



# Introduction to ISA100 Wireless *(in 20 minutes)*

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# Presenter



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# Introduction to ISA100 Wireless

- Applications
- Network Architecture
- Overview of IEC 62734 standard

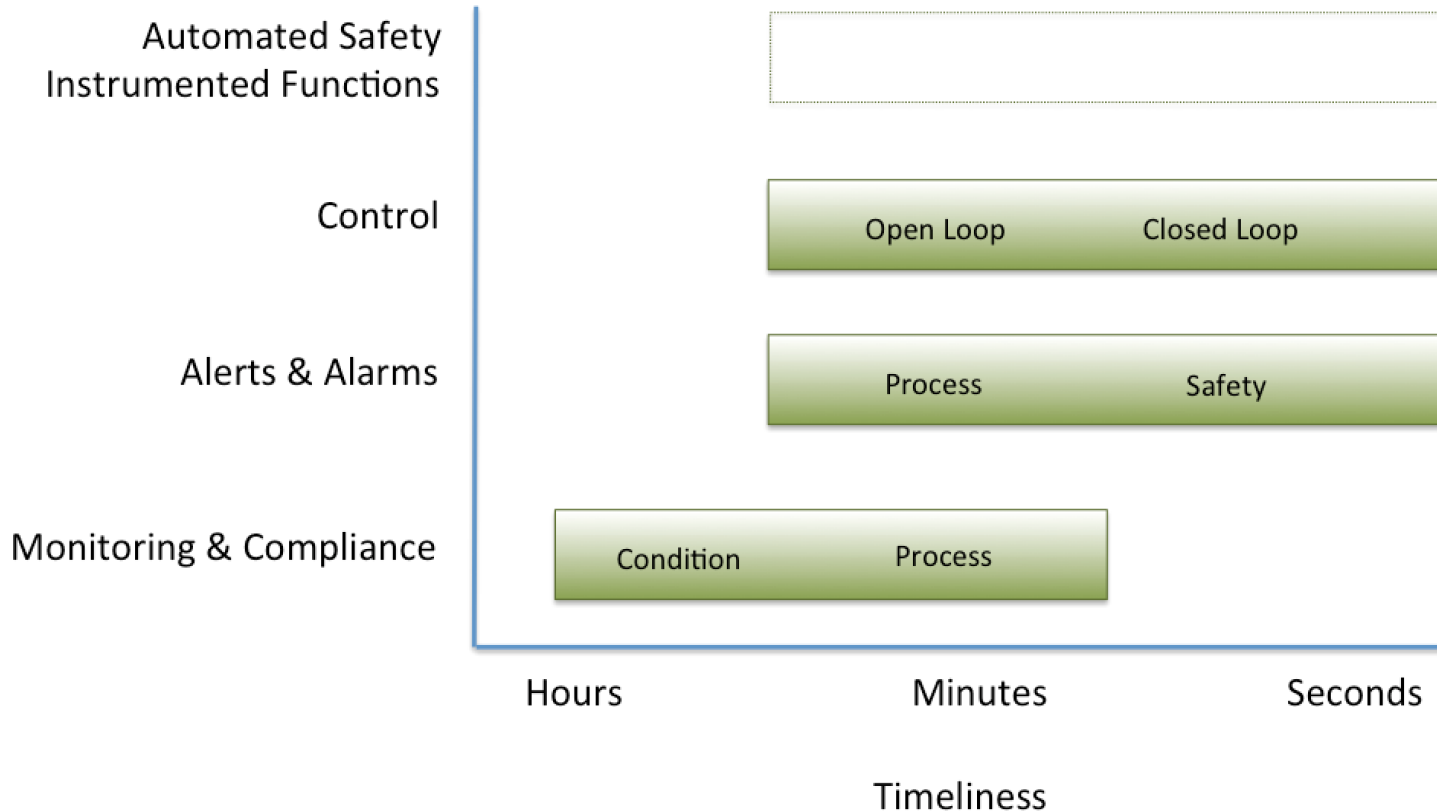
# Applications



# General Benefits of Wireless Instrumentation

<b>Cost Savings</b>	<ul style="list-style-type: none"><li>• Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction.</li><li>• Typically: 1/5 the time, 1/2 the cost.</li><li>• New and scaled applications are now economically feasible.</li></ul>
<b>Improved Reliability</b>	<ul style="list-style-type: none"><li>• Wired sensors may be prone to failure in difficult environments.</li><li>• Wireless can add redundancy to a wired solution.</li></ul>
<b>Improved Visibility</b>	<ul style="list-style-type: none"><li>• Condition monitoring (equipment)</li><li>• Process monitoring</li></ul>
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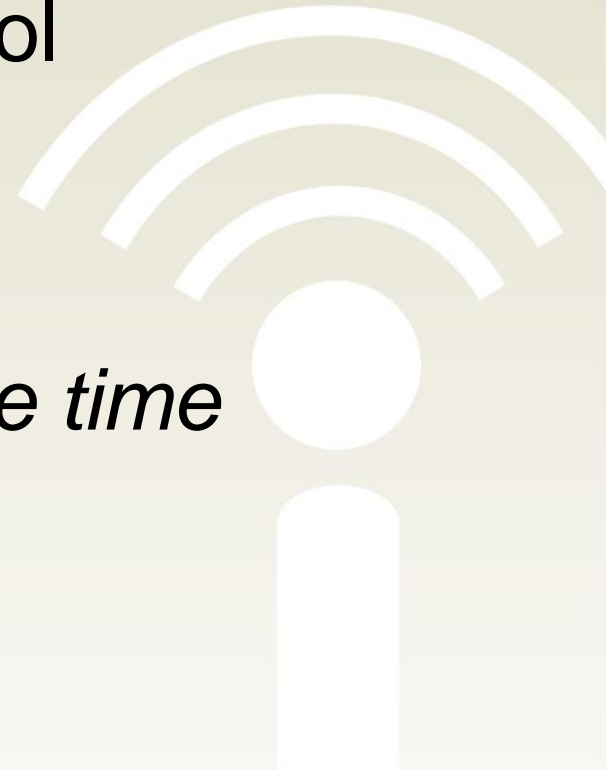
# Top Use Classes for Wireless Instrumentation



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



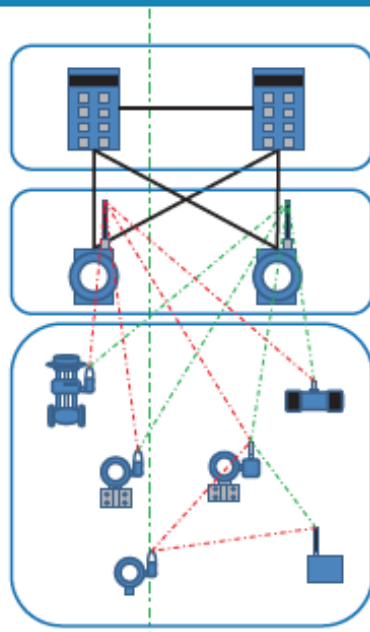


# ISA100 Wireless Network Architecture

Redundant Gateway,  
System Manager,  
Security Manager

Redundant Access Point  
(Backbone Router)

