Honeywell Industrial Wireless Network Solutions and Utilization

Bin Sai

Honeywell

Outline

- **Honeywell Overview**

- **Honeywell Wireless Products and Applications**

- **Coexistence and Interoperability**

- **Future Challenges and Radio Spectrum Needs**
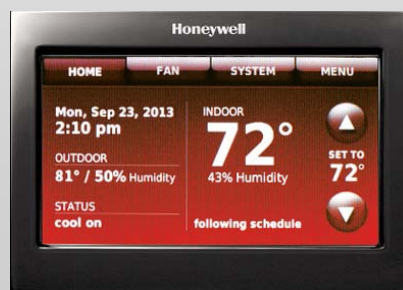
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Honeywell Overview

- $39 billion in revenues in 2013
- 130,000 employees operating in 100 countries
- Morristown, NJ, global corporate headquarter
- Chairman & CEO: Dave Cote

Aerospace	Automation and Control Solutions	Performance Materials and Technologies	Transportation Systems
$12B	$12.1B	$10.2B	$3.7B

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Honeywell Wireless Products and Solutions

Aviation

Terminal Automation

Process Automation

Industrial Process Monitoring

Wi-Fi Smart Thermostat

Efficiency, Energy & Utilities

Wi-Fi Fire Protection

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Industrial Safety

Industrial Process Control

Wireless Push Button

ISA100 WDM

Safety & Security

Scanning & Mobile

Efficiency, Security & Safety

Challenges and Opportunities

Inventory Management

Asset monitoring

Explosions

Unmonitored Areas and Processes

Limited access to critical data

Spills and HSE threats

Deteriorating infrastructure

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Honeywell Wireless Industrial Applications
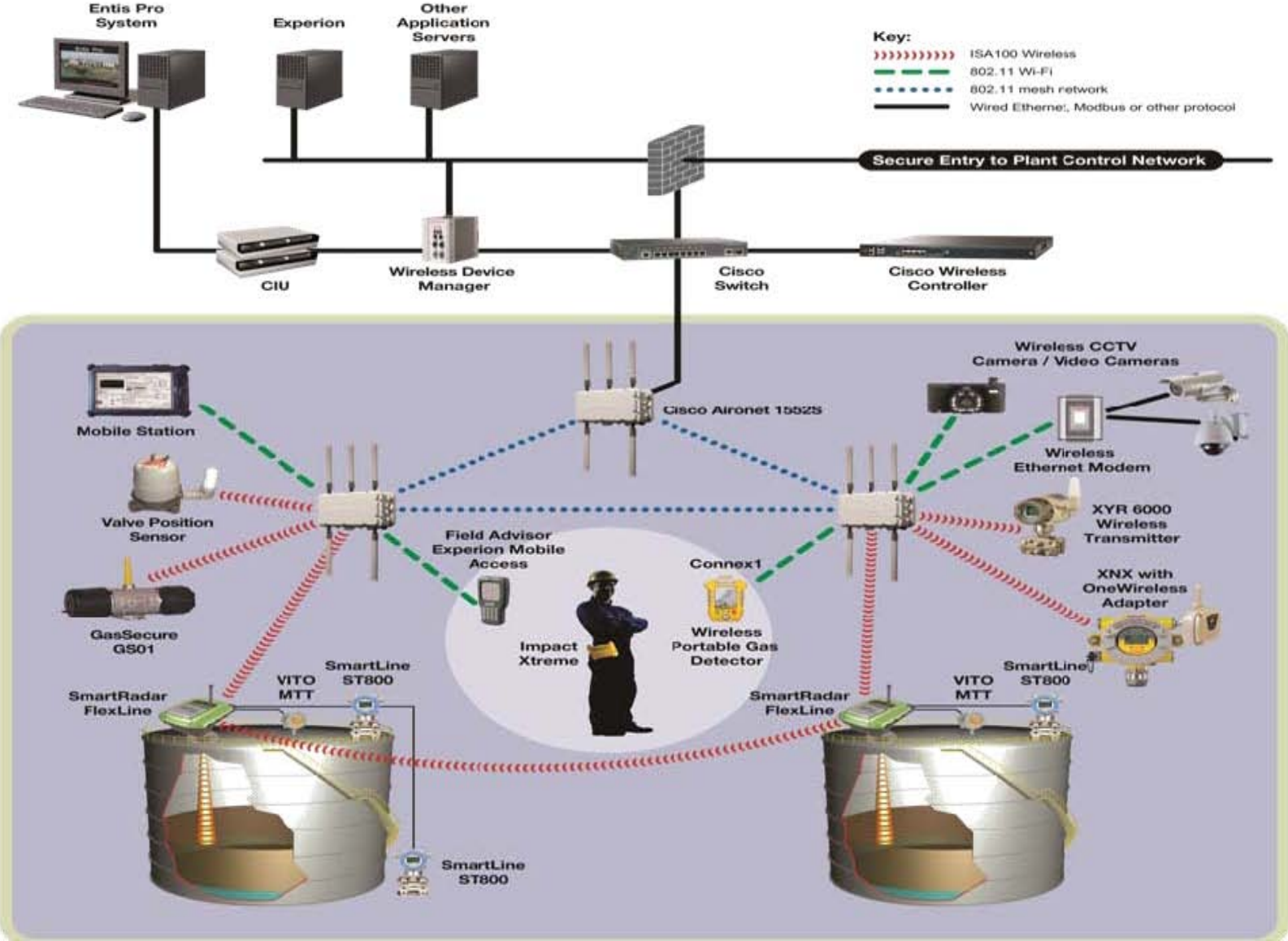
- **Site-wide wireless solution**
  - Single infrastructure solution
  - Operations efficiency
  - Personnel safety
- **Gas detection over ISA100 with a PROFIsafe layer**
  - Safety application
- **Tank gauging and level data**
  - Business goal and safety
- **Vibration waveform data for condition monitoring**
  - Asset management and reliability
- **Supports other existing protocols**
  - Coexistence and utilization of existing investments

