

ISA100 Wireless Network

ETSI Wireless Factory Starter Group
20-21 October 2009 - ETSI, Sophia Antipolis, France

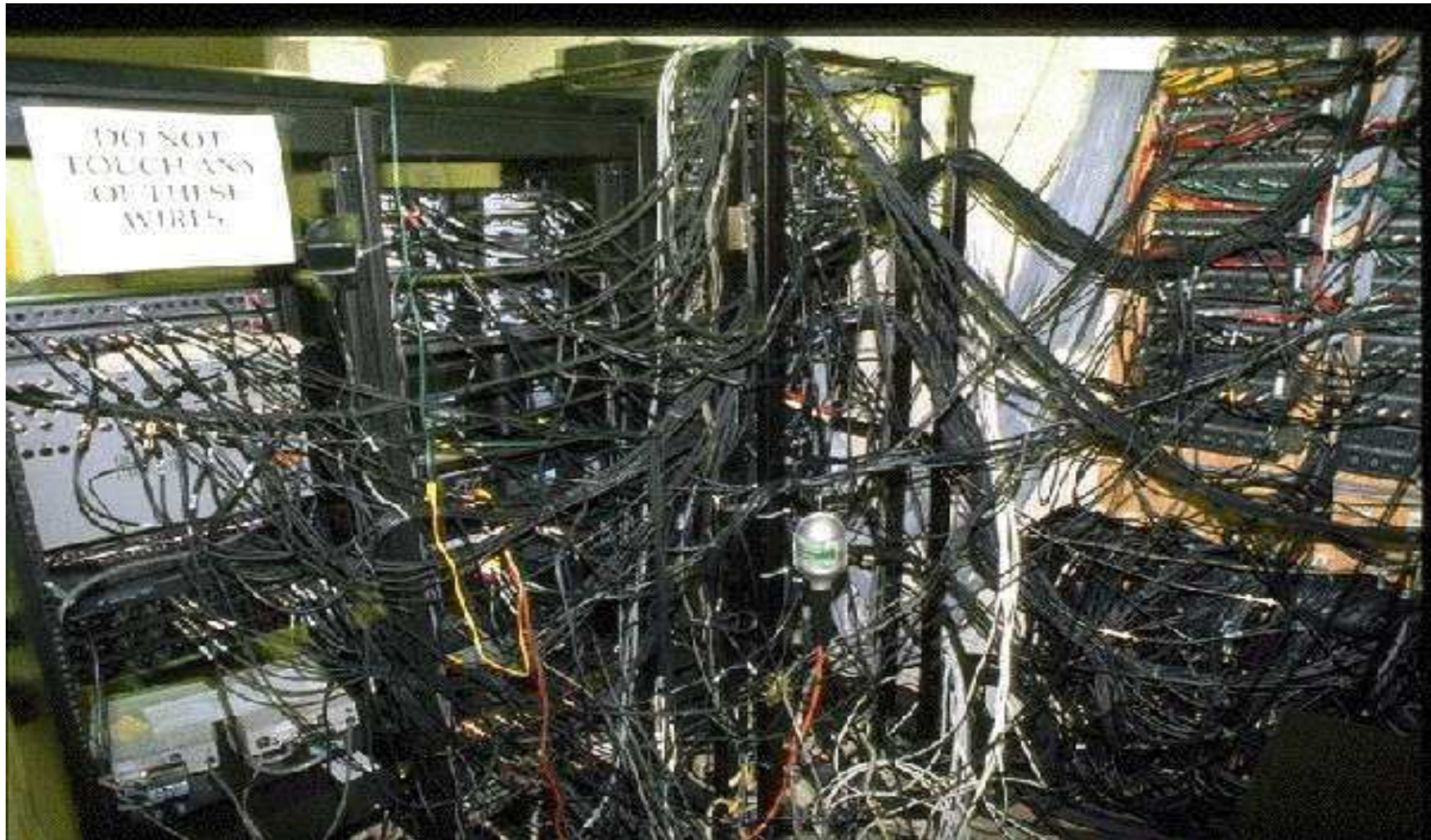
Bin Sai

Honeywell

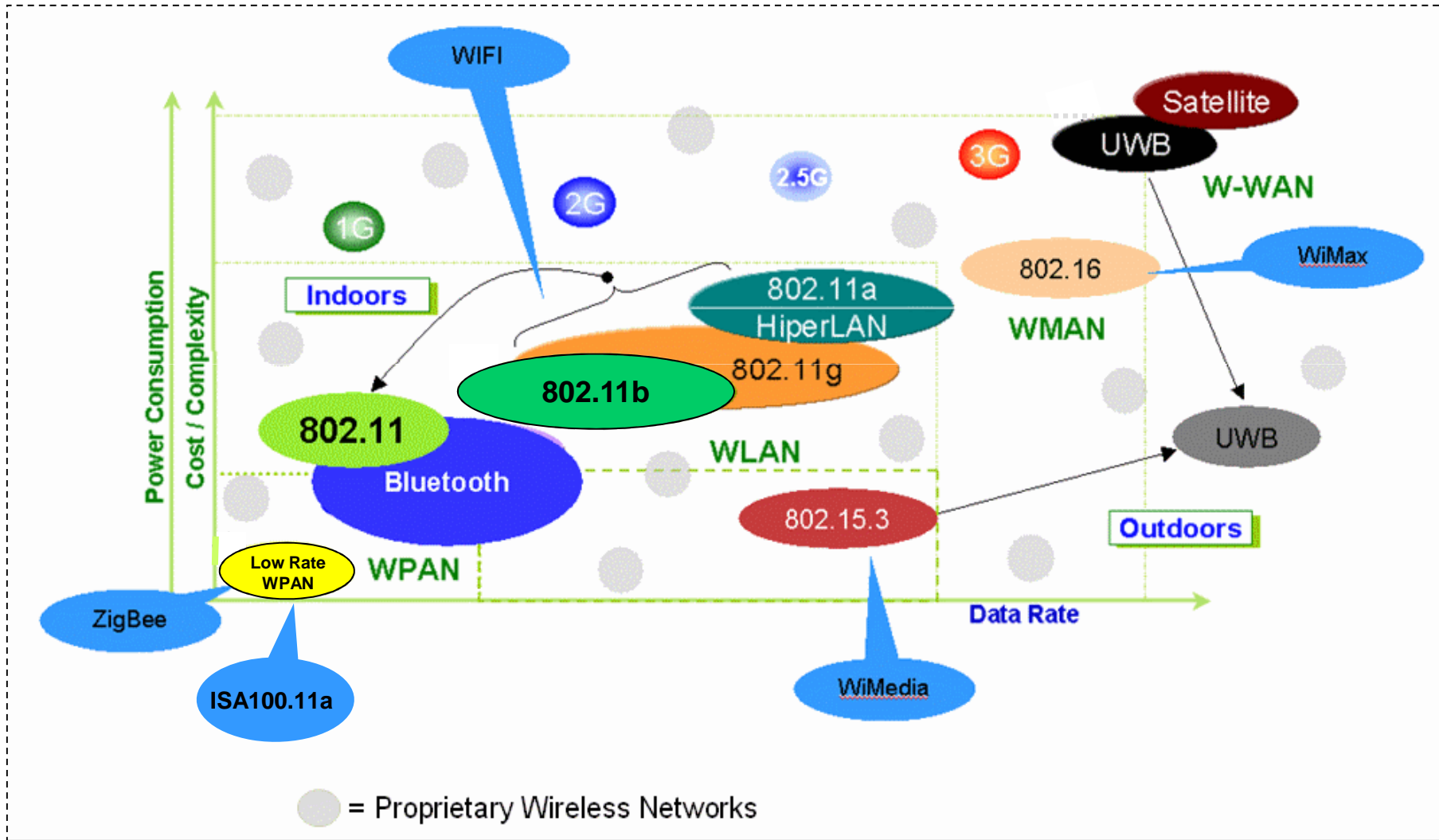
Outline

- Communications Landscape
- ISA100 Overview
- ISA100.11a Standard Technologies
- ISA Wireless Compliance Institute

Communications Landscape – “The Old Way”



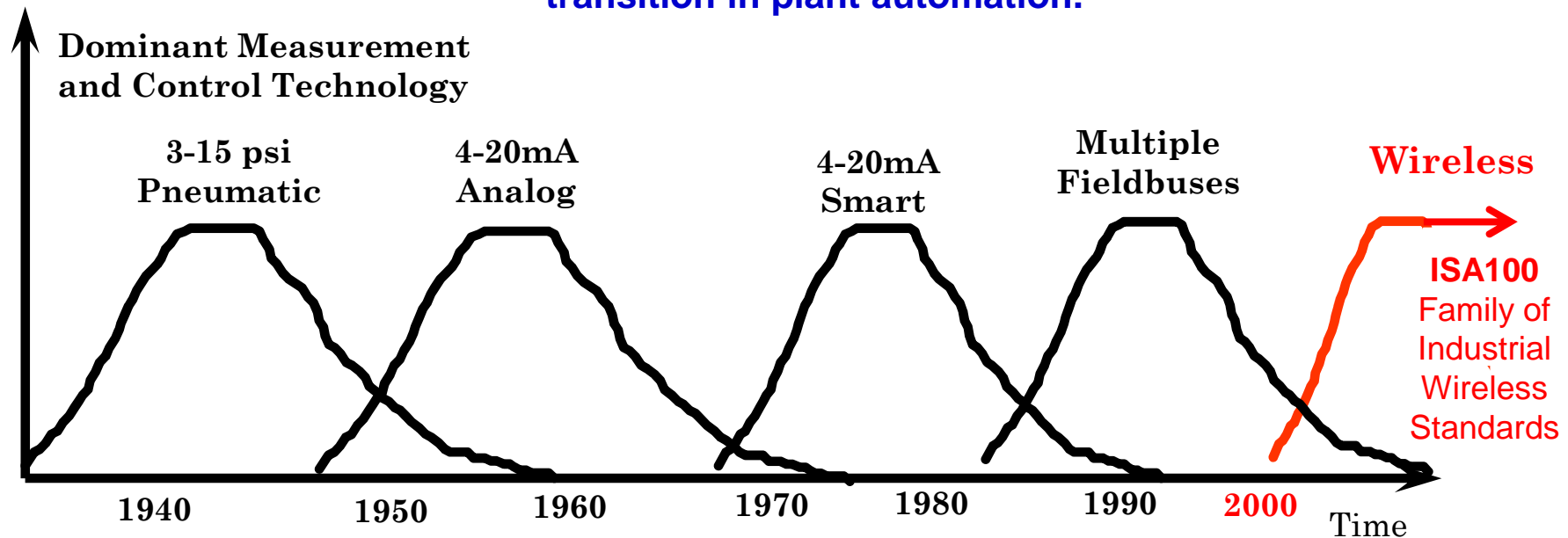
Communications Landscape – “The New Way”



History of Industrial Communications

The Standard for Industrial Wireless (ISA100) was developed by ISA to address all aspects of wireless technologies in a plant.

Industrial Wireless is the next major technology transition in plant automation.



ISA100 is the Next “4-20 mA Standard” for Your Plant

It Combines the Simplicity of 4-20mA with the Digital Communications of Multiple Fieldbuses – ISA100.11a is Just the Beginning

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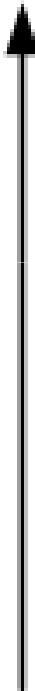
What is the ISA100.11a Standard?

Working Group Scope


This project defines all specifications including security and management; for wireless devices serving **application classes 1 through 5** for fixed, portable and moving devices.

The project's application focus is to address performance needs for **periodic monitoring and process control** where latencies on the order of 100 ms can be tolerated with optional behavior for shorter latency.

