Deploying ISA100 Wireless Distributed Networks
Current Status Quo

- Recent trend - deployments require
  - Increased scalability
  - Support for higher network throughput
- Due to the emergence of novel ISA100 Wireless compliant instruments such as
  - Stream trap monitoring
  - Safety – gas detection
  - Corrosion monitoring
  - Condition monitoring
Technical Primer – Logical Roles

**Field Network**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Device</td>
<td>Sources or consumes data. Does not route.</td>
</tr>
<tr>
<td>Router</td>
<td>Routes messages for other devices operating in the wireless subnet.</td>
</tr>
</tbody>
</table>

**Infrastructure**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backbone Router</td>
<td>Routes data over the backbone infrastructure.</td>
</tr>
<tr>
<td>System Manager</td>
<td>Provides policy controlled management for all network devices.</td>
</tr>
<tr>
<td>Security Manager</td>
<td>Enables, controls and supervises the secure operation of all devices.</td>
</tr>
<tr>
<td>Gateway</td>
<td>Provides an application interface between the wireless and the plant network.</td>
</tr>
</tbody>
</table>

**Operational**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Provisions devices with configurations required for network operation.</td>
</tr>
<tr>
<td>System Time Source</td>
<td>Responsible for maintaining the master time source of the network.</td>
</tr>
</tbody>
</table>

**Note:** Devices typically incorporate multiple logical roles.
ISA100 standard inherently supports various different network topologies

Infrastructure devices can support a combination of logical roles

- **Single Subnet – “All-In-One”**
- **Multiple Subnets – “Distributed”**
- **Multiple Gateways**
IPv6 Connectivity

- ISA100 mandates that all entities support native IPv6 addressability and connectivity
- Internet backbones are transitioning to native IPv6 connectivity
- Backbone can utilize any communication technology/protocol as long as it supports IPv6 connectivity
- ISA100 Wireless Infrastructure devices are IPv6 ready
- Support for standards based IPv4 encapsulation of IPv6 payloads
ISA100 Wireless networks – versatile topologies and scaling due to IPv6 based backbone infrastructure

**ISA100 Wireless Network Topology**

Manager  
Gateway 1  
Gateway 2  
IP Backbone

**ISA100.11a Scaled Mesh Network**

**WirelessHART Network Topology**

Mesh  
Gateway (& Manager)  
Mesh  
Gateway (& Manager)  
Mesh  
Gateway (& Manager)  
Mesh  
Gateway (& Manager)
“All-in-One” Topology

**Pros:**
- Simple network deployment
- Low cost installation and maintenance

**Cons:**
- Limited scalability
- Deeper mesh networks result in
  - Increased power consumption results in shorter field instrument battery life
  - Increased communication latency
  - Decreased network throughput
- Limited geographic coverage
Distributed Topology

• Increased scalability
• Shallow mesh networks result in
  • Optimized power consumption results in increased field instrument battery life
  • Lower communication latency
  • Increased network throughput
  • Extended geographic coverage

• Network deployment more complex
• Increased cost of installation and maintenance
Distributed Deployment – WiFi Mesh Backbone

**Standalone Gateway:**
- Wi-Fi Mesh AP/ Mesh Gateway
- System and Security Manager
- Gateway Process

**Connectivity Layer**

**Field Devices Layer**

**Backbone Router**

**Distributed Network Topology**

**FD:** Field Device
Deployment Considerations

- **“All-in-One” deployments**
  - Gateway is installed outdoors
  - Typically close to the control room
  - Determining optimal location is vital

- **Distributed deployments**
  - Gateway is installed in the control room
  - BBRs deployed throughout the facility
  - Wi-Fi Mesh backbone simplifies deployments
Benefits

- Supports distributed network topologies
- Supports multiple subnets managed by the same Gateway
- Mesh Wi-Fi enabled backbone

Cost-effective, extended geographic coverage

- Increased scalability lowers CAPEX and ensures swift ROI
- Reliable, robust wireless backbone infrastructure reduces installation and maintenance costs

Reduced TCO when compared to wired backbone solutions
Plant-wide wireless coverage supports a multitude of other applications.
The NIO200 Product Family

NIO200IAG – All-in1-Gateway
• ISA100 compliant System/Security Manager, Gateway and Backbone Router
• Manages an ISA100 subnet composed of field instruments arranged in a multi-hop wireless mesh configuration
• EZ Mesh Wi-Fi Backbone infrastructure connectivity to the control room + perfect triple play infrastructure video surveillance

NIO210IDG – Distributed Gateway
• ISA100 compliant System/Security Manager, Gateway and Backbone Router
• Manages multiple ISA100 subnets federated by NIO200IWR Backbone Routers
• Allows for distributed network topologies that maximize geographic
• EZ Mesh Wi-Fi Backbone infrastructure connectivity + perfect triple play infrastructure video surveillance

NIO200IDR – Backbone Router
• ISA100 compliant, cost-effective Backbone Router
• Provides wireless and wired backbone connectivity to ISA100 compliant wireless field instruments
• EZ Mesh Wi-Fi Backbone infrastructure connectivity + perfect triple play infrastructure video surveillance
Thank You!
Contact

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