



Setting the Standard for Automation™

Industrial Wireless Application Implementations & Wireless Technologies

Wireless Track Presentation #125

Standards
Certification
Education & Training
Publishing
Conferences & Exhibits

2

Sarah Prinster – Apprion
Bruce Manthey – Apprion



“The future of wireless in process automation could well turn out to be a battle between those who use it ‘incrementally’ – in effect to replace copper in conventional applications – and those who use it imaginatively to reshape the applications themselves.”

Andrew Bond

The *Industrial Automation Insider* Newsletter

- Significant Cost Savings By Not Having To Run Wires
 - More measurements for limited budgets
- More Measurement, Lower Cost
 - Greater availability of real time data integration
- Workforce Mobility
 - Connecting human, rolling and remote assets to applications in the field
- New Applications Driving Bottom Line Improvements
 - Plant business optimization
 - Enterprise asset performance management
- New Measurements Addressing Mandated Requirements
 - Personnel and equipment safety
 - Plant security

MULTIPLE APPLICATIONS

INDUSTRIAL GRADE

OPEN ARCHITECTURE

MANAGED SERVICES

Monitoring



Condition Monitoring



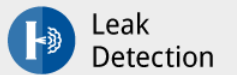
Emissions Monitoring



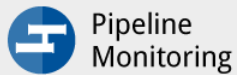
Tank Gauging



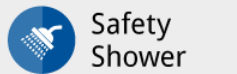
Network Monitoring



Leak Detection



Pipeline Monitoring



Safety Shower



