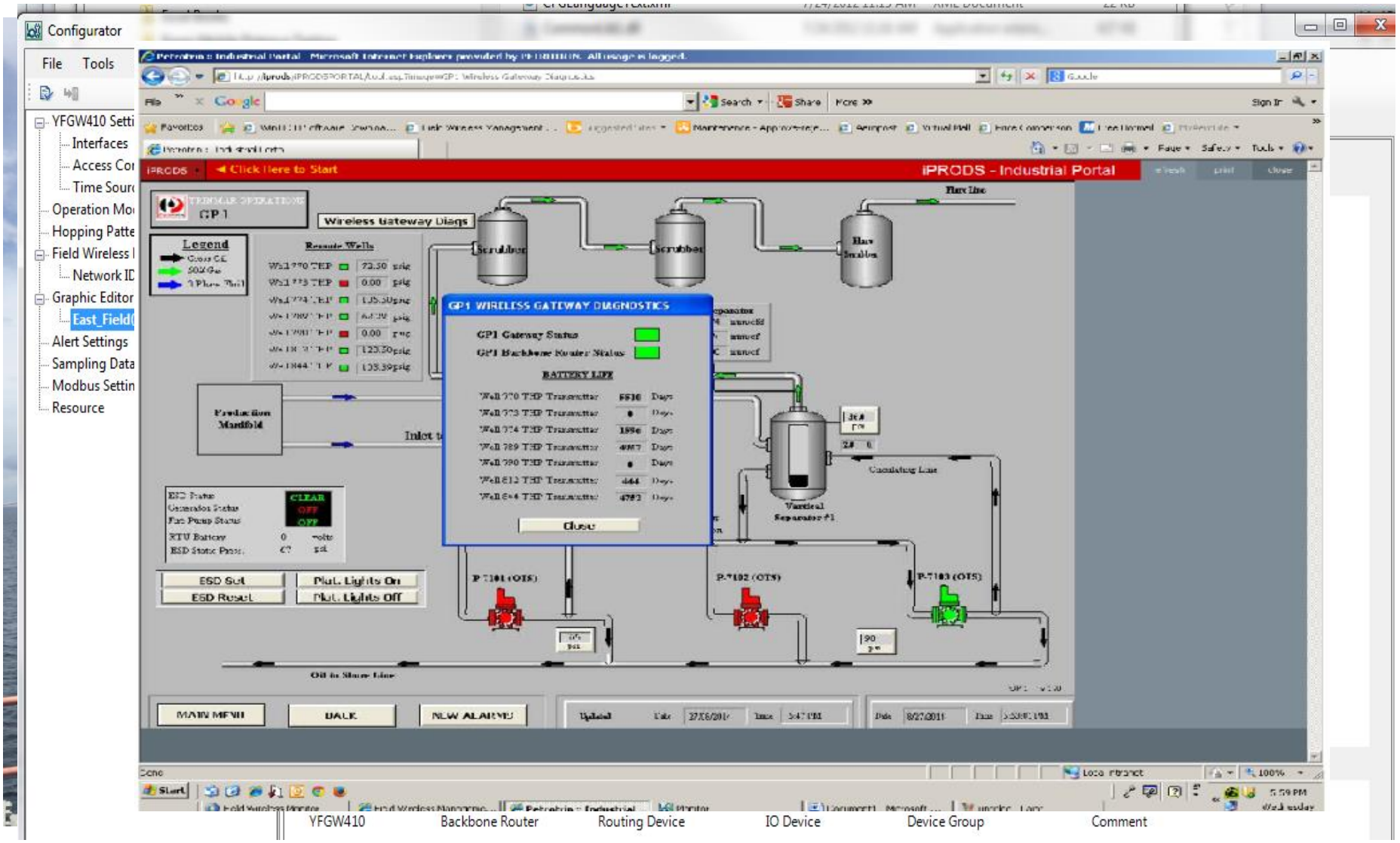
Yokogawa ISA100 – Common Technical Drivers

