ISA100 Wireless Training: Galveston, Texas

Field Deployment Guidelines
Session 5

Collect Requirements

- **RFP/RFQ that details field deployment requirements**

- **Centero Industrial IoT Field Deployment Survey**

- **Maps or drawings of deployment facility very helpful**

- **GPS coordinates allow for wireless link modeling**
  - **Distance between equipment to be deployed**
  - **Elevation differences**

Industrial IoT Field Deployment - Requirement Survey

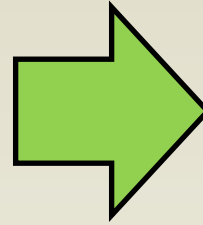| #	Question	
1	Customer name	
2	Application/Market	
3	Type of environment (please describe in detail, also include any HAZLOC area designation)	
4	Target line-of-sight range between field instruments	
5	Desired scalability per Gateway	
6	What is the typical real estate area covered by one deployment?	
7	Is standards compliance desired or mandatory? Is instrument certification desired or mandatory?	
8	How often is periodical data transmitted? (in msgs/sec)	
9	What is the typical data payload sent?	
10	What is the max data payload sent?	
11	Are instruments engaged in monitoring, control, or both?	
12	Any latency requirements?	
13	What is the size of the periodical data payload (bytes)?	
14	Are there any latency requirements associated with periodic data (max)?	
15	Are non-periodic commands being sent to the field instrument?	

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Collect Requirements

Type of application →

Process automation
Upstream or downstream
Mining – underground or open pit

Downstream

Upstream

Mining

Type 2 Area: WiFi MESH Infrastructure

Type 1 Area: ISA100 Wireless + WiFi MESH Infrastructure
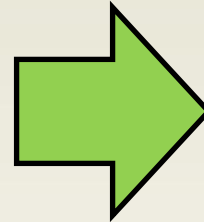
Requirements

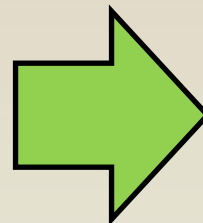|	
Area designation (HAZLOC, non-HAZLOC, zones etc)	→ Determine the selection of the equipment installed
Monitoring and/or control	→ Bandwidth and latency considerations
Connectivity to the plant network	→ MODBUS, GCCI, OPC UA, PROFINET/ProfiSafe, HART-IP
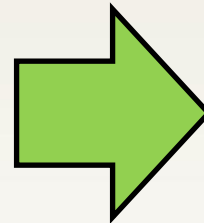
Deployment Topologies

Scalability and geographic area to be covered ➜ Determine deployment topology

All-in-One Network Topology
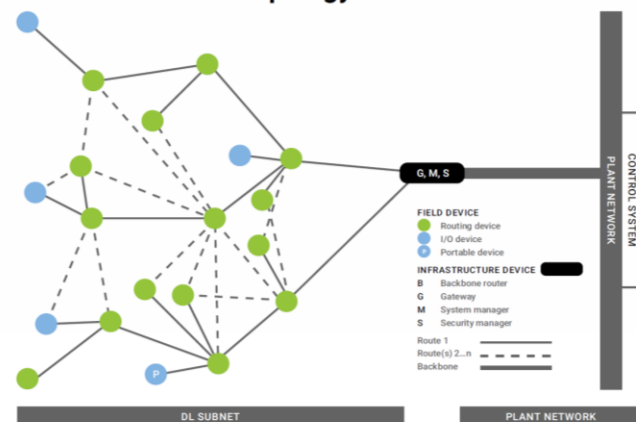
KEY CHARACTERISTICS

- Single subnet – no backbone infrastructure
- Typically scales to <100 field instruments
- Instruments deployed are in close proximity
- Cover smaller deployment areas
- Simplified network deployment

