Setting the Standard for Automation™

Industrial Wireless Application Implementations & Wireless Technologies

Wireless Track Presentation #125

Standards
Certification
Education & Training
Publishing
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Safe Harbor Statement & Disclosures

The following presentation includes forward-looking comments and information concerning industrial wireless, plans and objectives for the future, including estimates and assumptions with respect to economic, political, technological, weather, market acceptance and other factors that impact our businesses and customers. They also may include blah, blah…

Sarah Prinster – Apprion

Bruce Manthey – Apprion

Overview of Industrial Wireless Technology

"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

The Promise of Wireless

- 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

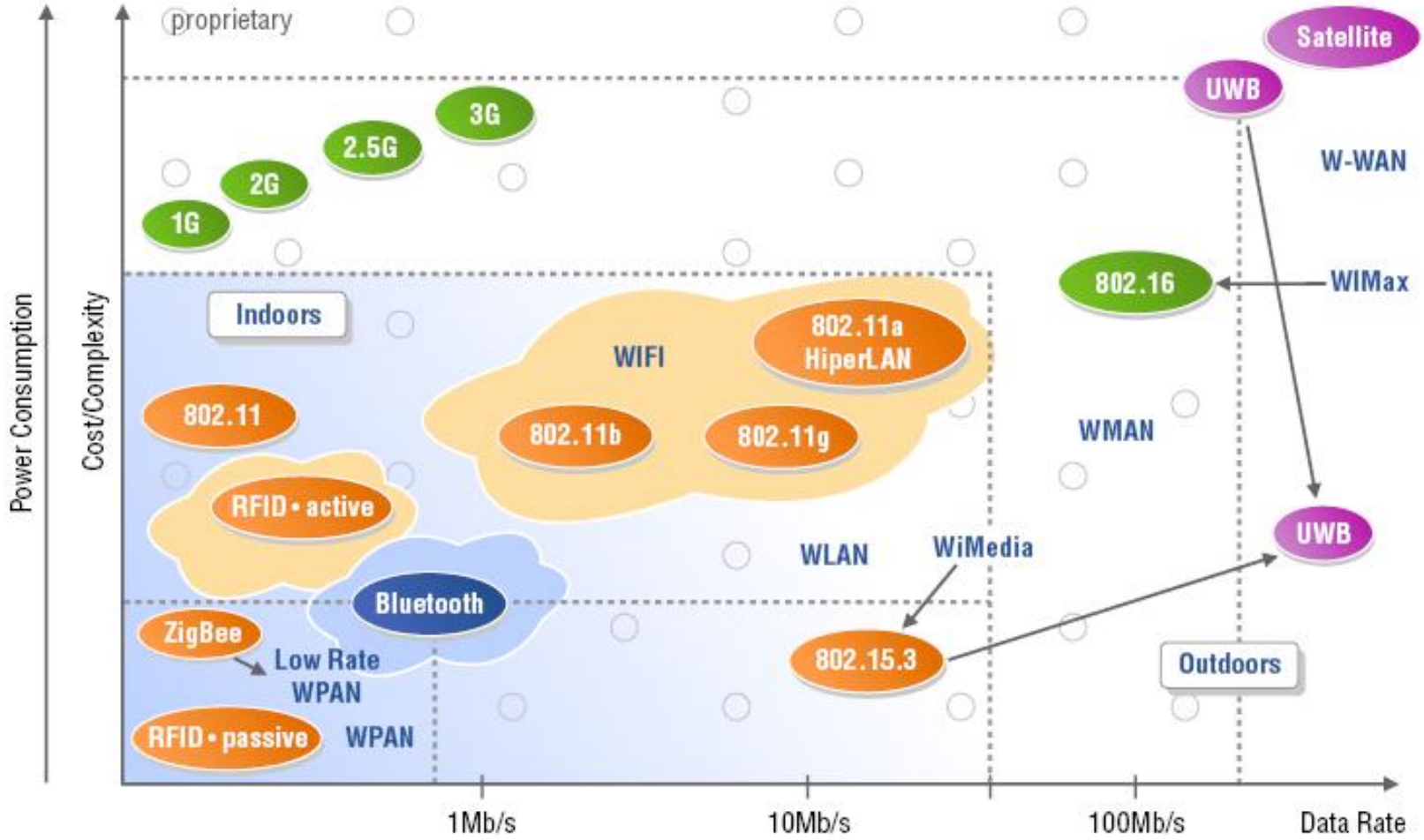
OPEN ARCHITECTURE

MANAGED SERVICES

Monitoring	Video	Location	Mobility	Comms
Condition Monitoring	Video Security	Access Control	Workflow	Emergency Notification
Emissions Monitoring	Process Video	Asset Tracking	Mobile Workforce	Digital Walkie-Talkies
Tank Gauging	WiMAX Video	Mustering	Turnarounds	Collaboration
Network Monitoring		Personnel Tracking		VoIP
Leak Detection				
Pipeline Monitoring				
Safety Shower				
Steam Trap Monitoring				