Wide variety of  
Field Devices



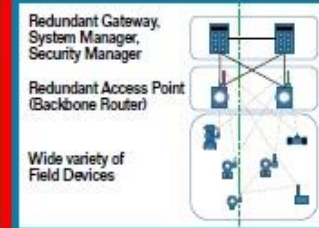
## Enterprise Scalability

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

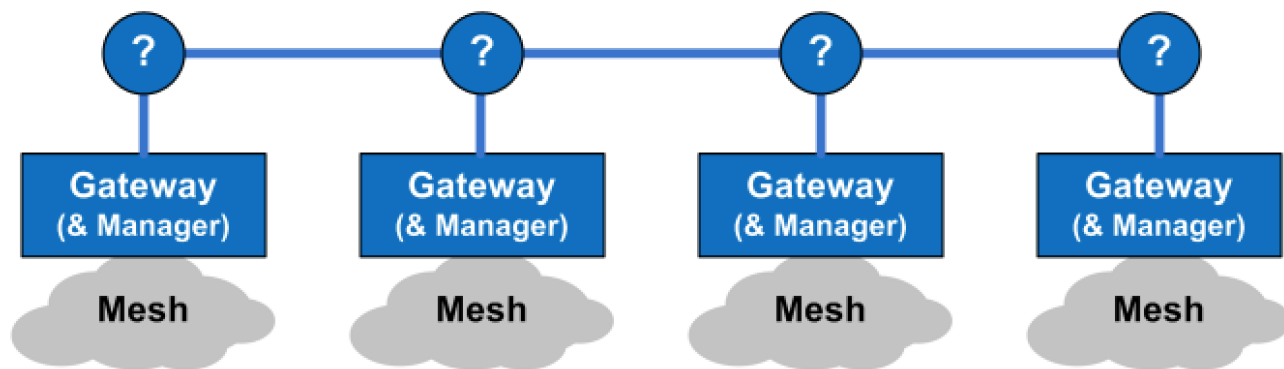


### Stand Alone Network/Point Solution

Simple and Easy  
Able to Grow

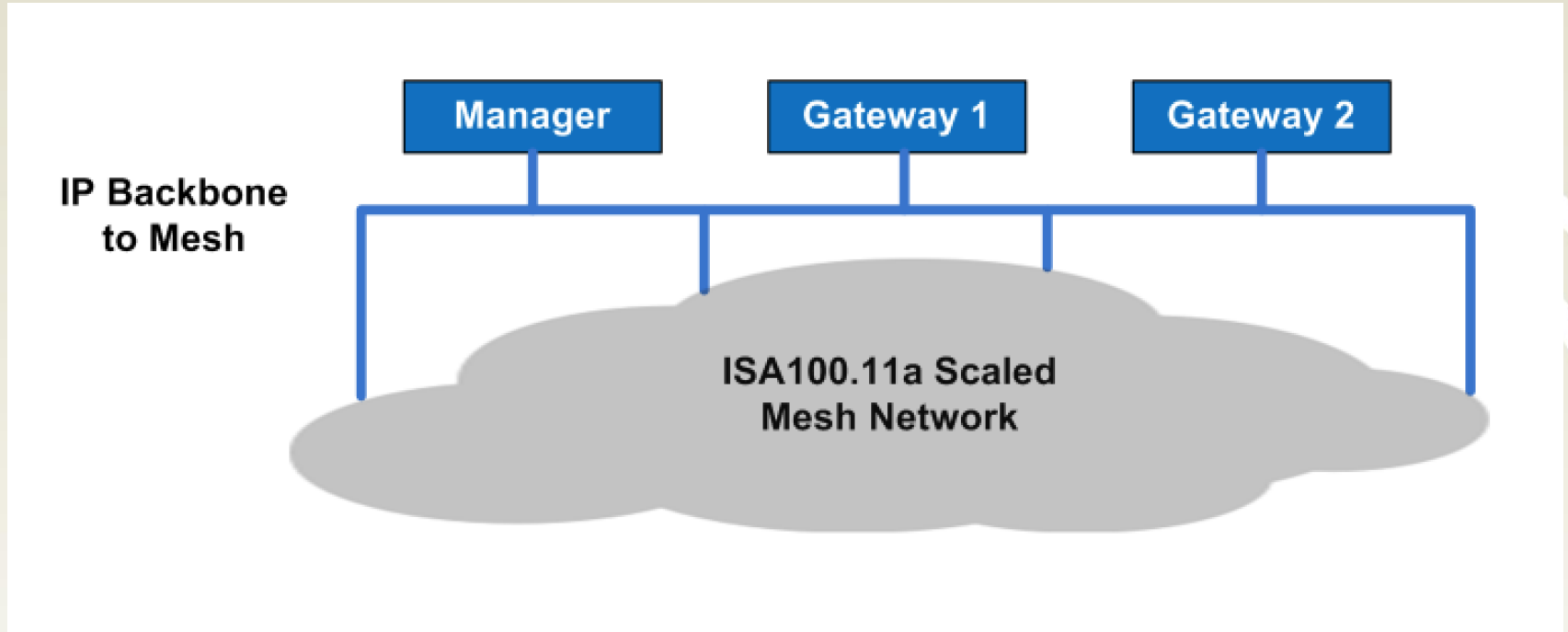
# Legacy Network Architectures

Mesh to  