ISA100.11a (IEC 62734) Standard is compliant with EN300328 v1.8.1

Honeywell OneWireless™ Solutions for Process Automation Industry

Network Infrastructure Equipment

Ethernet/WiFi Devices and applications

OneWireless™ XYR6000 Transmitter Family

Field Instruments

Honeywell OneWireless™ Plant Solutions

- Keep people, plants and the environment safe
- Improve plant and asset reliability
- Optimize through efficient employees, equipment and processes

Honeywell OneWireless™ Meshing / Non-Meshing Network

OneWireless Network
Reliable, Flexible, Scalable

A redundant wireless network with no single point of failure and wired-like performance.

Plant-Wide Mesh Network or Multi-Applications
- One network for Wi-Fi, ISA100 Wireless and Ethernet devices
- Powered backbone for highest performance and scalability

Field Device-Mesh Network Large-Scale, High Performance ISA100 Wireless
- Powered backbone for highest speed and reliability
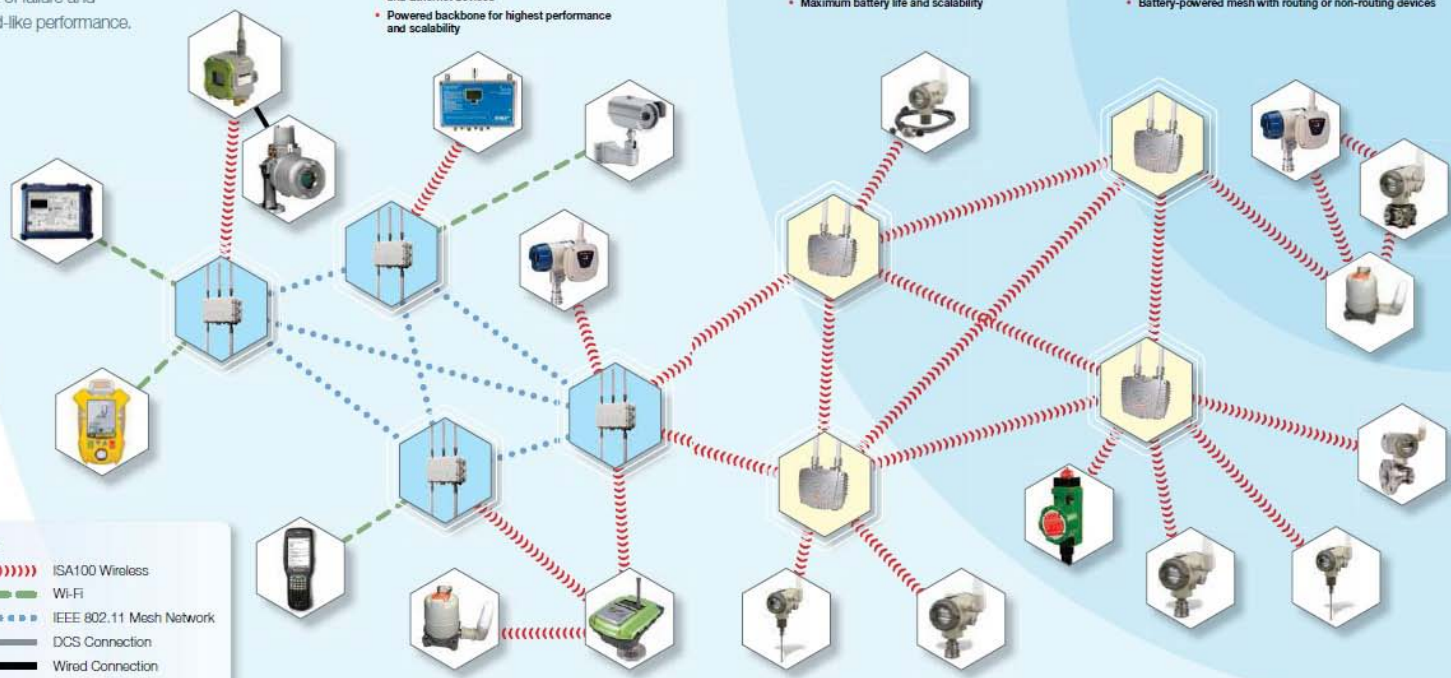- Maximum battery life and scalability

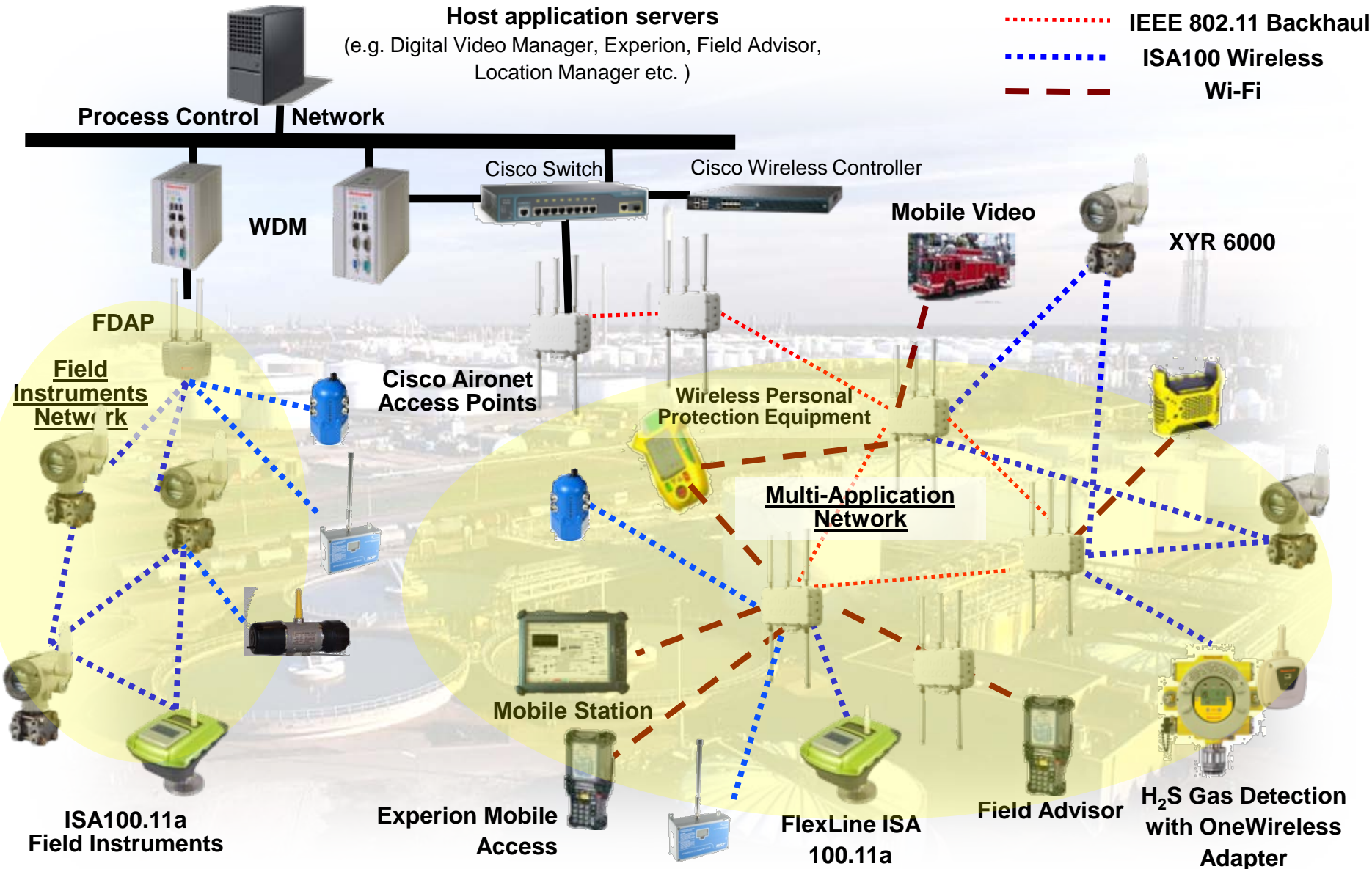**Field Device-Mesh Network Small to Medium Scale ISA100 Wireless**
- Slower speed networks
- Battery-powered mesh with routing or non-routing devices

