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Smart Mobile®: A Better Architecture for NonStop Wireless™ Networking

Trapeze Smart Mobile® Delivers Unmatched Reliability, Performance, Manageability and Security for Your Wireless LAN

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Smart Mobile: A Better Wireless LAN Architecture

With its superior distributed architecture, Trapeze Smart Mobile delivers unmatched reliability, performance, manageability and security for your Wireless LAN.

Current-generation Wireless LANs are significantly constrained in performance, scalability and mobility by their dependence on a centralized architecture. Trapeze Smart Mobile breaks those barriers with a distributed architecture that enables seamless enterprise-wide roaming, and maximizes performance and minimizes latency for voice and other mission-critical mobility applications.

Limitations of Traditional Architectures

As wireless LANs became more pervasive, enterprises quickly recognized that stand-alone "fat" access points (APs) would be a management nightmare on a large scale. Vendors responded with a different architecture comprising a centralized WLAN controller and "thin" APs. This is the norm with most WLAN vendors today.

This approach addresses the management problem, by enabling centralized administration and enforcement of security policies. It also allows coordinated network control and management. But performance is compromised, because all traffic must be forwarded by a WLAN controller. Since most WLAN controllers are centrally located at the data center, the centralized forwarding model not only increases latency and jitter, it also wastes backbone bandwidth. This highly inefficient traffic forwarding model has limited scalability, since forwarding capacity does not increase as access points are added.

Another major drawback is cross-controller roaming, since security credentials for a client are tied to its "home" controller, and are not distributed across the network. Thus as clients roam, they are prone to session time-out while the network tries to obtain session-level security credentials from the "home" controller.

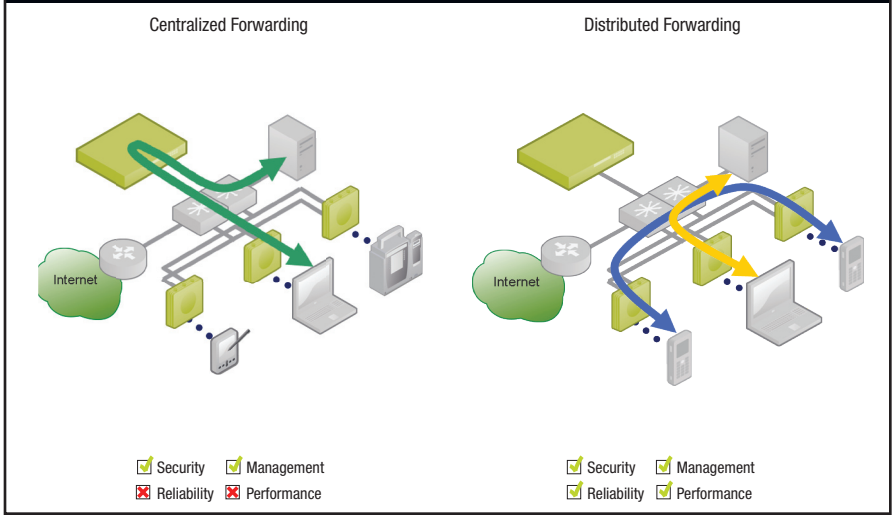
Smart Mobile: Traffic-Optimized

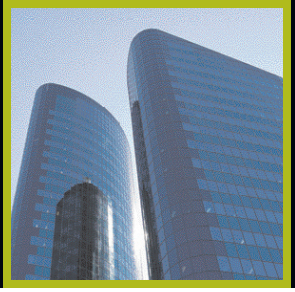
Smart Mobile™ from Trapeze Networks overcomes the limitations of current-generation WLANs by supporting both centralized and distributed data forwarding based on the requirements of the underlying application. The result is optimized traffic flows, radically reduced latency, and ultra high performance — all without the high cost of upgrading network controller infrastructure.

Smart Mobile: Seamless Mobility

Another key element of the Smart Mobile™ architecture is the distributed nature of session information to enable seamless roaming across controllers both indoors and outdoors. In contrast to centralized architectures that rely on a client being tied to a "home controller" Smart Mobile allows security to be administered centrally and enforced locally at the access point in a distributed manner. Once a client is allowed on the network, its security credentials are propagated through secure tunnels to all other controllers in the same Mobility Domain™. Thus, when a client roams between access points that are managed by different controllers, the client is recognized instantly, without needing to query the network. This ensures session persistence for highly mobile users and is a critical advantage for voice services.

Smart Mobile Supports both Centralized and Distributed Forwarding





Smart Mobile Delivers NonStop Wireless

Trapeze Networks wireless LANs deliver unparalleled reliability, performance, manageability and security. Only Smart Mobile ensures mission-critical mobility for applications such as voice communications, patient care, point of sale and location tracking, while delivering uninterrupted campus-wide network access, even in failure conditions.

Mission-critical Mobility

As enterprises recognize the benefits of mobility, wireless LANs are evolving from a "convenience network", into the de-facto access layer to the enterprise network. Whether it's nurses getting voice and messaging while on the move, or retail staff doing price checks and inventory management from anywhere in the store, or a teacher being able to deliver classes outdoors, almost every industry has highly mobile workers that can benefit from uninterrupted connectivity anywhere.

The growing dependence on wireless for primary connectivity, places new demands on the WLAN infrastructure – demands for a secure, high performance, highly reliable and easy-to-manage wireless network.

Better Security than Wired LANs

Thanks to the Wi-Fi Alliance all of the early security concerns with Wireless LANs have been laid to rest, and some say WLANs are now, even more secure than most wired networks. As standard, Trapeze provides the highest levels of security for both voice and data including the WPA/WPA2 standards and WMM. Trapeze also offers enhanced WIDS/WIPS protection, to prevent even the most determined hackers, and advanced Access Control software to enable dynamic access authorization based on location, time and date, traffic, and more.

Scalable Performance and Bandwidth

While Smart Mobile delivers unprecedented scalability with local switching to offload WLAN controllers and optimize traffic flows for latency-sensitive applications such as voice, Trapeze has implemented many other innovations to maximize bandwidth availability, and control utilization. QoS profiles and bandwidth limits can be set on a per SSID or per user basis. In addition to patent-pending band steering that transparently makes 802.11a-capable devices use the 5Ghz band, and recovers 30-40% more usable capacity, Trapeze is also unique in enabling automatic Access Point load balancing even between Access Points managed by different controllers.

