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The clear path to operational excellence



Yokogawa Wireless I/O Radio Solutions

May 2009

Network Solutions
Product Marketing

- Yokogawa Wireless I/O Offering
- Modems
- WIBnet
- Configuration Software
- Selling Wireless
- Applications
- Common Questions / Mistakes

Complete wireless offering - 2 major groups

Wireless I/O (905U-L-T, 905U-x, 115S)

- Complete range of wireless I/O
 - Analog
 - Digital
 - Pulse Train (Counter)
 - Thermocouple
- Start small, add as your needs dictate
- Low-cost, low power input wireless devices
- Industrially hardened package & operating specs

Wireless I/O Gateways (905U-G-xx)

- DCS, I/O, PLC interface - *peer-to-peer* connectivity
- Variety of bus interfaces – Profibus, Modbus, DeviceNet
- Protocol converter - Modbus, Devicenet, Ethernet
- **WIBnet™** data transfer technology - fast, secure, reliable



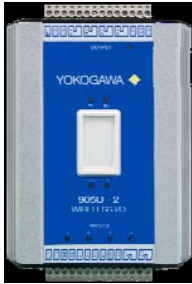
905U



115S



905U-G



905U

- ⇒ **Wireless I/O for control and monitoring of analog, discrete and pulse signals**
- ⇒ **Distances up to 20 miles Line Of Sight**
- ⇒ **IntelliPolling & Exception Reporting** technology for efficient, reliable, and fast data transfer
- ⇒ **Flexible IO**(each module contains different I/O combinations)
 - Analog
 - Digital
 - Freq
 - Pulse
 - Contact out
 - High/low set point available
 - Mix and match the RS485 IO expansion units to suit the application
- ⇒ **Two-way communications – allows monitoring & control (inputs & outputs)**
- ⇒ **SMARTpower for flexible and fail safe powering options**
- ⇒ **Built for harsh and congested industrial environments**
 - Free intuitive “Smart” diagnostics and configuration software
 - Safe & reliable protocol designed for secure operation in noisy environments
 - Compliant with international operating standards (EMC, CE, CUL)
- ⇒ **Much, much more: Set point control, pulse rate calculations, encryption, signal inversion, repeater functionality, WIBnet compliant**

Radio	905U-1	905U-2	905U-3	905U-4
DI	4	4	0	4-16
DO	4	1	8	4-16
AI	2	6	0	0
AO	2	0	8	0
PI	1	4	0	4
PO	1	0	4	4

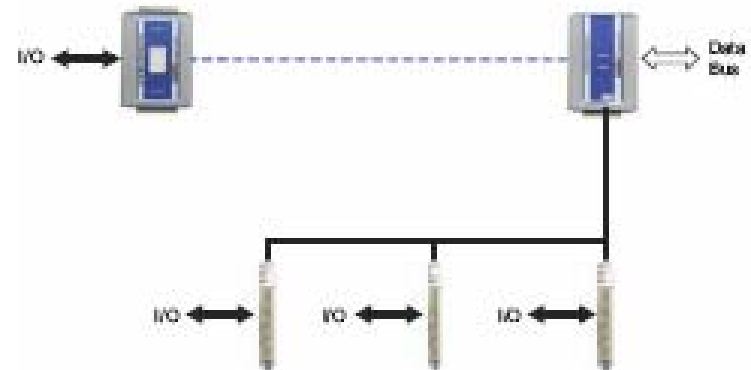
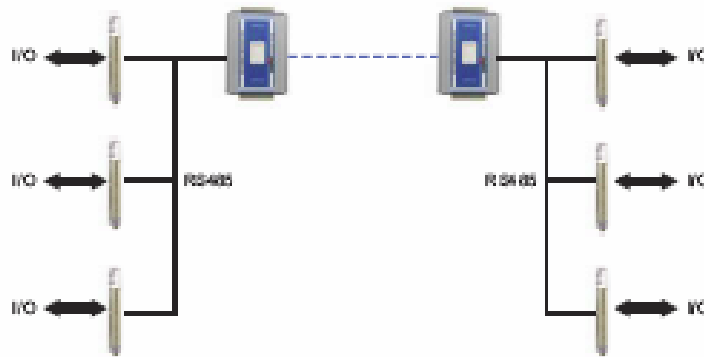
Serial Expansion – not a radio

- ❖ Low-cost expansion I/O
- ❖ multi-drop RS485 mode
- ❖ Up to 31 units per radio
- ❖ 3 versions – variety of I/O
- ❖ easy-to-use config software
- ❖ Class I DIV II certified
- ❖ DIN Mount or wall mount
- ❖ Use as expansion for Modbus PLC

115S

115S

115S



Serial X	115S-11	115S-12	115S-13
DI	Up to 16	Up to 8	Up to 8
DO	Up to 16	Up to 8	Up to 8
AI	0	4 Floating or 8 Common	0
AO	0	0	8 sync or source
PI	4	0	0
PO	4	0	0