Apprion

RF – One Size Does Not Fit All



Right Solution = Many Types of Wireless

Application	Best Wireless
Remote site monitoring	WiMAX
Increased I/0	Proprietary
Video surveillance	WiMAX
Mobile Operator	WiFi (802.11)
Condition Monitoring-temperature	ISA100; WiHART
Condition monitoring-Vibration, pressure, tank level	ISA100; WiHART
Asset tracking	Active RFID; UWB
VoIP/VoWLAN	Ethernet/WiFi
Safety and compliance	Multiple

MULTIPLE APPLICATIONS

INDUSTRIAL GRADE

OPEN ARCHITECTURE

MANAGED SERVICES

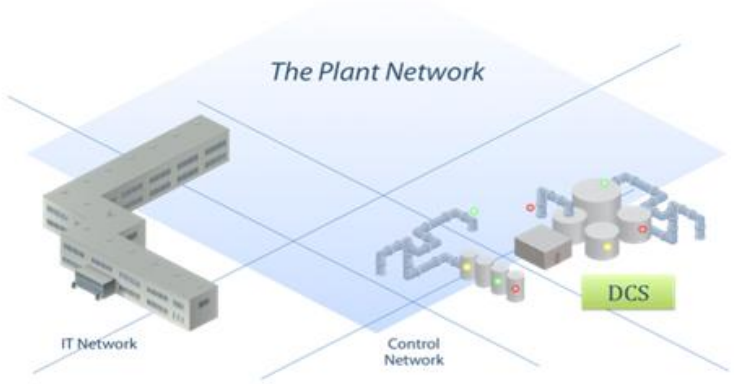
Vendor	Wireless	Wireline	Device
Emerson	WiHart	HART	APs
Honeywell	ISA100	ModBus	Cameras
Yokogawa	Zigbee	FieldBus	Handhelds
Cisco	802.11	4-20mA	Sensors
Motorola	WiMAX		Speakers
ABB	LTE		RFID
Siemens	VSAT		Tablets

Appion

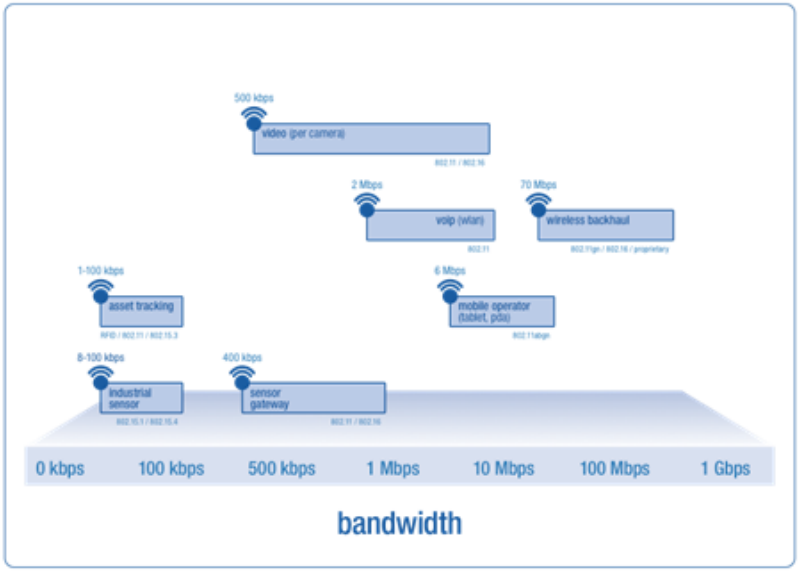
Best Practices for Wireless Approach

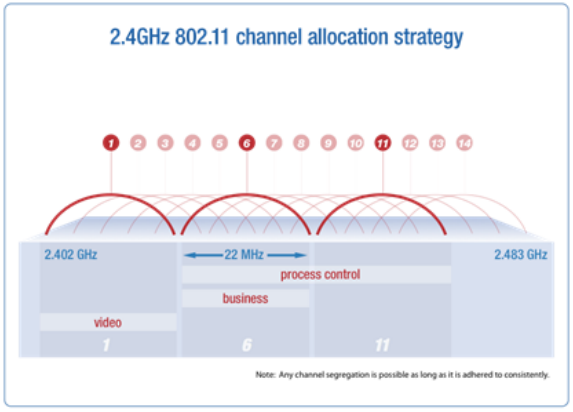
- Corporate Guidance & Standards
  - not prescriptive
  - situations are different
  - upstream / downstream / airports / hotels
- What is your roadmap?
- Budget