Award-Winning Management Software

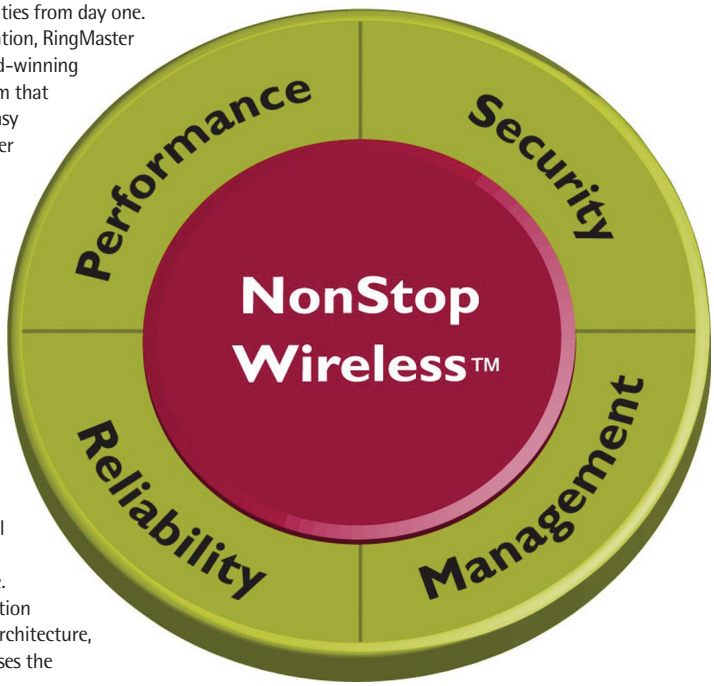
Trapeze delivers the easiest deployment in the industry, without resorting to gimmicks such as "virtual cell" that only ease deployment at the expense of performance. Unlike other vendors who added network management as an after-thought, Trapeze Networks led with advanced WLAN management capabilities from day one. Now in its 7th generation, RingMaster is a world class, award-winning management platform that makes it extremely easy for a network manager to plan, deploy, configure and monitor multi-site networks completely remotely, all from a single console.

Unmatched System-Level Reliability

High-availability demands system-level resilience, not just device level resilience. With the latest evolution of its Smart Mobile architecture, Trapeze Networks raises the bar on reliability.

The traditional approach to redundancy is to have a fully-loaded, fully-configured device ready to back up any other device which may fail. But many-to-one redundancy is inefficient, as ninety nine percent of the time, the back up device sits idle.

Trapeze's approach is different - think of it as controller virtualization. A group of controllers is configured as a Virtual Controller Cluster that allows each controller to act as a backup for any other. This many-to-many redundancy keeps all devices in service, so you know they work. This unique approach eliminates the need for expensive backup devices that rarely get used, and makes full use of access point licenses spread over multiple controllers. But much more important than that, is the unmatched reliability benefits - NonStop availability with hitless failover for active sessions. Because WLAN controller failure no longer has any impact on user sessions, this capability allows instant capacity scaling, and unscheduled in-service upgrades, all with zero downtime – this is simply not possible with other vendors systems.



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Most Secure Enterprise Wireless LAN

Studies prove Trapeze Smart Mobile provides unrivaled security and manageability.

Maximum Security

	Trapeze	Cisco	Aruba
WPA/WPA2	X	X	X
Integrated WIDS/WIPS	X	–	X
OpenSEA	X	–	–
FIPS 140-2	X	X	X
NIAP Common Criteria Certification (DOD)	X	–	X
Single console view	X	–	–
Common hardware for AP and sensor	X	–	–
Number of attacks defended	40	24	40

* "Who Leads in WLAN Security?" ABI Research 12/06

Smart Mobile combines the highest security standards for authentication and encryption with industry-leading intrusion detection and prevention, delivering the most secure wireless solution on the market. Trapeze Smart Mobile was honored by ABI Research® as the #1 enterprise vendor for Wi-Fi security out of eleven enterprise vendors studied.*

Standardized Authentication and Encryption

Using industry standard authentication and encryption, Trapeze protects against eavesdroppers and unauthorized users, and isolates traffic between multiple private groups. While distributed cryptography implemented in Trapeze Mobility Point access points ensures scalability of security policies without compromising throughput performance as the number of access points increases. Trapeze adheres strictly to the highest security protocols and industry standards adopted by all serious Enterprise WLAN vendors, including:

- 802.1X based authentication
- AES-CCMP encryption
- WPA/WPA2 (Wi-Fi Protected Access)
- 802.11i and all WMM subsets
- All common EAP types

For Federal Government applications Trapeze is also fully compliant with DODD 8100.2 and is one of the few Wireless LAN vendors that has a FIPS 140-2 validated solution.

Endpoint Integrity Interoperability

Trapeze WLAN Controllers prevent misconfigured or infected devices from accessing the network by checking for the latest security patches and service packs, firewalls, antivirus software, and anti-spyware. Trapeze supports Trusted Network Connect (TNC), an industry-standard approach to secure access control and end-point integrity, and is fully interoperable with Microsoft NAP, Cisco NAC, Juniper UAC and many other third party end-point Integrity solutions. In addition, Trapeze has integrated the Symantec On-Demand Protection agent into all Trapeze Mobility Exchange controllers. The security agent checks if the client complies with corporate security policies before allowing access.

Perimeter Security with RF Firewall

Beyond authentication and authorization within an AAA framework, enterprises can dramatically reduce their exposure to hackers by completely blocking access from certain areas – even for authorized users. With the Trapeze RF Firewall you can limit access to certain zones, and lock-down your perimeter security without resorting to crude, un-neighborly and mostly ineffective gimmics such as RF jamming. Because this form of Location-Based Access Control (LBAC) is so simple and easy to administer, it is the ideal first line of defense for organizations which do not have the personnel or the expertise to learn, implement and manage a full-blown Wireless Intrusion Prevention System.

Advanced Access Control with SmartPass

The typical goal of identity based is networking to preserve user security profiles and give users a consistent experience with consistent privileges as they roam around. The trouble is this is a rather simplistic model, as it ignores other factors, such as the time of day and location.

SmartPass takes Identity-based networking to the next level by augmenting conventional access security with a new layer of access control capabilities based on location, time and day of week and traffic, as well as group and user criteria. It enables dynamic adjustment of access authorization during sessions, depending on what each user is doing, and when and where they are doing it.

This Role-Based Access Control (RBAC) capability allows network managers to use policies to dynamically control network access, lock-down bandwidth abusers, restrict guest access to meeting rooms, and much more.