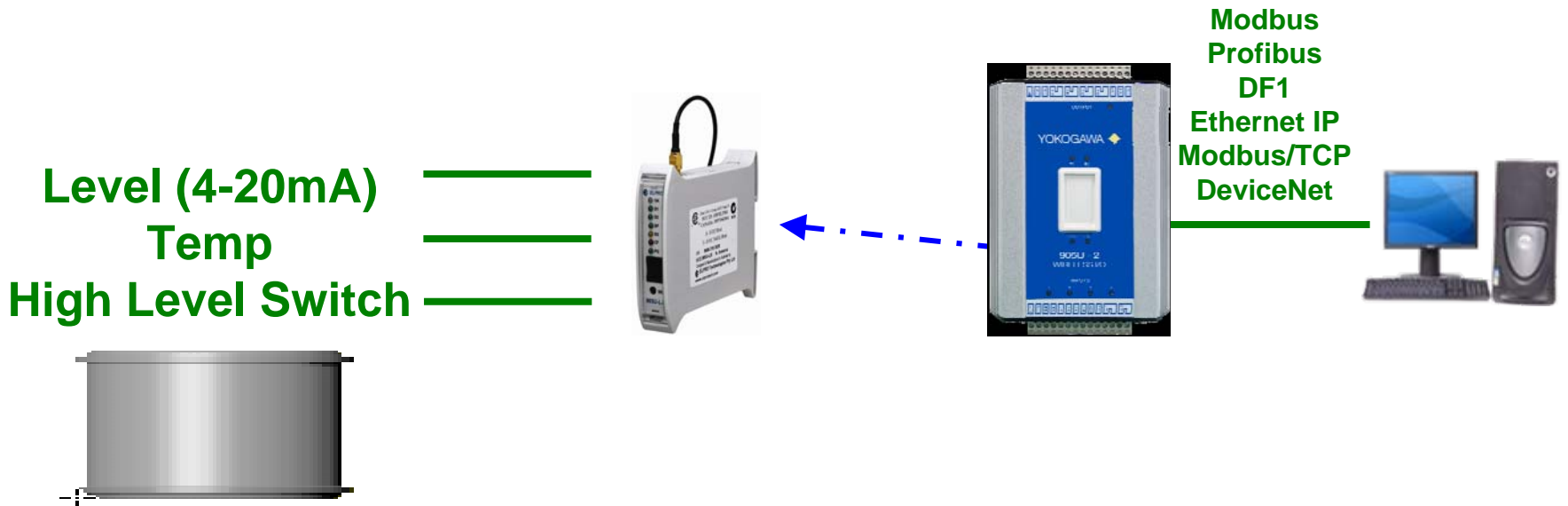
- Compact and simple back to back pair – pre configured as a pair from the factory.
- Also interfaces to any other WIBnet radio
- **905U-L-T inputs:**
 - 1 x 4-20mA
 - 1 x thermocouple (J/K/T)
 - 2 x DI
- **905U-L-R outputs:**
 - 1 x 4-20mA
 - 3 x DO (Dry Contact)
- **Industrial-strength transmission of 1W @ 900MHz**
 - LOS 20miles, 3000' congested areas
- Superior receiver sensitivity – best in class RSSI
- Targeted Applications: Pump condition monitoring, tank gauging, O&G plunger pump monitoring, oilfield water separation systems

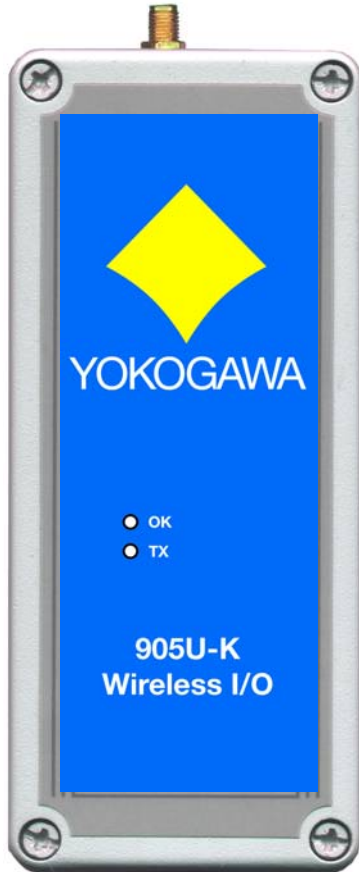




905U-G

- ❖ **Serially interface of WIBnet products to DCS, SCADA or PLC**
- ❖ **Multiple Protocols:**
 - Modbus Master / Slave
 - DF1
 - Profibus Master / Slave
 - DeviceNet
 - Ethernet IP / Modbus TCP,
 - Modbus Plus units available
- ❖ **Converts between any protocol wirelessly**
- ❖ **Capable of handling large I/O counts (up to 4300 16 or 12 bit registers)**
- ❖ **Licensed and unlicensed radios available**





→ Wireless monitoring with or without power

→ On board I/O

→ No outputs

DI	2
PI	2
AI	1

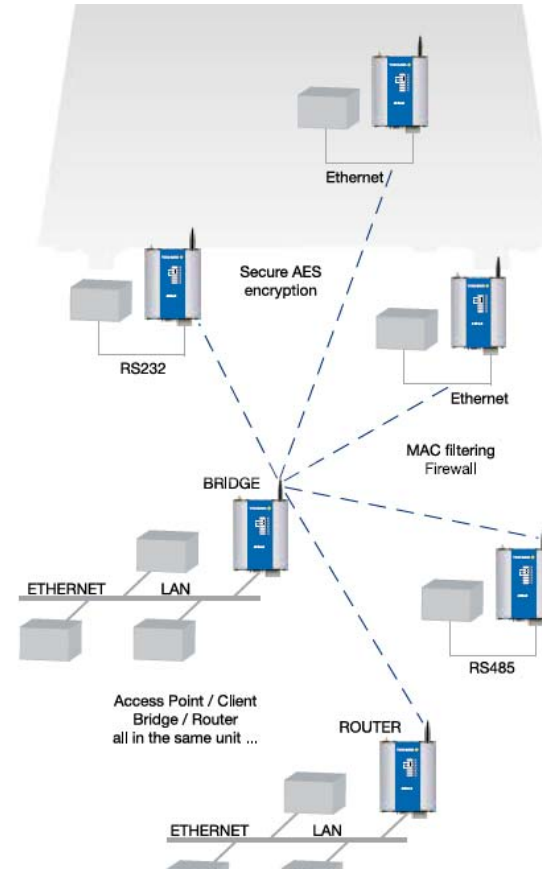
→ Built for Battery Power

- DI constantly monitored, AI powered on an interval "Sleep Mode"
- Monitors and alarms own battery power
- Battery-life calculation sheets available