Gateway



*Scale by Duplication*

# ISA100 Wireless IoT Network Architecture



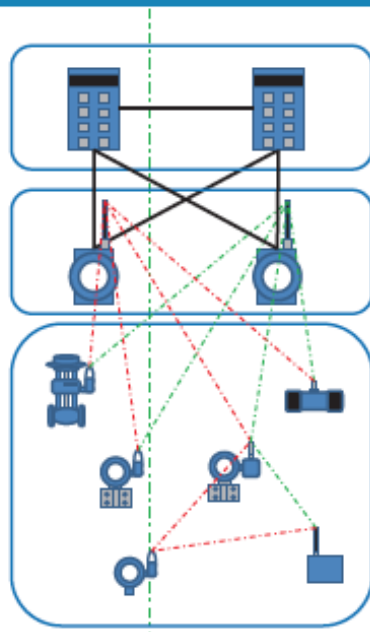
*Plant-Wide Network  
Scale Through IP*

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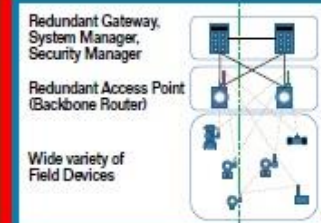
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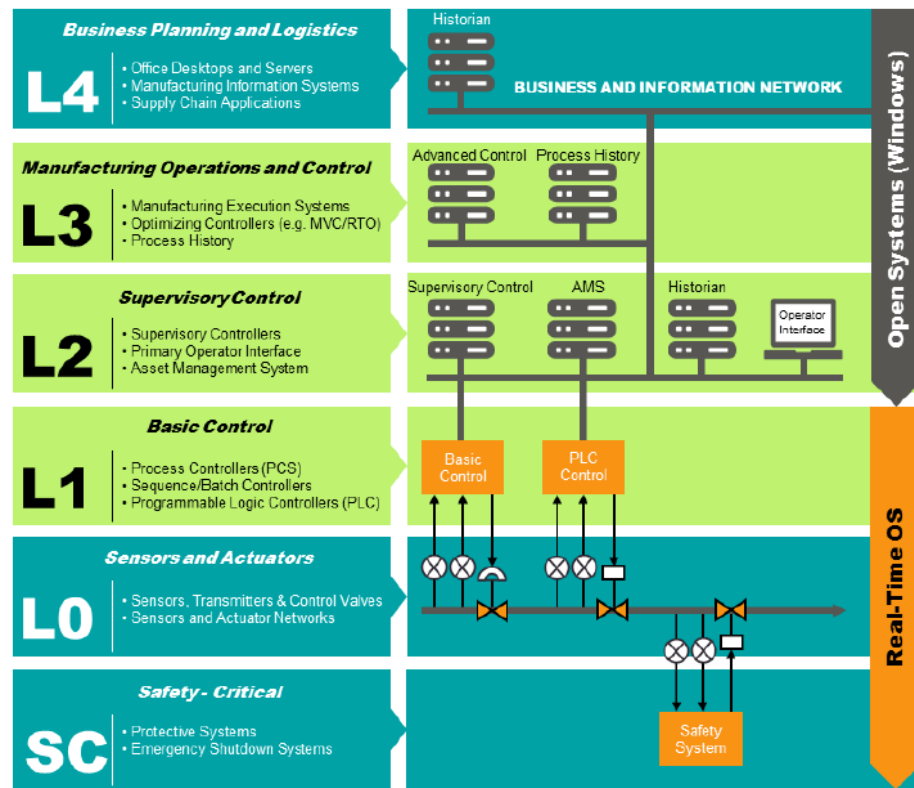