Key:
- ISA100 Wireless
- Wi-Fi
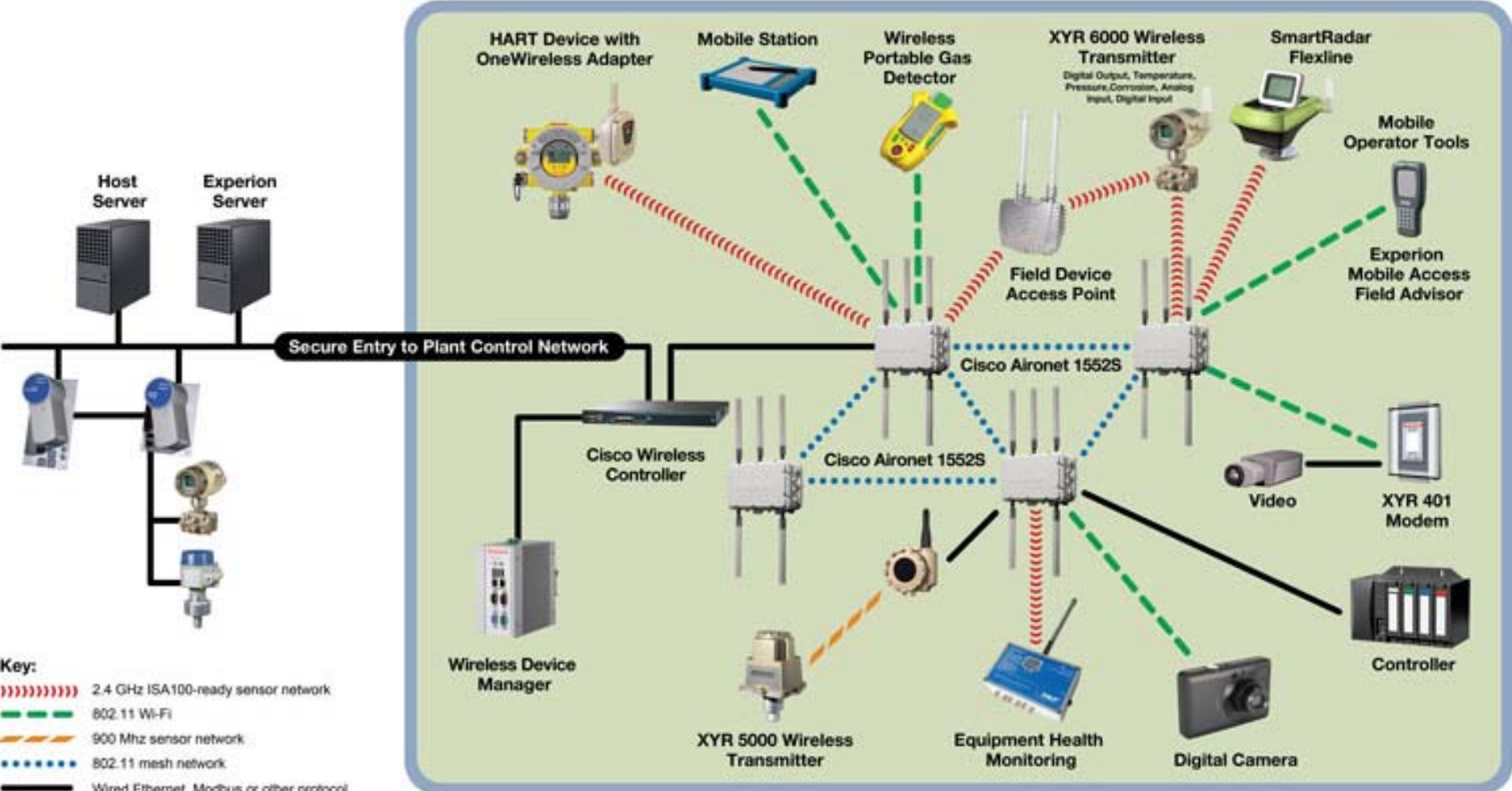- IEEE 802.11 Mesh Network
- DCS Connection
- Wired Connection

