

# WiFi Technologies for Health

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**NonStop Wireless™  
for the Always-on  
Enterprise**



# Drivers for Wireless in Healthcare



## Cost Containment

- Costs rising faster than inflation
- Pressure to contain both capital and operating expenses
- Need to increase efficiency and asset utilization wherever possible



## Digitization of Medicine

- Dependence on multiple systems
- Electronic medical records
- Medical decision support systems
- Emerging point of care applications
- Messaging and communications



## Quality of Care

- Reduce medical errors
- Improve patient outcomes
- Streamline patient workflow



## Skilled Worker Shortage

- Attract and retain best Clinicians

% of Healthcare execs reporting shortages

	U.S.	U.K.	Canada
Nurses	31	22	30
Pharmacists	14	27	33
Specialist Physicians	16	17	26

Source: Commonwealth Fund, 2005



## Highly Mobile Workforce

- Physicians and nurses on-the-go
- Widely distributed information
- Lots of departmental interaction



## Consumer-driven Healthcare

- Increasing consumer scrutiny around patient experience, quality of care, and patient comfort and amenities

# Everyone has Critical Mobile Applications

Industry	Mobile Data	Mobile Voice	Mobile Video
<b>Healthcare</b>	Point of Care Asset Tracking	Staff Communication Messaging	Telemedicine Remote Presence
<b>Retail</b>	Point of Sale Inventory	Customer Service	In-store Advertizing
<b>K-12 Education</b>	One-to-one Computing	Phone in every Class Emergency Response	Surveillance Distance Learning
<b>Higher Education</b>	All Coursework Research	Class Recording	Distance Learning
<b>Hospitality</b>	Guest Access	Staff Communication	In-Hotel Advertizing
<b>Manufacturing</b>	Process Management	Troubleshooting Messaging	Security Cameras
<b>General Enterprise</b>	Employee Productivity	Reduce Cell charges	Video Conferencing



# Mobility is Essential To Success

**PATIENT  
CARE**

**COMPLIANCE**

**COST  
CONTROL**

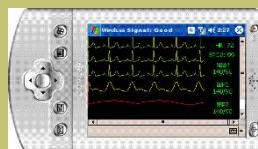
**PHYSICIAN  
RETENTION**



Medication Cart



Asset Tracking



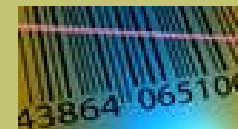
Patient Monitoring



Nurse Call



Specimen Label



B M V



Messaging



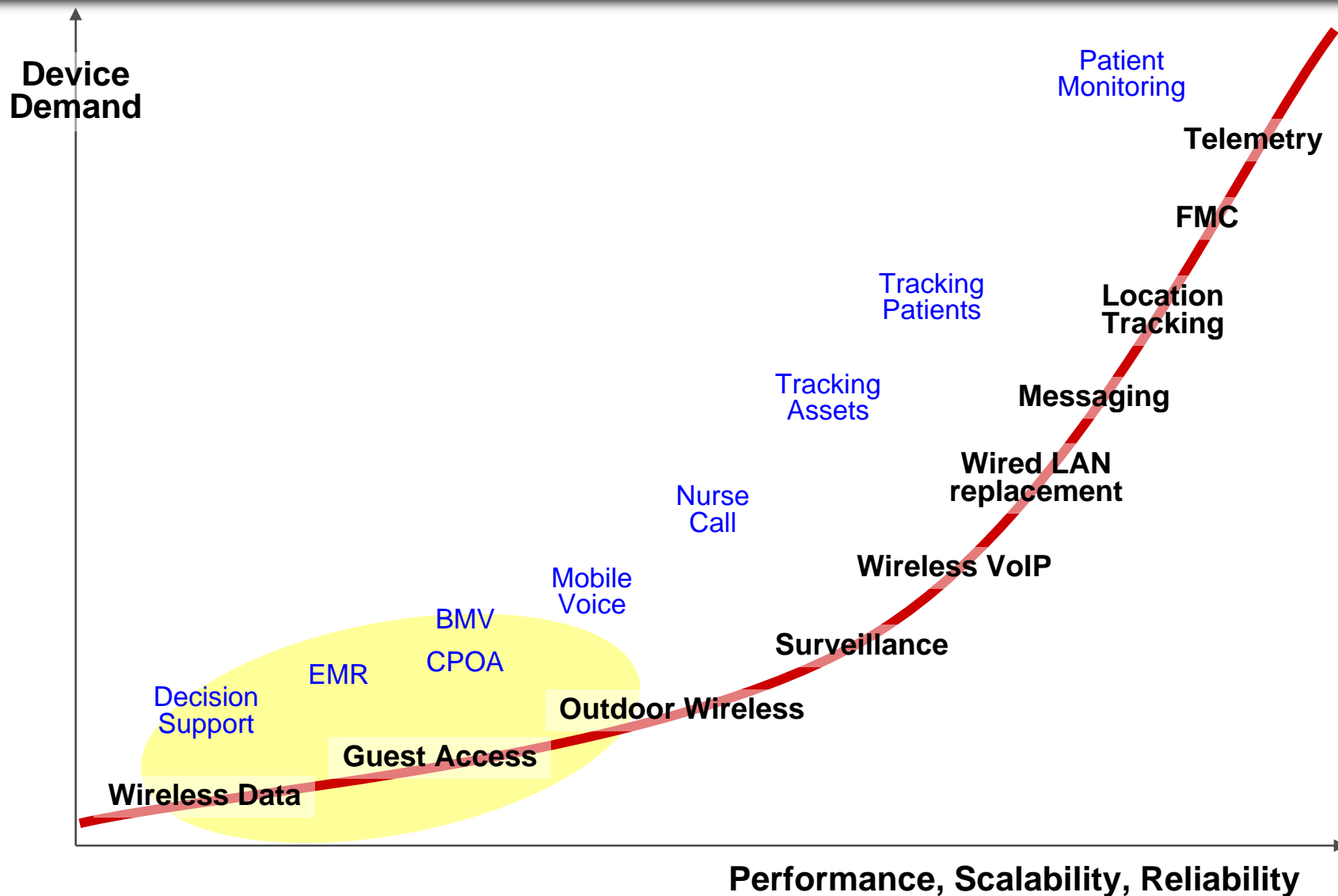
Decision Support



EHR

# MOBILITY

# Demands on Infrastructure Intensify



# Limited Mobility has Consequences



## Limited Wireless Mobility at the Point of Care

- Unreliable Applications
  - Most medical software not designed for wireless mobility
  - Application time-out, dropped calls, unreliable messaging
- Frustrated Nurses & Physicians
  - Physicians going elsewhere
  - Under-productive nursing staff
  - \$ Millions in lost revenue
- Missed Compliance Goals
  - Delayed or missed compliance
  - Under more scrutiny, not less
- Affecting quality of patient care

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# Hospital Mobility Requirements

- Uninterrupted mobile applications
  - Login once, roam all day, no dropped sessions, indoor/outdoor
- NonStop Wireless infrastructure
  - Completely resilient to any network component failure
- Cost effective, easy to manage
  - Doesn't require PhD to operate, easy to scale, long lasting
- Meets all regulatory security and safety requirements
  - Secure network access, audit trail, non-repudiation, reporting

## MEDICAL GRADE MOBILITY



**NonStop Wireless™**  
at every Point of Care





# Trapeze Solution Overview



NonStop Wireless™  
for the Always-on  
Enterprise

# Trapeze Networks Overview

- Founded March 2002
  - Over 50 patent filings
- Largest 802.11n WLAN
  - Univ Minnesota 9,500 APs
  - 300 Bldgs, over 1200 Acres
- Many F500 Customers
  - CocaCola, Chevron, Alcoa
  - Strong in Healthcare & EDU
- Global OEM Partners
  - Nortel, NEC, 3Com,
  - Enterasys
- High Industry Recognition
  - Burton, Yankee, ABI, Frost,
  - Forrester, Current Analysis
- Acquired by Belden Jul 08

**4,000+ organizations worldwide deploy Trapeze WLAN technology**



# Strength and Stability of Belden

- **Worlds largest provider of signal transmission solutions over copper, fiber and air**
- **Newbury Networks acquired 6 months ago – specialists in Asset Tracking and RF Firewall.**
- 100+ Yrs, \$2B+ annual revenue
- Renowned "Beyond Standards" performance and reliability
- One source for reliable, end-to-end wired + wireless infrastructure
- Expert design and installation with IBDN Certified System Vendors