Distributed Network Topology
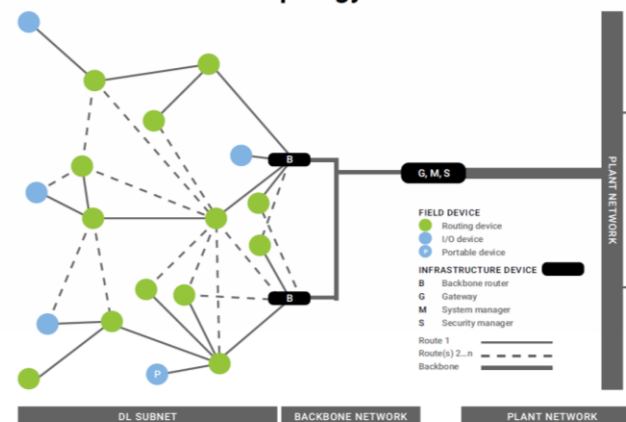
KEY CHARACTERISTICS

- Multiple ISA100 Wireless mesh subnets connected via Wi-Fi Mesh backbone
- Typically scales to hundreds of field instruments
- Instruments are scattered throughout the facility
- Extended geographic coverage (miles/kilometers)
- Plant wide wireless canopy

Centero Examples

Wi-Fi Connectivity MESH+ and PoE

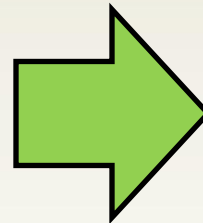All Products Include Wi-Fi Connectivity → Eliminate costly cabling needed for backbone connectivity
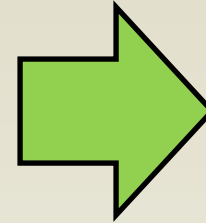