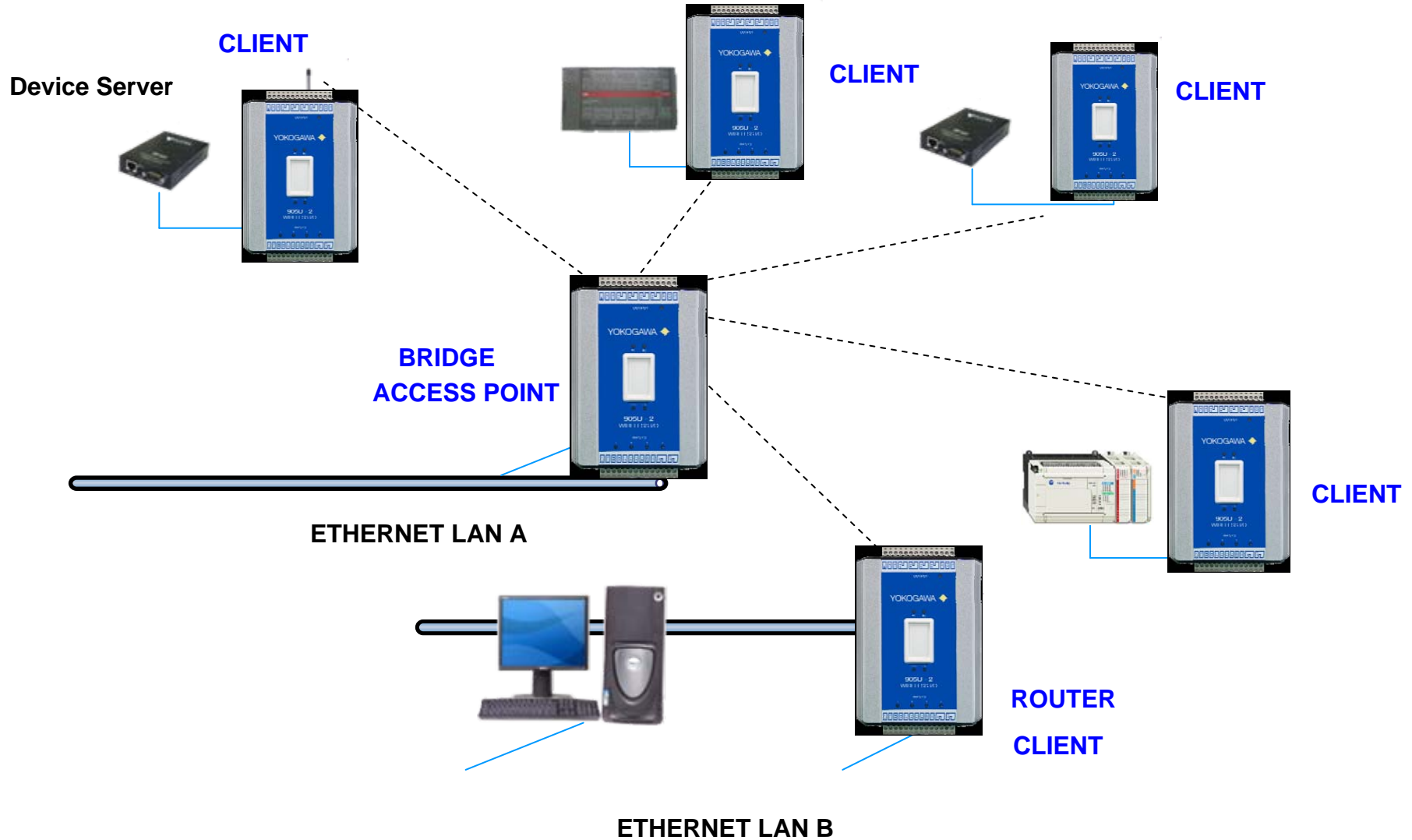
→ NEMA4 weatherproof housing

→ Variety of uses: tank level monitoring, gas detection, safety showers

1. Access Point Sends out a periodic “beacon”
2. Each Client responds to the access point with the best signal
3. A Link is then established
4. Data is transparently transferred over the wireless network