- Technical Drivers
  - Lack of communications, and often power, at desired measurement location
  - Significant cost / time / weight savings vs. adding wired points
  - Elimination/avoidance of tethers/slip rings for moving/rotating equipment
  - Limited DCS I/O expandability and desire for “intelligent I/O”
- Primarily monitoring
  - Beginning to see wireless monitoring with wired control

Source: SBM Offshore

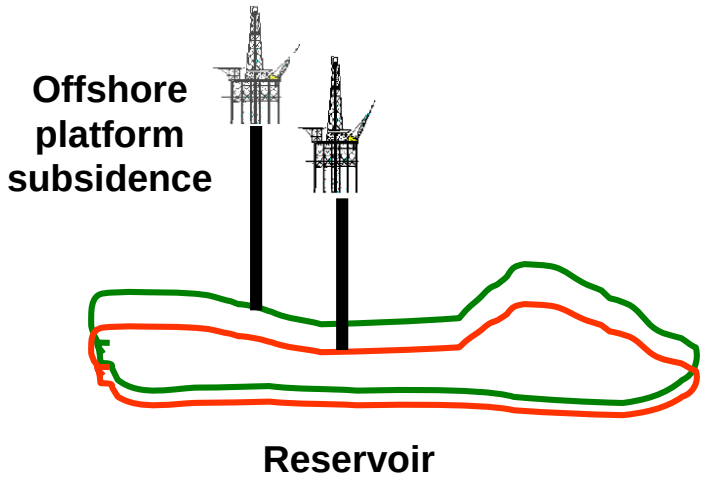
Upstream

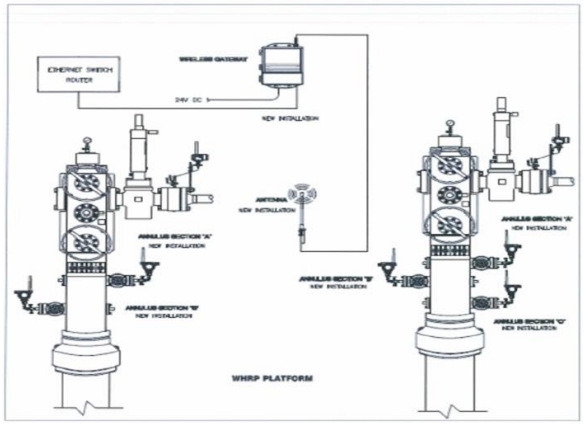
Offshore Oil Well Monitoring



Offshore Application – Annulus Pressure Monitoring

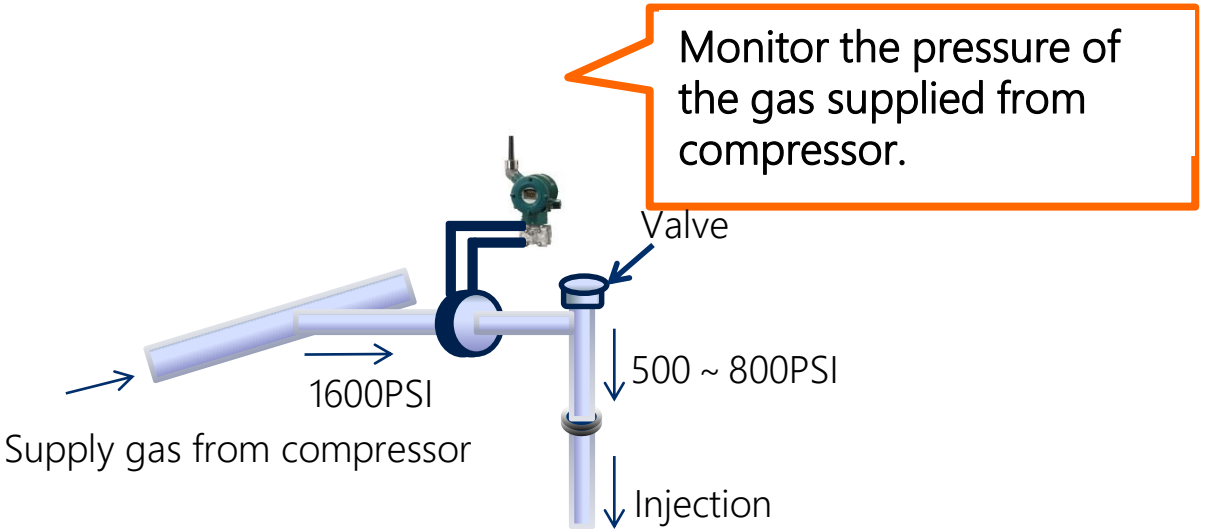
- There is **well integrity risk** due to subsidence
- Extreme subsidence experienced could lead to production, **safety** and business being jeopardized.
- Typical practice is to **monitor annulus pressure manually** by reading pressure gauge
- In order to ensure well integrity and **early detection** in case of leakage, migrate to **online monitoring** of annulus pressure