# Belden Enterprise Networking Portfolio

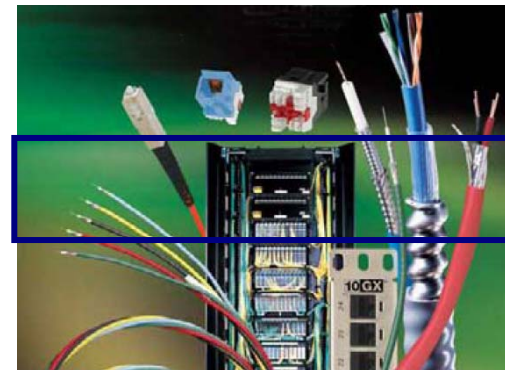
## Enclosures



## Structured Cabling Systems



## Cabling and Connectors



## Industrial Ethernet



## Power over Ethernet



## NonStop Wireless RF Firewall & RTLS

# Trapeze Industry Leadership

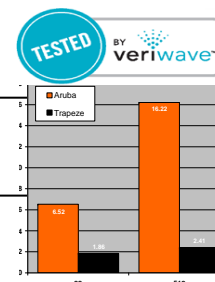
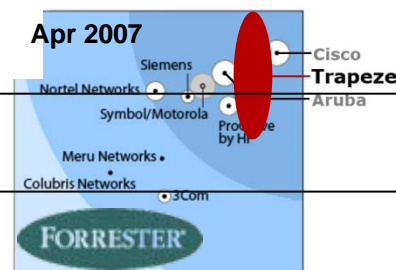
## Reliability

- First and only to offer NonStop Wireless
- Frost and Sullivan WLAN innovation award
- Hitless failover fully verified by Tolly Group



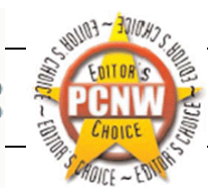
## Performance

- Best scalability with distributed forwarding
- Band-steering, Client and AP load balancing
- QoS and lowest latency for voice services



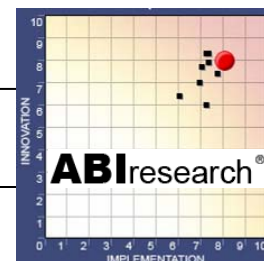
## Management

- Award-winning life-cycle management
- First to market with full 802.11n integration
- Advanced management integration with APIs



## Security

- Ranked #1 out of 11 vendors by ABI Research
- Advanced access control and WIDS/WIPS
- Best-in-class Real-Time Location Services
- Chairing WFA and IEEE security groups

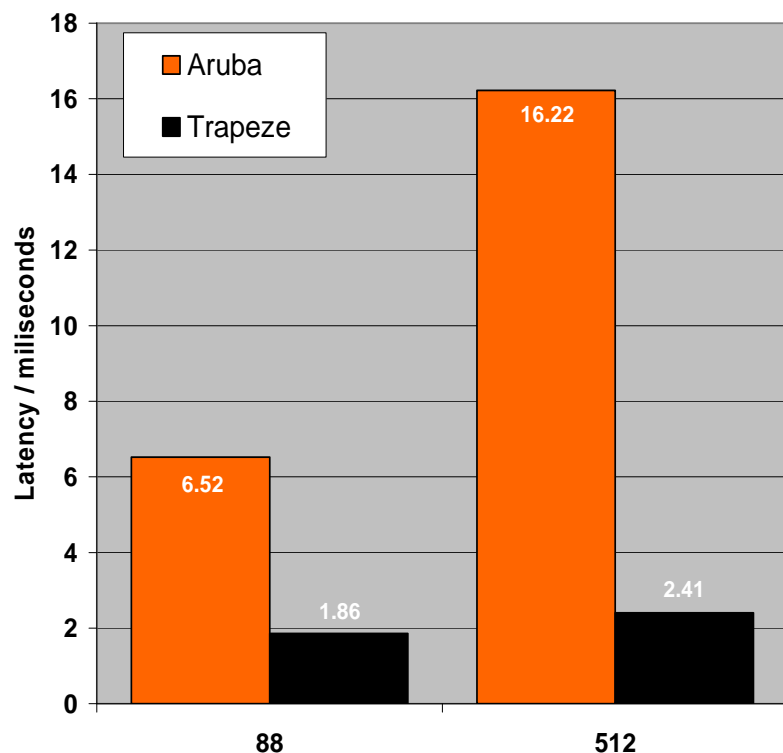


# Trapeze has Lowest Latency and Jitter

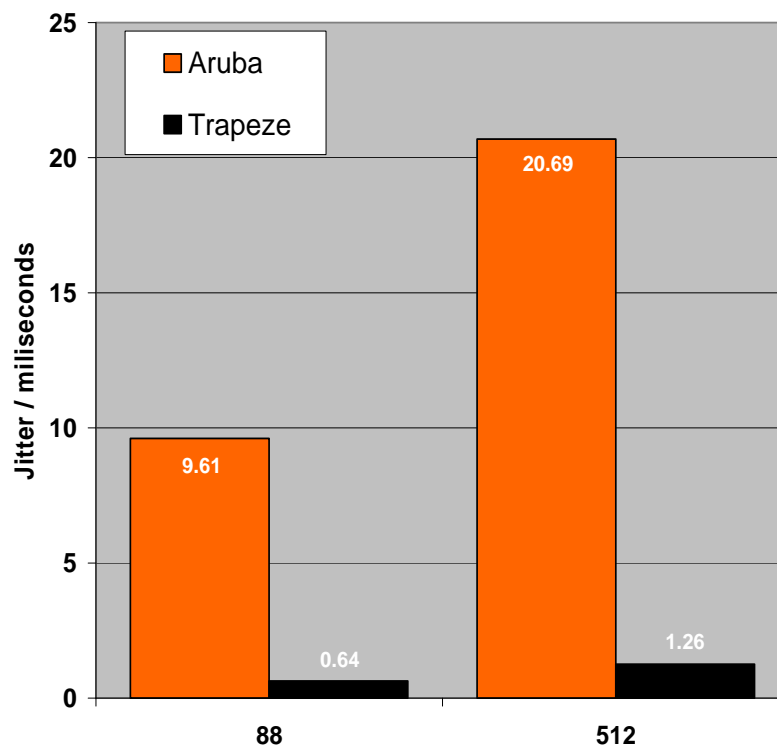
- Trapeze: Lowest Latency
- Aruba: 350% - 674% higher