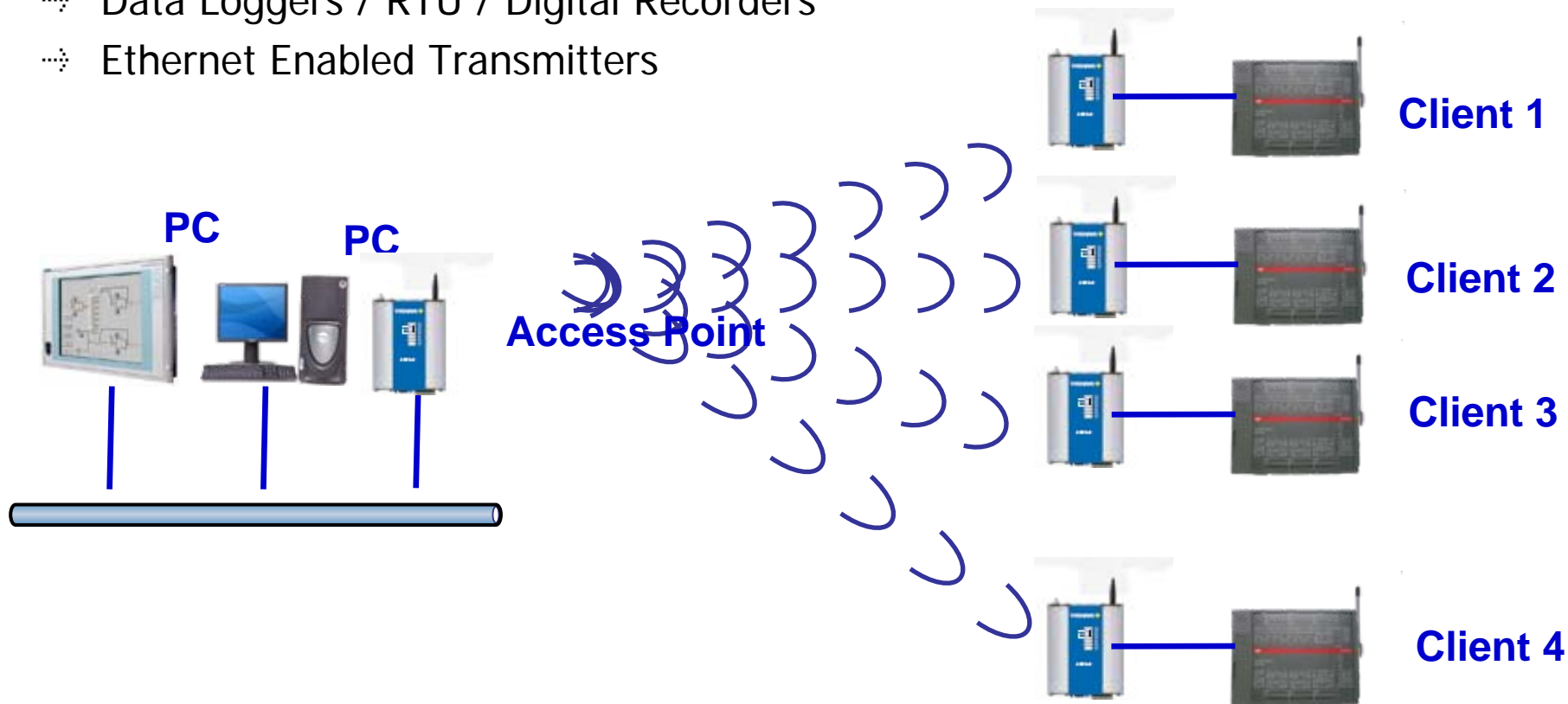


Access Point / Client / Router... all in one



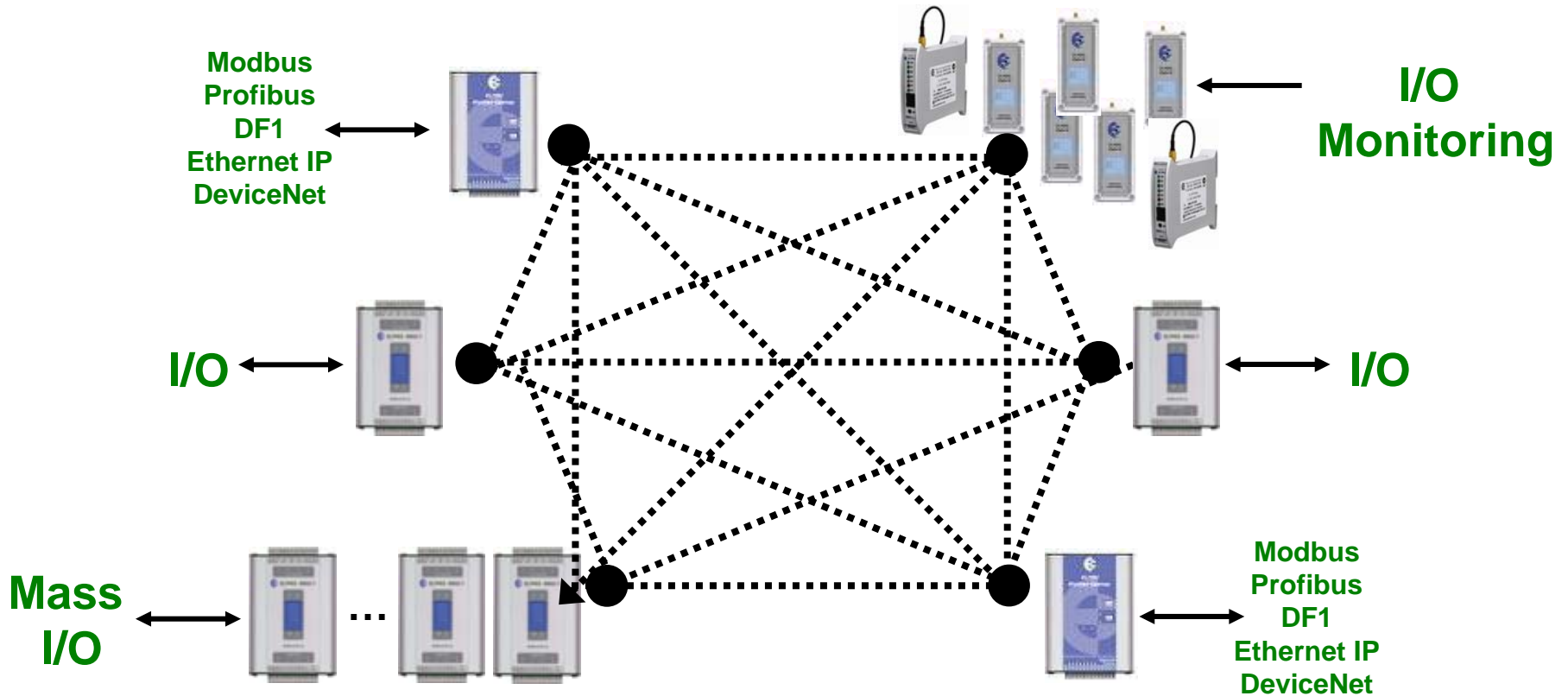
Wide variety of uses including...

- PLC Connectivity
- Data Loggers / RTU / Digital Recorders
- Ethernet Enabled Transmitters



- Low Cost
- No configuration necessary by default
- WIBnet Compliant – Prepare for future expansion into the ELPRO WIBnet
- Thermocouple Inputs
- Not RF matched easy to reconfigure units, no need for rechipping
- Easy to add units to network with ELPRO WIBnet
- Up to 3000 “L” units in the same network
- Exception Reporting throughout network
- Walk-Up signal strength diagnostics via onboard LEDs
- Small learning curve and setup time

Wireless system flexibility and scalability



- Any input can be mapped to any module, any output
- Inputs can be mapped many times to different outputs
- Each output should only be mapped once

The screenshot displays the configuration software interface. On the left is a tree view of units under 'Site Survey 1', including '905-1 Building 1 DCS', '905-K Remote Site 32', and '905-G#3'. The main area shows 'Unit Type: 905-K' with buttons for 'New ID Mapping', 'New Poll Mapping', 'New Comms Fail Mapping', 'Delete', and 'Edit'. Below this is a table with columns: Inv, Input, Dest Unit, Output, Rep'ter 1, Rep'ter 2, and Rep'ter 3. The first row shows 'N', 'DIN1', '905-1 Building ...', 'DOT3', and empty cells for the other columns.