Best in Class Integrated Intrusion Protection

For the few environments where the most extreme security measures must be taken, Trapeze RingMaster may be integrated with wireless intrusion detection systems / wireless intrusion prevention systems (WIDS/WIPS) from leading vendors. This eliminates the need for an additional security overlay, by sharing common access point/sensor hardware, and reducing configuration effort.

Industry-leading Wireless LAN Management

RingMaster® is an innovative, easy-to-use, full-lifecycle enterprise WLAN management suite. It enables network managers to perform all critical functions necessary for planning, configuring, deploying, monitoring, and optimizing their Wireless LANs across multiple sites, all from a centralized management console.

Industry's Only 3D Wireless Planning

RingMaster provides unparalleled RF planning capabilities. CAD files can be imported to model RF behavior within any building or outdoor area, with different layers representing different building materials or other physical obstructions, each with corresponding RF characteristics. RingMaster then performs a Virtual Site Survey™ to automate coverage, capacity, and voice planning. The result is an accurate three dimensional RF plan. RingMaster's intuitive graphical display shows signal strength, coverage holes, interference, and high utilization areas, and even allows drag-and-drop repositioning of access points if their recommended placement is inconvenient. RingMaster also produces a comprehensive deployment plan identifying precisely where to mount access points, and the expected signal strength in different places.

Easiest, Most Intuitive Configuration

RingMaster configuration wizards provide an easy and error-free means of setup for wireless services including WPA/WPA2 802.1X-based secure wireless access, voice services, mesh services, guest access services, 802.11n "hot zones" as well as customizable service profiles. The same intuitive wizards can be run for a single WLAN controller or to define the configurations for hundreds of controllers spread over multiple locations. Advanced users can skip the wizard and configure any part of the Wi-Fi network directly using WebView or CLI. All configuration parameters and changes are tested and validated before deployment.

Award-winning Management

	Trapeze	Cisco	Aruba
Management Interface	Single console	Multiple components	Multiple components
Software Generation	7th Generation	Many Generations Many Products	2nd Generation
Outdoor/Indoor Operational Model	Single integrated model	Different for outdoor and indoor	Outdoor not integrated
WLAN Controllers per Server	1000	25	125
Integrated 3D Planner	X	–	–
Network Wide Service Deployment and Change Management	X	Limited	–
Network Wide Fault Correlation and Location	X	Limited	X
Drill Down to Real Time and Historical Data	X	–	–
Comprehensive 1-hour to 30-day Reporting	X	–	–

Fastest, Most Accurate Deployment

RingMaster makes deployment easy. The administrator simply clicks on the Deploy button and all the WLAN controllers and access points are automatically configured simultaneously. RingMaster uses a transactional protocol which ensures the deployment is precisely orchestrated from one stable state to the next desired state. This avoids the problem of partial updates, where some devices are newly configured but others are not. Even changes made directly at the controller using WebView or CLI are reflected in RingMaster, giving network administrators the ability to accept or reverse the changes.

Most Comprehensive Monitoring

RingMaster simplifies the ongoing operation of even the most complex wireless LANs. It features a single, centralized monitoring dashboard which provides real-time information on network status, traffic patterns, Wi-Fi client connectivity, access point and WLAN controller status, and reports any alarms instantly. Monitoring is real time and provides a 30-day historical record. From the visual dashboard, the administrator can launch into specific views to obtain detailed information on any aspect of the Wi-Fi network.

Powerful Reporting

Reports are generated according to pre-defined schedules. The resulting report output is stored on the RingMaster server, accessible via secure Internet connections or e-mail. A wide range of predefined report types are provided, including inventory, client session summary, rogue summary, switch configuration, and equipment installation. Reports can also be run on customizable criteria.

Most Scalable Management Platform

RingMaster's architecture is designed for scalability and is available as a software license or in a plug-and-play "Appliance" form factor. Every aspect of multi-site networks can be fully managed from a single console. A single RingMaster server scales to support thousands of Access Points and tens of thousands of Wi-Fi client devices. Administrators can manage the network on-site or remotely.

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Best Overall Performance and Scalability

Trapeze Smart Mobile delivers a quantum leap in performance and scalability while helping you avoid costly upgrades in the migration to 802.11n.

Using a combination of intelligent switching, controller virtualization and dynamic load balancing, Smart Mobile delivers the highest overall performance and scalability of any enterprise-grade WLAN, and offers the smoothest migration path to 802.11n, without requiring costly upgrades of WLAN controllers.

Smoothest Migration to 802.11n Speeds

The Smart Mobile architecture makes it possible to offload an enormous amount of processing—including data forwarding, encryption, and policy enforcement—from the controller to access points. This unique approach has immediate benefits for enterprises migrating to 802.11n, as it allows for the 10-fold increase in traffic loads that 802.11n will bring, without requiring additional WLAN controllers or upgrades to existing gear. Smart Mobile scales with exceptional efficiency, because each access point adds processing capacity. In contrast, with solutions that rely on centralized forwarding at the controller, each access point, instead, adds significantly to the controller load, requiring more and/or bigger controllers as the number of access points increases, or as 802.11n is deployed. Because Trapeze 802.11n access points can be deployed with existing controllers and supports the existing 802.3af Power over Ethernet (PoE) infrastructure, enterprises can enjoy a low-cost transition to 802.11n, replacing old APs over time, as necessity and budgets allow.

Superior Access Point Load Balancing

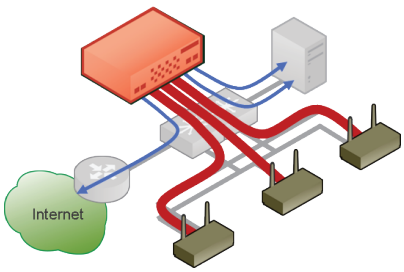
Regardless how forwarding is handled—centralized or distributed—Smart Mobile provides dynamic load balancing, not only between radios, and between access points, but also—thanks to controller virtualization—between controllers. Why this matters is because clients tend to aggregate on the same access point, even though others could provide equivalent services. It arises in particular with always-on mobile devices such as Wi-Fi phones, dual-mode phones and PDAs - when people enter a building, the devices associate with the AP offering the strongest signal at the point of entry, leaving very unbalanced AP and WLAN controller loadings. Worse, with vendor solutions that rely on a "home" controller, these clients remain forever locked to the controller serving that AP, and no matter how far away the user roams, traffic still must be tunnelled back to the home controller - wasting bandwidth and increasing round-trip latency.