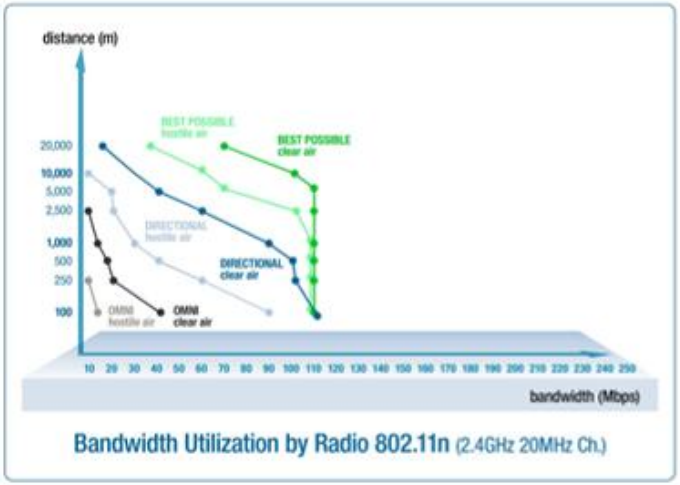
Open Wireless Roadmap and Standards



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







Comparison of WiMAX with Other Broadband Wireless Technologies

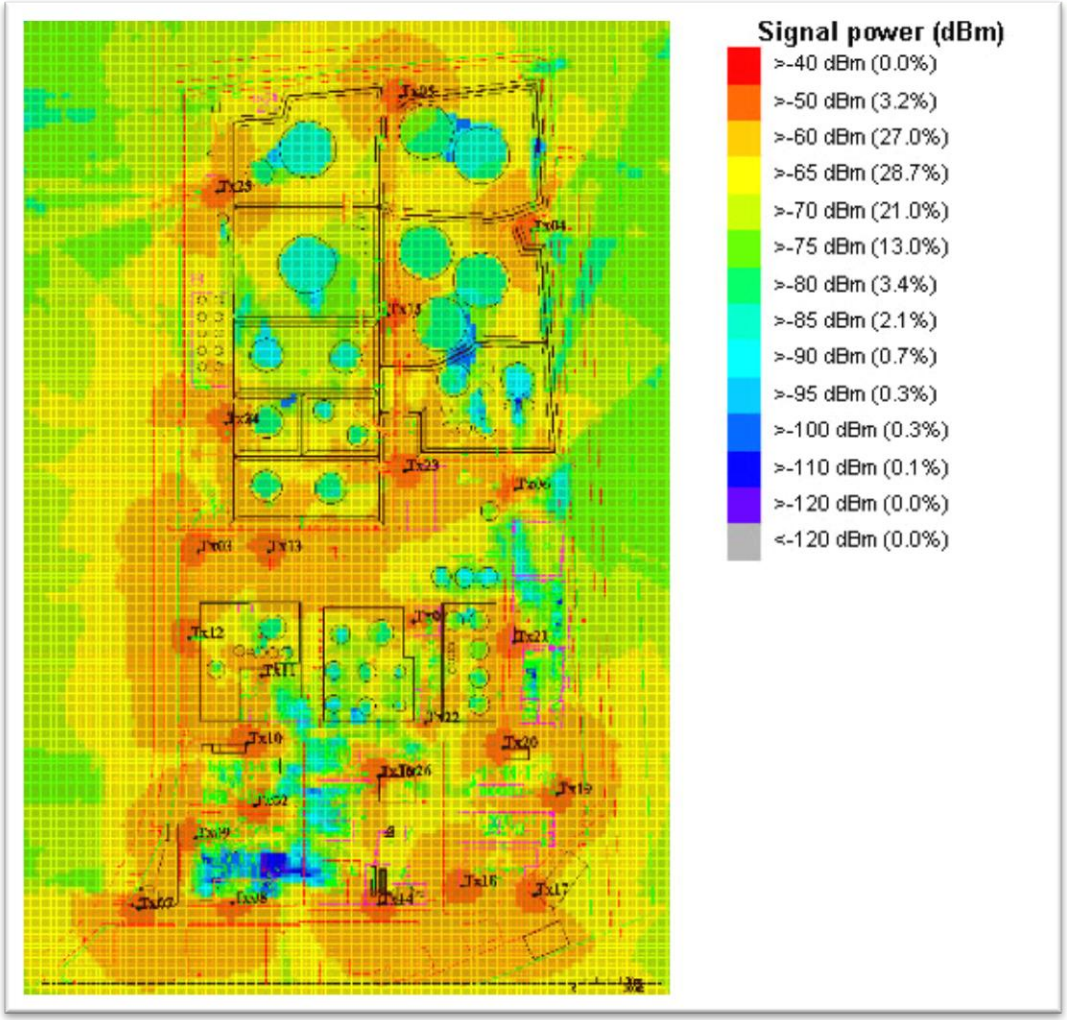
Parameter	Fixed WiMAX	Mobile WiMAX	HSPA	1xEV-DO Rev A	Wi-Fi
Standards	IEEE 802.16-2004	IEEE 802.16-2005	3GPP Release 6	3GPP2	IEEE 802.11a/g/n
Peak down link data rate	9.4Mbps in 3.5MHz with 3:1 DL-to-UL ratio TDD; 6.1Mbps with 1:1	46Mbps[a] with 3:1 DL-to-UL ratio TDD; 32Mbps with 1:1	14.4Mbps using all 15 codes; 7.2Mbps with 10 codes	3.1Mbps; Rev. B will support 4.9Mbps	54Mbps[b] shared using 802.11a/g; more than 100Mbps peak layer 2 through-put 802.11n
Peak uplink data rate	3.3Mbps in 3.5MHz 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 initially; 5.8Mbps later	1.8Mbps	
Bandwidth	3.5MHz and 7MHz in 3.5GHz band; 10MHz in 5.8GHz band	3.5MHz, 7MHz, 5MHz, 10MHz and 8.75MHz initially	5MHz	1.25MHz	20MHz for 802.11a/g; 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	CSMA
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)	3–5 miles	<2 miles	1–3 miles	1–3 miles	< 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

