Advantages of Wireless Technology

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History

- Regardless of industry, hardwiring remote instrumentation has been the only option.
- In order to accomplish this, digging trenches and/or running conduit and pulling wire were required to acquire the signals.
- Wireless I/O offers the ability to create reliable, robust Supervisory Control and Data Acquisition (SCADA) networks.
What is Wireless I/O?

• Wireless I/O is a mechanism by which analog (4-20mA, 1-5VDC, etc.), discrete and other raw signals are transmitted via radio to and from a central processing device.

• Specifically, the data transmitted includes level, pressure, flow, temperature, alarms and signals generated to actuate final control elements, such as valves.
What is Wireless I/O?

• In the simplest of terms, wireless I/O is wire replacement, where the wireless communication link emulates wire in the application.
What is Wireless I/O?
Remote Control Functionality
Why Wireless I/O?

- The need for geographically scattered asset and sensor data.

- Wireless I/O offers:
  - Measurable Cost Savings in:
    - Engineering
    - Installation
    - Logistics
Foundation of Wireless I/O

- Foundation of Wireless I/O is license-free 900MHz spread spectrum radio technology designed specifically for integration into remote assets and SCADA systems.

- This technology has been widely used in oil and gas field automation for close to 20 years and has proven to be very reliable.
Spread Spectrum

- FCC allows two methods for building spread spectrum radios.
  - Frequency Hopping Spread Spectrum (FHSS)
  - Direct Sequence Spread Spectrum (DSSS)
Advantages

- Installation Savings
  - Installation costs are a growing concern for many managers as labor rates continue to rise.
Advantages

• **Installation Savings (cont’d)**
  
  – Reduction in material costs required to hardwire assets.
  – Speed of deployment
  – Hazardous environments
Advantages

• Safety
  – Limiting human exposure to hazardous environments.
  – Allows for greater safety and compliance with OSHA regulations, especially in dangerous environments.
Advantages

- **Economies of Scale**
  - Deploying additional points in a Wireless I/O network is incremental.
  - Capacity is increased by adding I/O slaves and sharing common I/O Master
    - “Pay-as-you-go” architecture
Advantages
Advantages

- Communication Alarms and Fail Safe actions
  - No system is completely immune to signal loss.
  - Communication alarms inform user the link is lost.
  - In the event of a communication failure, the I/O slave will control outputs based on the pre-programmed fail-safe default.
Advantages
Advantages

• Flexibility
  – Not required to replace existing legacy infrastructure. Wireless I/O can be implemented slowly over time.
  – Mobile Instrumentation
Advantages

• Flexibility (Cont’d)
  – Modbus
    • Dramatically increases available I/O count
    • Eliminates the need for hardwiring I/O Master to the control system
Advantages

• Reliability
  – Wireless systems must be just as reliable as traditional Copper wire.
    • Depending on the specific application, corrupted data can result in anything from a disruptive glitch to a devastating failure.
  – Three factors determine signal reliability
    • Path Loss
    • RF Interference
    • Transmit Power
Advantages

- **Diagnostic Monitoring**
  - Occurs outside the normal transmission of I/O data
  - Normally fed into diagnostic monitoring software package
  - Provides overall RF management
  - Historical database
Advantages

• Low Power Consumption
  – Translates into smaller batteries and solar panels
  – Makes remote site deployment feasible in areas previously considered impractical for monitoring and control.
  – Provides up to 14 days of autonomy
Applications

- **Plunger Lift Control** - A microprocessor-based controller for oil or gas wells using a plunger lift device is disclosed, which responds to variations in the well production and operation through a series of input signals derived from the well operation. The controller will automatically make corrections in the operation times and cycles to maximize the well performance and maintain environmental safety.

Using Wireless you can:

- Change optimization set points remotely
- Monitor multiple well pressures wirelessly using 1 RTU (Analog Inputs)
- Monitor multiple plunger arrival sensors wirelessly using 1 RTU (Digital Inputs)
- Valve control (Digital Outputs)
Applications

- **Pump off Control** - A pump off control method comprises detecting the speed of the induction motor and an instantaneous value of secondary current of the induction motor. Down stroke time in every cycle of the pump jack is detected. An average value of instantaneous values of the secondary current of the induction motor in the down stroke time in said every cycle is calculated. An average value reference of the secondary current of the induction motor to be compared with calculated average value of the instantaneous values of the secondary current of the induction motor is set. The calculated average value of the instantaneous values of the secondary current is compared with the average value reference after the down stroke end in each cycle. An occurrence of pump off is detected if the calculated average value of the instantaneous values is greater than the average value reference.

Using Wireless you can:

- Remotely monitor pump jack status and cycle times
- Manage failures by exception
Applications

Security – “Copper theft task force makes first arrests”

Using Wireless you can:

- Take advantage of theft security surveillance technology
- Configure event triggered cry out alarms
Success Story

• Wireless technology has widespread acceptance throughout all of the major production fields – both onshore and offshore.

Optimizing the efforts of our staff resources - engineering and mobile technical units – is critical to our overall Return on Investment (ROI) and ultimately our bottom line.
Conclusion

• Wirelessly enabled I/O solutions offer an evolutionary opportunity to turn more information into knowledge across geographically dispersed assets, leading to:

  • Optimized Productivity
  • Improved Safety
  • Asset Reliability
• **Wireless I/O** is positioned to meet specific challenges beyond just wiring costs. As a result, companies can:

  – Make better decisions with real time information,
  
  – Creatively solve difficult challenges, and
  
  – Deliver a major, positive impact to the bottom line
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