30-40% Increased Capacity

Another common problem is that most wireless clients default to 802.11b or 802.11g, oftentimes resulting in congestion on the 2.4Ghz band while the 5Ghz band remains virtually unused. Only Trapeze has patent-pending Band Steering that forces clients to use the 5Ghz band whenever possible. This not only increases usable capacity up to 40%, but it also improves the experience for clients connected on 2.4Ghz.

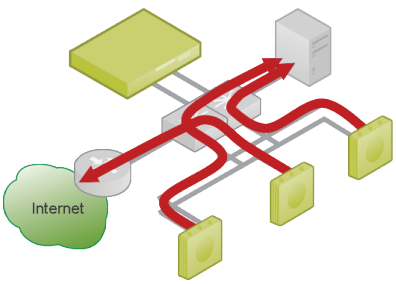
Smart Mobile Scalability Advantage with 802.11n

Centralized-Only Switching Breaks Down Under Increased Load from 802.11n



Offered load exceeds controller capacity

Distributed Switching Handles 802.11n without Breaking Down



No additional burden on the WLAN controller

Highest Resiliency and Availability

With the latest advances of its Smart Mobile architecture, Trapeze Networks has applied the principles of virtualization to Wireless LANs. The result is a quantum leap in system-level reliability, session-level availability and simplification of adds, moves and changes in a redundant configuration.

Controller Virtualization Maximizes Availability

With other vendors' solutions, WLAN controllers are configured individually and operate independently of one another, while access points are hard-mapped to each controller. Therefore, if a controller fails, so do all the access points. Or if the access points are dual homed to another controller, the access points must drop all active sessions, in order to reconnect to the secondary controller. Either way, users experience interrupted service, and in the case of voice, dropped calls.

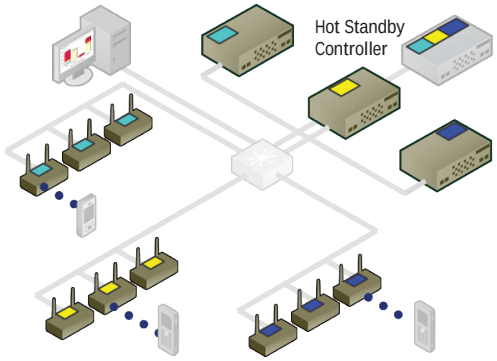
The Smart Mobile architecture allows a distinctly different approach to system-level resilience. Instead of treating each switch as a discrete device, multiple controllers are treated as virtual pool of capacity, so they act together as a single Virtual Controller Cluster. This approach provides the highest network resiliency and availability:

- **Many-to-many redundancy.** If any controller fails, all other controllers in the cluster serve as backup capacity—not just one or two designated stand-by controllers. The access point load previously assigned to the failed controller, is immediately redistributed among other controllers in the cluster.
- **Hitless failover.** Instead of being hard-mapped to a particular controller, access points are dynamically mapped to wherever there is available capacity. In a failure condition, affected APs automatically failover to other controllers without any interruption in service - not even active voice calls are affected.
- **Zero-downtime, in-service upgrades.** When a controller needs to be upgraded with a new release, the network administrator can take it out of service with no network downtime. Just as with a controller failure, any APs associated with the out-of-service controller will automatically failover to other controllers.

Approaches to Controller Redundancy

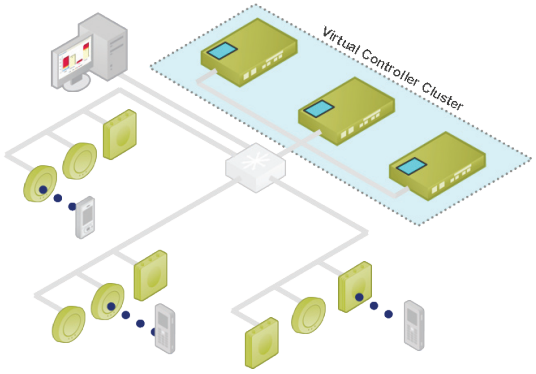
Traditional Approach:
Hot Standby Controller

Each controller is a discrete device. Redundancy is limited to the availability of designated hot standby controllers which remain idle until required for backup.



Smart Mobile Approach:
Virtual Controller Cluster™

Smart Mobile clusters all MX controllers in the network so they act as a single Virtual Controller Cluster, providing NonStop availability.



Easiest Adds, Moves and Changes

Clustered switching also results in dramatic improvements in the configuration of a fully redundant network, and accommodates adds, moves and changes with minimal reconfiguration required.

- **Automatic redundancy configuration.** The ability to configure multiple controllers in a cluster enables you to configure Wi-Fi parameters and service profiles for the entire network only once. The configuration is loaded onto a seed controller, which in turn replicates the configuration to all other controllers in the cluster. This approach substantially reduces the effort required to deploy and configure a redundant network design.
- **Instant capacity scaling.** Controllers can be easily added to the network to provide additional capacity. This is similar to a server farm or RAID approach, whereby adding more servers adds more capacity to the overall system. The controllers do not have to be located together—they can be anywhere in the network while acting collectively as a single Virtual Controller Cluster.

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Industry's Only WLAN Solution Optimized for Voice

Trapeze Smart Mobile is the only WLAN solution optimized for toll-quality voice and has a deployment model well-suited for scalable coverage, both indoors and out.

Voice over Wireless LANs requires low latency, efficient traffic forwarding, Quality of Service and seamless roaming indoors and outdoors. Smart Mobile delivers. It is the only WLAN solution optimized for toll-quality voice services.

Voice-optimized Traffic Forwarding

The latency-inducing centralized architecture of today's enterprise WLANs goes against the current trend in VoIP traffic handling. In contrast, Smart Mobile distributed forwarding is analogous to the way a SIP-enabled VoIP server hands-off an initiated voice call to the clients themselves. This minimizes network latency, enabling VoWLAN deployments for thousands of users.

Advanced Fast Roaming

As voice over WLAN users roam, their voice connections must be quickly handed-off from one AP to another to avoid degraded quality or dropped calls. This is particularly problematic with cross-controller roaming. Smart Mobile implements the most advanced techniques including all relevant industry standards, to ensure the highest levels of session persistence and service quality while maintaining the utmost session security.