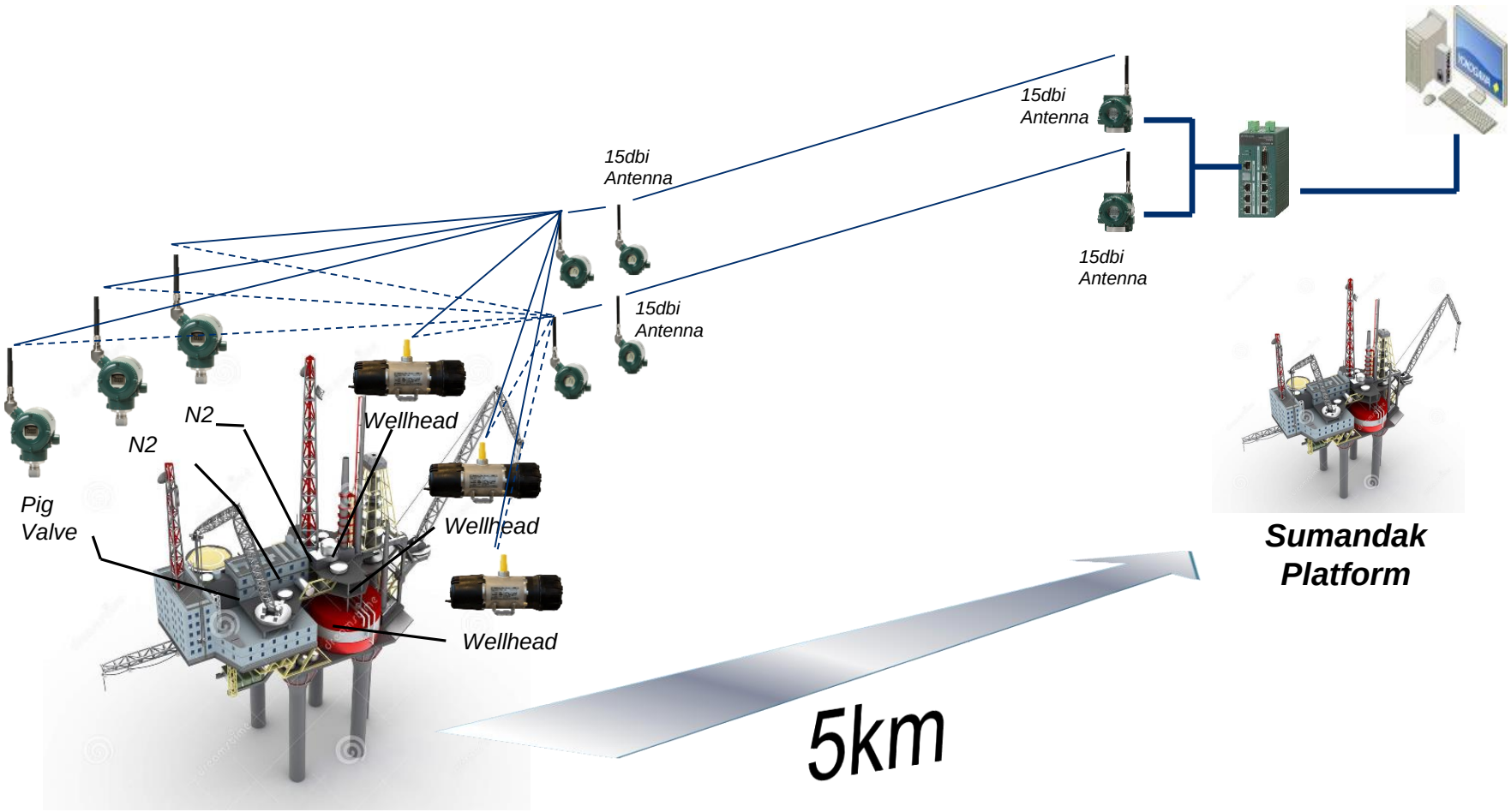


Upstream – Offshore Injection Pressure Monitoring

- Challenges
  - Wiring difficulty
  - No power source