A 'Mapping Configuration' dialog box is open, showing the following details:

- Source Unit: 905-K Remote Site 32
- From Input: Digital Input 1
- To Destination: 905-1 Building 1 DCS
- At Output: Digital Output 3
- Buttons: Apply, Cancel
- Via Repeaters: 1 None, 2 None, 3 None, 4 None, 5 None

The dialog also features three lists: 'Originating IO' (including Analogue Input 1, Supply Voltage, Digital Input 1-2, Setpoint 1, Supply Low Volts, and Pulsed Input 1-2 Count and Rate), 'Destination Unit' (Unknown Unit, 905-1 Building 1 DCS, 905-K Remote Site 32, 905-G#3), and 'Destination IO' (Analogue Output 1-2, Digital Output 1-4, Pulsed Output 1).

Other Process Industries

- Tank Monitors
- Vibration Monitors
- Temperature Monitors
- Gas Detection Systems
- Emergency Shower Alarms
- Outflow Monitors
- Water well pump control
- Mobile Cart Wiring
- Outflow Monitors
- Utility Monitors
- Water system control

Oil and Gas Production

- Cathodic Protection
- Sump Pump Monitoring
- Well Pump Monitoring/Control
- Gas Detection
- Pipeline pressure, flow and valve monitoring

Oil and Gas Refining

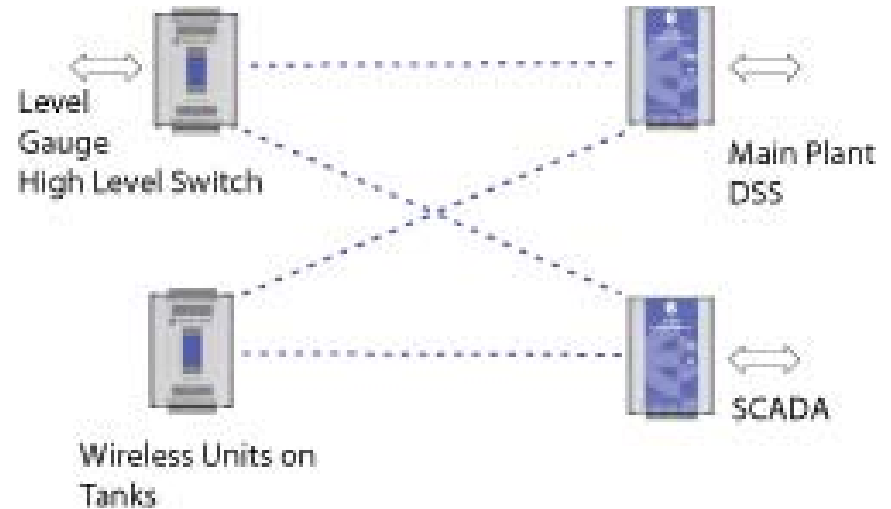
- Tank Monitoring
- Vibration / Temp Monitoring
- Safety Shower Monitoring
- Outflow Monitors
- Gas Detection
- Water well pump monitor/control
- Redundancy Applications
- Leakage detection systems

An oil refinery fitted ELPRO wireless gateways to its tank level-gauges.

ELPRO was chosen because of the Gateways' ability to connect to a wide range of different level gauges, each using different field bus protocols.

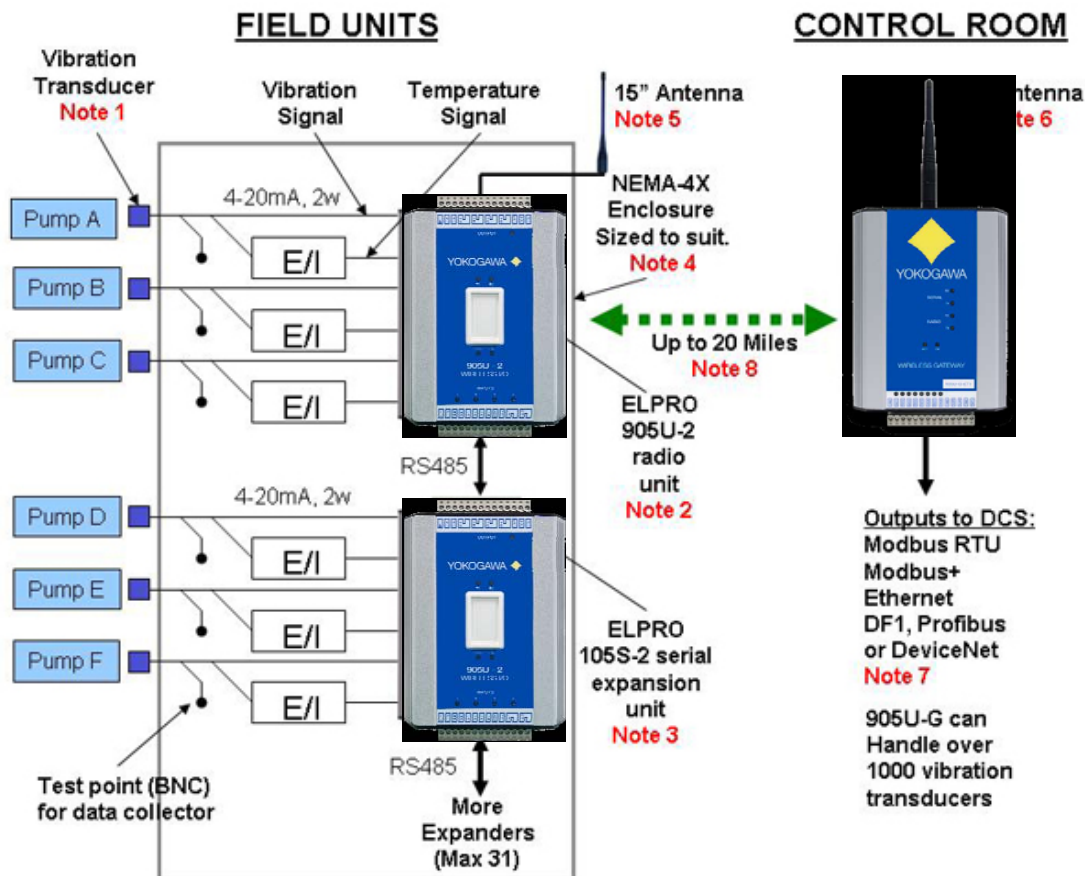
The ELPRO gateways also connected directly to the tanks independent high level point alarm.