Wizard-based Voice Configuration

Implementing voice over WLAN requires potentially complex configurations such as setting policies, defining service levels, and specifying support of multiple handset types. Trapeze RingMaster provides advanced wizards that guide you step by step, making voice configuration fast and easy, even down to selecting proprietary QoS features supported by different handset vendors.

Comprehensive Standards Support

Smart Mobile fully supports all leading wireless standards for quality, security, mobility and performance, including:

- **WPA2/802.11i** – highest enterprise class authentication and encryption
- **WMM, 802.11e** – Wi-Fi Alliance and IEEE Quality of Service
- **WMM-PS** – power-saving functionality to extend handset battery life
- **SVP (SpectraLink)** Quality of Service, voice traffic prioritization
- **802.11k** – efficient roaming and network resource utilization
- **802.11r** – fast, secure roaming (as standard gets ratified)
- **TSPEC** – call admission control

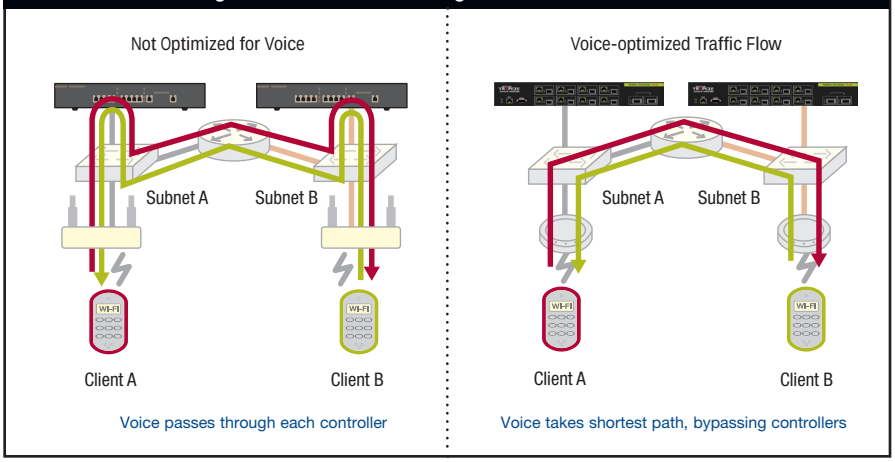
Extensive Handset Support

As an Avaya Devconnect partner, and the first Spectralink VIEW-Certified partner, Trapeze has repeatedly demonstrated leadership in supporting the widest selection of handsets from a variety of leading vendors, including: Ascom, Avaya, D-Link, Inter-Tel, Hitachi, Mitel, NEC, Nokia, Nortel, Polycom, UTSartcom, Vocera, ZyXEL

Fixed Mobile Convergence Today

Trapeze supports seamless voice mobility across WLAN and cellular networks to enable dramatic reductions in cell minute charges. In partnership with several pioneers of fixed mobile convergence (FMC), Trapeze has demonstrated interoperability with dual mode phones (Wi-Fi + cellular) and leading cellular network carriers.

Centralized Forwarding vs. Distributed Forwarding for Voice Traffic



Outdoor Enterprise WLANs without Limits

Through bandwidth-optimized intelligent switching, Smart Mobile delivers the most scalable WLAN solution for outdoor and uncarpeted areas, and provides a single deployment model for both indoor and outdoor deployment.

Bandwidth Conservation is Critical Outdoors

Deploying enterprise WLANs outdoors or in uncarpeted locations, such as warehouses and factory floors, poses significant challenges. Due to the unavailability of Ethernet wiring in these areas, over-the-air bandwidth—which is limited even with 802.11n outdoor APS—must be shared for backhaul and bridging services as well as for client access. Bandwidth usage, therefore, must be very efficient. Yet current-generation WLANs with centralized architectures are highly inefficient, as they require both centralized policy enforcement and forwarding at the controller.

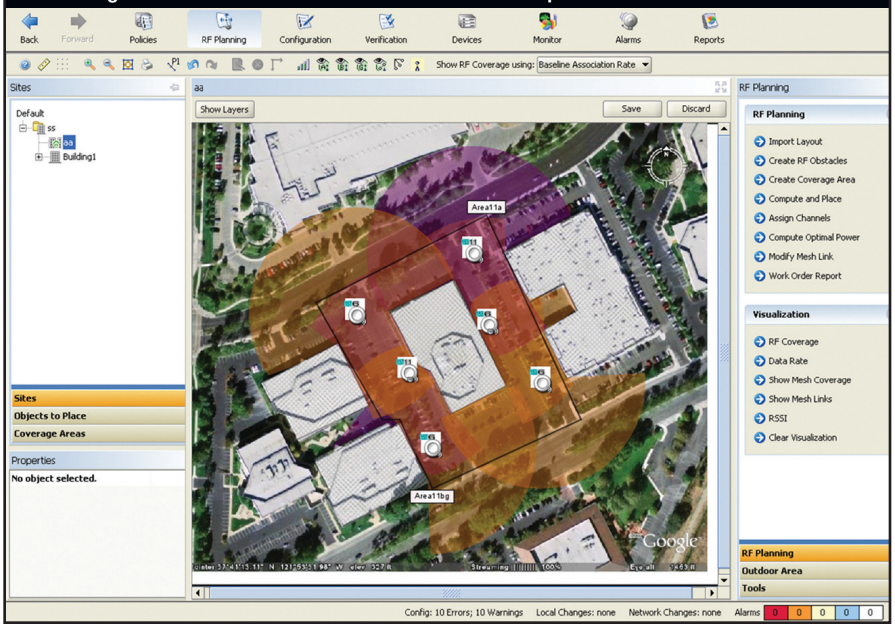
Optimized for Scalability and Resilience

The distributed architecture of Smart Mobile is ideal for optimizing usage of scarce over-the-air bandwidth in outdoor mesh or bridging applications. Smart Mobile allows forwarding and policy enforcement in a scalable, distributed fashion, at the wired-wireless edge. By optimizing bandwidth, Smart Mobile outdoor WLANs can provide highly scalable wireless mesh, point-to-point and point-to-multipoint bridging, and client services with significantly less infrastructure than outdoor WLANs from other vendors, resulting in lower capital and operating costs, and better value. The distributed approach also enables rapid failover and alternate routing if an access point fails, or when inclement weather or obstructions disrupt transmission between mesh nodes.