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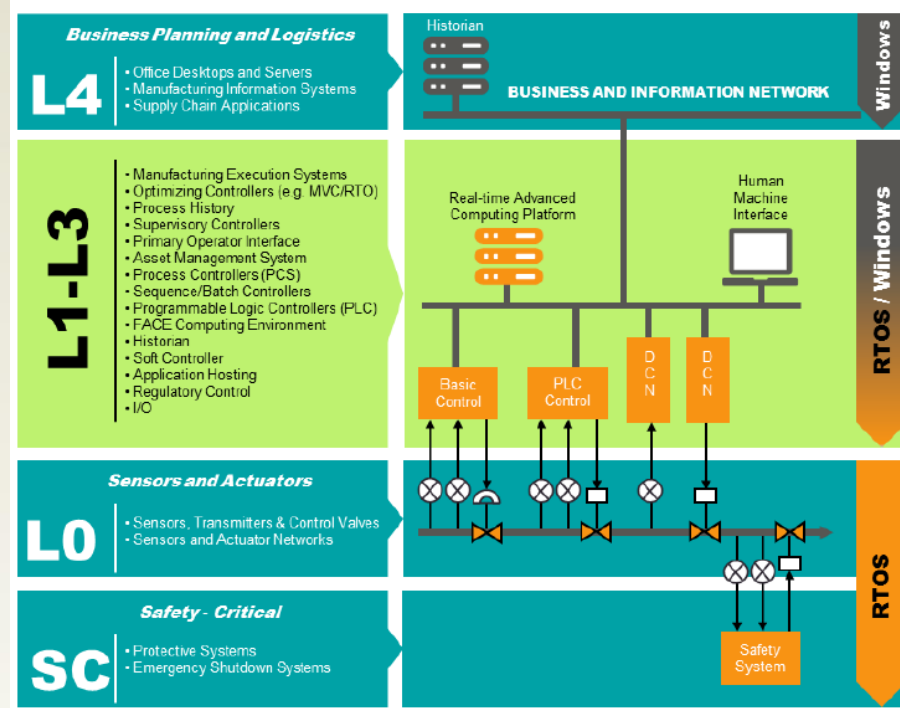
Simple and Easy  
Able to Grow