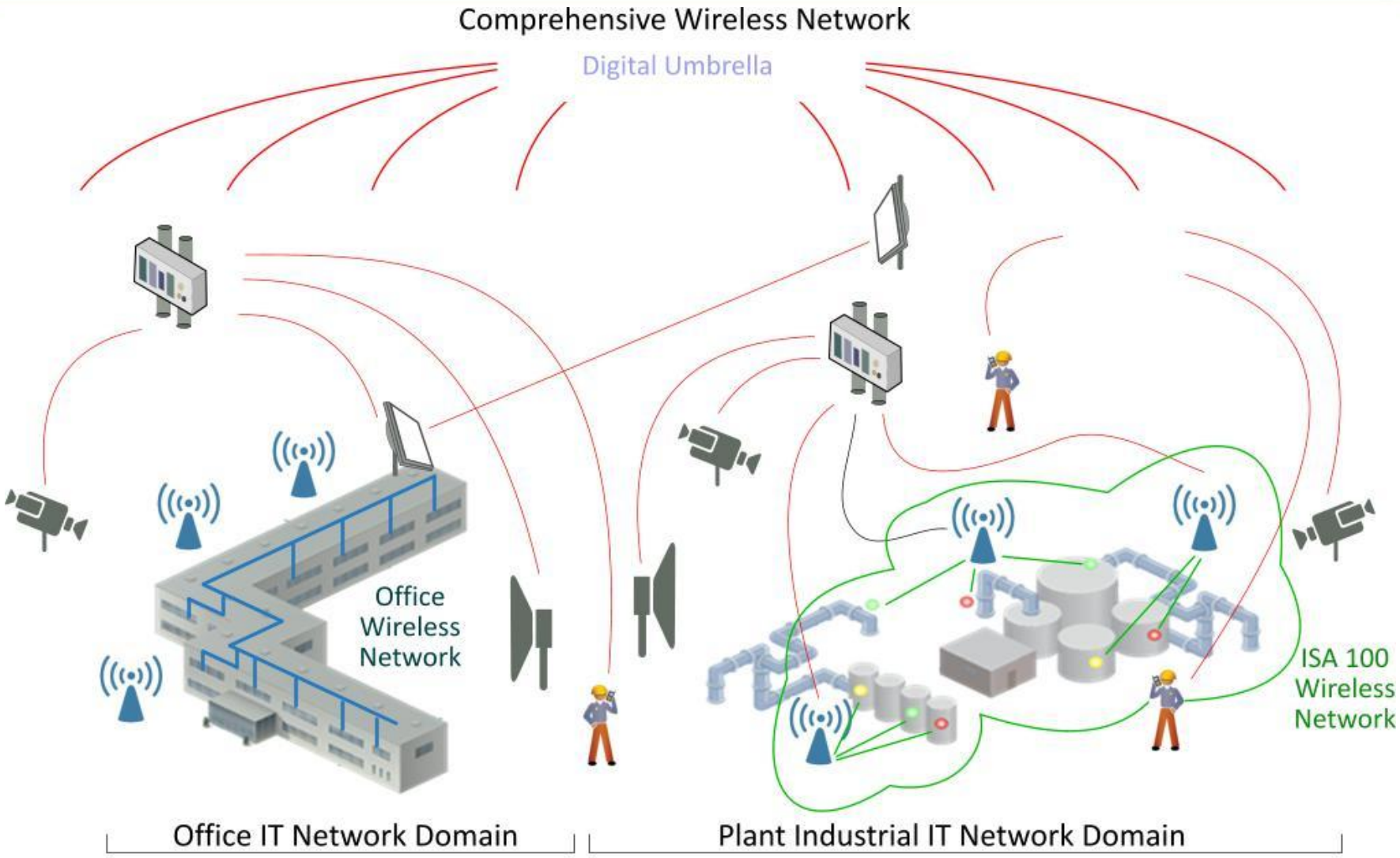
a. Assumes 2x2 MIMO and a 10MHz channel
b. Due to inefficient CSMA/MAC, this typically translates to only ~20Mbps to 25Mbps over 2 throughput.