- Trapeze: Lowest Jitter
- Aruba: 1513%-1645% higher

Latency under Maximum Load  
25 Access Points

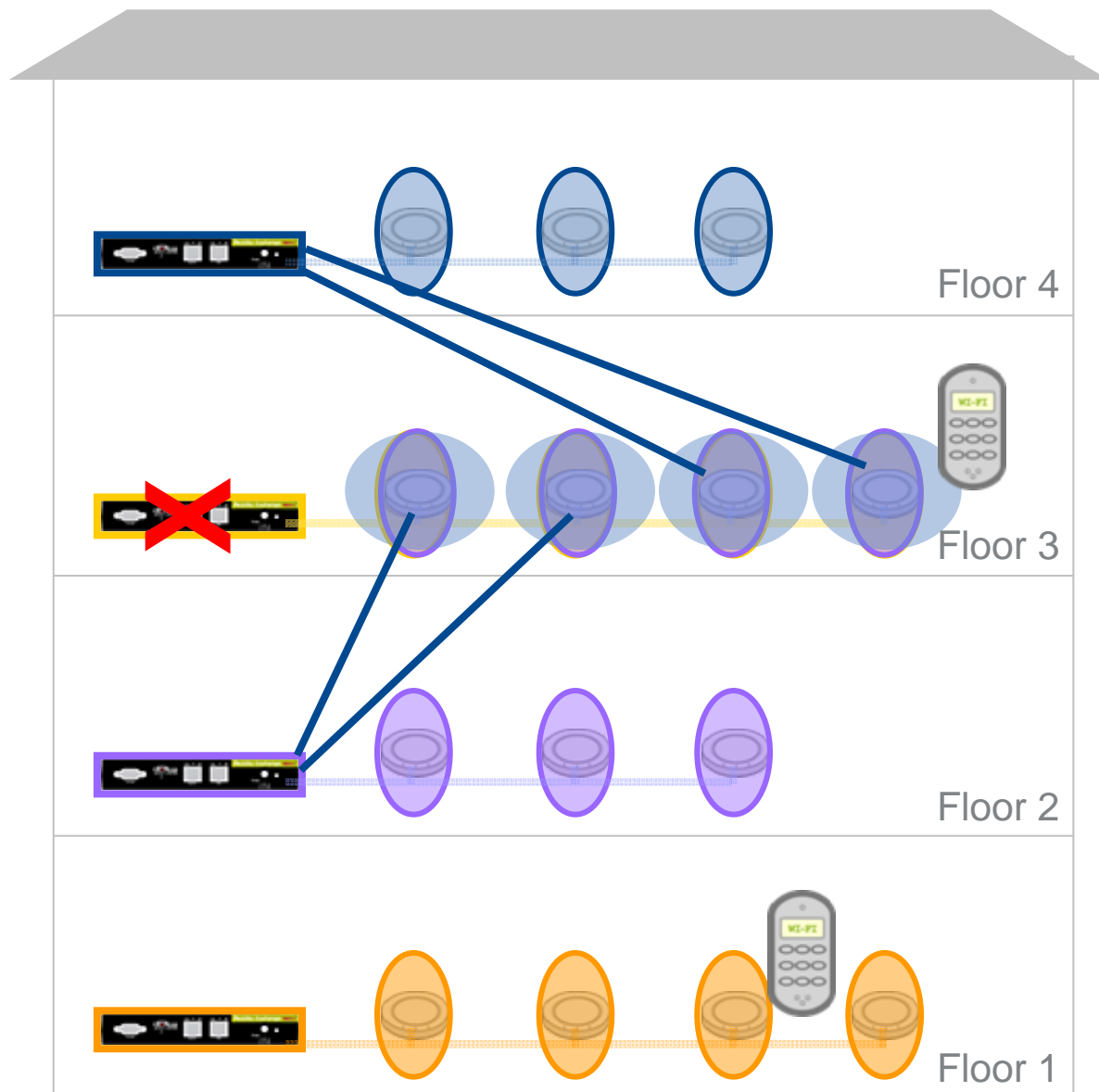


Jitter under Maximum Load  
25 Access Points





# Hitless Failover

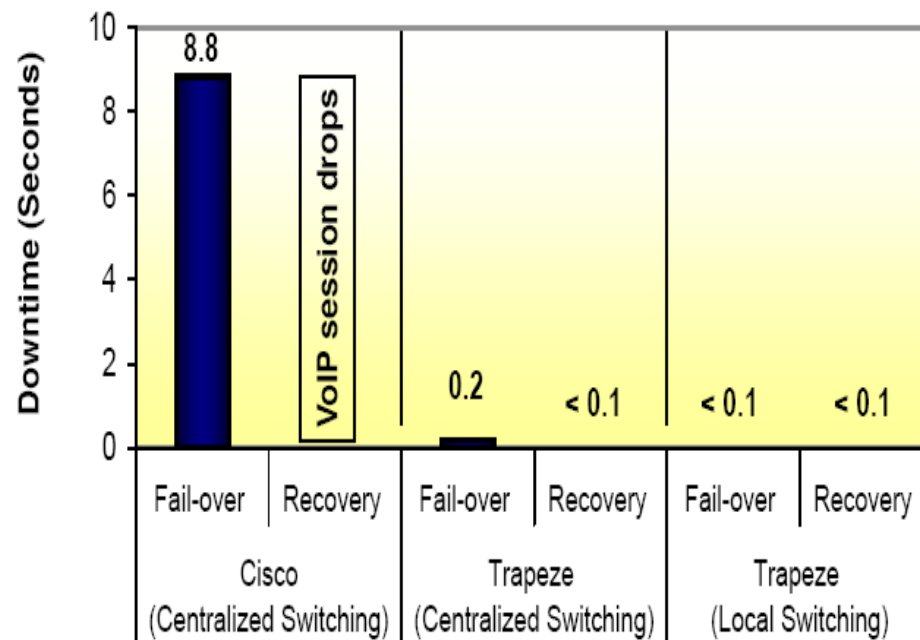


- Random controller fails
- Access points are immediately remapped
- No Disruption to Voice
- Enables unscheduled in-service upgrades



# Tolly Group Test on WLAN Resiliency

- **Trapeze Versus Cisco in WLAN Resiliency**
- Delivers sub-second fail-over using Trapeze's clustered wireless controller approach, while a comparable Cisco solution
- results in network downtime of 9 to 12 seconds Local switching delivers better failover and recovery behavior than centralized switching
  - Exhibits less than 0.1 seconds recovery without interrupting applications, while the Cisco solution drops both FTP and VoIP sessions during recovery
  - Demonstrates dynamic access point balancing and centralized
- Cluster configuration for easy resiliency configuration and
- Optimal usage of large-scale enterprise wireless networks



Source: The Tolly Group, October 2008

Figure 1

## TOLLY GROUP

No. 208354

NOVEMBER 2008

### Trapeze Networks, Inc.

### Trapeze Virtual Controller Cluster™

Competitive Wireless LAN Controller Resiliency Evaluation  
versus Comparable Cisco Solution



Test  
Summary

*Premise: As wireless LANs (WLANs) proliferate the enterprise network landscape, network managers are demanding that their WLANs offer the same resiliency as wired counterparts. For enterprises such as healthcare, manufacturing, education and retail that demand an always-on WLAN solution, it is essential to understand how applications are affected by network component failures.*

Trapeze Networks, Inc. commissioned The Tolly Group to evaluate the resiliency feature of its WLAN controller cluster against a

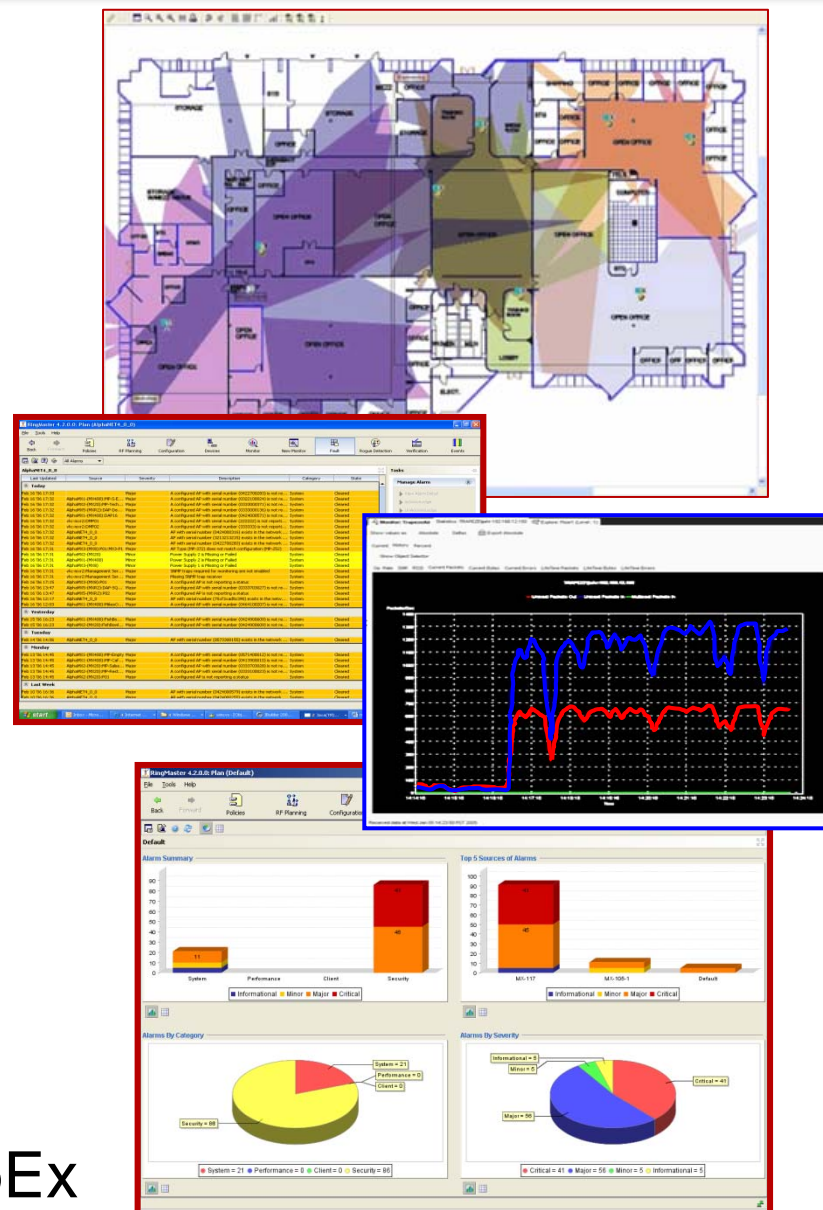
### Test Highlights

- ▶ Delivers sub-second fail-over using Trapeze's clustered wireless controller approach, while a comparable Cisco solution results in network downtime of 9 to 12 seconds
- ▶ Local switching delivers better failover and recovery behavior than centralized switching
- ▶ Exhibits less than 0.1 seconds recovery without interrupting applications, while the Cisco solution drops both FTP and VoIP sessions during recovery
- ▶ Demonstrates dynamic access point balancing and centralized cluster configuration for easy resiliency configuration and optimal usage of large-scale enterprise wireless networks