Complete Enterprise-class Client Services

Unlike other vendors systems, that typically require a completely different product family with a different architecture and separate management for outdoor applications, the Trapeze Smart Mobile architecture extends seamlessly to outdoor deployments. The exact same client access features available for indoor WLANs are available outdoors too, including the highest security standards (802.1X, WPA2, AES CCMP encryption, etc.) and toll-quality voice support (WMM, PMK cached fast roam, etc.).

Eliminating the Boundaries: Outdoor WLANs with Indoor Sophistication



With Trapeze RingMaster, you can visually plan your outdoor wireless network, taking into account the effects of obstacles such as buildings, foliage, and other obstructions.

MP-632 - Outdoor 11n Access Point

Single Integrated WLAN, Indoors and Outdoors

As enterprises extend their WLANs to outdoor and uncarpeted locations, they do not want to manage these extensions as separate networks requiring yet another set of management tools

Smart Mobile outdoor WLANs are fully integrated with Smart Mobile indoor WLANs. The deployment model is the same. That makes it easy for network administrators to enforce consistent identity-based service profiles enterprise-wide, using a single management platform. With RingMaster, network administrators have a single consolidated view of the entire network, indoors and out, with full lifecycle control over planning, configuration, deployment, and ongoing optimization of the network.

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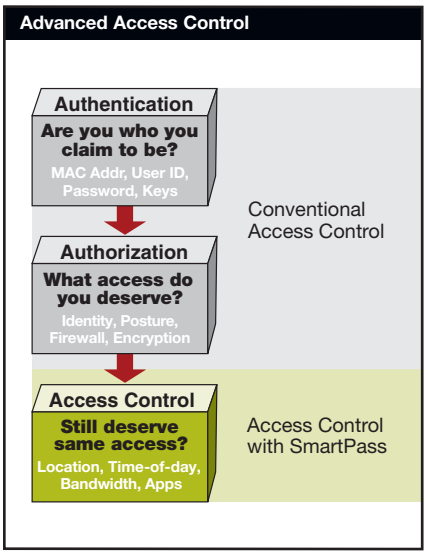
Industry's Most Advanced WLAN Access Control

SmartPass lets you dynamically control and adjust client access privileges based on their behavior and physical location.



SmartPass delivers advanced Access Control with Dynamic Authorization over all wireless client access. This allows WLAN access privileges for any user to be dynamically adjusted based on a variety of criteria such as the user's location, time and date, day of week, user traffic and more.

Beyond Conventional Access Control

In large enterprises, conventional access control usually involves two steps: user authentication to determine that a user is who they claim to be, and an end-point integrity check using Network Access Control products to ensure the device is safe to be on the network - it does not have a virus and is running appropriate software.

In many environments these measures are adequate. But since a wireless LAN footprint often exceeds the physical boundaries of the floor or building where it is installed, people in neighboring offices, on other floors in a multi-tenant building, or even someone in the parking lot, pose a potential threat.

More Granular control over All User Access

Having stricter control over the what, when and where of WLAN access, even for authorized users, reduces exposure to attacks and offers many additional benefits. For example in higher education, you may want to curb bandwidth abusers. In a government building you may want to permit employee WLAN access, only once they've passed through standard building security checks. While in hospitality you may wish to offer free wireless in the lobby, but charge for it in rooms. And finally, as more companies offer wireless internet access to corporate guests, there is a growing need to put more stringent controls on when and where they are permitted access, without wasting scarce IT resources to perform this tedious chore.

Trapeze SmartPass augments existing Authentication and End-point Integrity solutions with granular access controls that allow dynamic access control over all users including guests.

Identity Based Roaming with Dynamic Authorization

In the past, the goal of identity-based roaming has been to give users a secure, predictable and consistent user experience, based on each user's service profile and privileges, as they move around the premises. This is easier said than done, since there is currently no way to preserve access point resources in anticipation of a user potentially roaming to that access point. Trapeze was first to introduce the concept of Identity Based Roaming and has extended the capability on a global level, so that a user may expect a consistent wireless experience, even at a different office.

SmartPass takes this one step further, by allowing authorization attributes - what resources the user has access to - to be modified on-the-fly depending on other variables such as time of day, day of week, SSID, traffic passed within a specific timeframe or even location. These unique enhancements make it possible to disconnect any user the moment they step outside the building, or disable access based on time of day. The applications are varied and numerous. For example, in a school setting, a teacher could prevent Internet access from Room 205 between 2:00-3:00pm while a test is in progress; or in a corporate setting, guests may be granted internet access, but only when they are in a meeting room.

Open APIs for Systems Integration

All the functionality of SmartPass can be controlled from external applications using web-based open APIs. This allows integration with credit card billing systems, visitor registration systems, facilities management systems, other security systems and more.

Safest, Most Flexible Guest Provisioning

While the capabilities of SmartPass extend to all users, not just guests, it dramatically eases the growing challenge of provisioning temporary access for corporate guests. Most vendors' guest access is primitive, requiring non-technical personnel, such as front desk staff, to configure guest profiles by entering guest records directly into individual WLAN controllers - actually changing the configuration of an operational network. Not only is that a threat to the integrity of the network, it is also the cause of numerous IT support calls.

SmartPass is different. It is separated from the infrastructure by a centralized database, and requires no reconfiguration of controllers. That makes it much safer, easier to use and reliable. Since no guest credentials are in the controllers, even in a failover state guest access security is preserved. And because all guest information is centralized, it's easy to audit over any time period. Non-technical staff can easily assume guest provisioning responsibility and offload this task from IT.

Scalable Real-Time Location Services

Tracking and locating high-value assets in real time is a critical requirement in industries such as healthcare, manufacturing, logistics, and distribution, where delays can be costly or even life threatening. Trapeze Networks Wi-Fi based location appliance enables fast, accurate location tracking as well as location-based access control.

Smart Mobile Allows Application Scalability

Trapeze provides the industry's most scalable location tracking capabilities, enabling organizations to deploy across the enterprise without fear of crippling the performance of other applications, or compromising future voice over Wi-Fi deployment. Unlike other Wi-Fi based location solutions, Trapeze delivers reliable real-time positioning data without causing additional load on the WLAN controller – all thanks to the Smart Mobile's intelligent switching architecture which enables network administrators to optimize the performance of location tracking through distributed switching.

Complete Software Ecosystem

Trapeze is partnered with location services technology leaders including Newbury Networks, PanGo, AeroScout and ekahau to ensure a complete location tracking ecosystem. Allowing rapid deployment alongside asset management, workflow, resource-planning and network management applications, the Trapeze solution includes useful out-of-the-box location tracking tools as well as APIs for custom integration. Our partners also offer additional off-the-shelf business-centric location tracking applications.