The wireless tank farm system formed part of a plant-wide wireless information system, utilizing ELPRO's efficient peer-to-peer WIBnet wireless communications. The system also formed part of the plant energy management system, and alarm monitoring system.

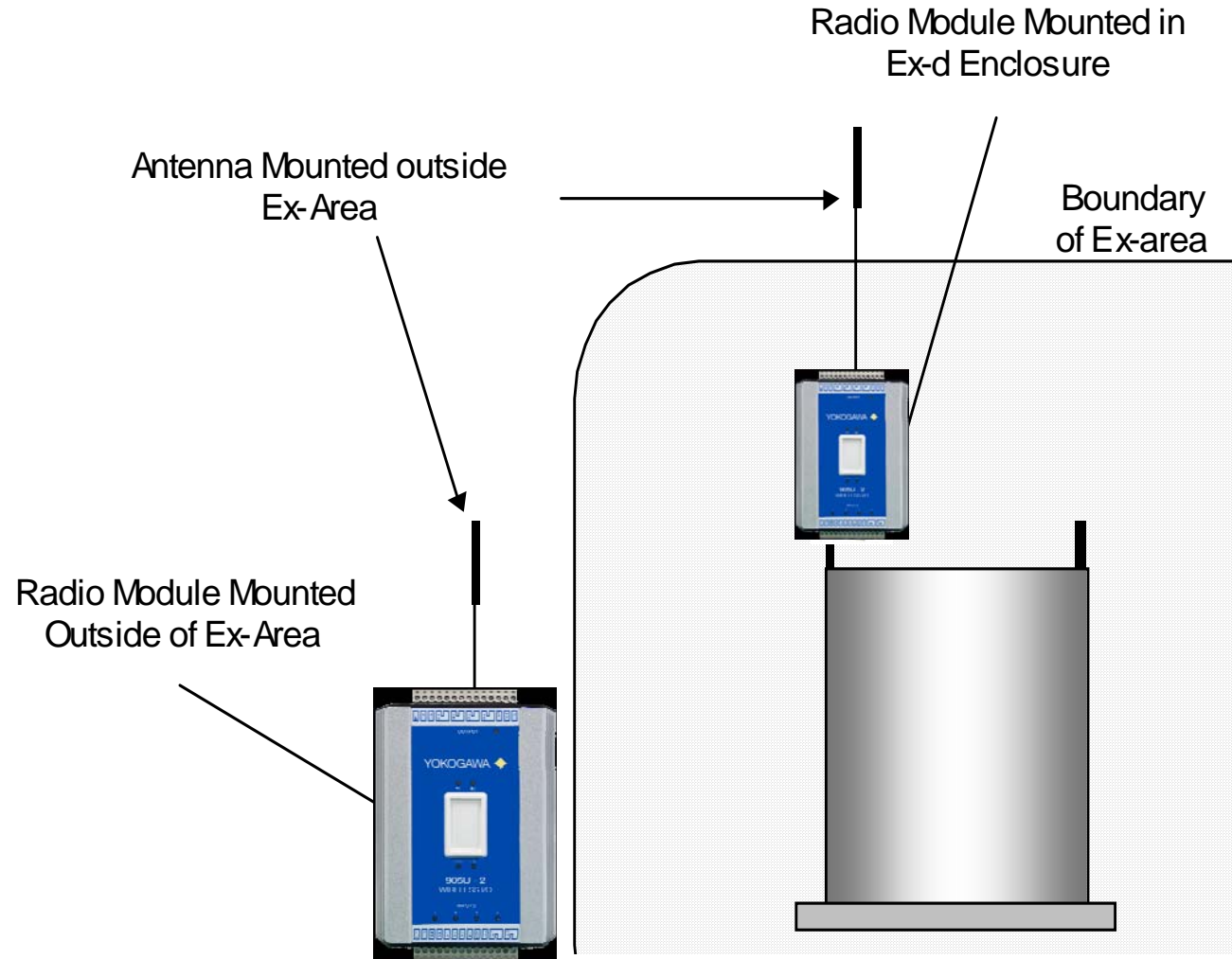


Preventative Maintenance

Vibration transducers can output a 4-20mA value to indicate the amount of vibration occurring on a device. The 4-20mA value is wired directly into one of ELPRO's wireless IO devices, and the signal transmitted across the plant to a receiving unit, which interfaces the field IO to a DCS or PC in the form of a 12 or 16 bit value from 9 different industrial protocols. Vibration is then constantly monitored and trended, with alarming done locally.



Explosive Area - Tank Gauging



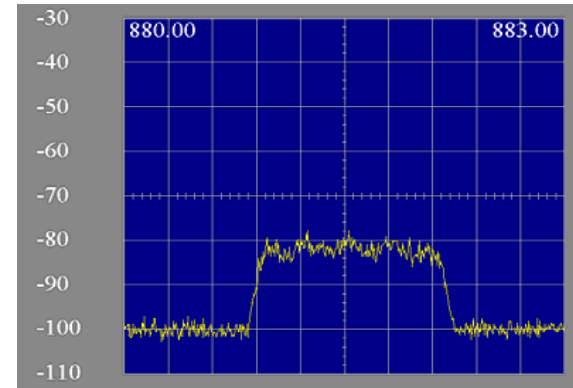
- ❖ Does it have to be LOS?
 - Not necessarily.
- ❖ How does it handle interference?
 - 5retries on 5 different frequencies
 - Alarms if communications is lost
- ❖ What is its area classification?
 - Class I, Div II
- ❖ Does it have to be in a panel?
 - Out of the elements
- ❖ What are the temperature specs?
 - -40F to 140F
- ❖ Are there relay contacts?
 - Yes, on the 905U-1
 - No, FET on the 905U-2, 905U-3, 905U-4 – use an interposing relay