ISA100 Usage Classes

<i>Category</i>	<i>Class</i>	<i>Application</i>	<i>Description</i>	Importance of message timeliness increases 
<i>Safety</i>	0	Emergency action	(always critical)	
<i>Control</i>	1	Closed loop regulatory control	(often critical)	
	2	Closed loop supervisory control	(usually non-critical)	
	3	Open loop control	(human in the loop)	
<i>Monitoring</i>	4	Alerting	Short-term operational consequence (e.g., event-based maintenance)	
	5	Logging and downloading/uploading	No immediate operational consequence (e.g., history collection, sequence-of-events, preventive maintenance)	

ISA100.11a



ISA100 Overview

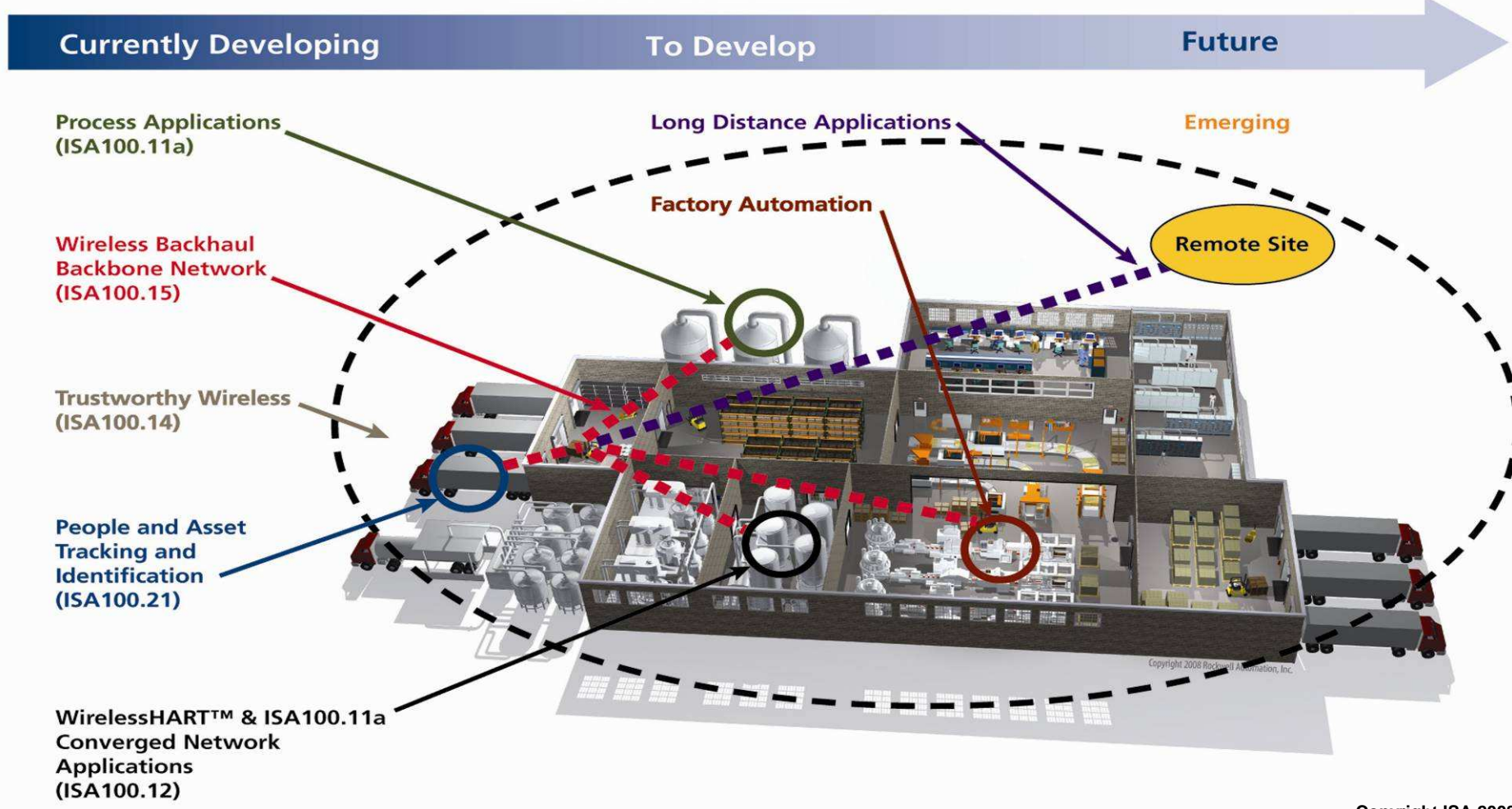
Wireless Systems for Industrial Automation

- **Backed by ISA Expertise, Heritage and History**
 - Nearly 30,000 Members with 140 Standards Committees using an Open Standards Development Process **Accredited by ANSI**
 - Estimated at **~1 Billion Products** Using ISA Standards Technologies
 - ISA 100 **Designed by Experts** in Wireless, Security, and Instrumentation Technologies with Direct End Users Involvement on Committee
- **Family of Standards: Single-Stop Standardization Effort**
 - Designed to **Accommodate all your Plant Needs**
 - Areas of Coverage Identified to Date; Process Automation (Process Focus), Factory Automation (Discrete Focus), Transmission and Distribution (Long Distance Focus), RFID (Industrial Tagging Focus)
- **Multi-Protocol Capability: The Power of a Single Network**
 - Allows **Deployment of a Single, Integrated Wireless Network**
 - Bring Simplicity to your Work with:
 - o **Single Technology** to Learn, Maintain and Operate
 - o **Single Security System** to Manage
 - o **Single Set of Infrastructures**
- **Co-Existence: Providing Peace of Mind**
 - Designed with Co-existence features
 - **Ensures Best Possible Performance**

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ISA100 Overview

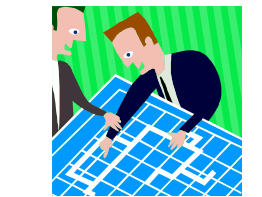
ISA100 Timeline



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ISA100.11a Architecture ...