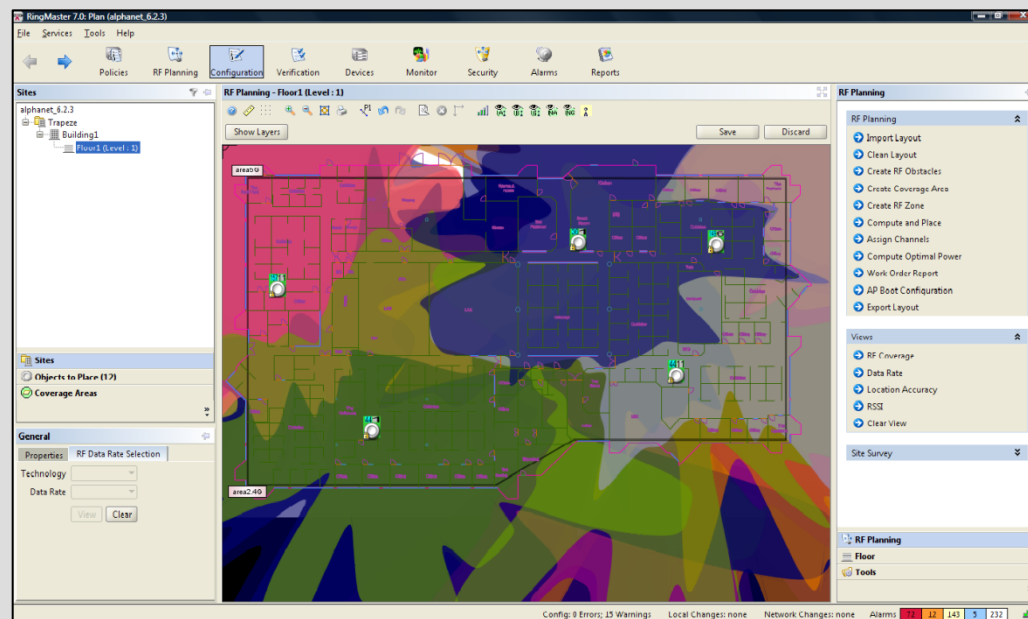
# World-Class Network Management

- Planning and Deployment
  - 3D predictive planning tool
  - Indoor and Outdoor network plan
- Configuration and Verification
  - Complete offline configuration
  - System and service wizards
  - Pushes configuration to MXs
- Monitoring and Reporting
  - By user, radio, AP, MX, SSID
  - Present location, roaming history
  - 30 day history aids compliance
    - SOX, JCAHO, PCI-DSS, CALEA ...
  - WIDS/WIPS integration
- Advanced Location tracking
- Sophisticated tool saves 50% OpEx



# RingMaster – Holistic RF Planning

- **Predictive RF planning indoor and outdoor**



- Plan entire building vs. just a floor
- Supports CAD files with pre-configured layers
- 3 dimensional model takes account of other floors
- Auto computes attenuation based on building properties
- Auto generated wireless coverage map and work order

# Smart Mobile Delivers NonStop Wireless

## PERFORMANCE

- Lowest latency
- Efficient traffic flows
- Seamless roaming
- Load balancing
- Application QoS
- Highest scalability

## RELIABILITY

- Controller clustering
- Hitless failover
- Self-optimized mesh
- In-service upgrades
- Application continuity
- Validated by Tolly group



## SECURITY

- Identity based roaming
- Voice call security
- Endpoint integrity
- Advanced WIDS/WIPS
- Application firewall
- Location-awareness

## MANAGEMENT

- Predictive RF planning
- Cluster configuration
- Monitoring & reporting
- History and audit trail
- Easy guest provisioning
- Real-time Location Services



# Real Time Location Services Overview

Using Wi-Fi Based  
Positioning to Enable  
Real-Time Location  
Services



# RTLS is a reliable cost effective solution

“We expect to see WLAN deployments scale to support RTLS in any industry that has goods, assets or personnel worth tracking over the next 5 years.”

FORRESTER

“Wi-Fi RTLS will represent a \$1 billion market by 2011”



“RTLS is the endgame...it will become the most pervasive technology the world has ever seen.”



“Location and tracking is going to be a key part of every enterprise-class WLAN systems vendor's arsenal.”



# Location Services Value Proposition

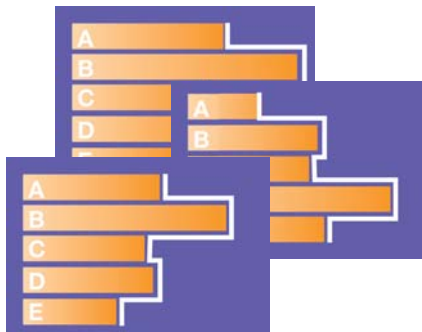
- Tracking Assets
  - Higher asset utilization
  - Lower equipment inventory
  - Reduced asset losses
  - Optimized business processes
- Tracking people
  - Improved communication
  - Streamlined workflow
  - Enhanced workplace safety
  - Location-aware security