- Solution
  - Long range, battery powered pressure monitoring



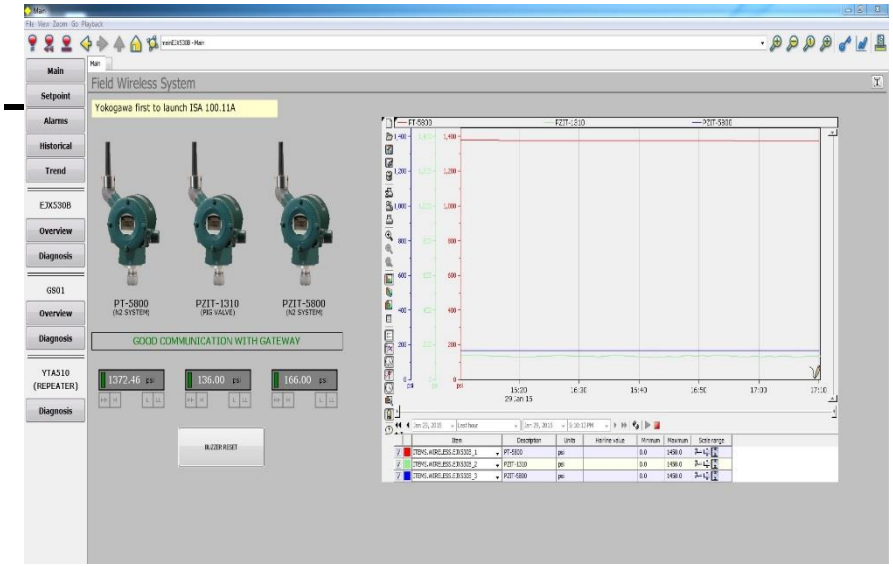
Offshore Platform Safety and Asset Management