Universal Wi-Fi Client Support

The Trapeze solution supports any Wi-Fi client as well as chirping or beaconing "tags" on any frequency band. No special "tags" or client software or agent are required.

Industry Leading Speed and Precision

Rapid response times and precision are critical factors in deploying real-time location services. Many mission-critical location applications demand immediate and accurate positional pinpointing to within a few meters. The Trapeze location appliance can detect and monitor the position of thousands of devices across the enterprise while also achieving the highest overall performance in the industry.

Fast, accurate location tracking streamlines workflow and eliminates costly delays.

Unique Location-based Access Control

No other WLAN vendor has integrated location tracking with Access Control. By doing so, Trapeze provides network administrators new levels of flexibility to restrict network access, based on a person's location. This enables much tighter control of guests as they move in and out of meeting rooms and around the campus, and augments traditional endpoint security with location awareness, in order to prevent parking-lot hackers who may have stolen a laptop or PDA.

Lowest Total Cost of Ownership

By using their WLAN infrastructure to support location services, customers realize significantly lower costs compared to deploying passive RFID, or proprietary non Wi-Fi based location systems. Coupled with the demonstrated lower cost of ownership afforded by Trapeze Smart Mobile over other WLAN offerings, customers can easily leverage their WLAN infrastructure to achieve the most cost-effective location solution available.

Superior Tracking Performance

	Trapeze	Cisco	Aruba
Accuracy at 10 Meters	99%	90%	N/A
Accuracy at 5 Meters	97%	50%	N/A
Accuracy at 3 Meters	95%	N/A	N/A
Average Seek Time	30 Seconds	5 Minutes	N/A
Fastest Seek Time	10 Seconds	1 Minute	N/A
Number of Devices Tracked	2,000	1,500	N/A

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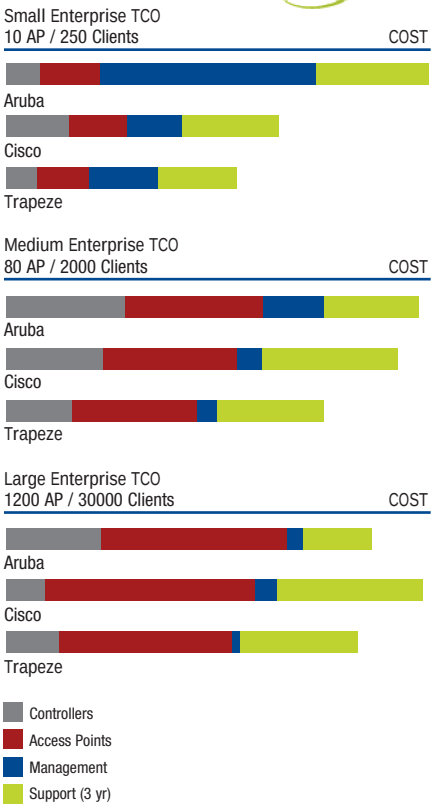
Lower Total Cost of Ownership

"Trapeze's WLAN switching equipment is the clear choice, with the lowest TCO for small, medium and large enterprise deployments."

yankee group



Thanks to a superior architecture, and a stackable form factor, Trapeze Networks has lower capital cost than other leading WLAN solution vendors. In addition, RingMaster enables network administrators to plan, configure, manage and optimize their networks in a fraction of the time required by others, yielding significant savings in operating expense, especially for fully redundant configurations.

25%-45% CapEx Savings over Cisco and Aruba

It's difficult to argue against lower TCO claims when they are based solely on list price or street price comparisons of equivalent solutions. This was the case in a detailed comparison of Trapeze solutions against Cisco and Aruba, conducted by the Yankee Group in 2007.

Compared with Cisco and Aruba, the study found Trapeze has lower capital costs for functionally equivalent configurations in each of three enterprise scenarios: Small enterprise (250 users); Mid-sized enterprise (2000 users); and Large enterprise campus (30,000 users).

Religion aside, it is common knowledge that stackable switches and hubs are less expensive than chassis based switches, because there is less overhead in the platform. Stackables also need less power. Chassis-based architectures are best if you need the box to perform multiple functions or have a range of different I/O ports to support. But neither of these requirements apply in wireless LAN controllers.

Aruba's WLAN controllers are heavily burdened with the overhead of a dedicated encryption engine, because they do all their cryptography at the controller - not at the access points as other vendors do. Since it gains no security advantage whatsoever, this is an unnecessary cost, when you consider that the inherent cryptographic processing power on every access point is being wasted.

Additional Savings in Redundant Configurations

Not only are there notable capital equipment savings in redundant configurations, there are dramatic OpEx savings as well. With both Cisco and Aruba, redundancy requires additional controllers configured in a hot-standby mode. In contrast, Trapeze's controller virtualization approach allows all the controllers in a "Virtual Controller Cluster" to act as backups for one another, without requiring any standby devices. On top of this, Trapeze requires no additional configuration to enable full redundancy, because there is no need for duplicate configurations to be maintained when there are adds, moves or changes. Configuring a fully redundant network with Trapeze takes approximately 20% of the time required by Cisco and Aruba, and requires substantially less knowledge, experience and understanding of redundancy mechanisms and protocols. It just works.

Full Utilization of AP Licenses - No Waste

Trapeze Networks controller virtualization approach is highly efficient in its use of access point licenses. This is because access points get assigned to the least loaded controllers in the Virtual Controller Cluster so none of the licenses go to waste. Unlike other vendors systems, access points are not mapped to any one controller, they are dynamically mapped to any controller that has capacity to serve them. This way, all licenses get used. If you need more capacity anywhere in the network, you simply buy a few more licenses for one controller.

Unified Management for Indoor and Outdoor

As previously mentioned, most other vendors' outdoor solutions are wholly different from their indoor solutions, and require different management. Managing two networks has time and cost implications for IT staff. Not only is there a lot of duplicated effort, to match the security and authorization privileges for a user on both networks, but it also adds to the complexity of troubleshooting. Further, IT now has to learn and maintain two separate management applications.

Comprehensive Enterprise WLAN Solution

Trapeze has the broadest and most flexible family of WLAN infrastructure components for any size deployment, from a small office to the largest corporate, hospital, university, or government networks. Whatever your wireless needs, Trapeze delivers the most scalable and reliable solution with the best overall management, at the lowest total cost of ownership.