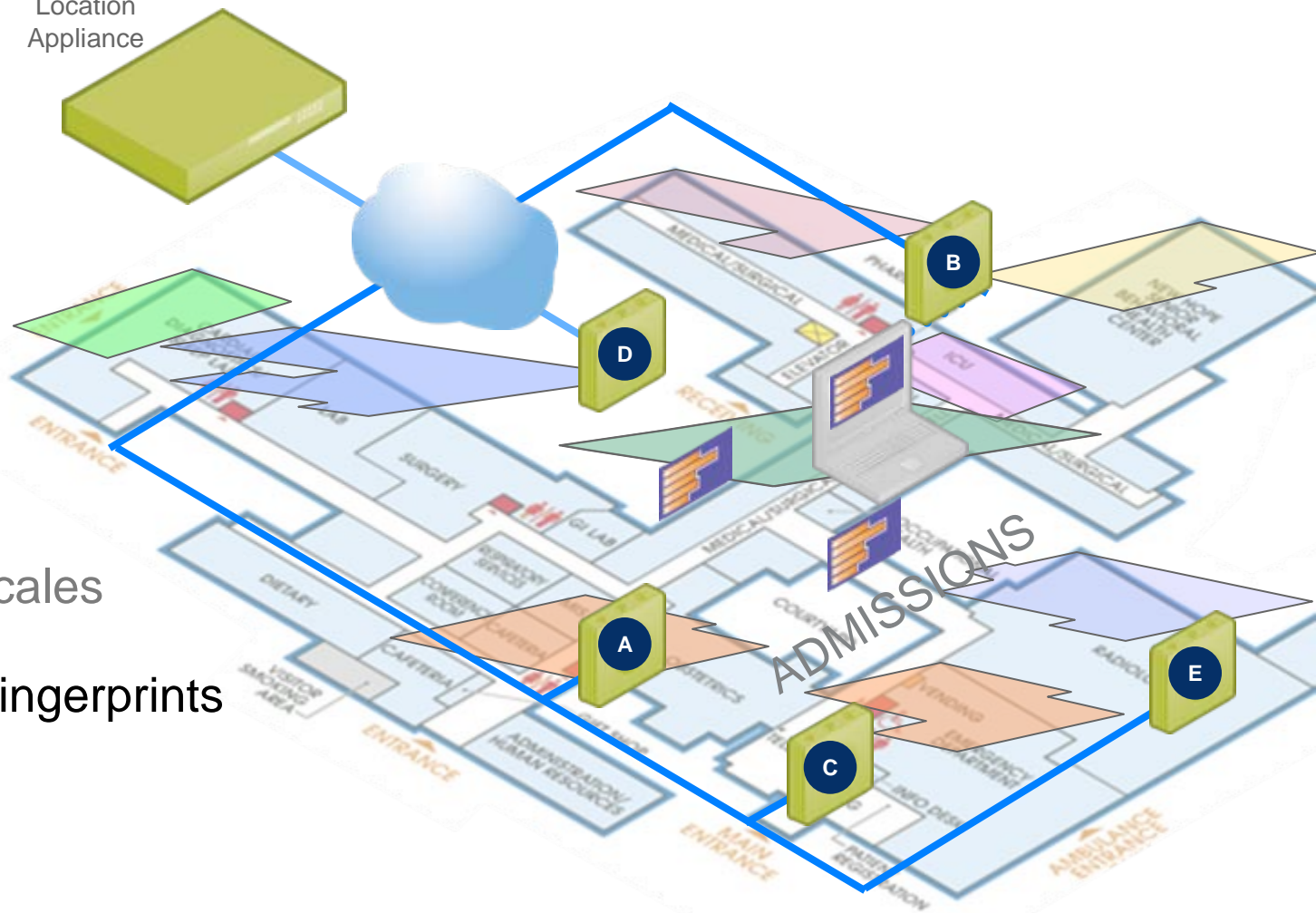


# RTLS Conceptual Overview

## Reference fingerprints for ADMISSIONS

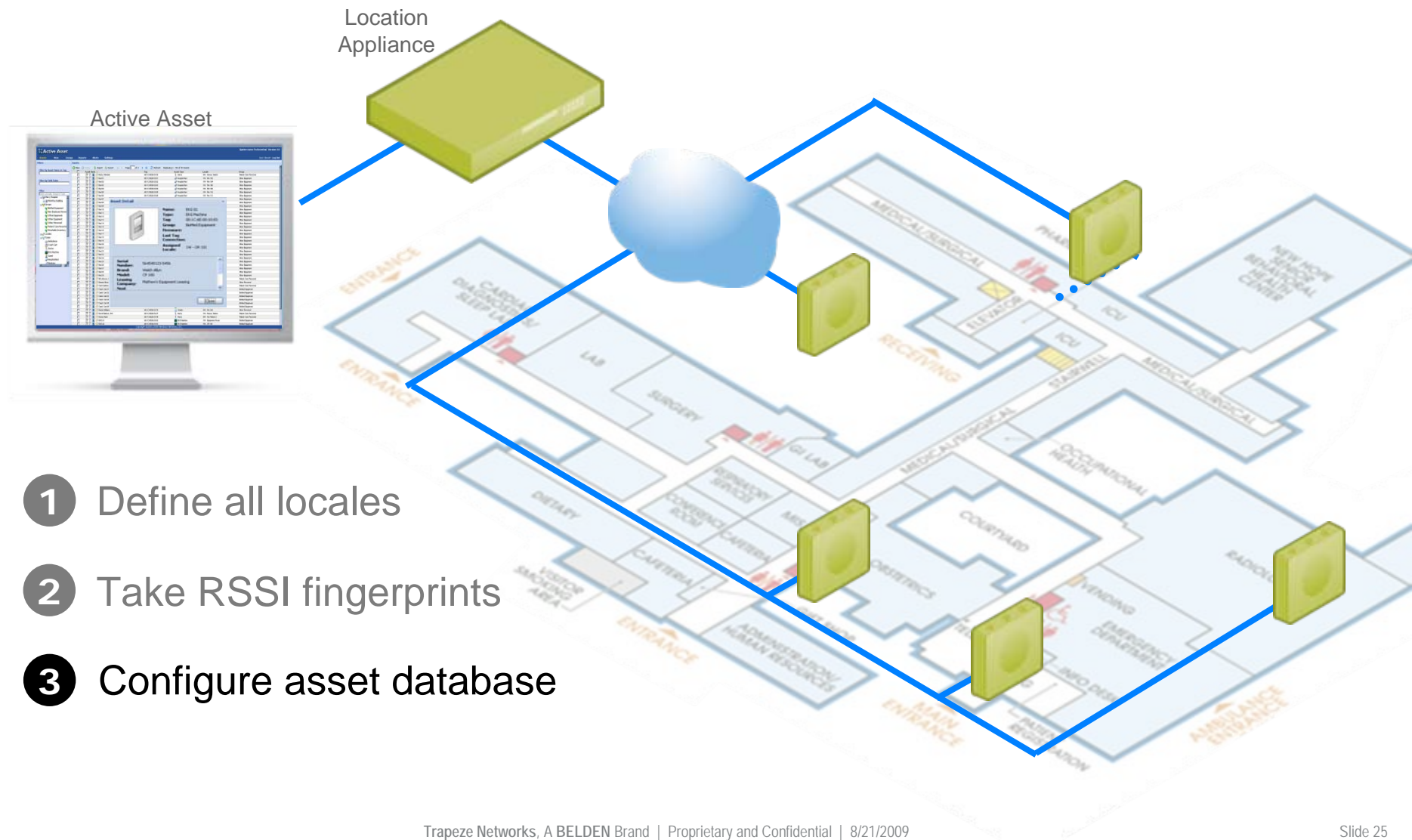


Location  
Appliance



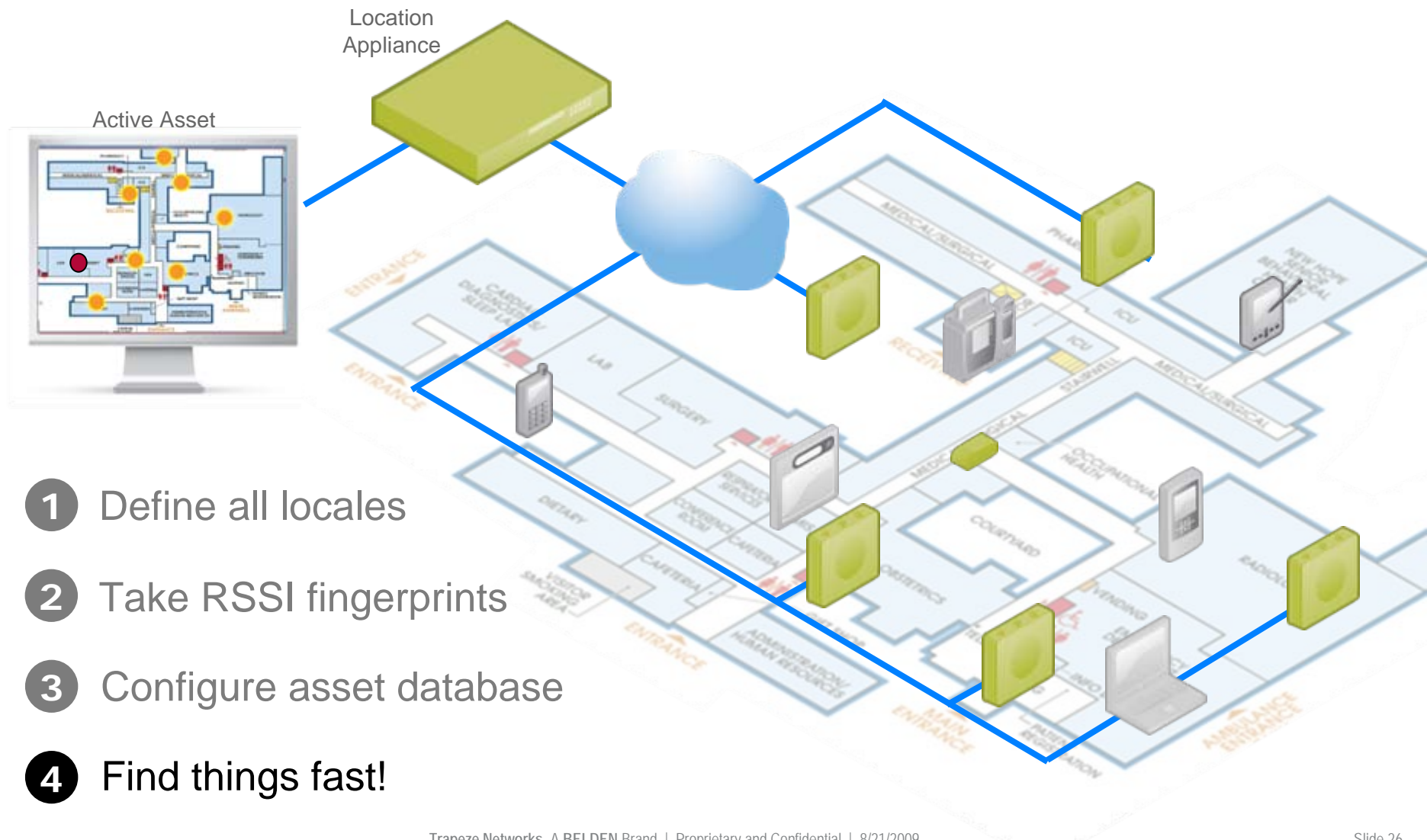
- 1 Define all locales
- 2 Take RSSI fingerprints

# RTLS Conceptual Overview





# RTLS Conceptual Overview





# RTLS Applications in Healthcare



## Location Tracking

Find a patient, clinician or shared asset



## Location-based Security

Manage access based on user and location



## Asset Management

Manage inventory of shared assets



## Content Delivery

Push medical records to the point of care

# RTLS Applications in Education



## Prevent Cheating During Tests

Prevent any network access from any device from 2pm-3pm from room 540



## Stop Bandwidth Abusers

If traffic threshold exceeded within 1hr, during peak hours restrict that user's bandwidth



## Control Guests

Contractors, parents, other teachers  
Prevent access outside certain areas



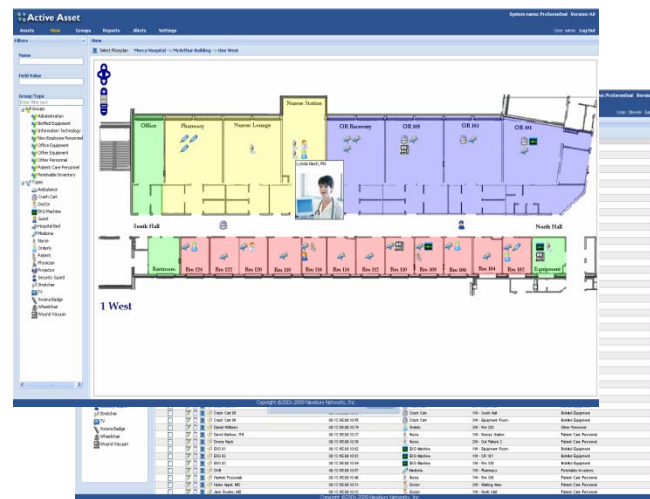
## Lock-Down Perimeter Security

Prevent access from specific areas such as outside the building, or campus perimeter

# Trapeze RTLS Solution Components



Trapeze WLAN Infrastructure



Active Asset



LA-200E & RF Firewall



AT-320 Asset Tags



# Only Trapeze has full RTLS Solution

	Location Appliance	Asset Management	Perimeter Security	Access Control	Content Delivery	Asset Tags
<b>Trapeze</b>	LA-200E	Active Asset	RF Firewall	SmartPass	LA-200E SDK	AT-320
<b>Meru</b>	Newbury	Newbury	RF Barrier	-	Newbury	Newbury
<b>Cisco</b>	ME 3300	Aeroscout	-	-	-	Aeroscout
<b>Aruba</b>	-	-	-	-	-	-
<b>Enterasys</b>	-	-	-	-	-	-
<b>Nortel</b>	Newbury	Newbury / Ekahau	-	-	Newbury	Newbury / Ekahau
<b>3Com</b>	-	-	-	-	-	-
<b>Motorola</b>	-	-	-	-	-	-
<b>HP Procurve</b>	-	-	-	-	-	-

# Location Appliance with RF Firewall

- Real-time location tracking
- First to support 802.11n clients
- Simultaneously tracks up to 4,000 devices
  - Handles up to 200 APs per Location Appliance
- Tracks any Wi-Fi client (no client s/w), asset tags