Plant Wireless Coexistence with Others

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Secured Wireless Access to Plant Control Network

Host Server

Experion Server

HART Device with OneWireless Adapter

Mobile Station

Wireless Portable Gas Detector

XYR 6000 Wireless Transmitter
Digital Output, Temperature, Pressure,Corrosion, Analog Input, Digital Input

SmartRadar Flexline

Mobile Operator Tools

Secure Entry to Plant Control Network

Field Device Access Point

Cisco Aironet 1552S

Experion Mobile Access Field Advisor

Cisco Wireless Controller

Cisco Aironet 1552S

Video

XYR 401 Modem

Wireless Device Manager

XYR 5000 Wireless Transmitter

Equipment Health Monitoring

Digital Camera

Controller

Key:
-)))))))))) 2.4 GHz ISA100-ready sensor network
- — — — 802.11 Wi-Fi
- — — — 900 Mhz sensor network
- ••••••• 802.11 mesh network
- ——— Wired Ethernet, Modbus or other protocol

Experion is a registered trademark and XYR and OneWireless are trademarks of Honeywell International Inc. © Copyright Honeywell International Inc. All rights reserved.

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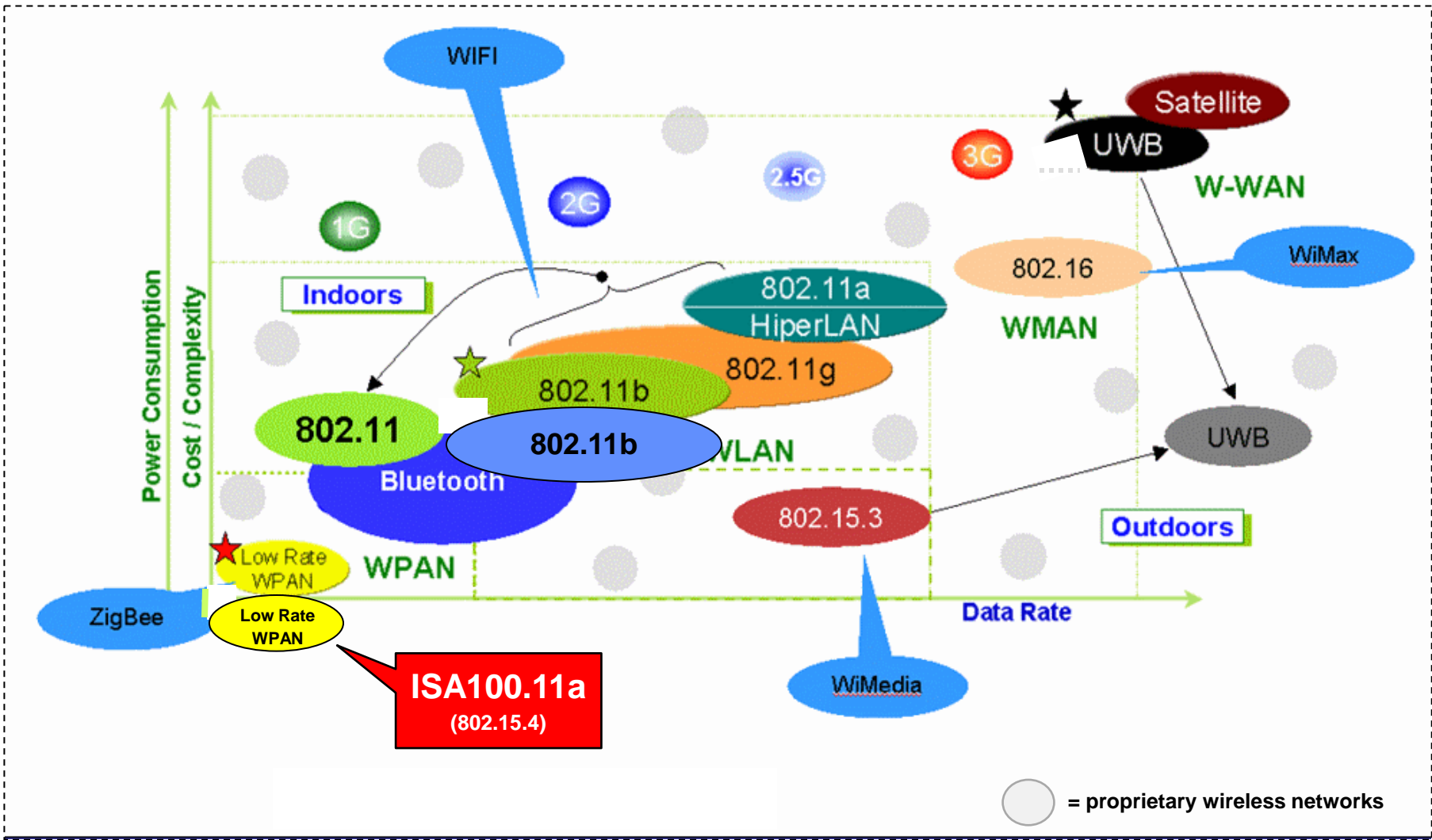# Real-time Tracking and Personnel Safety

Wi-Fi-connected gas detectors provide immediate health, location and compliance visibility for high risk areas

ConneXtPro System

Communications Landscape – "The New Way"

Many Wireless Choices with a Changing Landscape

ISA Background Information

- **ISA100.11a = ISA100™ Wireless = IEC 62734**

- **ISA**
  - **International Standards Association**
    - ISA100 committee - scope to create a family of wireless standards
    - Developed the ISA100.11a wireless communication standard