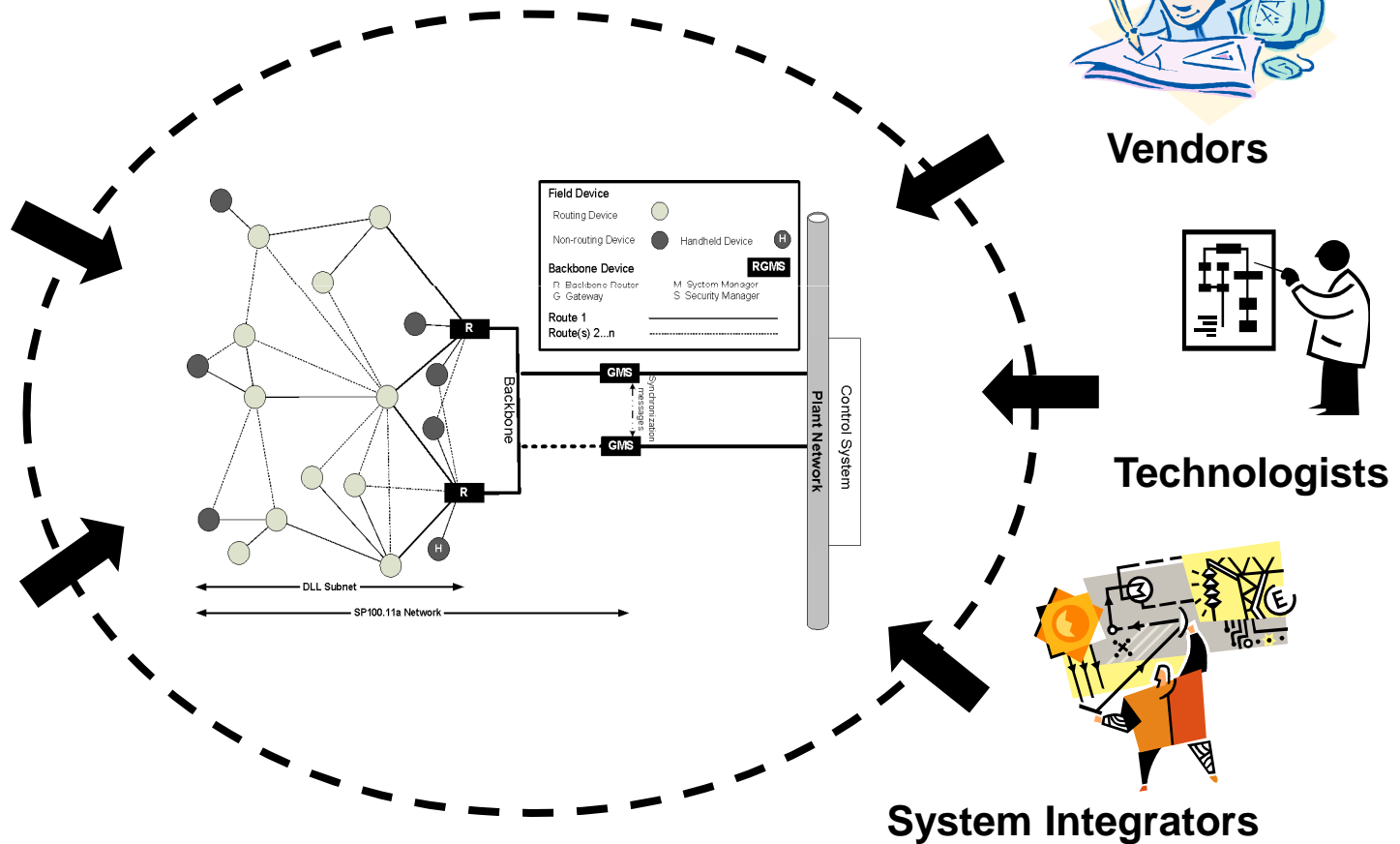
Developed in Open Process - Anyone Can Contribute!



Consultants



Users



Technologies and Benefits

User Requirements	ISA100.11a Technology or Process	User Benefit
Investment Protection	Application Interface Sub-Layer, Mapping, Tunneling	Connects any Sensor to any Host
	Non-Routing Nodes	Enables Low Cost "Lick & Stick" Sensors
	Radio Agnostic, Subnets, Variable Time Slots, Peer to Peer Communications	Future Proof Design
Secure	128 bit AES Encryption, TAI Time, End to End, 2 Automatic Rotating Keys	Tough for the Bad Guys to Crack
Reliable	Mesh Enabled at Both the Sensor and Backbone Level, System Mgr Redundancy, Multiple Gateways	Multiple Data Paths Across the Plant
Interoperable	Open Standard	Best in Class Product Choices
Good Power Management	Standardized Interface for Backbone Routing, TDMA/CSMA	Provides "Single Hops", Lowers Power Consumption
Real Time Performance		"Wired-like" Performance (1 second updates)
Scalable		Thousands of Sensors in Single Network
Simple Network Management		Single Network to Manage
No Proprietary or Consortia-Based Technology	Open, Worldwide, Consensus-based Expert Development Process	Best in Class Design
Global Usage	2.4 GHz	Usable Anywhere in the World (Almost)