Do a Site Survey

- Cannot do this on Google Maps!
- Do an on-site
  - real walk-about
  - with real measurements
- <5% of total budget



A Better Way – the Wireless Network



Real-Life Examples
Huntsman Port Neches - Mobility

Achieve Manufacturing "Zero, Zero, Zero" Goals

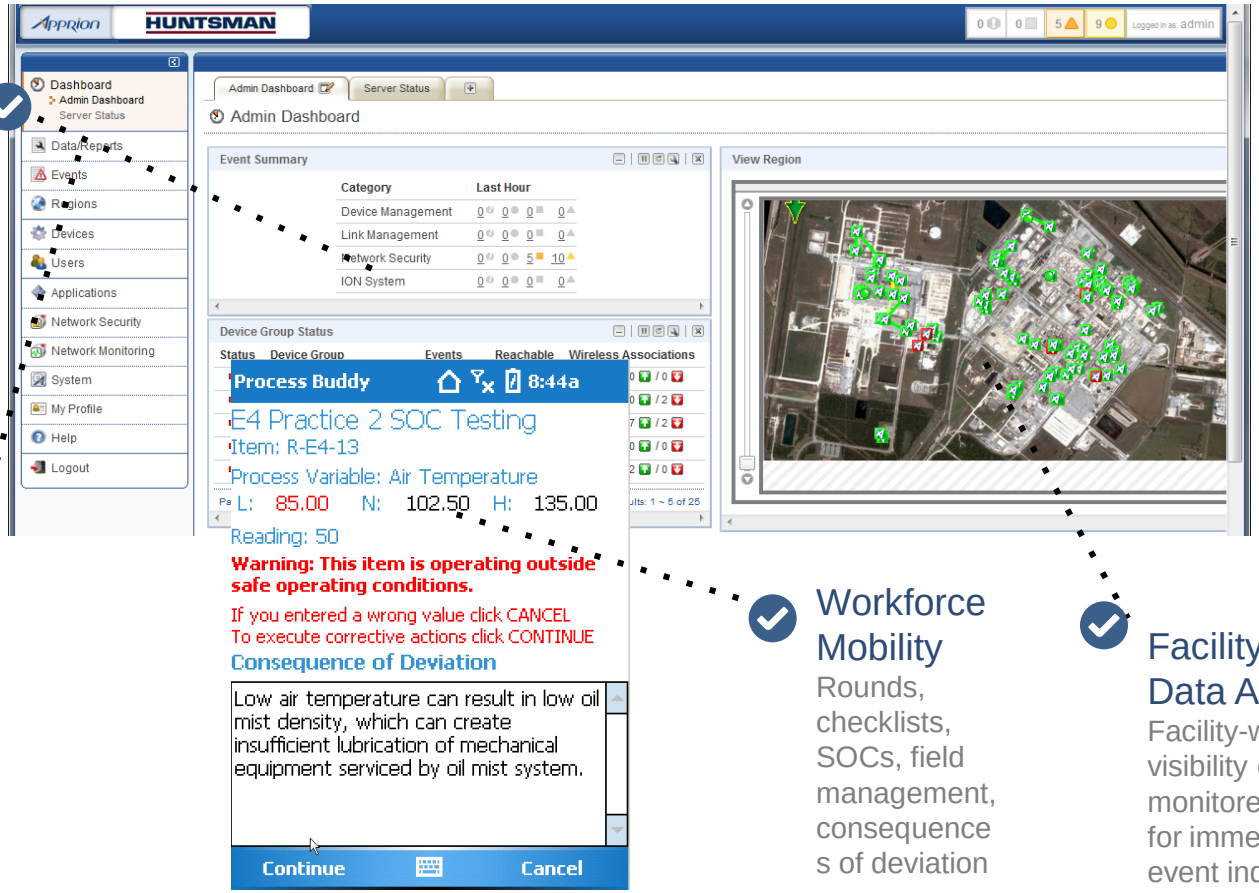
- Implemented a Manufacturing Excellence Program the goal of: zero injuries, zero equipment and product defects, and zero environmental releases
- Reduce the high costs due to equipment downtime and lifecycle run time
- 30% of workforce retiring immediately and taking non-documented knowledge with them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

Workforce Mobility
Rounds, checklists, SOCs, field management, consequences of deviation

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

Results to Date

Safety Incidents Continue to Fall to Zero

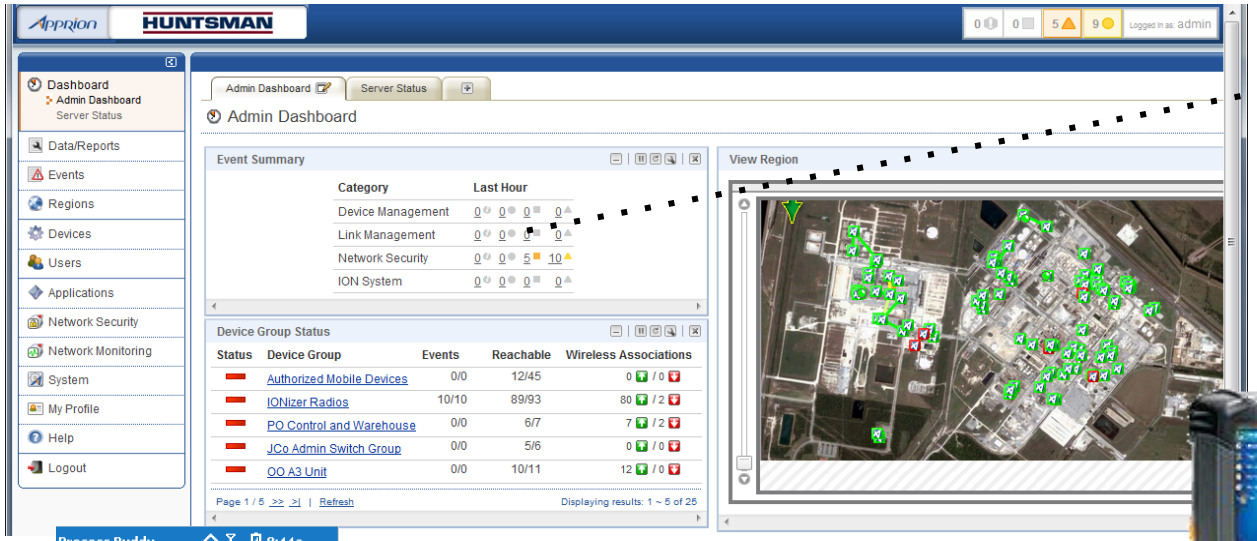
- 50% reduction of daily pump inspections
- Safety incidents have been reduced by over 75% and are expected to fall to zero.
- Increased effectiveness in defect capture and providing accountability at all levels of the organization
- Reduced maintenance costs.
- Increased uptime from the improvement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