## Dashboard



## API SDK

```
<soapenv:Envelope
  xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:mon="http://presence.newburynetworks.com/monitor">
  <soapenv:Header/>
  <soapenv:Body>
    <mon:getDevicesInLocations>
      <locations>
        <item>
          <key>a28820630a04000a0162aada66914a7e</key>
        </item>
      </locations>
    </mon:getDevicesInLocations>
  </soapenv:Body>
</soapenv:Envelope>
```

## Perimeter Security



**LA-200E**

# LA-200E Performance is Superior

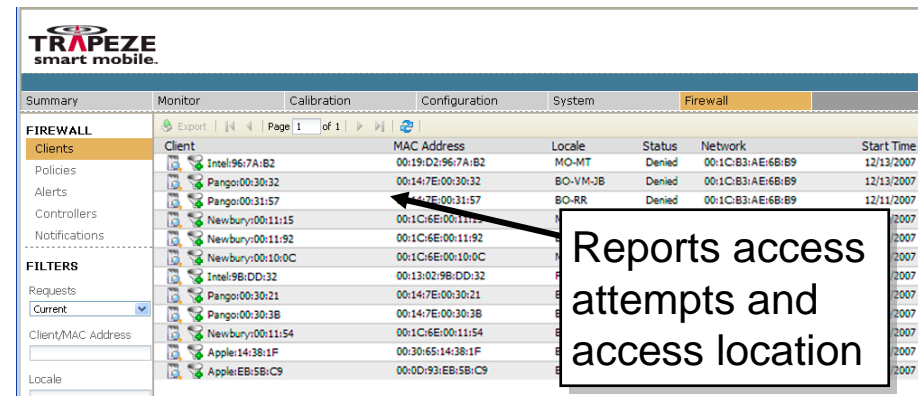
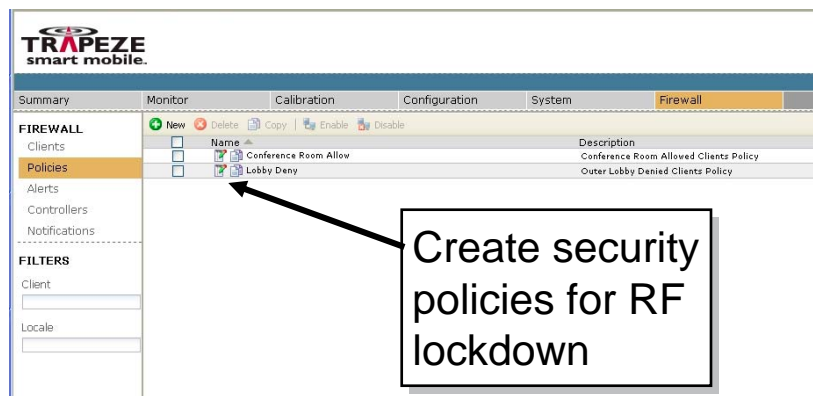
- Server-side RSSI fingerprinting
  - Reliable – not affected by AP transmit power changes
  - Accurate – distinguishes floor levels and locale perimeter
- Highest accuracy and precision
- Fastest seek response time
- Any Wi-Fi client, not just tags
- No load on WLAN controllers

	Trapeze	Cisco
10 Meters	99%	90%
5 Meters	97%	50%
3 Meters	95%	< 50%
Average Seek	30 Secs	5 Min
Fastest Seek	10 Secs	1 Min
# Devices	4,000	2,500



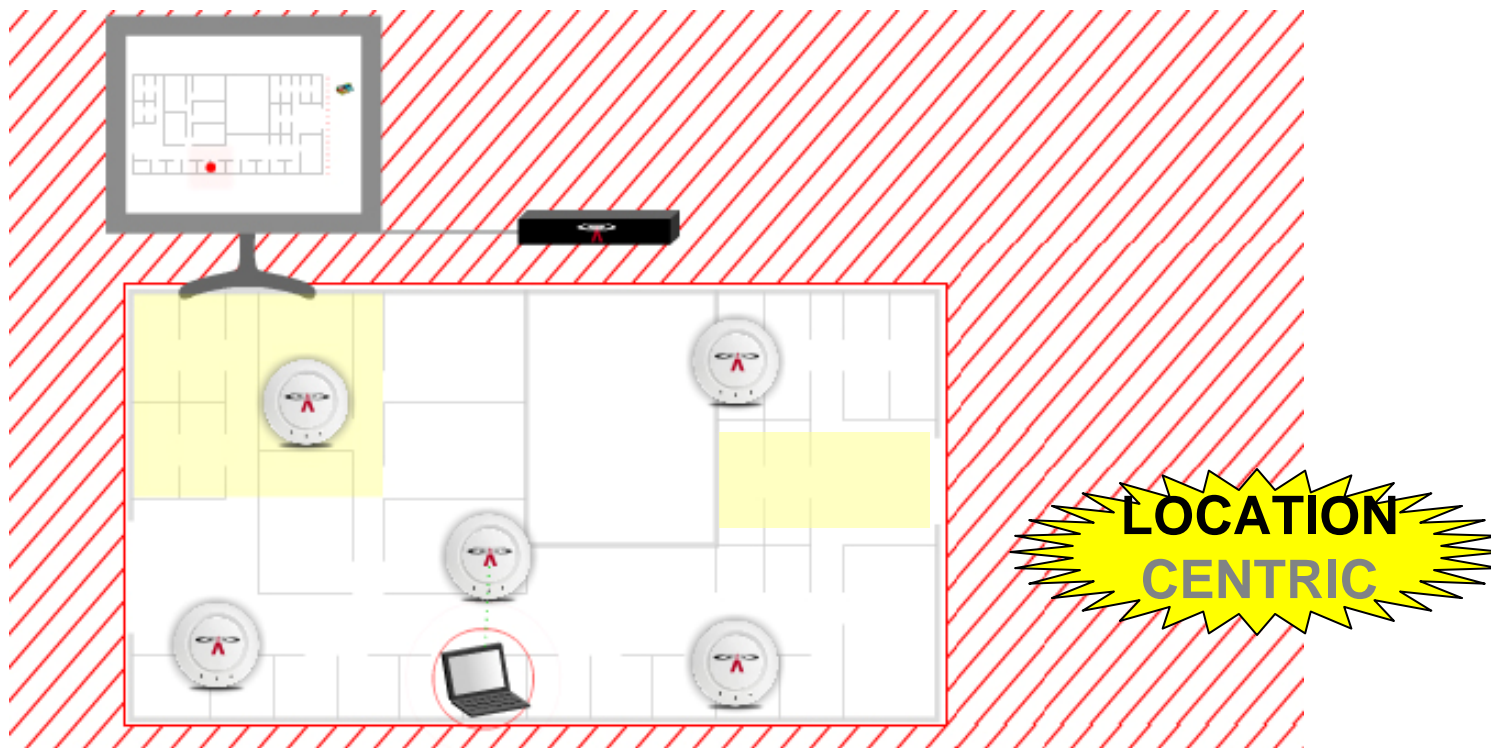
# RF Firewall – Policies and Alerts

- Any area indoors or outdoors may be defined as a locale
- Policies define whether access is allowed/denied in each locale
- Optional policies for known MAC addresses, otherwise access is limited to “allow or deny” only
- Logs all association or access attempts for historical reporting
- Shows “rogue AP” alerts from Trapeze WLAN controllers
- Configure/send alerts via Syslog and email to escalate threats



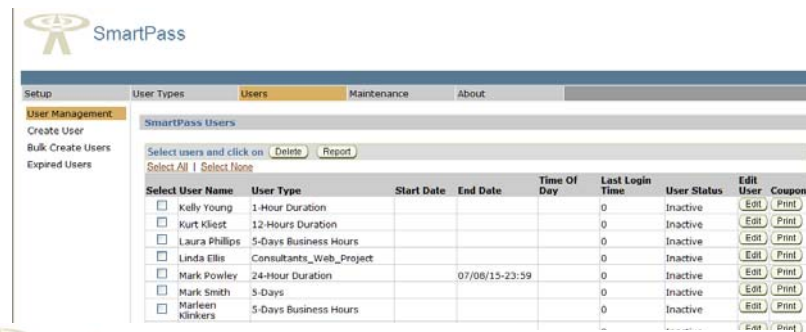
# RF Firewall - Perimeter Security

- First line of defense – locks down building perimeter
- Enforces location-based access control (LBAC)
- Simple for anyone to deploy, easy to manage