# Internet of Things Enables Next Generation Automation Systems

## Systems Today

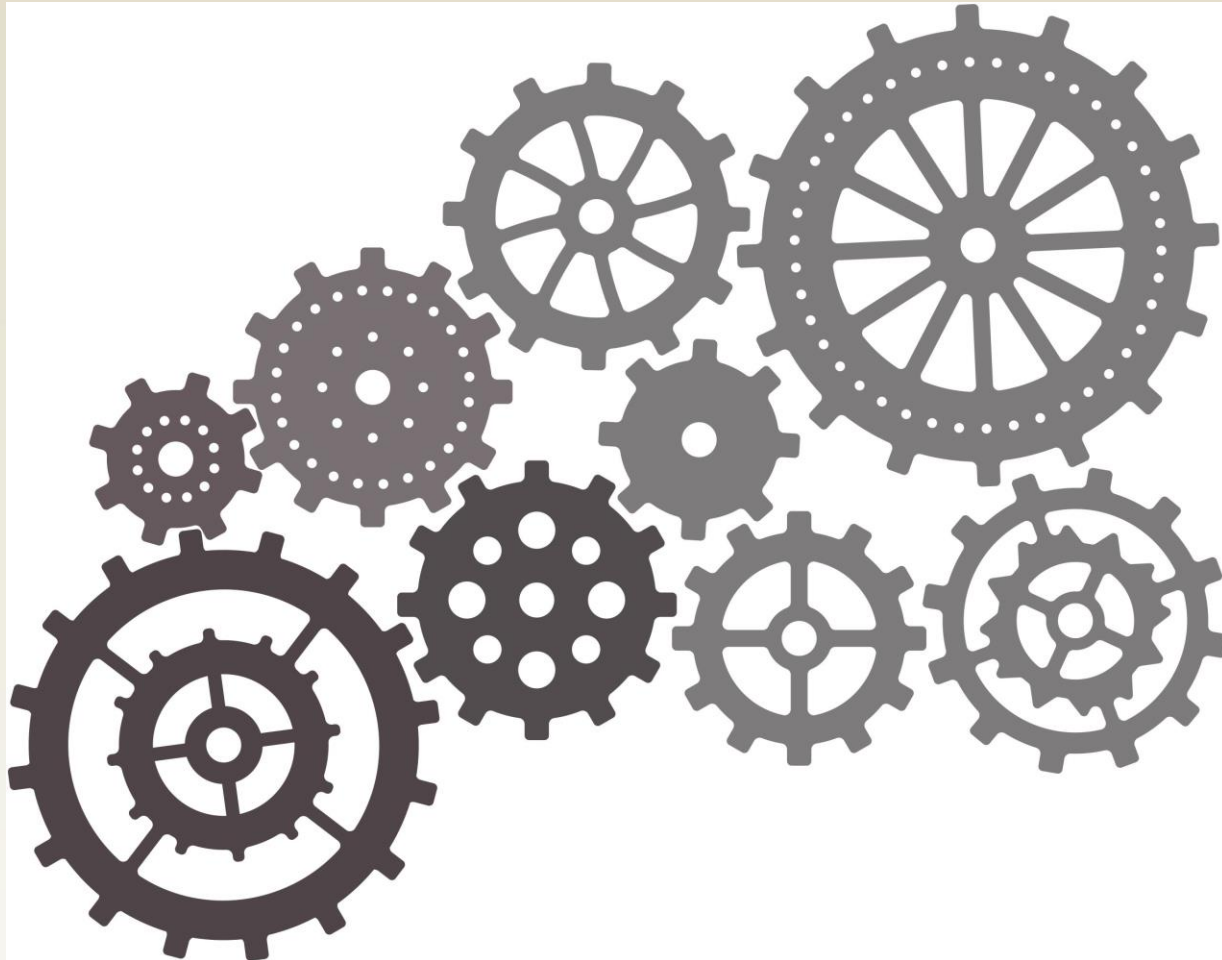


## Systems Tomorrow



XOM diagrams from Lockheed Martin PIRA#OWG20161002

# IEC 62734 Standard

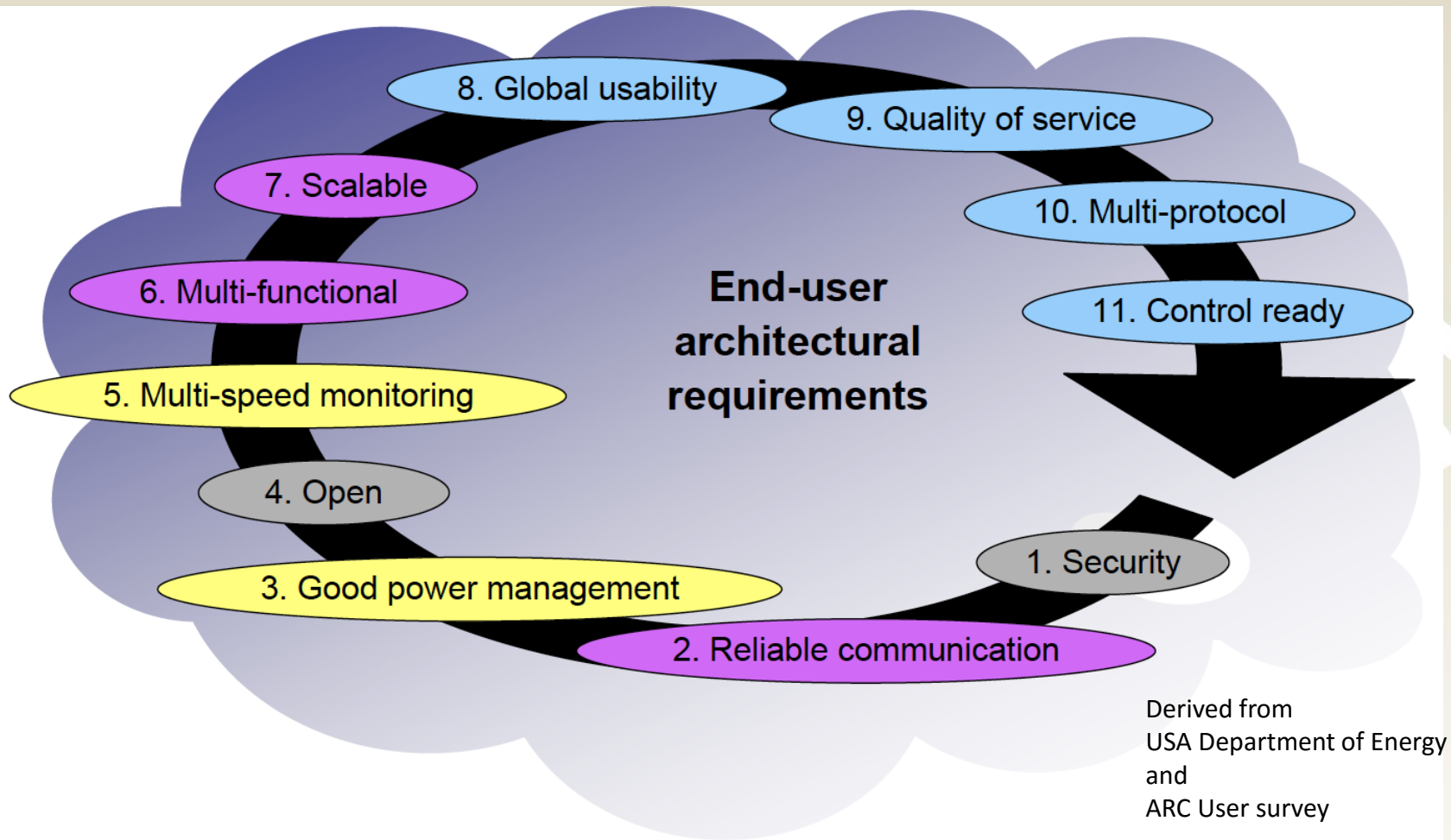




# Main Features of IEC 62734

IEEE 802.15.4 Radio	<ul style="list-style-type: none"><li>• Available from multiple high quality sources.</li></ul>
ETSI Compliant	<ul style="list-style-type: none"><li>• Compliant to new ETSI 300.328 v1.8.1</li><li>• Various modes of compliance, described in the standard</li></ul>