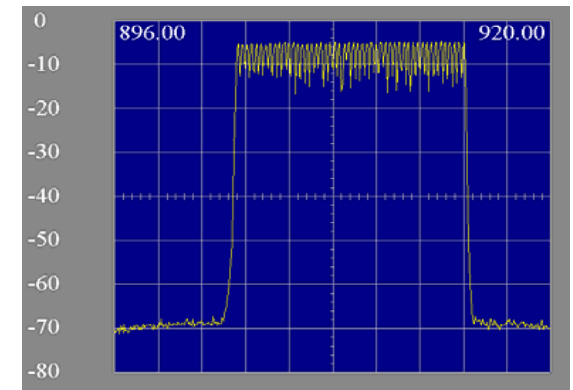
- Product recommendation
- Antenna recommendation & placement

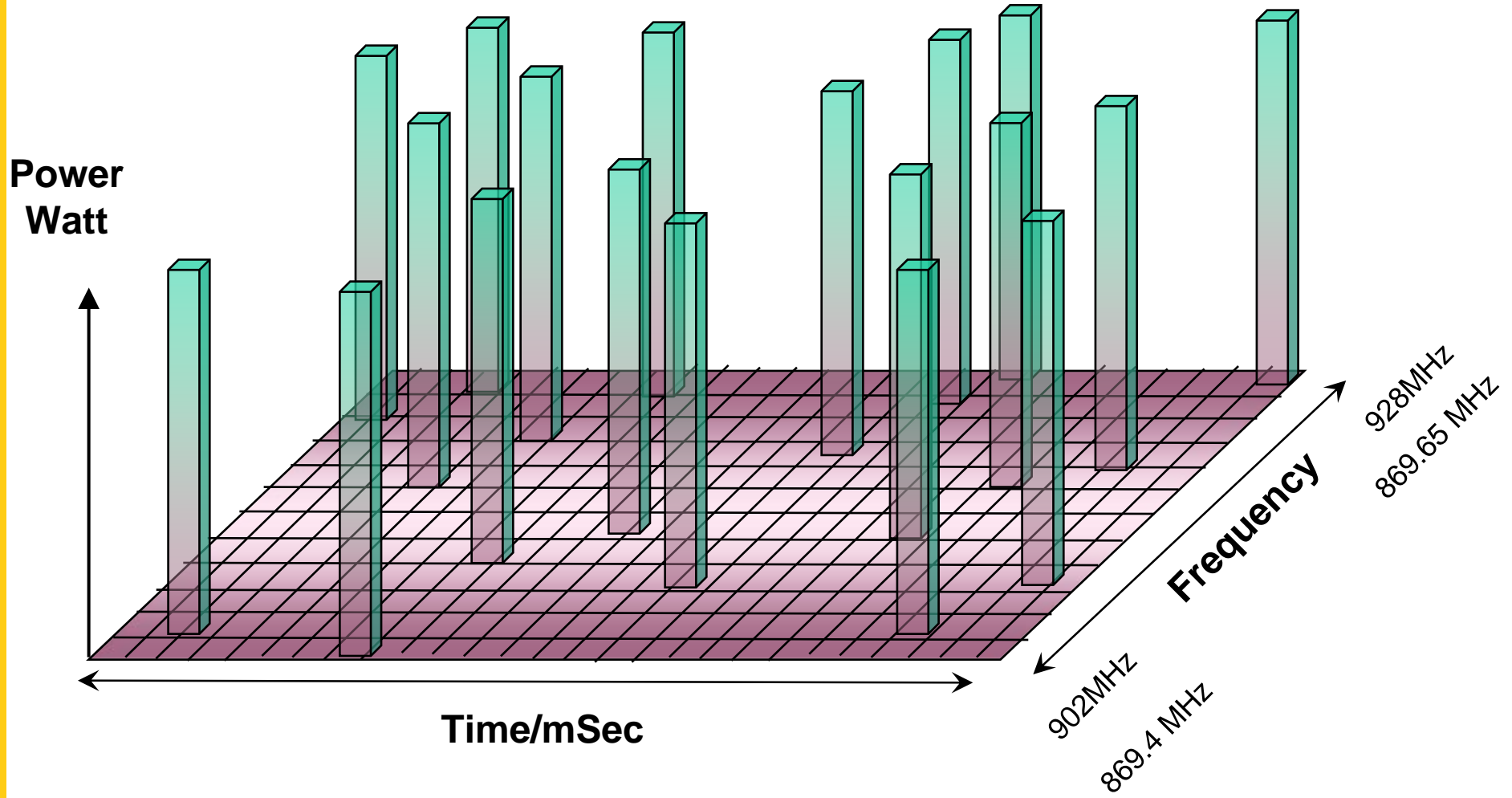


- **Direct Sequence (DSSS) 2.4GHz**
Spreads data packet over wide band - effectively transmitting each bit on many channels. Higher data rates (> 1Mb/s), but vulnerable to interference.
 - **100 or 300mW**
 - **1-3 miles LOS** (Line of Sight)