# SmartPass - Advanced Access Control

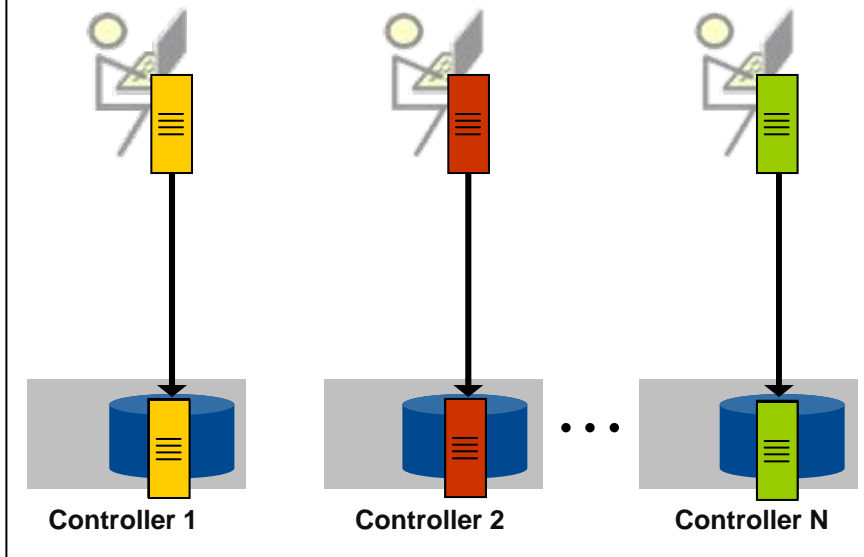
- Dynamic Authorization
  - Location, date, time, behavior
  - Based on filters and triggers
  - Scheduled or on-demand
  - Invoked via GUI or APIs
- Easy guest provisioning
  - Safe and scalable
  - Bulk name creation
  - Designed for non-IT staff
- History and reporting
  - Centralized and auditable





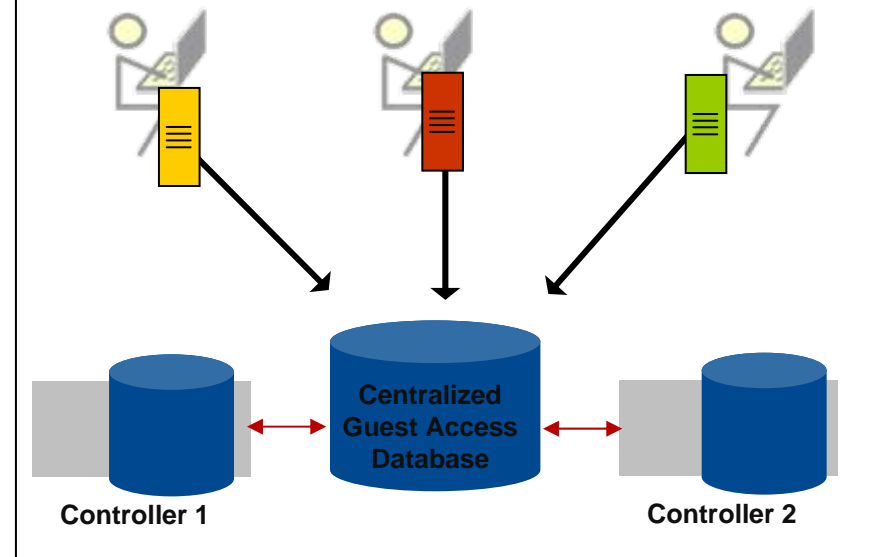
# Safe and Practical Guest Access

## Others - Decentralized Architecture



- No audit trail of guest privileges
- Threat to network integrity
- Cause for IT support calls

## Smart Pass – Centralized Architecture



- Centralized and auditable
- No changes to infrastructure
- Virtually support free

# Core IDS/IPS Detected Attacks

- Rogue access points
- Interfering access points
- Rogue 802.11 clients
- Interfering 802.11 clients
- 802.11 adhoc clients
- Unknown 802.11 clients
- Interfering 802.11 clients on wired LAN
- 802.11 probe request flood
- 802.11 authentication flood
- 802.11 null data flood
- 802.11 mgmt type 6 flood
- 802.11 mgmt type 7 flood
- 802.11 mgmt type d flood
- 802.11 mgmt type e flood
- 802.11 mgmt type f flood
- 802.11 association flood
- 802.11 reassociation flood
- 802.11 disassociation flood
- Weak wep initialization vectors
- Spoofed access point mac-address attacks
- Spoofed client mac-address attacks
- Ssid masquerade attacks
- Spoofed deauthentication attacks
- Spoofed disassociation attacks
- Null probe responses
- Broadcast deauthentications
- FakeAP ssid attacks
- FakeAP bssid attacks
- Netstumbler clients
- Wellenreiter clients
- Active scans
- Wireless bridge frames
- Adhoc client frames
- Access points present in attack-list
- Access points not present in ssid-list
- Access points not present in vendor-list
- Clients not present in vendor-list
- Clients added to automatic black-list

# WLAN Security Comparison

Differentiator	Trapeze	Cisco	Meru	Aruba
Support highest standards for Authentication & Encryption	✓	✓	✓	✓
Scalable Cryptography Model	✓	✓	—	—
Industry Standard Endpoint Integrity Verification	✓	✓	—	✓
Voice-aware Application Firewall Policies	✓	—	—	✓
Dynamic Authorization based on Location, Time/date, Activity	✓	—	—	—
WIDS/WIPS: Protection Against Attack Types	230	24	20	40
Safe, Auditable and Scalable Guest Provisioning	✓	✓	—	—



# Where RF Firewall and SmartPass Fit US\$

	Basic	Medium	Advanced	Extreme
<b>Locations</b>	-	RF Firewall	RF Firewall	RF Firewall
<b>Users</b>	RADIUS	RADIUS	RADIUS + SmartPass	RADIUS + SmartPass
<b>Connections</b>	Embedded WIDS/WIPS	Embedded WIDS/WIPS	Embedded WIDS/WIPS	Overlay WIDS/WIPS
<b>Cost</b>	Included	\$20K	\$30K	\$100K
<b>AAA Security</b>	X	X	X	X
<b>~40 Attack types</b>	X	X	X	X
<b>Perimeter security</b>		X	X	X
<b>Dynamic auth</b>			X	X
<b>Guest provisioning</b>			X	X
<b>~200 Attack types</b>				X

# RF Firewall and SmartPass

## RF Firewall

- **Location-Centric Security**
- Adds location as a new **authentication** criterion
- Doesn't care about user types
- No guest provisioning functions
- \$20K cost of ownership
- Pros:
  - Simple plug & play concept
  - Single function perimeter security
  - Minimal expertise required
  - Zero maintenance Appliance
- Cons:
  - "All or nothing" access model

## SmartPass

- **User/Role-Centric Security**
- Adds location, date, time, usage, as a new **authorization** criterion
- Enables granular user differentiation
- Advanced guest provisioning
- \$30K cost of ownership
- Pros:
  - Enables dynamic access control
  - Allows flexible security policies
  - Lets non-IT staff provision guests
- Cons:
  - Requires moderate IT expertise
  - Requires server maintenance

## RF Firewall

- **Location-Centric Security**
- Adds **location** as a new authentication criterion
- Reduces attack target area
- Eliminates all outdoor intruders
- \$20K cost of ownership
- Advantages:
  - Fast and simple to deploy
  - Minimal expertise required
  - Foundation for more advanced location-based security
- Disadvantages:
  - “All or nothing” access model

## WIDS/WIPS i.e. Wireless Intrusion Detection/Prevention Systems

- **Attack-Centric Security**
- Designed to detect and mitigate complex and obscure attack types
- Advanced counter-measures
- Forensics and audit trails
- \$100-200K cost of ownership
- Advantages:
  - Dedicated real-time monitoring
  - Monitors inside and outside
  - Mechanisms to add protection for legacy devices (WEP cloak)
- Disadvantages:
  - Requires security expert
  - Too much info & false positives