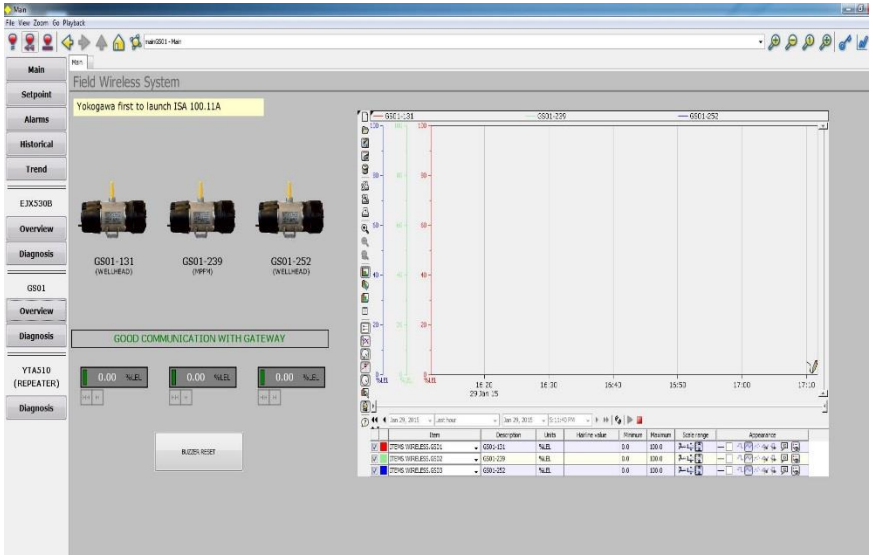


Zuhal Platform
Unmanned Platform

Sumandak Platform

Wireless Pressure and Gas Detection





Heavy Steel Obstruction

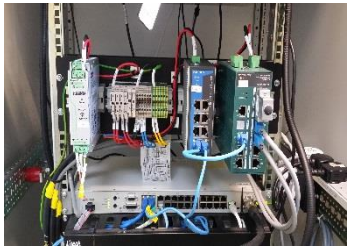
Multi-deck Obstruction

5km Long Distance

15dbi Antenna

Wireless Press Transmitter

Wireless Gas Detector



Gateway

Midstream

Oil Pipeline Leak Detection

LNG Liquefaction Leak Detection

- Detect leaks at pipeline welds using wireless temperature transmitters

Upstream

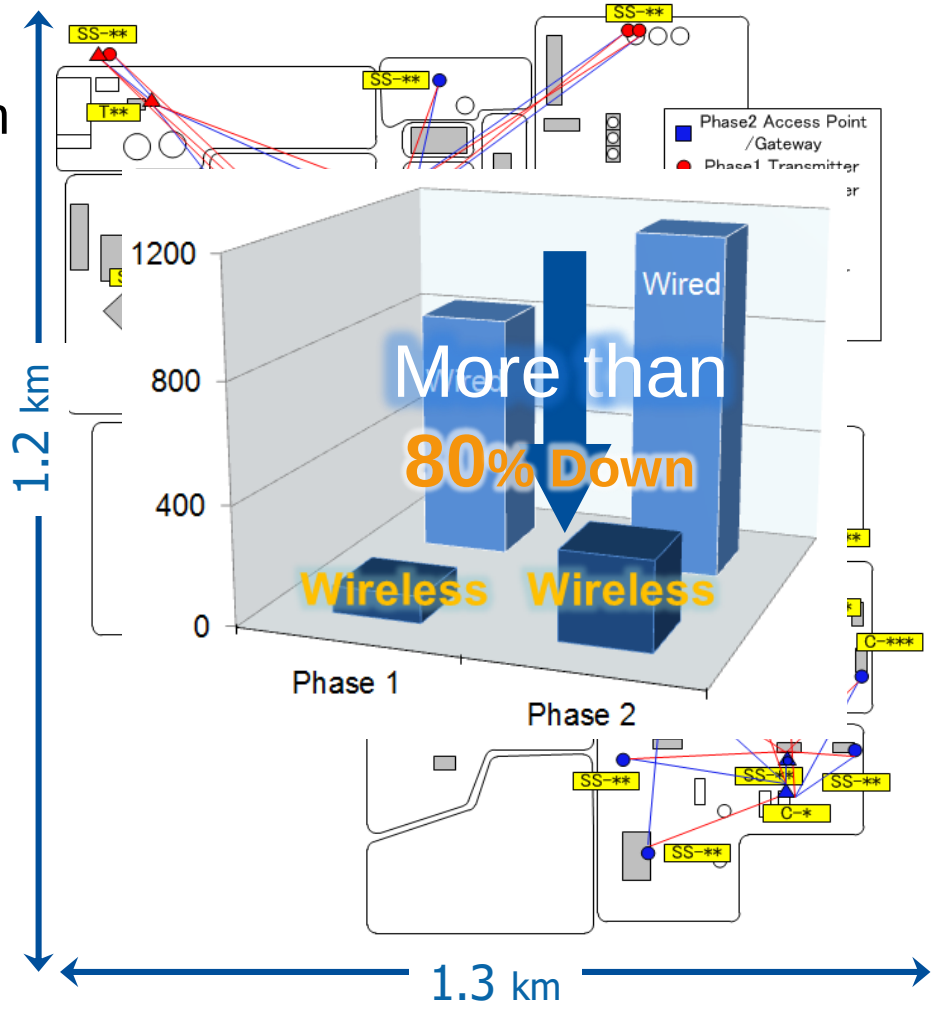
Refinery in Salt Lake City - Tank Level/Alarm