Robust	<ul style="list-style-type: none"><li>• Advanced coexistence and resiliency mechanisms at all levels</li></ul>
Secure	<ul style="list-style-type: none"><li>• Two layer AES 128 cryptography</li></ul>
IP based	<ul style="list-style-type: none"><li>• Future Proof</li></ul>
Object based	<ul style="list-style-type: none"><li>• Compact and Extensible</li><li>• Supports Tunneling</li></ul>

# End-user requirements for Industrial wireless sensing



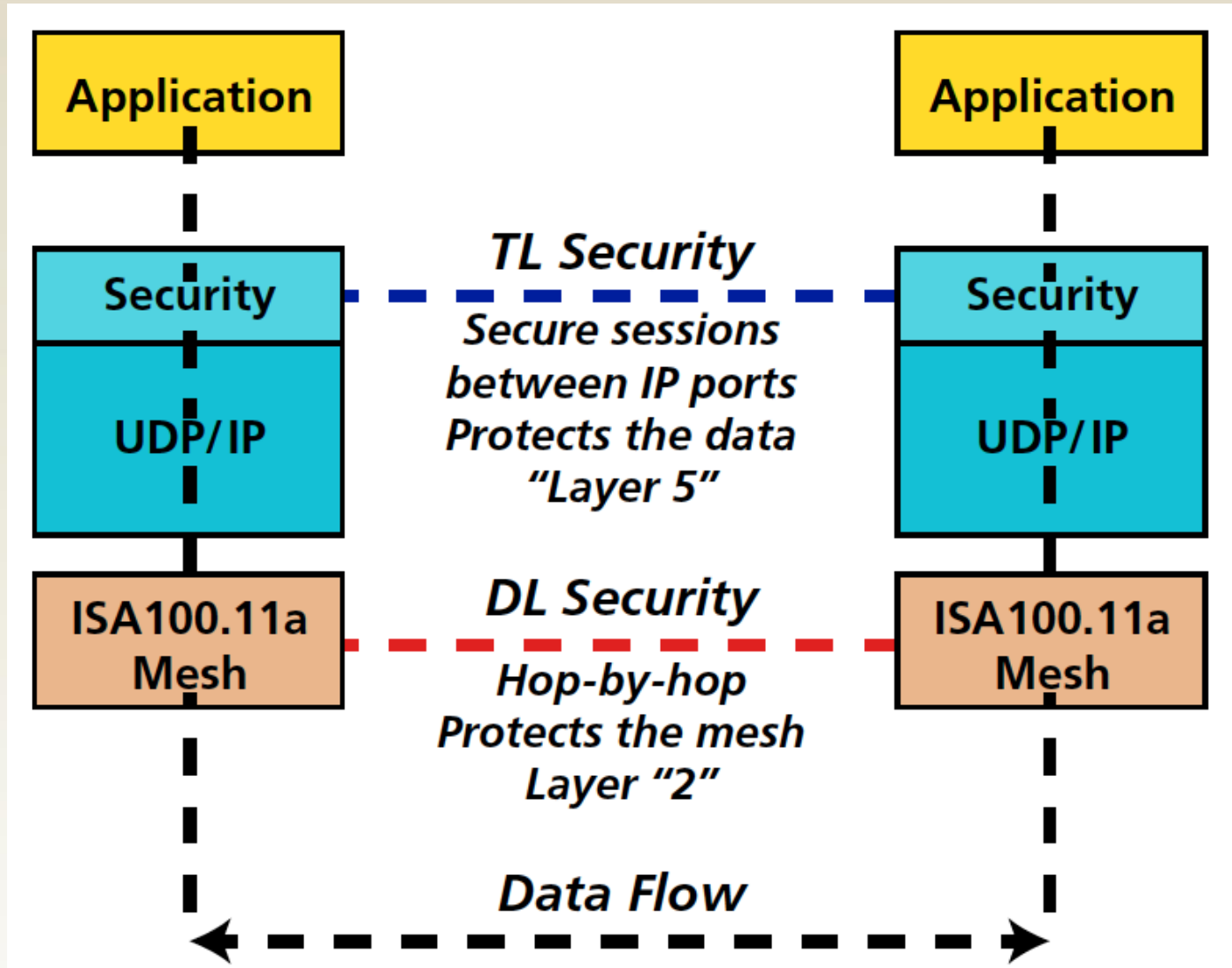
***ISA100 solutions must meet all requirements simultaneously***