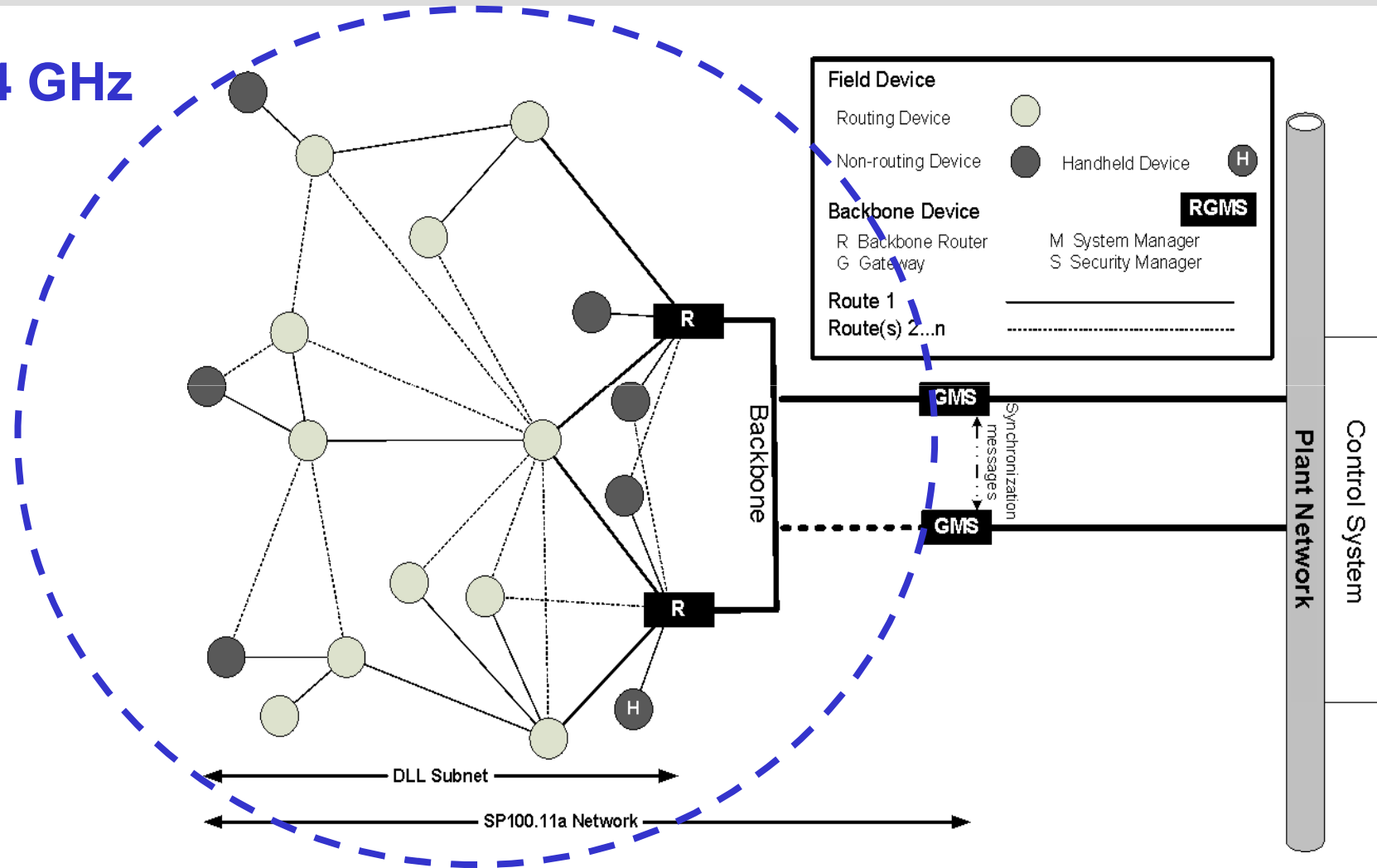
ISA100.11a Standard Technologies Reference List

ISA100.11a Technology	D2a Standard Section Reference
Legacy field device application mapping	Page 439; also 12.5.2.8
Legacy field device application data tunneling	Page 439; 12.5.2.7 Table 249 page 491
Adapting a wired legacy field device to Wireless support	Page 439; 12.5.2.7 Table 249 page 491
Support for other network protocols	Page 390 10.2.6.1
Device routing capability	Page 707
Frequency Hopping Support	8.2.2.3
Multiple channel hopping sequences supported	Page 261 9.1.7.25
Scheduled timeslotting (TDMA) support	Page 257; Figure 51; 9.1.7.1
CSMA-CA	page 257; Figure 52; 9.1.7.1
Standardized Interface for Backbone Routing	Page 387 - Section 10.2.4 ; Bullet 3 & page 417 10.5.4.1
Time Reference	9.1.9.1.4
Time standard	9.1.9.1.3
Timeslot Duration	9.1.9.1.4
Standardized Interface for Backbone Routing	10.5.4
Support for other network protocols	Page 390 10.2.6.1
Multiple <u>Overlapping</u> DLL Sub-networks	Page 79 also 10.2.7.9
Source Routing	9.1.6.3