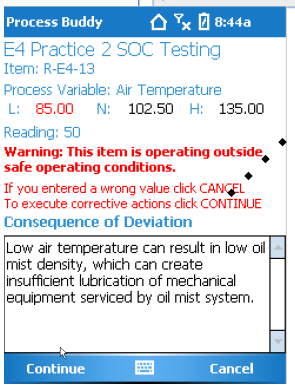
Integrated Applications in Existing Infrastructure

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, SOCs, field management, consequences of deviation

Rugged Handhelds
TEAM VoWiFi Industrial Handhelds

RockTenn – Video for Security

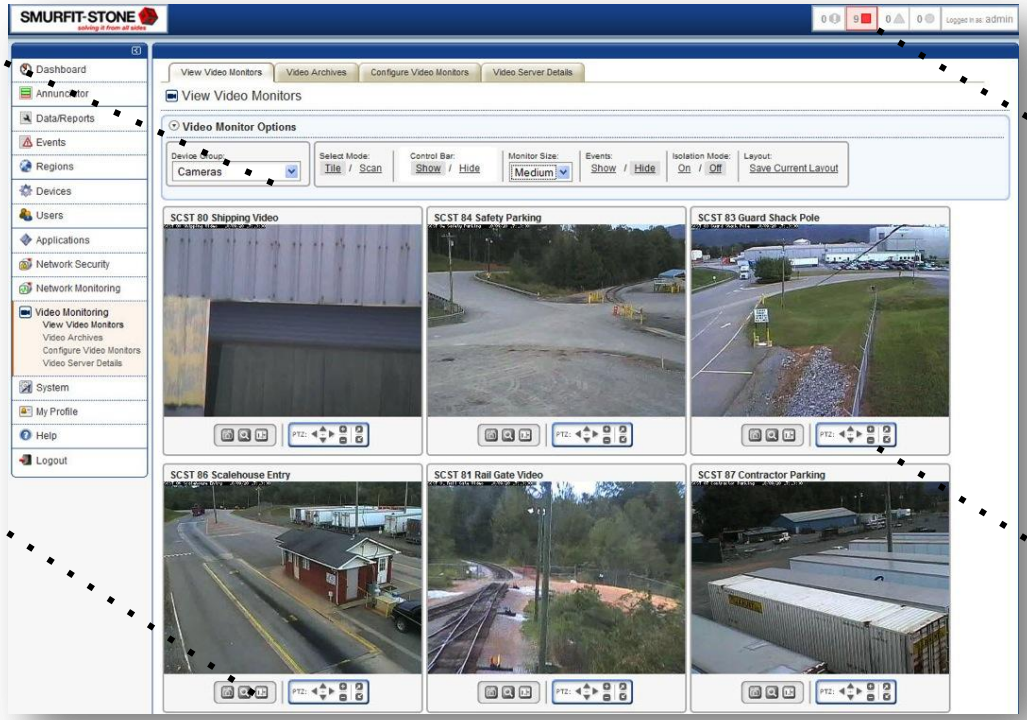
MarSec compliance mandates video for safety and security