Steam Trap Monitoring

Video



Video Security



Process Video



WiMAX Video

Location



Access Control



Asset Tracking



Mustering



Personnel Tracking

Mobility



Workflow



Mobile Workforce



Turnarounds

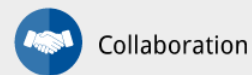
Comms



Emergency Notification



Digital Walkie-Talkies



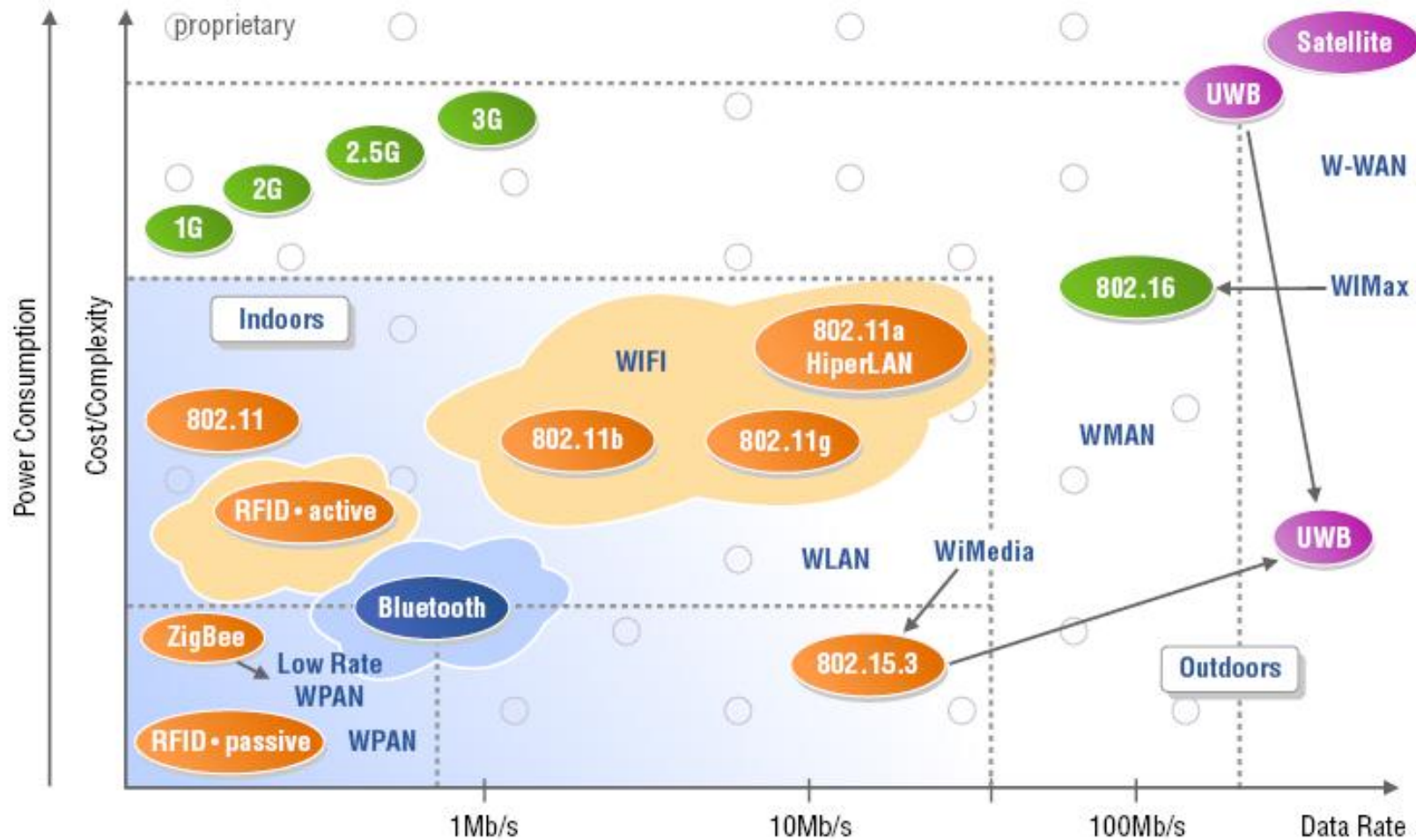
Collaboration



VoIP



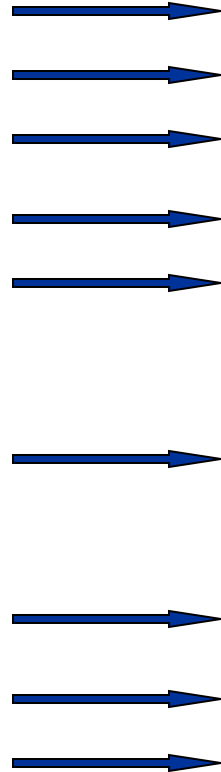
RF – One Size Does Not Fit All



Right Solution = Many Types of Wireless

Application

- Remote site monitoring
- Increased I/O
- Video surveillance
- Mobile Operator
- Condition Monitoring-temperature
- Condition monitoring-Vibration, pressure, tank level
- Asset tracking
- VoIP/VoWLAN
- Safety and compliance



Best Wireless

- WiMAX
 - Proprietary
 - WiMAX
 - WiFi (802.11)
 - ISA100; WiHART
-
- ISA100; WiHART
-
- Active RFID; UWB
 - Ethernet/WiFi
 - Multiple

MULTIPLE
APPLICATIONS

INDUSTRIAL
GRADE

OPEN
ARCHITECTURE

MANAGED
SERVICES

Vendor	Wireless	Wireline	Device
Emerson	WiHart	HART	APs
Honeywell	ISA100	ModBus	Cameras
Yokogawa	Zigbee	FieldBus	Handhelds
Cisco	802.11	4-20mA	Sensors
Motorola	WiMAX		Speakers
ABB	LTE		RFID
Siemens	VSAT		Tablets

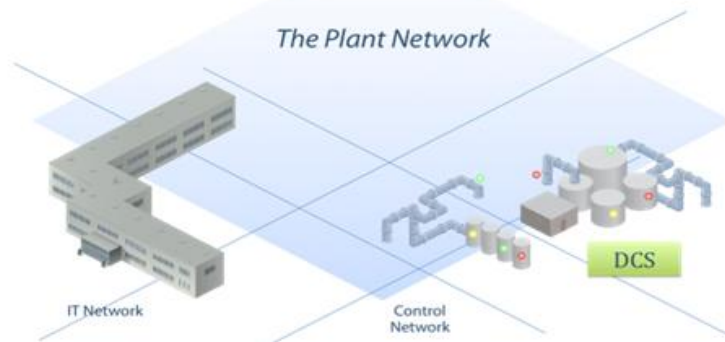


Best Practices for Wireless Approach

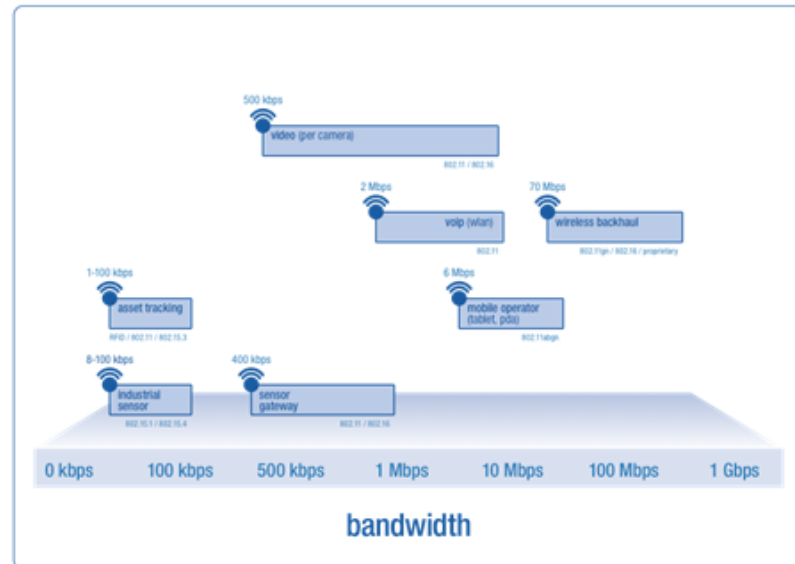
- Corporate Guidance & Standards
 - not prescriptive
 - situations are different
 - upstream / downstream / airports / hotels
- What is your roadmap?
- Budget