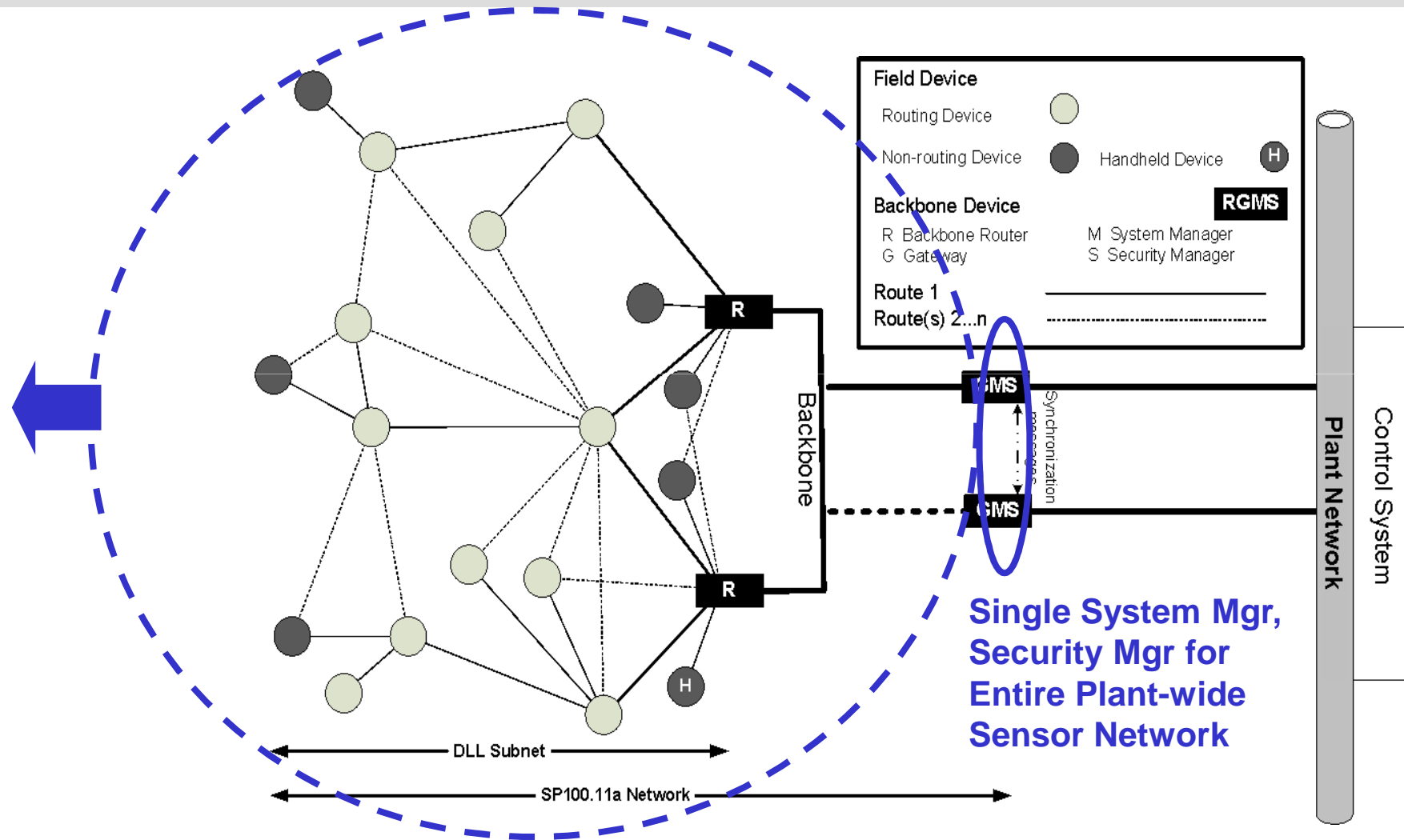
ISA100.11a Technology	D2a Standard Section Reference
Graph Routing	9.1.6.2
Device addressing method	10.2.2
Mesh topology	9.1.6. 10.2.6
Configurable policy settings with device roles	7.9
Out of Order TPDU caching based on QoS	7.4.8 Page 196-7
128-bit key Symmetric Encryption	Clause 7
DLL Key Update Support	7.7
Peer to Peer Communications	6.3.11.2.5 - peer to peer contract establish ment Figure 98 - peer to peer routing
Partitioning of NWK Management function	Page 83 Figure 13
NWK management redundancy	Page 83 Figure 13
Ease of migration to future wireless PHY layers	See Clause 10
Redundant Connectivity	Page 64- 4.6.7 Page 293 9.1.9.4.7
Multiple sets of sub-network addresses per device	10.2.2 Page 385
Gateway Multiplicity and Capacity	Figure 12 Page 82
Fragmentation and Reassembly	10.2.5
Fragmentation and Reassembly end points	10.1.2 Page 384
Native application layer for process data	Clause 12

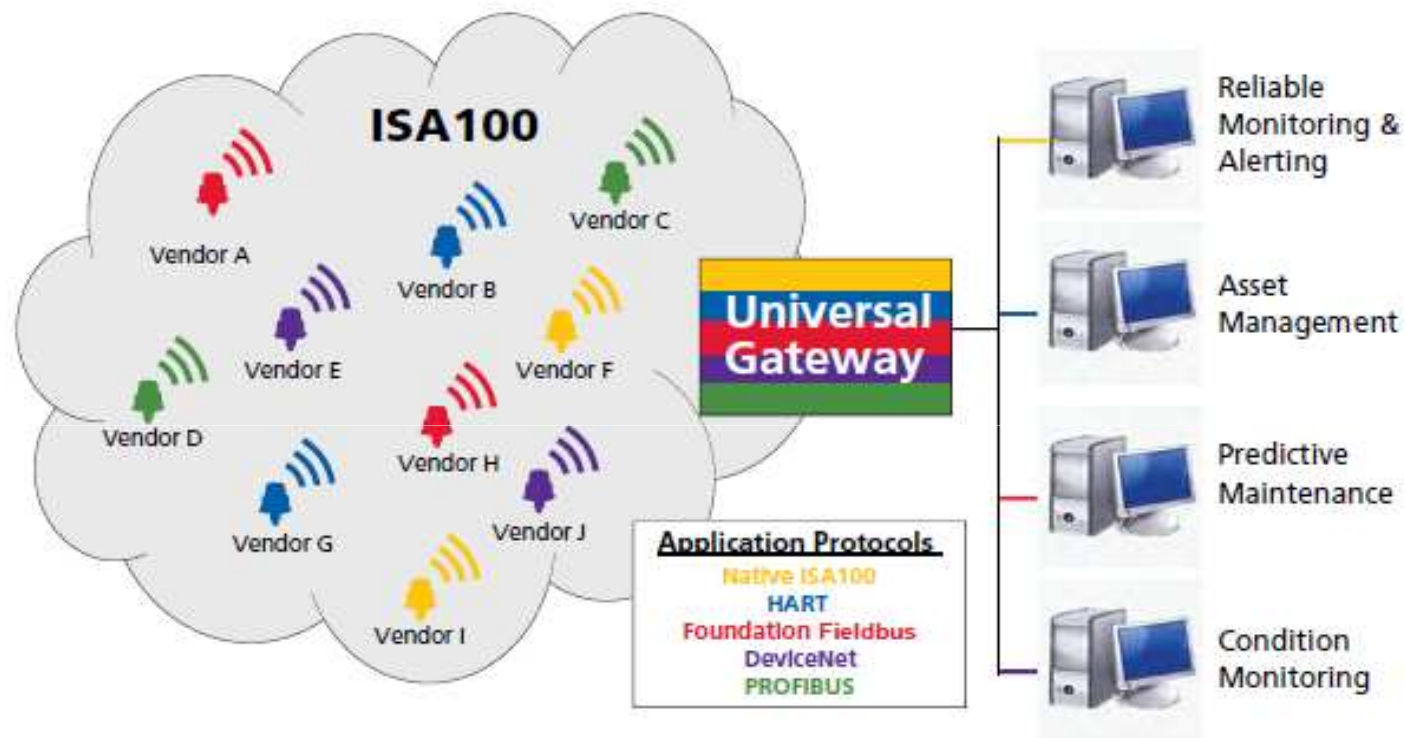
ISA100.11a Architecture ...