- 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



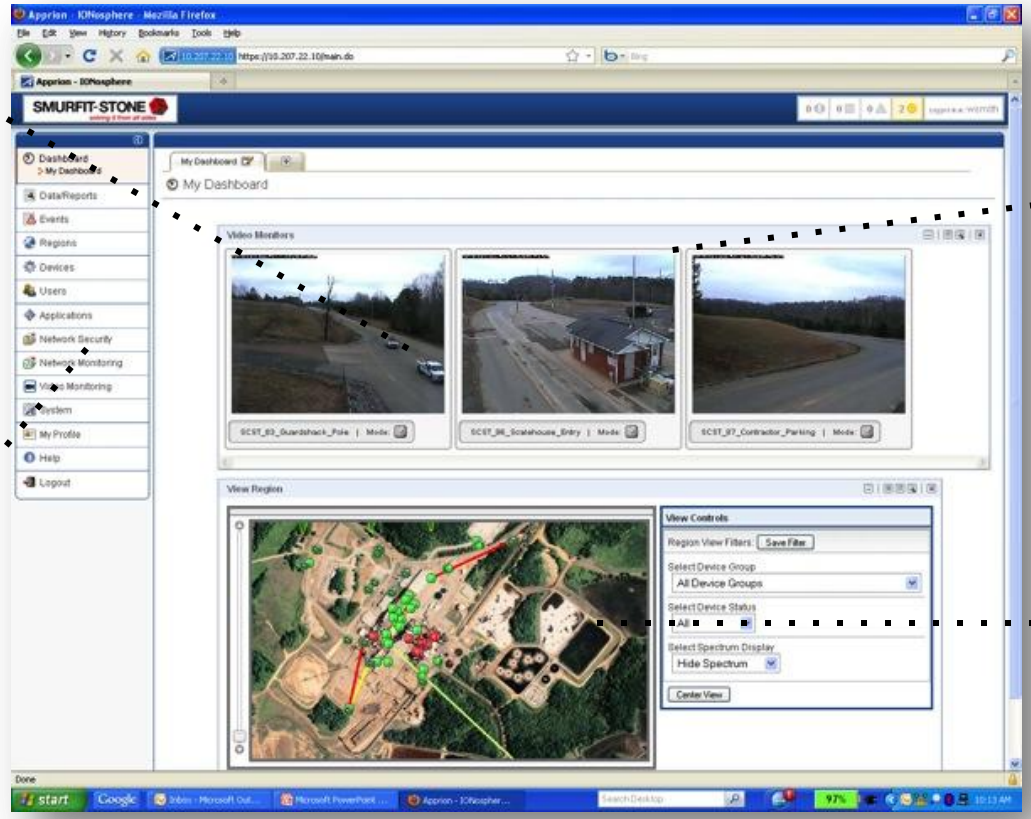
Real-Time Alerts
Video Event triggered alerts and alarm notifications and status bar

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

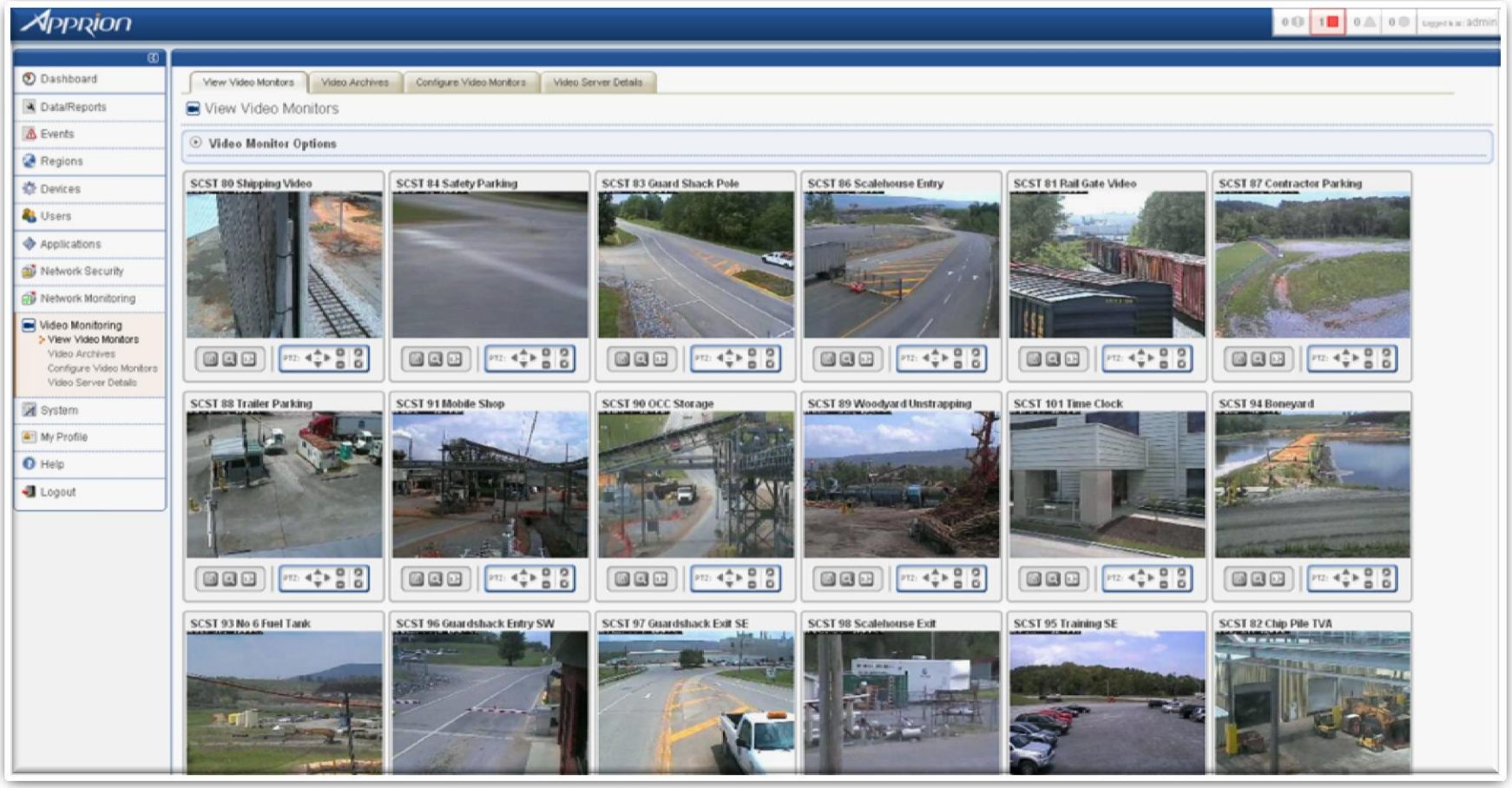
Video Archives
Store and index all past events and activity for easy search and access