Most Scalable WLAN Controller Family

The Mobility Exchange® (MX) family of WLAN controllers, powered by Smart Mobile intelligent switching technology, enables seamless integration of scalable and secure wireless LANs with your existing wired infrastructure. MX controllers are available in a broad range of models to meet the needs of any size WLAN, from branch offices to corporate data centers. They can be easily clustered together to provide a single virtual pool of switching capacity, able to support more than 16,000 access points in a single network.

Most Intelligent Access Point Family

The Mobility Point® (MP) family provides access point, mesh access point, mesh portal, point-to-point, and point-to-multipoint wireless services for Smart Mobile wireless networks indoors and outdoors. Configured and controlled by Mobility Exchange controllers, MPs perform encryption and can also enforce policy and forward data, depending on the application needs.

Most Advanced System Software

Trapeze Networks Mobility System Software® (MSS) drives the networking functionality in Smart Mobile wireless LANs. MSS runs on all Trapeze WLAN equipment, enabling Trapeze Mobility Exchange controllers and Mobility Point access points to operate as a single unified system. Trapeze delivers regular enhancements to MSS that provide customers ongoing network performance improvements without expensive hardware upgrades.

Industry-leading WLAN Network Management

Trapeze's award-winning RingMaster® software sets the industry standard for WLAN lifecycle management. It provides unparalleled capabilities for planning, configuring, deploying, and monitoring wireless networks of any scale—both indoors and outdoors. Configuration wizards enable easy, error-free setup for wireless services including security, voice, mesh, and guest access. Deployment is easy: simply click the Deploy button and all the WLAN controllers and access points are automatically configured simultaneously. For ongoing network management, RingMaster provides a single, centralized, visually graphic dashboard that provides real-time monitoring of network status and reports any alarms instantly.

Advanced Access Control and Guest Access

SmartPass™ software enables organizations to augment conventional Authentication and End-point Integrity with advanced access control capabilities. It enables network administrators to create policies that adjust a users' access privileges on-the-fly, based on a variety of criteria including: users' location, time and date, traffic passed, SSID and more. In addition, SmartPass dramatically simplifies provisioning, control, and management of guest access.

Industry's Only Real Time Location Appliance

The LA-200E Location Appliance, in combination with Smart Mobile, provides the industry's most accurate and scalable Wi-Fi-based solution for location tracking and asset management, and also serves as the base platform for RF Firewall perimeter security. Providing location accuracy to within a few meters, the LA-200E can simultaneously track up to 4,000 assets in real times. It supports any Wi-Fi client as well as chirping or beaconing "tags" on any frequency band. No special client software or agent is required.

abg WiFi n DRAFT CERTIFIED®

From WLAN controllers and access points to system and management software, Trapeze provides the broadest and most flexible family of WLAN infrastructure components.

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NonStop Wireless for Always-on Enterprises

More than 4,000 organizations worldwide have discovered the unlimited power, ease, and flexibility of deploying Trapeze WLAN technology. Spanning all industries and geographies, Trapeze customers enjoy superior value and return on investment from their Trapeze WLAN solutions.

HEALTH CARE

Wheaton Franciscan Healthcare

Organization

Leading healthcare provider in midwestern United States, with 17 hospital campuses in Wisconsin, Iowa, and Illinois

Objectives

- Provide campus-wide wireless support for rapid move to electronic patient records
- Monitor entire network centrally from one location
- Deploy future Voice Over WLAN services

Solution

- Deploying a Trapeze WLAN with almost 2000 Mobility Point access points

"We are very excited about the Trapeze Smart Mobile technology. Smart Mobile will enable us to accelerate WLAN deployment across our campuses for bandwidth-intensive applications including voice and patient records management, without having to tear out our existing wireless infrastructure, and to enable us to implement fixed-mobile convergence applications in the future."

Larry Griffith
Director of Technology Operations
Wheaton Franciscan Healthcare

EDUCATION

University of Utah

Organization

Major institution of higher education based in Salt Lake City, with more than 29,000 students and 16,000 employees

Objectives

- Provide wireless support for more than 45,000 students and faculty across 1,534 acre campus and 200 buildings

Solution

- Deployed Trapeze WLAN with over 1800 Mobility Point access points to date
- Extending coverage from indoor facilities to outdoor areas and student housing

"Trapeze has a solid product with the best support infrastructure and feature set I've tested. I like how Trapeze architected its products. The Mobility System gives me granular control over security settings, and is easy to configure and scale."

Chris Hessing
Head of Networking
Willard Marriott Library
University of Utah

ENTERTAINMENT

Mazda Raceway Laguna Seca

Organization

World-renowned raceway located near Monterey, California

Objectives

- Provide indoors/outdoors WLAN to staff, teams, fans, vendors, and media

Solution

- Trapeze multi-tenant WLAN provides public and private wireless services anywhere, over a single infrastructure to different groups of users
- Ubiquitous indoor and outdoor coverage

"With Trapeze Smart Mobile™ technology, we can confidently deploy a scalable indoor/outdoor wireless network with seamless mobility and integrated management. It enables us to expand our outdoor wireless coverage area without having to use 3rd-party equipment or adding more fiber. This is all possible by leveraging the existing wireless infrastructure from Trapeze."

Frank Basso
Director of Communications
Mazda Raceway Laguna Seca

Trapeze Networks is a Strategic Component to Several Partners

Trapeze Networks technology is at the heart of Enterprise WLAN solution offerings from its OEM partners, including:

- Nortel
- 3Com
- NEC

Trapeze Networks also licensed its technology and supplied products to be sold under Enterasys and D-Link brands from 2005-2009.

TRANSPORTATION

Manchester Airport

Organization

United Kingdom's third-largest airport, serving 20 million passengers each year

Objectives

- Implement WLAN allowing secure access for staff and travelers, through a common infrastructure and single management

Solution

- Trapeze WLAN provides wireless coverage to 3 airport terminals
- Travelers and employees now have network access throughout the airport, rather than in just isolated hotspots

"Airports have suffered from dilution of wireless service due to multiple uncontrolled wireless infrastructures that are difficult to manage and potentially confusing for the traveling public. Manchester Airport is teaming with partners including Trapeze that can offer a single, common wireless infrastructure that allows traveling passengers to access wireless services in all passenger areas of the terminal."

Aaron Bazle
Network and Infrastructure Manager
Manchester Airport

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