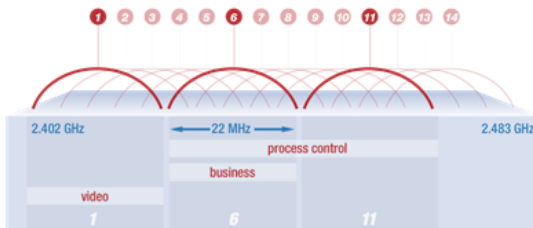
Open Wireless Roadmap and Standards



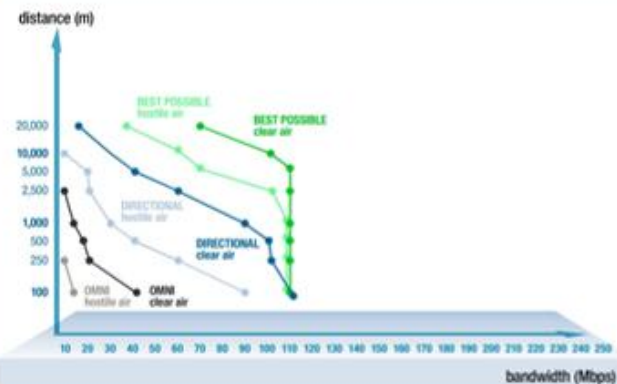
IT Network Characteristics	Plant Network Characteristics	Control Network Characteristics
Approximate Time	Application-Time	Real-Time
Response reliability is critical	Application-driven QOS	Response time is critical



2.4GHz 802.11 channel allocation strategy



Note: Any channel segregation is possible as long as it is adhered to consistently.



Bandwidth Utilization by Radio 802.11n (2.4GHz 20MHz Ch.)

Comparison of WiMAX with Other Broadband Wireless Technologies

Parameter	Fixed WiMAX	Mobile WiMAX	HSPA	1xEV-DO Rev A	Wi-Fi
Standards	IEEE 802.16-2004	IEEE 802.16-2005	3GPP Release 6	3GPP2	IEEE 802.11a/g/n
Peak downlink data rate	9.4Mbps in 5MHz with 3:1 DL-to-UL ratio TDD, 6.1Mbps with 1:1	48Mbps with 3:1 DL-to-UL ratio TDD, 32Mbps with 1:1	14.4Mbps using all 15 codes, 7.2Mbps with 10 codes	3.1Mbps Rev. B will support 4.3Mbps	54Mbps shared using 802.11a/g, more than 100Mbps peak layer 2 throughput for 802.11n
Peak uplink data rate	3.1Mbps in 5MHz using 3:1 DL-to-UL ratio, 6.5Mbps with 1:1	7Mbps in 10MHz using 3:1 DL-to-UL ratio, 4Mbps using 1:1	14Mbps in initial, 5.6Mbps later	1.8Mbps	
Bandwidth	3.5MHz and 7MHz in 3.5MHz band, 10MHz in 5.0MHz band	3.5MHz, 7MHz, 5MHz, 10MHz and 8.75MHz initially	5MHz	1.25MHz	20MHz for 802.11n, 20-40MHz for 802.11n
Modulation	QPSK, 16 QAM, 64 QAM	QPSK, 16 QAM, 64 QAM	QPSK, 16 QAM	QPSK, 8 PSK, 16 QAM	BPSK, QPSK, 16 QAM, 64 QAM
Multiplexing	TDM	TDM/OFDMA	TDM/CDMA	TDM/CDMA	CDMA
Duplexing	TDD, FDD	TDD initially	FDD	FDD	TDD
Frequency	3.5MHz and 3.5GHz band initially	2.3GHz, 2.5GHz, and 3.5GHz initially	800/900/1,800/1,900/2,100MHz	800/900/1,800/1,900MHz	2.4GHz, 5GHz
Coverage (typical)	3-5miles	<2miles	1-3 miles	1-3miles	<100 ft indoors, <1000 ft outdoors
Mobility	Not Applicable	Mid	High	High	Low