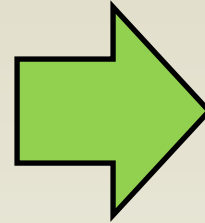Power-over-Ethernet or DC Powered → Combine connectivity and power cabling
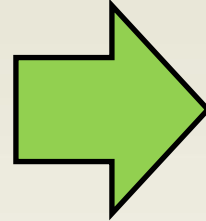
Configurable Wi-Fi – Three Modes Includes two (2) Wi-Fi modules → Modules configured independently Flexible deployment topologies
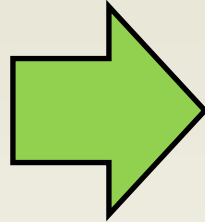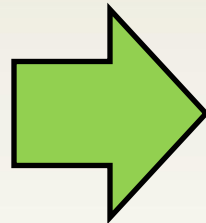
Wi-Fi Connectivity MESH+

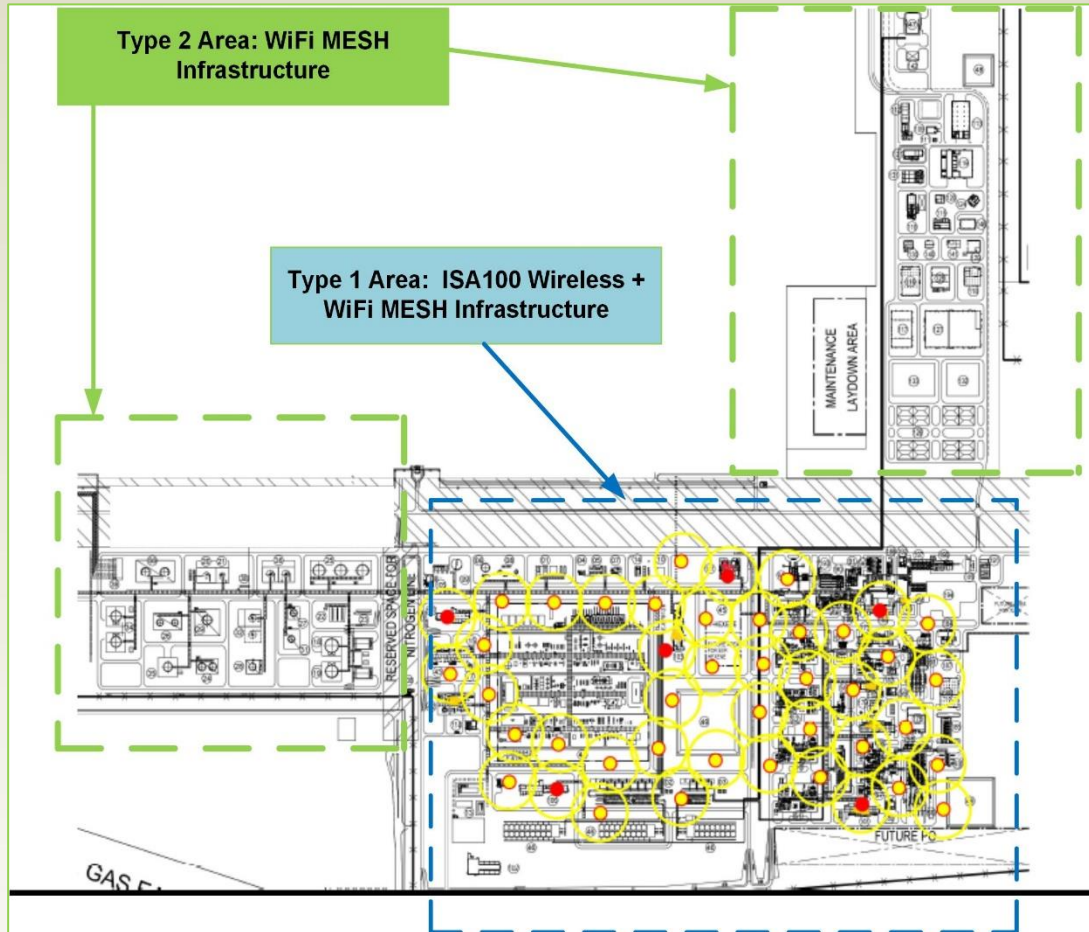|	
Mode 1: Wi-Fi Mesh	→	**High reliability due to mesh Self-forming and self-healing Cover large geographic areas**
Mode 2: Wi-Fi Client	→	**Connect to existing Wi-Fi infrastructure**
Mode 3: Wi-Fi Access Point	→	**Connect to existing Wi-Fi infrastructure**