# Technical requirements for Industrial wireless sensing

1. Rate and Latency	<ul style="list-style-type: none"><li>• Publication rates 1-2 seconds</li><li>• Capable of 100 ms latency</li><li>• Controlled latency, ~50% publication rate</li><li>• 4 Hz publication in constrained configurations</li></ul>
2. Mesh Networking	<ul style="list-style-type: none"><li>• IP Backbone: Engineered and scalable</li><li>• Mesh and non-mesh topology; access points and field devices</li><li>• Peer-to-peer communication</li><li>• Objects = Function blocks at device level</li><li>• Long and deterministic battery life</li></ul>
3. Reliability	<ul style="list-style-type: none"><li>• Wireless transmission is deterministic</li><li>• Wireless transmission is received</li><li>• Wireless transmission is accurate</li><li>• Redundant communication paths to process control network</li></ul>
4. Security	<ul style="list-style-type: none"><li>• Wireless transmission is secure; prevention &amp; detection</li></ul>

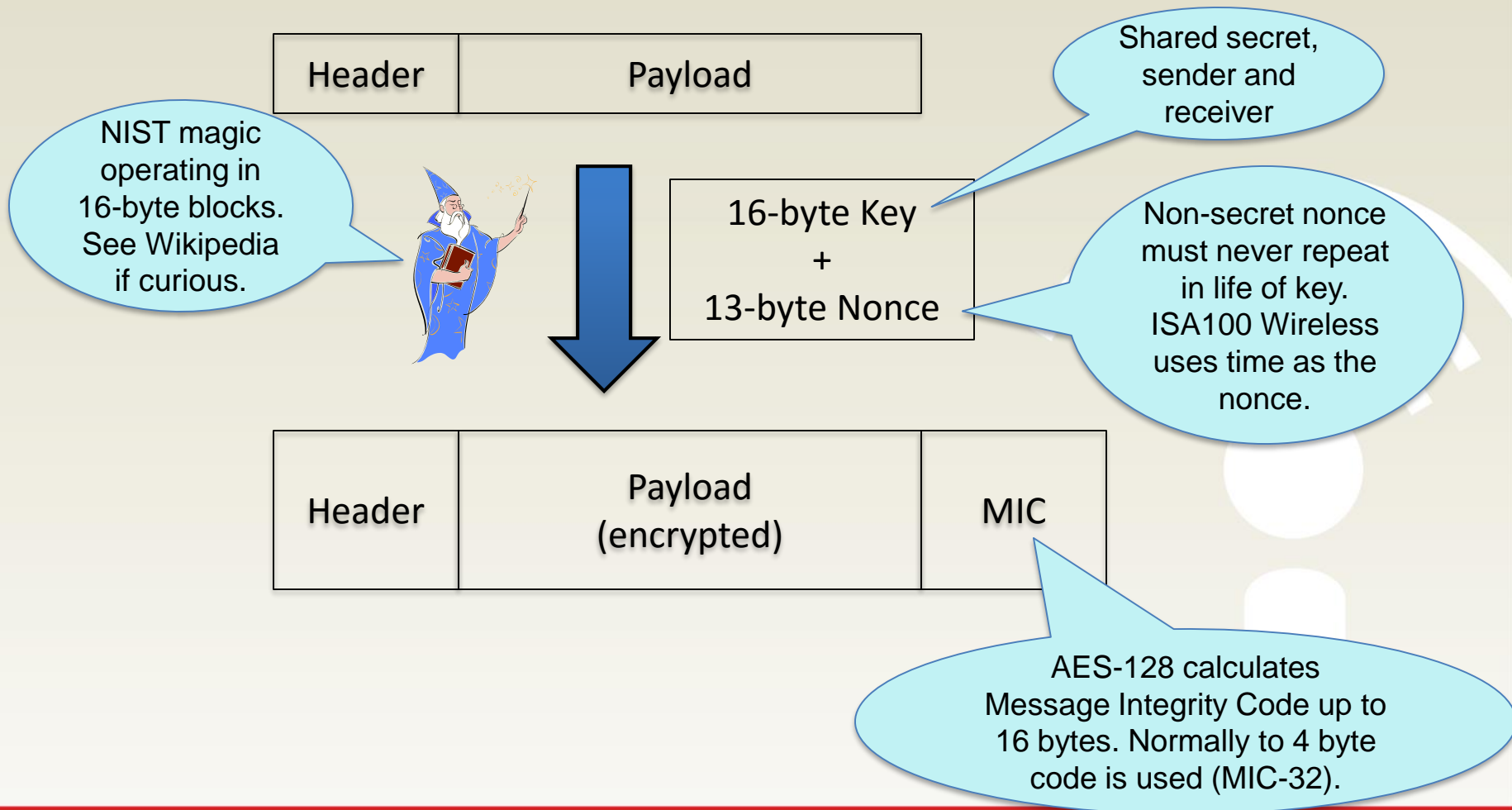