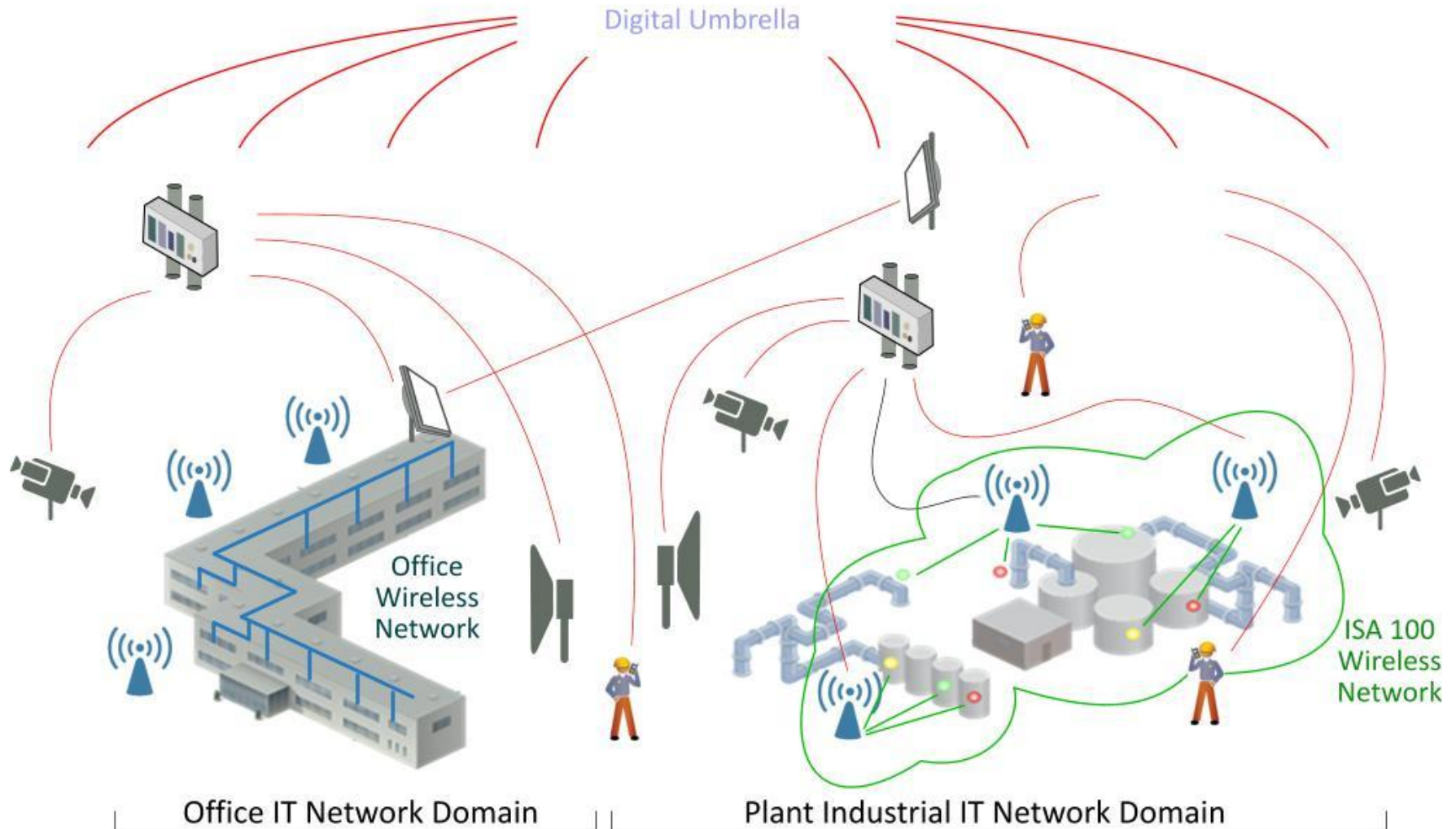
Legend: WiMAX = Worldwide Interoperability for Microwave Access HSPA = High Speed Packet Access 1x EV-DO = 1X Evolution Data Only Wi-Fi = Wireless Fidelity

a. Assumes 2.7MHz and a 10MHz channel
b. Due to inefficient CSMA/CA, this typically translates to only ~20Mbps to 25Mbps steady throughput.