Industrial IoT for Process Automation

- Deploy highly reliable plant wide WiFi Mesh wireless backbone canopy
- Connect ISA100 Wireless compliant field instruments
- Connect MODBUS RTU/TCP and Ethernet/serial field instruments using WiFi MESH+ adapters
- Products suitable for deployment in hazardous and non-hazardous areas
- Support for high-throughput, low-latency communications and mobility for simultaneous field data, audio and video surveillance transmission
- Connect IP cameras and handheld maintenance tools

BACKEND

BACKBONE INFRASTRUCTURE

FIELD NETWORK

IP Camera

Handheld

NON-HAZARDOUS AREA

ISA100 WIRELESS.   WirelessHART

HAZARDOUS AREA
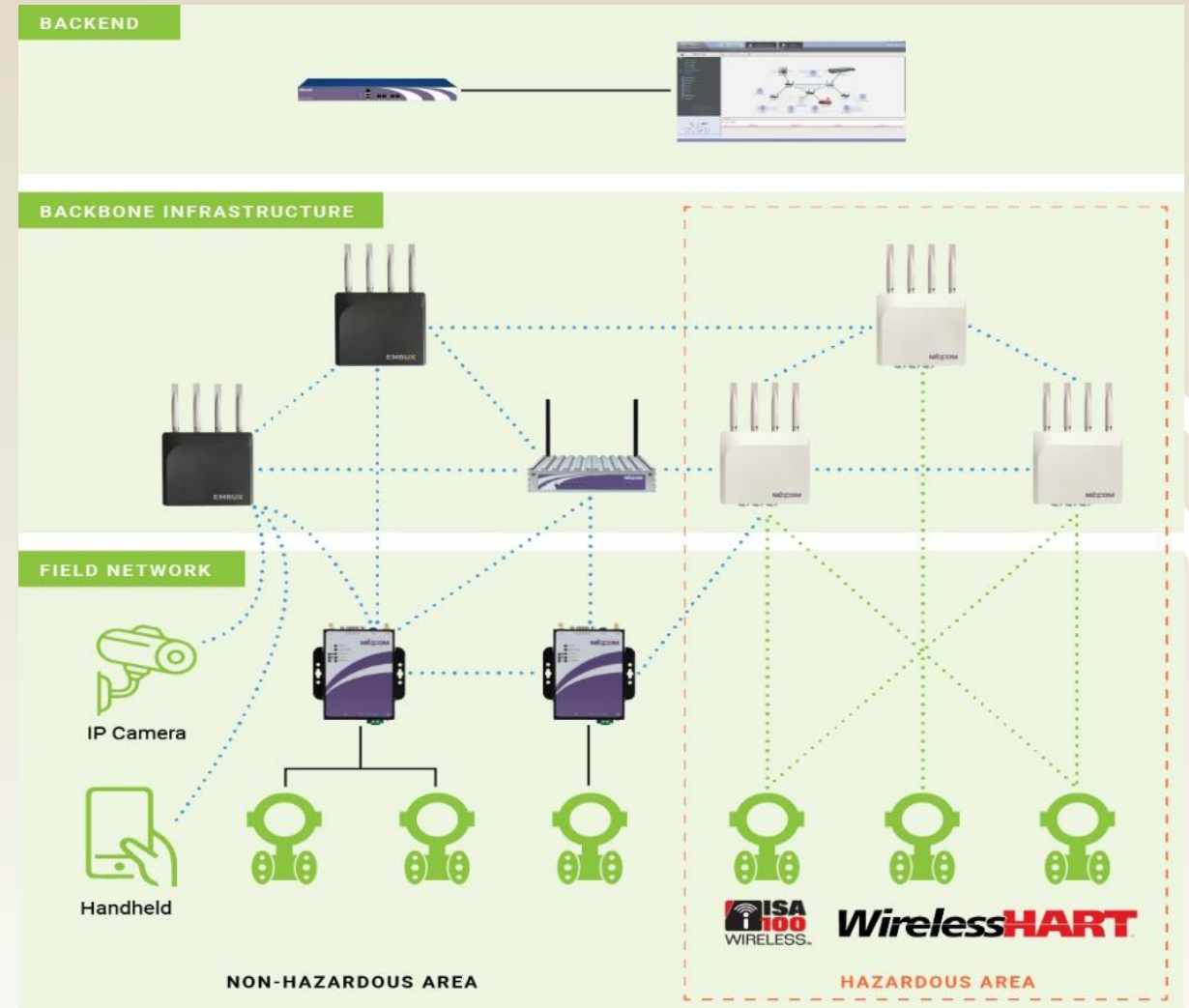
Proposed Deployment Map

List of Equipment

Icon	Product	Product Description	Quantity
	NIO200IDG	NIO200IDG ISA100 Wireless Gateway	1
	NIO200IDR	NIO200IDR ISA100 Wireless Router	5
	IWF610	IWF610 IP67 WiFi Mesh Router	6
	NIO51	NIO51 Industrial Wi-Fi MODBUS TCP/RS485/Ethernet Adapter/Router/Gateway	10
	IWF800	IWF800 nCare I4.0 Asset Manager	1

List of Accessories

| Icon	Product	Product Description	Quantity
	603ANT01700	High-gain, rugged omni-directional antennas	37
	603ANT0013X00	High-gain, rugged directional antennas	16
	AR-0NM0NF06-NI	Surge Arrester FT-RF, DC-6 GHz N-MALE TO N-FEMALE	69
	3M	Low RF loss cable high-gain antenna, L=3M	12
	6M	Low RF loss cable high-gain antenna, L=6M	32
	9M	Low RF loss cable high-gain antenna, L=9M	6
	M/F	Gender-change adapters M/F	50
	5040410110X00	Pole mount kit for NIO200	13