# Two Levels of Security



# Security Sidebar

- ISA100 Wireless cannot guarantee that a radio message is received, because radios are not 100% reliable. Many levels of redundancy maximize availability.
- The standard does ensure that a received message is valid and confidential. That is the primary purpose of security in the standard.
- Security is always enabled in practice.

# AES-128 Message Processing Authentication and Encryption



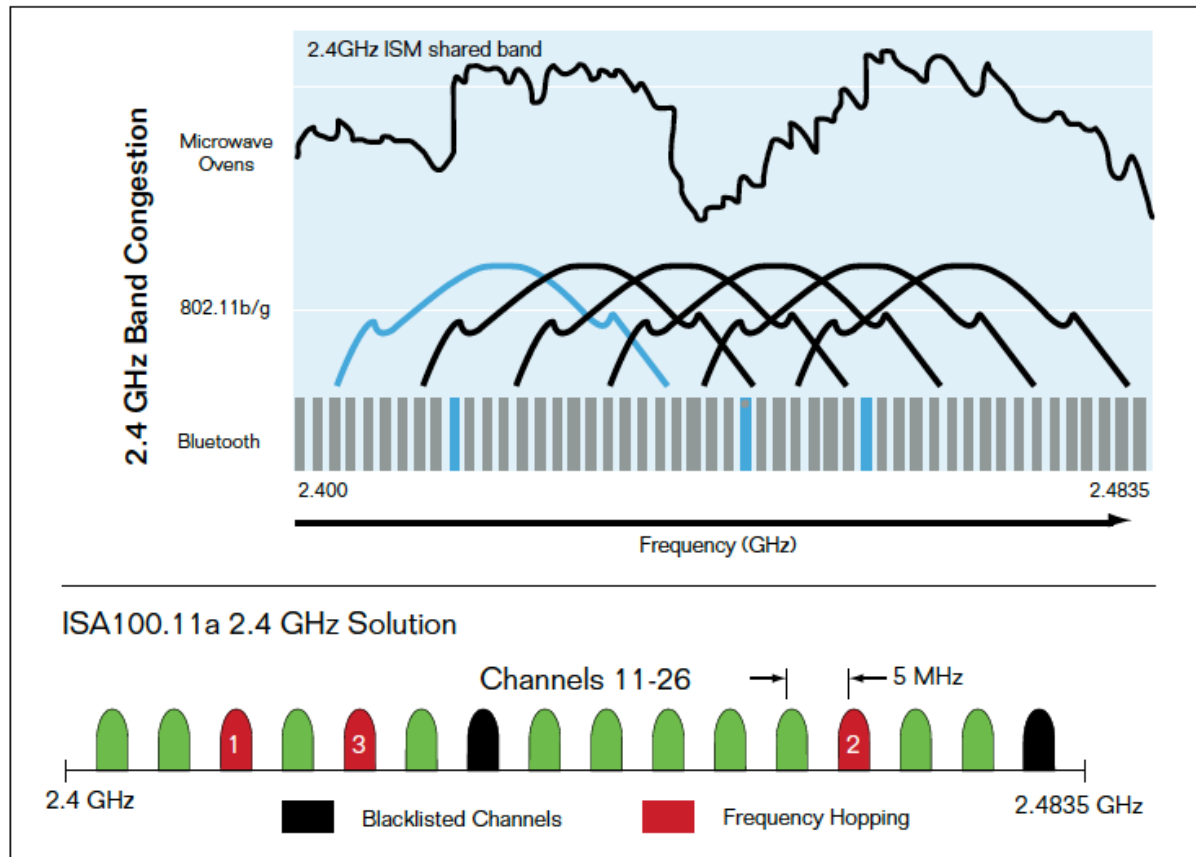
# Robust Communications

## Spectrum Analysis System Management Policy Enforcement

Identifying Interferers  
Monitoring Saturation

Device Configuration  
Element Provisioning  
Performance Monitoring

Channel Allocation  
Rules Creation  
Blacklisting



ISA100 – Ensured Coexistence with Many Wireless Networks

# Conclusion

<b>Cost Savings</b>	<ul style="list-style-type: none"><li>• Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction.</li><li>• Typically: 1/5 the time, 1/2 the cost.</li><li>• New and scaled applications are now economically feasible.</li></ul>
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