-
- Signal power (dBm)**
- | |
|------------------|
| >-40 dBm (0.0%) |
| >-50 dBm (3.2%) |
| >-60 dBm (27.0%) |
| >-65 dBm (28.7%) |
| >-70 dBm (21.0%) |
| >-75 dBm (13.0%) |
| >-80 dBm (3.4%) |
| >-85 dBm (2.1%) |
| >-90 dBm (0.7%) |
| >-95 dBm (0.3%) |
| >-100 dBm (0.3%) |
| >-110 dBm (0.1%) |
| >-120 dBm (0.0%) |
| <-120 dBm (0.0%) |

A Better Way – the Wireless Network

Comprehensive Wireless Network



Real-Life Examples

Huntsman Port Neches - Mobility



Achieve Manufacturing “Zero, Zero, Zero” Goals

- Implemented a Manufacturing Excellence Program the goal of: zero injuries, zero equipment and product defects, and zero environmental releases
- Reduce the high costs due to equipment downtime and lifecycle run time
- 30% of workforce retiring immediately and taking non-documented knowledge with them
- Implement a wireless solution that would replace a completely manual approach

Wireless Implementation



- Integrated Industrial Platform - IONosphere
- Wireless Infrastructure – Industrial Appliances/IONizers
- Wi-Fi & WiMAX Umbrella
- Network Management Services
- Motorola handhelds
- Mobility software on handhelds
- Motorola TEAM Server



Mobility Implementation



Real-time Data Transfer

Live rounds, incident handling, and critical updates from the mobile field

Data Capture

Historical data capture for reporting and future knowledge transfer

The screenshot displays the HUNTSMAN mobile application interface. The top navigation bar includes the Apprion and HUNTSMAN logos, along with user status and login information. The left sidebar contains a menu with options: Dashboard, Admin Dashboard, Server Status, Data/Reports, Events, Regions, Devices, Users, Applications, Network Security, Network Monitoring, System, My Profile, Help, and Logout. The main content area is divided into several sections:

- Event Summary:** A table showing event categories and their status in the last hour.
- Device Group Status:** A table showing the status of various device groups.
- Process Buddy:** A detailed view of a specific device group, showing its status, events, and a warning message.
- View Region:** A map showing the geographical location of the device group.

The **Process Buddy** section displays the following information:

- Category:** Device Management
- Last Hour:** 0 / 0 / 0
- Link Management:** 0 / 0 / 0
- Network Security:** 0 / 0 / 10
- ION System:** 0 / 0 / 0

The **Process Buddy** section also displays the following information:

- Status:** Device Group
- Events:** Reachable Wireless Associations
- Process Variable:** Air Temperature
- Pa L:** 85.00 **N:** 102.50 **H:** 135.00
- Reading:** 50
- Warning:** This item is operating outside safe operating conditions.
- Consequence of Deviation:** Low air temperature can result in low oil mist density, which can create insufficient lubrication of mechanical equipment serviced by oil mist system.

The interface includes a 'Continue' button and a 'Cancel' button at the bottom of the warning dialog.

Workforce Mobility

Rounds, checklists, SOC's, field management, consequences of deviation

Facility-wide Data Access

Facility-wide visibility of all monitored devices for immediate event indication

Safety Incidents Continue to Fall to Zero

- 50% reduction of daily pump inspections
- Safety incidents have been reduced by over 75% and are expected to fall to zero.
- Increased effectiveness in defect capture and providing accountability at all levels of the organization
- Reduced maintenance costs.
- Increased uptime from the improvement in overall equipment effectiveness that increases production quality and quantity.