Practical Considerations – Antennas

- ISA100 Wireless: 2.4 GHz, high-gain omni-directional antennas
- WiFi MESH+: 5 GHz, high—gain omni-directional or directional antennas
- Installation height matters – the higher the better
- Always run RF qualification tests on antenna + extension cable + arrestor + all connectors
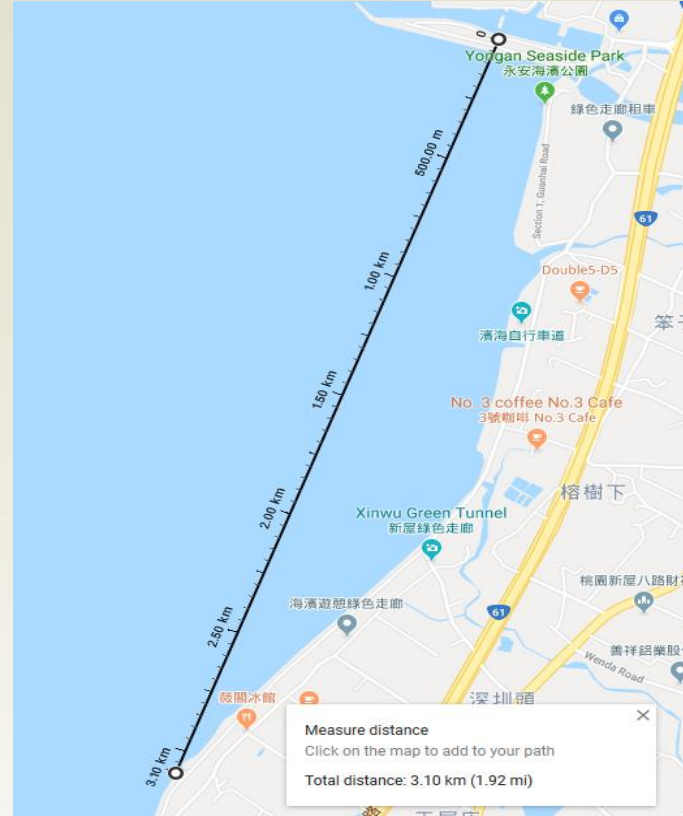
WiFi Directional Antennas are Magic

End user deployment in the port of Taipei (Taiwan).
Note that GHz RF link propagated over ocean water.
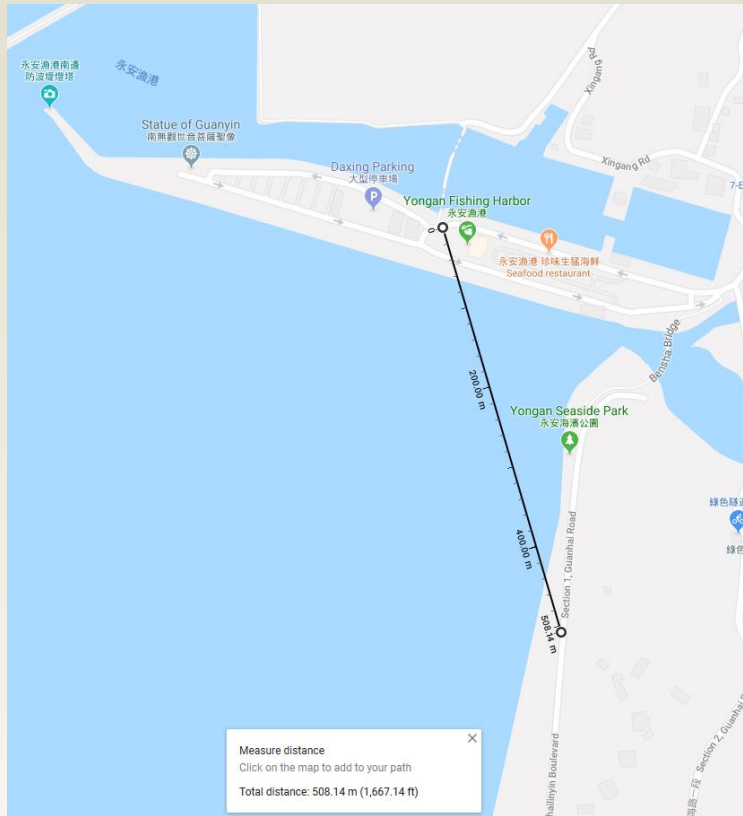
500 m – 0.3 miles

3 km – 1.86 miles

Practical Considerations - Power

- Undervoltage and over-voltage protection
- Power conditioning components
- Surge protection – line
- Battery backup desired – especially in upstream applications

Practical Considerations – Surge Arrestors

- Install surge arrestors as close to the RF port as possible
- Always weatherproof RF connections with appropriate tools and materials