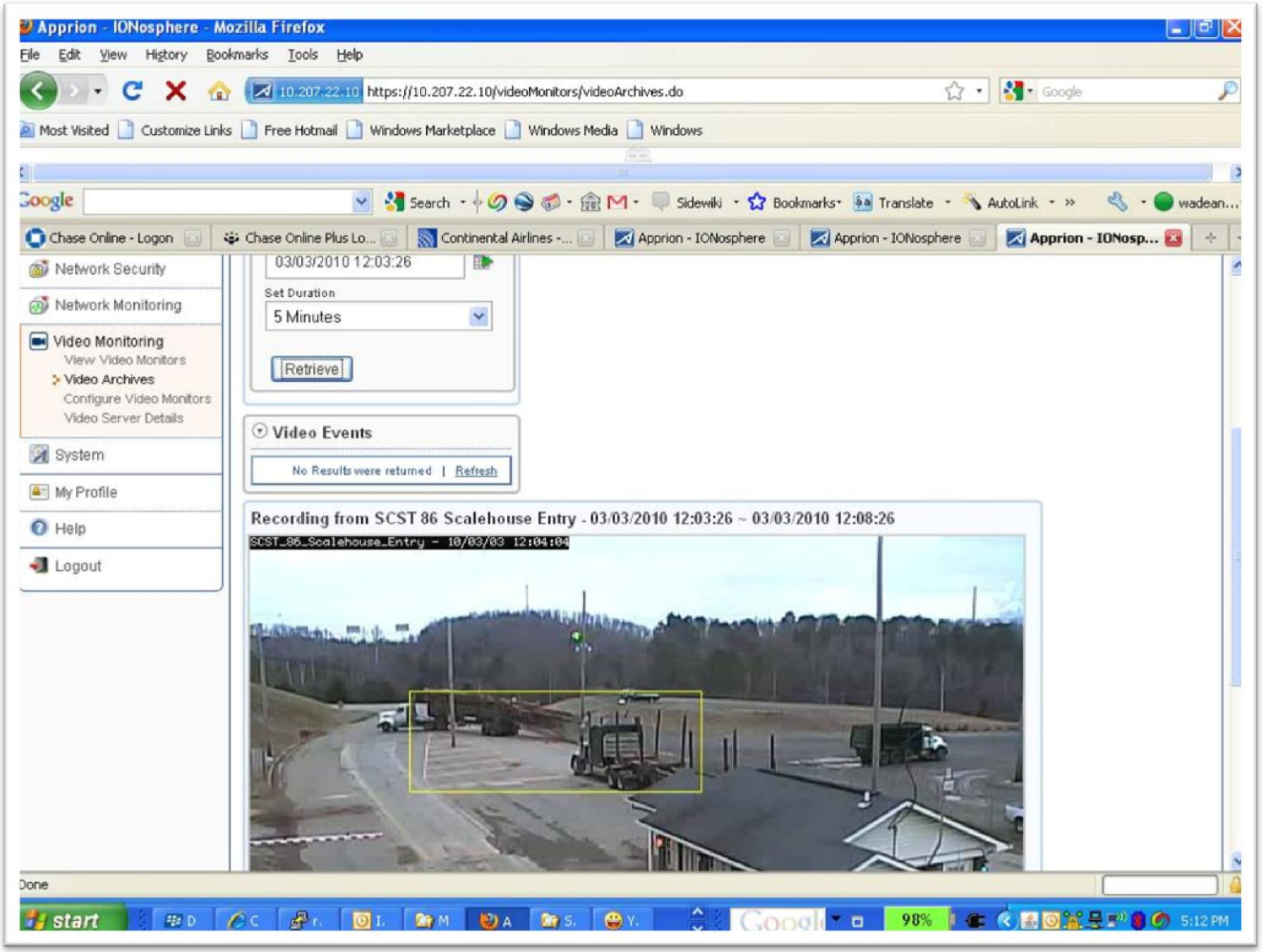
Remote Monitoring
Continuous camera rotation and monitoring of critical remote areas

Integrated Video
View Video with other Applications in one central dashboard

RockTenn – Video for Security



“Caught in the Act!”



RockTenn – Video for Security

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

RockTenn – Video for Security

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
Grazie
Obrigado
Koszonom
Mahalo
arigato
Спасибо
Takk
Рахмет
Prasom
Gracias
Danke
Merci
Multumesc
Dziekuje