Integrated Applications in Existing Infrastructure



Emergency Notification

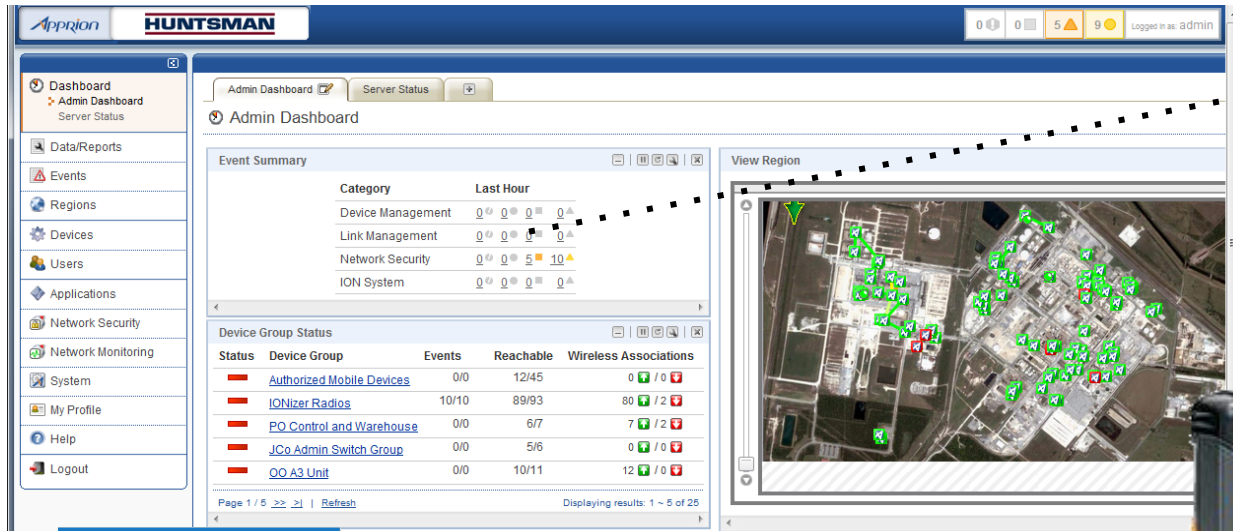


Tank Gauge Monitoring



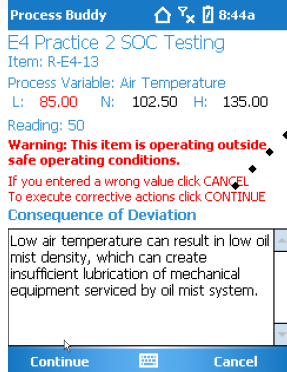
Additional Wireless Benefits

Turnarounds



Facility-Wide Metrics

Continuous, reliable communication & metrics regarding maintenance, process status and critical events



Workforce Mobility

Rounds, checklists, SOC's, field management, consequences of deviation

Rugged Handhelds



TEAM VoWiFi
Industrial Handhelds



MarSec compliance mandates video for safety and security

- Compliance mandates required video for safety and security
- Wanted to add Communications and Condition Monitoring Applications in the near future
- Budget constraints required implementation at the lowest cost possible
- Needed to immediately and cost-efficiently avoid compliance fines and possible security risks

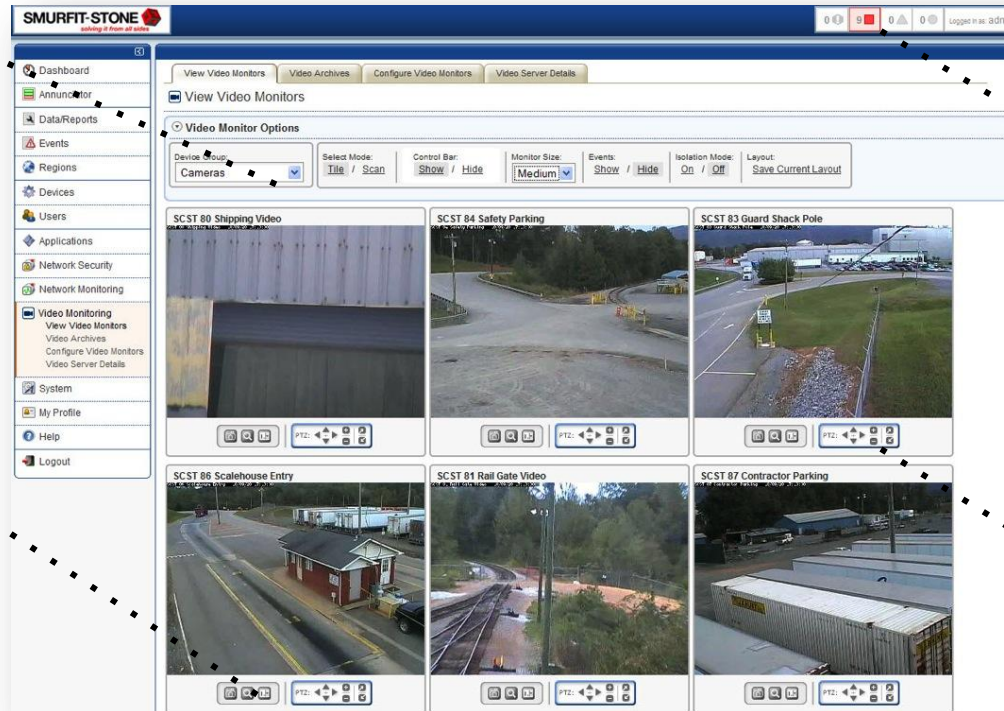
RockTenn – Video for Security



Carousel Monitoring
Stream video from multiple cameras with up to 16 camera views