    - Over 400 automation professionals and experts provided user requirements

- **WCI**
  - **Wireless Compliance Institute**
    - Responsible for compliance testing to the wireless standard
    - Similar to Foundation Fieldbus and HART Communications Foundation
    - www.isa100wci.org

ISA100 Usage Classes

ISA100.11a addresses process automation industry needs

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

ISA100.11a (left side label)

Importance of message timeliness increases (right side label)
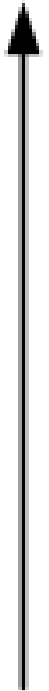
Addresses Most of the Industrial Plant's Field Device Applications

Committee Defined 11 Core Requirements

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1	Security	Flawless application of proven cryptography
2	Reliable communication	24x7 operation - High data integrity
3	Good power management	Long and deterministic battery life
4	Open	Select best in class from multiple suppliers
5	Multi-speed	Some devices report frequently, others not
6	Multi-functional	One network, many applications with different needs
7	Scalable	Scalable in numbers, space, and rate
8	Global usability	One technology legal everywhere
9	Quality of Service	Controlled latency, low error rate
10	Multi-protocol	Cleanly integrate with existing investment
11	Control ready	Solves real problems

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Global Usability

INTRODUCTION

0.1 General

The ISA100 Committee was established by ISA to address wireless manufacturing and control systems in areas including:

- The environment in which the wireless technolo...
- Technology and life cycle for wireless equipmen...
- The application of wireless technology.

