Presenter

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Introduction to ISA100 Wireless

- Applications
- Network Architecture
- Overview of IEC 62734 standard
Applications
## General Benefits of Wireless Instrumentation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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</table>
| **Cost Savings**  | • Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction.  
                   • Typically: 1/5 the time, 1/2 the cost.                                                 |
|                   | • New and scaled applications are now economically feasible.                                    |
| **Improved Reliability** | • Wired sensors may be prone to failure in difficult environments.  
                              • Wireless can add redundancy to a wired solution.                                   |
| **Improved Visibility** | • Condition monitoring (equipment)  
                               • Process monitoring                                                                   |
| **Improved Control** | • Add wireless to existing processes for more optimal control.                                |
| **Improved Safety** | • Safety related alarms                                                                         |
Top Use Classes for Wireless Instrumentation

- Automated Safety Instrumented Functions
  - Control
    - Open Loop
    - Closed Loop
  - Alerts & Alarms
    - Process
    - Safety
  - Monitoring & Compliance
    - Condition
    - Process

Timeliness

Hours
Minutes
Seconds

Courtesy AIW LLC
ISA100 Wireless
Major Application Types

• Asset Health Monitoring & Analytics
• Process Monitoring & Control
• Safety Alarms

• *One network, all at the same time!*
Network Architecture
ISA100 Wireless Network Architecture

- Redundant Gateway, System Manager, Security Manager
- Redundant Access Point (Backbone Router)
- Wide variety of Field Devices

Enterprise Scalability
IPv6 to the Devices

Enterprise Networks
Big Data Aggregation from Multiple Sites

Plant-wide Network
High Reliability and Availability
Duocast for redundancy
Scales to 1000s of devices

Stand Alone Network/Point Solution
Simple and Easy
Able to Grow
Legacy Network Architectures

Scale by Duplication
ISA100 Wireless IoT Network Architecture

Plant-Wide Network Scale Through IP
ISA100 Wireless Network Architecture

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IPv6 to the Devices

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Wide variety of Field Devices
Internet of Things Enables Next Generation Automation Systems

Systems Today

Systems Tomorrow

XOM diagrams from Lockheed Martin PIRA#OWG20161002
IEC 62734 Standard
### Main Features of IEC 62734

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>IEEE 802.15.4 Radio</td>
<td>Available from multiple high quality sources.</td>
</tr>
</tbody>
</table>
| ETSI Compliant        | Compliant to new ETSI 300.328 v1.8.1  
                          Various modes of compliance, described in the standard |
| Robust                | Advanced coexistence and resiliency mechanisms at all levels |
| Secure                | Two layer AES 128 cryptography |
| IP based              | Future Proof |
| Object based          | Compact and Extensible  
                          Supports Tunneling |
End-user requirements for Industrial wireless sensing

1. Security
2. Reliable communication
3. Good power management
4. Open
5. Multi-speed monitoring
6. Multi-functional
7. Scalable
8. Global usability
9. Quality of service
10. Multi-protocol
11. Control ready

Derived from USA Department of Energy and ARC User survey

ISA100 solutions must meet all requirements simultaneously
Technical requirements for Industrial wireless sensing

| 1. Rate and Latency | • Publication rates 1-2 seconds  
|• Capable of 100 ms latency  
|• Controlled latency, ~50% publication rate  
|• 4 Hz publication in constrained configurations |

| 2. Mesh Networking | • IP Backbone: Engineered and scalable  
|• Mesh and non-mesh topology; access points and field devices  
|• Peer-to-peer communication  
|• Objects = Function blocks at device level  
|• Long and deterministic battery life |

| 3. Reliability | • Wireless transmission is deterministic  
|• Wireless transmission is received  
|• Wireless transmission is accurate  
|• Redundant communication paths to process control network |

| 4. Security | • Wireless transmission is secure; prevention & detection |
Two Levels of Security

**TL Security**
Secure sessions between IP ports
Protects the data "Layer 5"

**DL Security**
Hop-by-hop
Protects the mesh
Layer "2"

Data Flow
Robust Communications

Spectrum Analysis  System Management  Policy Enforcement
Identifying Interferers  Device Configuration  Channel Allocation
Monitoring Saturation  Element Provisioning  Rules Creation
Performance Monitoring  Blacklisting

2.4 GHz Band Congestion

2.4 GHz ISM shared band

Microwave Ovens
802.11b/g
Bluetooth

2.400  2.4835

ISA100.11a 2.4 GHz Solution

Channels 11-26

2.4 GHz

Blacklisted Channels
Frequency Hopping

ISA100 – Ensured Coexistence with Many Wireless Networks
## Conclusion

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