Intelligent Search
Search on key visual attributes captured in the video



Real-Time Alerts

Video Event triggered alerts and alarm notifications and status bar



Pan, Tilt & Zoom

Alter camera remotely via PTZ widget in dashboard

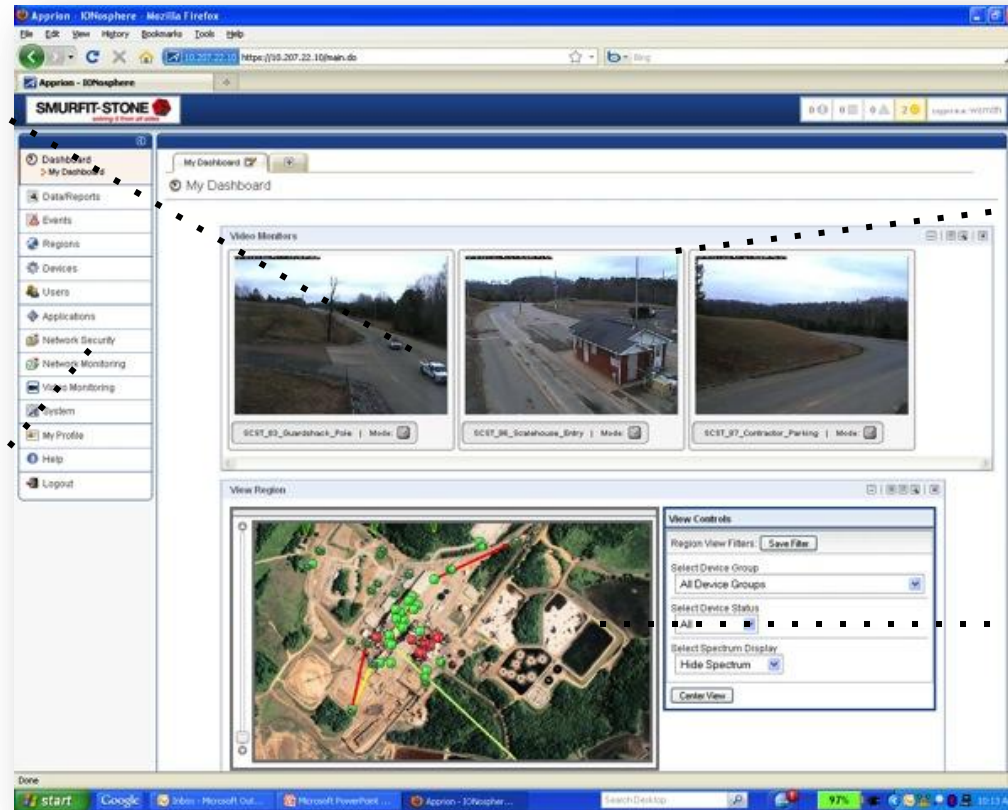
RockTenn – Video for Security



Object Recognition
Detect and recognize specific objects, faces and motions



Video Archives
Store and index all past events and activity for easy search and access



Remote Monitoring
Continuous camera rotation and monitoring of critical remote areas