The Committees focus is to improve the confid... components or systems used for manufacturing or ... and implementing wireless technology in the contro... Committees guidance will improve manufacturing a... identify vulnerabilities and address them, thereb... causing manufacturing control systems degradation...

This ISA standard is intended to provide reliable a... monitoring, alerting, supervisory control, open ... applications. This standard defines the protocol ... security specifications for low-data-rate wireless c... devices supporting very limited power consumption... address the performance needs of applications suc... latencies on the order of 100 ms can be tolerated, w...

To meet the needs of industrial wireless user... robustness in the presence of interference found ... legacy non-ISA100 compliant wireless systems. As described in Clause 4, this standard addresses coexistence with other wireless devices anticipated in the industrial workspace, such as cell phones and devices based on IEEE 802.11x, IEEE 802.15x, IEEE 802.16x, and other relevant standards. Furthermore, this standard allows for interoperability of ISA100 devices, as described in Clause 5.

This standard does not define or specify plant infrastructure or its security or performance characteristics. However, it is important that the security of the plant infrastructure be assured by the end user.

> **This standard addresses coexistence with other wireless devices anticipated in the industrial workplace such as cell phones and devices based on IEEE 802.11x, IEEE 802.15x, IEEE 802.16x, and other relevant standards.**

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ISA100 Wireless Standard

7 Layer OSI Model

Application Layer
Presentation Layer
Session Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer
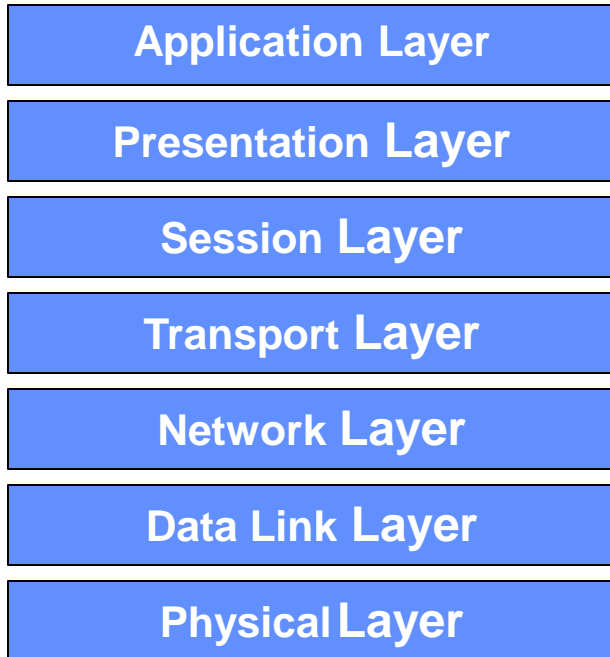
ISA100 Wireless utilizes the OSI (*Open System Interconnection)* model which defines a networking framework with seven independent layers, facilitating the ability to incorporate new technologies in the future.

Future of Wireless – Internet of Things (IoT)

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- **IoT is the concept of increasing connectivity of smart objects**
  - **Either to the Internet or some kind of Internet-like structure.**

- **Smart devices should be able to communicate with each other or with human interfaces anywhere on the planet thus enabling new business models.**

- **Will use vetted and emerging protocols and technology prevalent in the internet.**
  - **ARC "No new technology breakthrough required."**

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ARC "Planning for the Industrial Internet of Things"

ARC whitepaper

http://www.arcweb.com/services/pages/industrial-internet-of-things-service.aspx

Standard	Organization	Summary
LTE	ETSI	Telecomm standard for modern connected cars and cellular devices
MQTT	IBM, OASIS (proposed)	Publish/subscribe message transport for remote devices
Numerous	IEEE	Network physical and data link layers: Ethernet, WiFi, 6LowPan, Bluetooth, etc.
IPv6	IETF	Internet network/transport layers
ISA 100	ISA	Wireless industrial network architectures
TR50	TIA	M2M Smart Device Communications Framework

Selected Examples of IoT-Related Standardization Efforts

Radio Spectrum Needs and Usage

More and more applications in limited wireless capacity

New radio spectrum allocation

Efficient wireless spectrum usage

Large bandwidth

Multi-mode/multi-band transceivers

Towards higher frequency

SDR and Cognitive Radio

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Thank You