Monitoring for Toxic Gas Dispersement

- Goal:
  - Auxiliary monitoring points at plant perimeter
  - Not a safety application
- Challenges:
  - No power or communications at fence line
  - No battery powered toxic gas detector
- Solution:
  - H_2S monitor
  - ISA100 IO adapter with AI
  - Battery backed solar to power gas monitoring

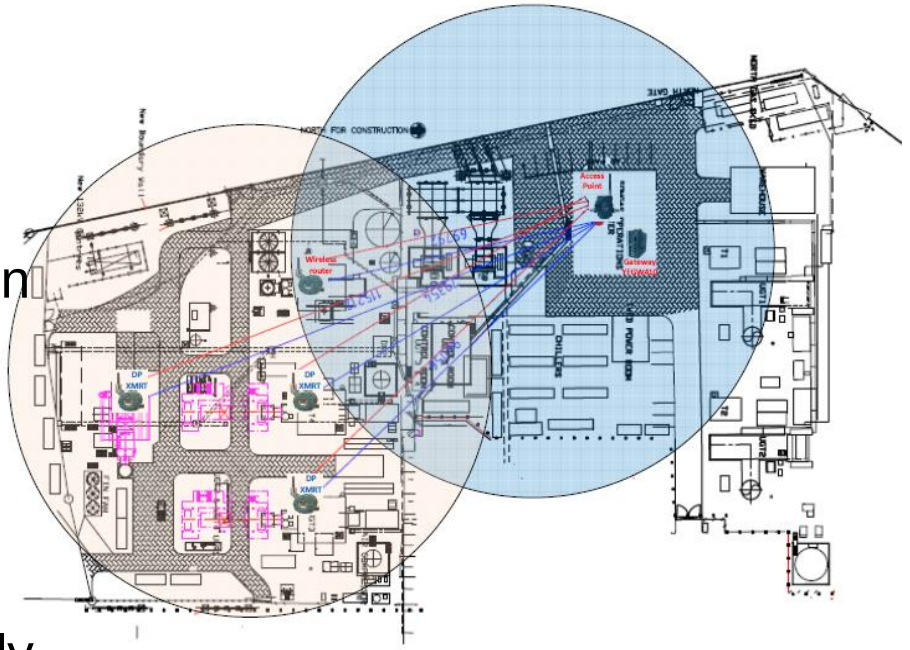
Low CAPEX Plant-wide Monitoring of Battery Rooms

- Application
  - Temperature and A/C operation monitoring emergency shut down battery rooms
- Key Features
  - Full redundant system
  - Four hops, max 1 km communication
- Customer benefit
  - One week commissioning & engineering
  - Reduce Capital Expenditure (Approx. 80% down)
  - One system can monitor two km^2 whole plant



Gas Fired Power Plant

- Application
  - Analysis of gas turbine performance
  - (Flow/temp for vent & combustion air system)
- Customer benefit
  - Digital measurement of key parameters in the DCS
  - Achieved monitoring of previously difficult to reach and un-monitored parameters
  - Eliminated costly conventional instrumentation
  - Eliminated need for operator patrols to obtain key parameters



Questions and Discussion

Co-innovating tomorrow™

Thank You