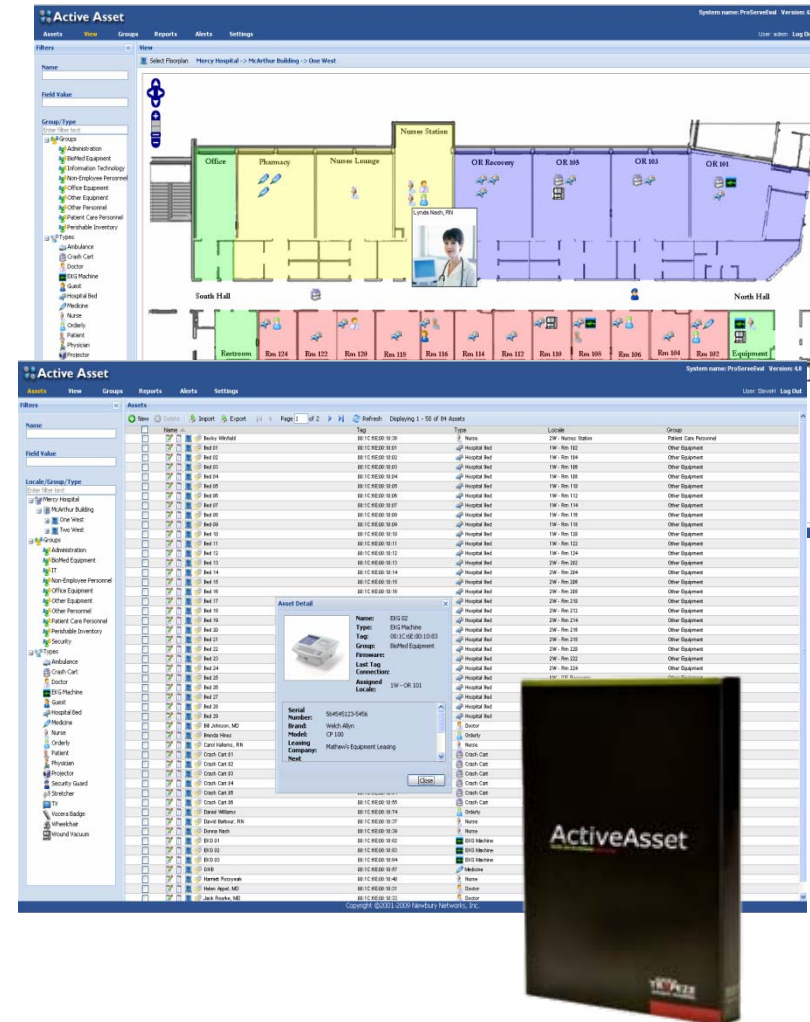


# Best Solution Defined By Use Case

Requirement	SmartPass	RF Firewall
Allow Guest access in conference rooms, but allow employee access anywhere		
Deny Wi-Fi access for anyone outside the building		
Stop students using IM and texting during class		
Deny Wi-Fi access unless in these named locations		
Shut down user if they consume too much bandwidth		
Allow access to known MACs only from these places		
Prevent network access for contractors after 6:00 pm		
Detect complex hacking scenarios such as "man-in-the middle" attacks either inside or outside building	WIPS/WIDS	

# ActiveAsset – Asset Management

- Real-time asset tracking and management for WLANs
- Accurately and rapidly locates shared assets and people
- Send alarms and alerts when location-based events occur
- Track patients and personnel to improve safety and security
- Improves workforce efficiency
- Continuously monitor, analyze and report on asset movements



# Trapeze RTLS Success Stories



- Aeneas Nursing Home, Breda, Netherlands
- AT-320 asset tags used for nurse call
- Integrates with Mobicall from New Voice
- Transform alerts to voice calls with location



- The Florida Aquarium, Tampa
- Location-based content delivery
- Audit trail and foot traffic metrics provided by LA-200 and use of APIs



- AerCap, Schiphol Airport
- Trapeze LA-200 and RF Firewall
- Location based access control for wireless network in office park



- Onze-Lievevrouws Hospital, Belgium
- LA-200 and ActiveAsset deployment
- 500 AT-320 asset tag deployment



# Trapeze RTLS Summary

- Only Trapeze has complete WLAN and RTLS solution
- LA-200E provides foundation for all RTLS applications
- Trapeze solution is more accurate, flexible and scalable
  - Patented RSSI fingerprinting is immune to RF changes
- Location adds a new dimension to Wi-Fi security
  - Location based access control (LBAC) - RF Firewall
  - Role based access control (RBAC) - SmartPass
- RF Firewall delivers instant lock-down of perimeter

Trapeze WLAN and WiFi Location Base positioning engine are providing location services to locate medical equipments like anesthesia machines, infusion pumps, neural stimulator, imaging devices for endoscopic operations etc.

<http://www.marubeni-sys.com/infinite-ideas/chousen/osakadai/index.html>



# Trapeze Delivers Medical Grade Mobility

- Superior scalability and mission-critical availability
  - Award-winning strategy for NonStop wireless
- Architecture optimised for voice and seamless mobility
  - Lowest latency, session persistence, identity-based roaming
- Easiest planning, deployment, life-cycle management
  - Don't need Cisco CCIE to design, deploy and operate
- Complete security and safety compliance
  - RTLS, AirDefense, Secure Voice, Location-aware Guest Access
- Dramatically lower TCO compared with Competitors
  - 300 bed hospital - Upto \$300K savings on Capex and Opex
  - Plus \$200K savings per 0.1% gain in clinician productivity



# Case Study: Wheaton Franciscan



Wheaton Franciscan Healthcare

**“In addition to the fundamental requirements of reliability and security—which are essential to healthcare environments—the ability to centrally manage a network of that scale with minimal resources was critical.”**

— Larry Griffith, Director Technology Operations, WFH

Situation & Objectives	Solution	Results
<ul style="list-style-type: none"> <li>One of the largest healthcare providers in midwest USA.</li> <li>16,000 employees</li> <li>100 hospitals and clinics</li> </ul> <p><u>Objectives:</u></p> <ul style="list-style-type: none"> <li>Replace a 802.11b Cisco-based network</li> <li>Deploy a system-wide wireless LAN that provide security, mobility, and manageability</li> <li>Deploy Voice over WLAN for PDAs and phones</li> </ul>	<ul style="list-style-type: none"> <li>Trapeze Smart Mobile deployed in all 100 hospitals and clinics</li> <li>WLAN controller in each hospital</li> <li>Ongoing rollout – over 2000 access points already deployed</li> <li>RingMaster software used to monitor and manage WLAN deployment</li> </ul>	<ul style="list-style-type: none"> <li>Trapeze Smart Mobile provides system-wide, unified wireless network supporting mobile applications, including clinical applications (e.g., charting, surgery management), voice over Wi-Fi, monitoring, and guest access</li> <li>Clinical staff moves freely throughout WFH facilities while maintaining connectivity to applications</li> <li>Small team centrally manages entire wireless network with RingMaster</li> </ul>

# High Global Penetration in Hospitals

100's of Health Systems worldwide deploy  
Trapeze WLAN technology



Wheaton Franciscan Healthcare



**STANFORD**  
SCHOOL OF MEDICINE



**fraserhealth**

Better health. Best in health care.



University of  
Massachusetts  
**UMASS** Medical School



A Premier Medical Center...  
**Memorial Hospital**



slotervaartziekenhuis



**SAN ANTONIO** COMMUNITY HOSPITAL



Radiological Society  
of North America  
Founded in 1915



Ziekenhuis Walcheren



**HARTFORD**  
HOSPITAL



Fresenius Medical Care



Diaconessenhuis  
Leiden



**UMC Utrecht**



Akershus Universitetssykehus

# University of Minnesota - the Largest 802.11n WLAN in the World !



UNIVERSITY OF MINNESOTA

*Twin Cities • Duluth • Morris • Crookston • Rochester • Other Locations*



## Worlds Largest 802.11n Deployment:

- 5 Year Program
- 2 major campuses, over 258 buildings (22m sq ft), 1,200 acres of outdoor coverage
- 9,500 Access Points, 50 Data Center Controllers
- 80,000 Students, Faculty, Staff
- Competition – Cisco, Aruba, (30 proposals), rigorous technical & business evaluation

## Requirements:

- Campus-wide indoor/outdoor access
- 802.11 a/b/g/n with 802.1X – Linux, Mac, Windows clients
- High density usage in classrooms and auditoriums
- Highly secure, rogue detection, WIDS, WIPS
- Distributed authentication
- Roaming for any protocol
- Applications
  - > Internet access, Online library catalog and services
  - > Web-based classes and discussion forums
  - > VoIP & Video streaming



Area of University of Minnesota's Trapeze WiFi Coverage (Red line describes coverage area)

## Why They Chose Trapeze Networks:

- Technical Superiority
  - > 11n performance
  - > Resiliency, availability
  - > Scalability
  - > Management
- Best Support & Service
- Access options & services
- Automated RF planning
- Advanced monitoring and accounting



# Hangzhou WiFi City, China

## CNET 2008

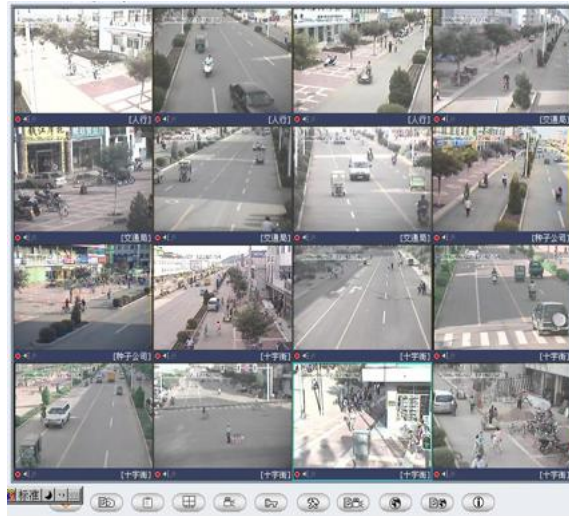
- Hangzhou WiFi City, the largest wireless city to deploy 'Triple-Play' Application
- Trapeze Networks is a major supplier
- Total 3 Phases
- Phase I Cover 728 km<sup>2</sup> with over 3000 Access Points
- Target to cover 16600 km<sup>2</sup>



# Hangzhou WiFi City – The Largest WiFi network

**Solution/Applications – Low Cost Wireless Network to cover the city at a fraction of the cost of Cellular Data Network: ROI < 18 months**

- Government Parking POS
- Wireless Data Service for the Traffic & Police Department
- Support CCTV and surveillance
- Public Transport and Kiosk.
- Data Service for Park, School and the community







# Trapeze Features and Benefits



NonStop Wireless™  
for the Always-on  
Enterprise