2.4 GHz



ISA100.11a Architecture ...

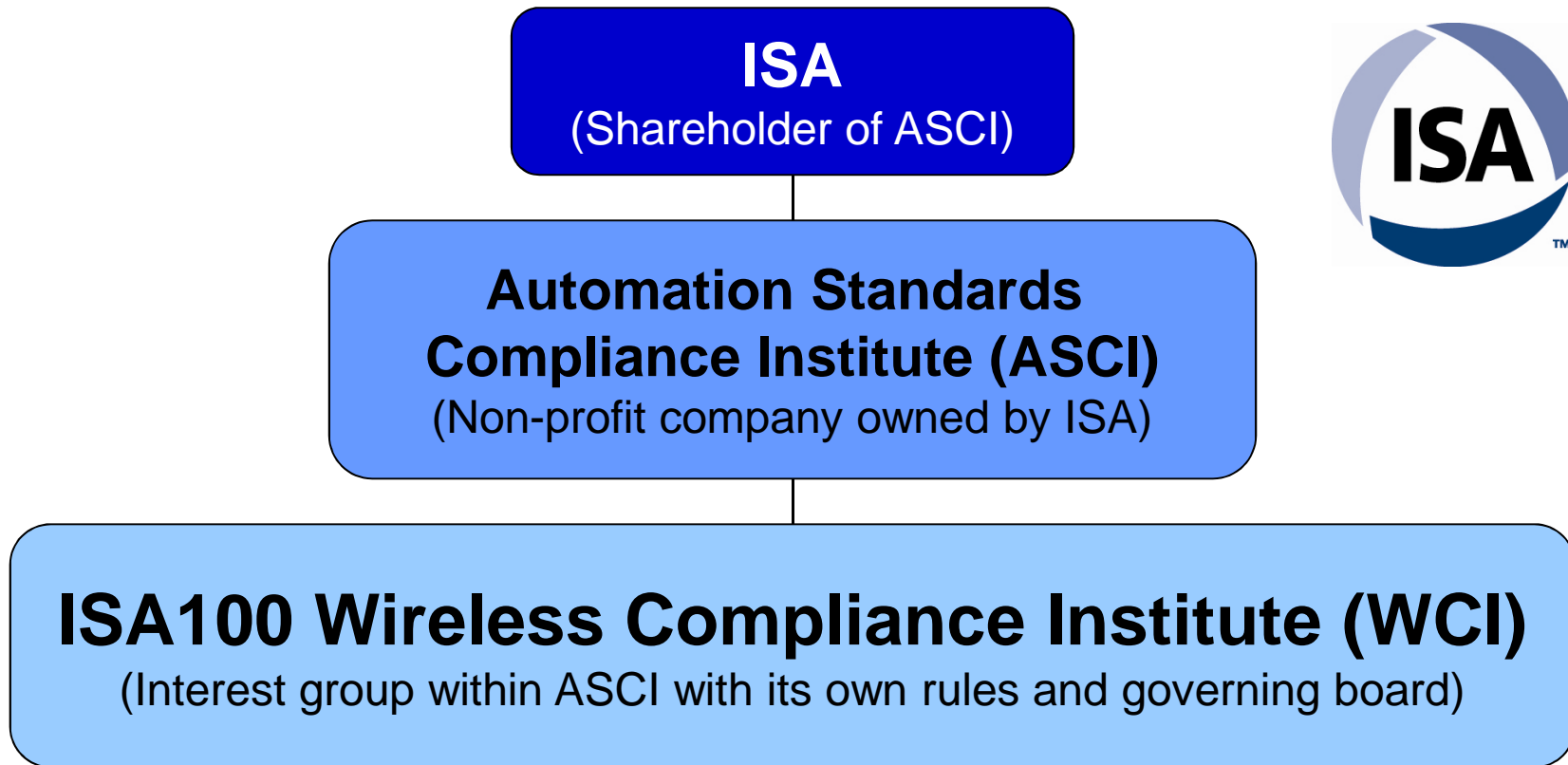




Many Applications, Many Protocols,
A Single Wireless Network

Source: ISA

ISA Structure



*The WCI is Operated as an ASCI Interest Group to Lead
the Wireless Compliance Initiatives*

ISA100 Wireless Compliance Institute

Mission

Decrease the time, costs, and risks of developing and deploying standards-based industrial wireless devices and systems.

Provides...

- Interoperability
- Compliance
- Tools
- Technical Support
- Education
- Market Awareness



... For the ISA100 Family of Industrial Wireless Standards

ISA100.11a Interoperability Video Demo

[Click Here to Start
Video](#)

Note: The video provides a live multi-vendor demonstration of the ISA100 .11a technologies. Vendors participating include; Accutech, Flowserve, Honeywell, Nivis, and Yokogawa.

Certification



Certification does the following...

- **Assures interoperability** based on a test specification derived from ISA100 wireless communication standards
- **Provides instant recognition** of wireless communication characteristics
- Promotes **a key differentiator** for product or system
- **Allows equal and fair testing** for all products to gain compliance
- **Enables registration** for an easy access listing of conformant products on the web

Progress to Date

- **Test Points Completed**
- **Device Test Kit Development Underway**
- **Alpha Test Bed Established** (Demo at ISAEXPO)
 - 15+ Vendors Participating, 2 Radio Platforms, 2 stacks
- **Current Sponsors**
 - Aprpron
 - BP
 - Chevron
 - ExxonMobil
 - Fuji Electric
 - Honeywell
 - NIVIS
 - Procter & Gamble
 - Shell
 - Shenyang Institute of Automation
 - Yokogawa



Small Sample of Supporting Companies



And
many
more

...