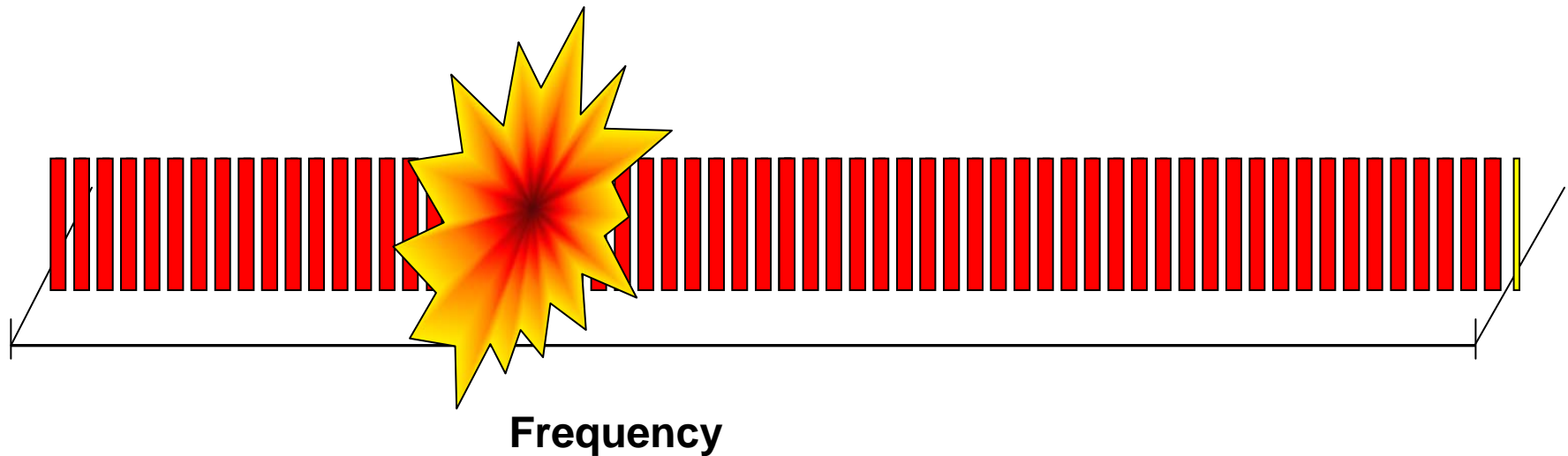


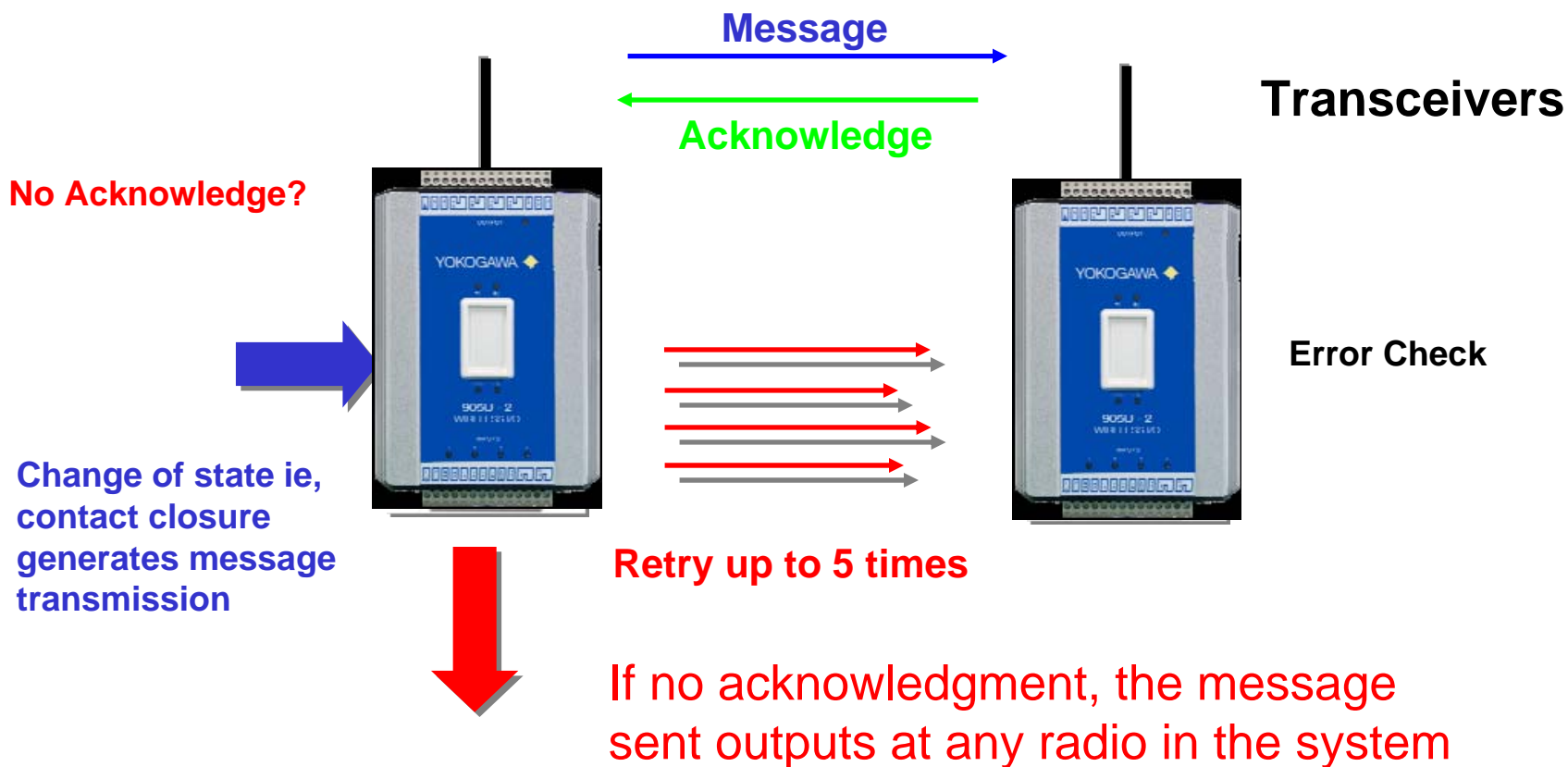
- **Frequency Hopping (FHSS) 900MHz**
Change frequency after each data packet. Slower data rates (115.2Kbd), but more robust. Less vulnerable to interference.
 - **1W**
 - **Up to 20 miles LOS** (Line of Sight)





- Each message (data) sent at a different frequency over the spectrum
- Moderate RF Interference – Pretty Good Signal Reception
- Heavy RF Interference – **Acceptable Communication**





Thank you....