Integrated Video
View Video with other Applications in one central dashboard

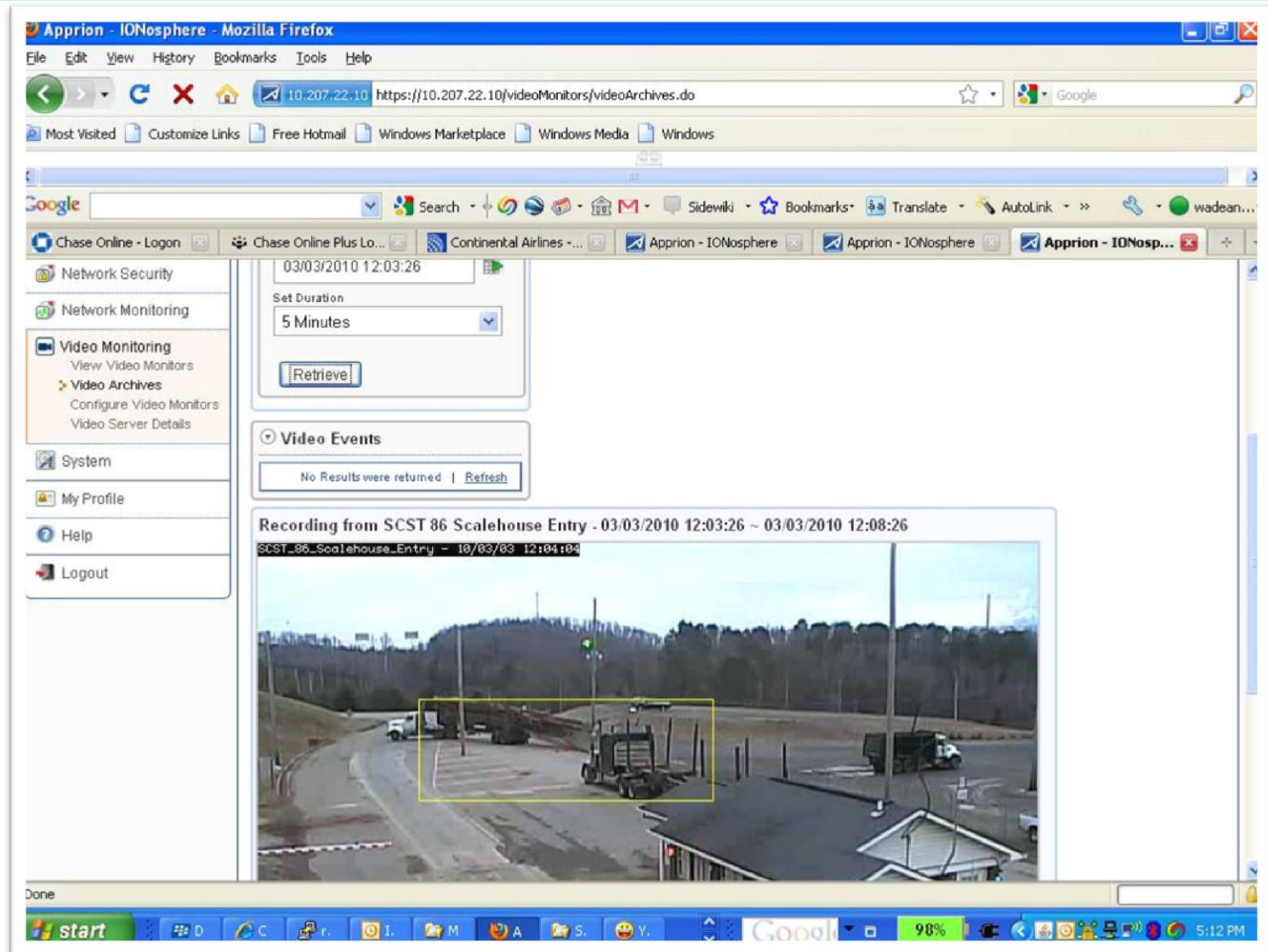
RockTenn – Video for Security



The screenshot displays the Apprion Video Monitoring web interface. The top navigation bar includes the Apprion logo and a user login status (Logged in as: admin). The left sidebar contains a menu with options: Dashboard, Data/Reports, Events, Regions, Devices, Users, Applications, Network Security, Network Monitoring, Video Monitoring (selected), System, My Profile, Help, and Logout. The Video Monitoring section is expanded, showing sub-options: View Video Monitors, Video Archives, Configure Video Monitors, and Video Server Details. The main content area is titled 'View Video Monitors' and features a 'Video Monitor Options' section. Below this, there is a grid of 18 video feeds, each with a title and a live video stream. The feeds are arranged in three rows of six. Each feed includes a set of control buttons (PTZ, zoom, pan, etc.) at the bottom. The video feeds show various industrial and security camera views, including shipping areas, parking lots, guardshacks, scalehouses, and storage areas.

Video Feed Title	Video Feed Title	Video Feed Title	Video Feed Title	Video Feed Title	Video Feed Title
SCST 80 Shipping Video	SCST 84 Safety Parking	SCST 83 Guard Shack Pole	SCST 86 Scalehouse Entry	SCST 81 Rail Gate Video	SCST 87 Contractor Parking
SCST 88 Trailer Parking	SCST 91 Mobile Shop	SCST 90 OCC Storage	SCST 89 Woodyard Unstrapping	SCST 101 Time Clock	SCST 94 Boneyard
SCST 93 No 6 Fuel Tank	SCST 96 Guardshack Entry SW	SCST 97 Guardshack Exit SE	SCST 98 Scalehouse Exit	SCST 95 Training SE	SCST 82 Chip Pile TVA

“Caught in the Act!”



ION Software and Devices

- IONosphere
- Motorola 5181's
- Apprion IONizers
- 22 Wired and Wireless PTZ Video Cameras throughout facility
- ION Video Server
- Wi-Fi & WiMAX Umbrella
- ION Managed Services

Compliance + Increased Safety + Security + Cost Savings

- Increased safety and security of plant operations
- Economically addressed security compliance
- Improved process monitoring through remote video
- Cost savings of 25% by not having to lay wires
- A site-wide wireless umbrella that enables the easy addition of future applications
- Apprion's 24/7/365 ION Services provides round-the-clock network support - securely

THANK YOU

Gratias
Tak
Paxmet
Prasom
Dziakuje
Merci
Multumesc
Danke
Obbrigado
Koszonon
Mahalo
arigato
Спасибо