Small Sample of Supporting Companies

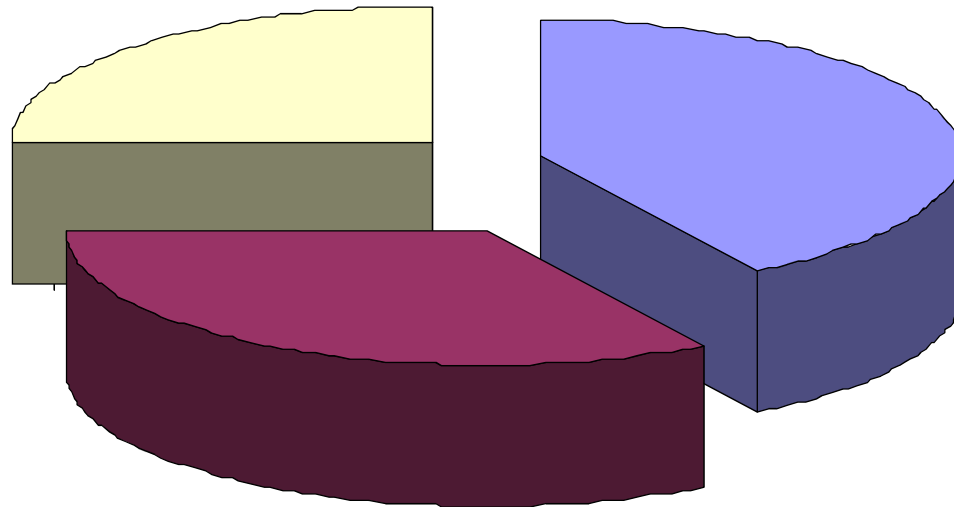


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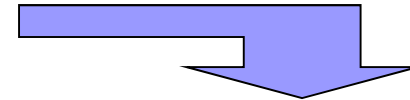
ISA100 Voting Member Info

25% Others *

42% Users



33% Producers



Company	Voting Member
ARKEMA	Norman McLeod
Bayer Materials Science	Jim Becker
Bayer Technology Services	Rahul Siddharth Bhojani
Boeing	Mark A. McNerney
BP	Dave Lafferty
Chevron Energy Technology Co	Greg LaFramboise
Conagra Foods	Evan Hand
ConocoPhillips	David Land
E I DuPont	Nicholas P. Sands
ExxonMobil	Pat Schweitzer
Frontier El Dorado Refinery	Jeff Strecker
Husky Energy Inc	Jim Jamison
Hydro-Quebec	Sylvain Riendeau
Intel Corp.	Dennis Nasont
Nova Chemicals Ltd.	Mike Carley
PETRONAS	Ali Azizan Maamor
Procter & Gamble	Jim Reizner
Saudi Aramco	Abdelghani Daraiseh
Shell Global Solutions	Herman E. Storey
Shell Global Solutions Int'l BV	Sicco Dwars
Syncrude Canada Ltd	Aris Espejo
The Dow Chemical Co.	Eric Cosman
Washington Savannah River Co	Mike Mets
Worsley Alumina Pty Ltd	Arnold Oliver

* Others includes Members Representing; General Interest, Regulatory or Government, Architect-Engineer, Engineer-Constructors, Integrators, Testing, Certification, or Approval

Benefits of Participants

Benefits for Early Supporters

- Understand and **shape the compliance program**
 - For vendors - no false starts
 - For users - ensure your needs are included 'out of the box'
- Contribute to and **understand the testing details**
- Collaborate with end users & suppliers to **gain valuable insights**
- Become part of the ISA100 **beta tests**

Simple membership enrolment

Complete a membership application form available on the ISA100 Wireless Compliance Institute website. <http://www.isa.org/ISA100Compliant>

Or

Contact Andre Ristaino, ASCI Managing Director
Phone: 919-990-9222
Email: aristaino@isa.org



-- **Control Global** Submitted by Walt Boyes on Thu, 01/15/2009 - 21:47

<http://community.controlglobal.com/content/isa100-opening-plenary-talk-exxonmobils-pat-schweitzer>

ISA100 Opening Plenary -- a talk by ExxonMobil's Pat Schweitzer :

“... would also like to thank ISA for asking me to continue to serve as your co-chair for one more year, but my presence here is more than just to add another user to the voting roster. **It is an expression of the commitment and importance that ExxonMobil has placed in the output of ISA100 and the emergence of ISA100.11a. ExxonMobil views the work done in ISA100 as strategic.**”
“**ExxonMobil is supporting ISA100 as it views this open standards body as a vehicle where our requirements can be vetted in an open forum** with an output that would ensure our suppliers will meet our corporate specifications through our influence in the process. **Reliance on proprietary or consortia based specifications where we have no input or influence is a risk to future security and our commitment to excel and increase our margins.** We feel this is the best option for us to continue to have freedom to operate and improve our operations.”

Customer Testimonial



-- Press Release NIVIS website – April 22, 2009

Large Process Automation Suppliers Committed to ISA100.11a Standard

[http://www.nivis.com/Docs/Large Process Automation Suppliers Committed to ISA100.11a_4-22-09.pdf](http://www.nivis.com/Docs/Large_Process_Automation_Suppliers_Committed_to_ISA100.11a_4-22-09.pdf)

.....companies of all sizes are committing to or evaluating ISA100.11a standard-based solutions utilizing Nivis technologies. These companies include **Access Wireless Solution, Aprion, Banner Engineering Corporation, Cameron, ConocoPhillips, Dresser Masoneilan, Freescale, Flowserve, Honeywell, Krohne, Machine Talker, Magnetrol, NASA, Nivis, ProSoft, Texas Instruments, Yokogawa, Western Research, Williamson plus others.**

....“I’m excited to see such a **diverse set of leading companies committed to delivering a broad portfolio of ISA100.11a standard devices,**” said David Land, ConocoPhillips. “This will provide end-users with choices for devices that meet most of the initial ISA100.11a applications.”.....