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ABSTRACT

Wireless data usage in consumer space is rising dramatically and driving user-led demand for more wireless applications in the workplace as well. At the same time, cloud computing, deployment of 802.11n networks and the push for greater mobility are enabling those applications, thereby feeding the same trend.

Yet a sharp increase in wireless client traffic places a big burden on the wireless controllers and wired transport network in today’s typical network architecture – a burden it may not be able to handle. Making matters worse, many of the new applications include latency-sensitive VoIP and bandwidth-hungry video streaming.

We’ve got the answer: WiNG 5 WLAN solutions. Our WLAN team led the industry-wide evolution from stand-alone access points to centralized hub and spoke wireless networks, placing intelligence in the wireless controller. Now Motorola innovated a paradigm shift to address the needs of a new wireless era. WiNG 5 WLAN distributes intelligence throughout the network so that traffic can flow directly, without bottlenecking at the wireless controller or burdening the wired network. And the WiNG 5 solution enforces QoS, security and mobility services for all traffic, even when it doesn’t go through the controller, which is unique to our solution. Enabling QoS, security and mobility at the access points also provides a higher level of network survivability and more flexibility on how the network is architected and deployed. Customers will get more network capacity, more resiliency, more flexibility and a better quality of experience. And because fewer wireless controllers are needed, the solution delivers all these benefits at less cost.

BACKGROUND

802.11n Is the Opportunity Driver

802.11n networks are capable of operating at speeds up to 600Mbps, as opposed to 54 Mbps for 802.11a/b/g networks or 100 Mbps for Fast Ethernet. This performance allows organizations to enable new high-bandwidth applications and capabilities over wireless that improve processes and offer competitive advantages.

802.11n is a key technology for vertical enterprise operations that use wireless as their primary network access technology. It evolves the wireless LAN from a network of convenience (an adjunct to the wired network) to a business- or operations-critical network in which users are dependent on its reliability.

IT’s Challenge: Making the Right Decisions When Investing in Wireless

IT departments need to provide the users with optimal wireless quality of experience, so every application gets crisp, clean connectivity that is reliable and secure. They need a wireless network that is agile enough to grow and change with the needs of the operation without forklifts, gimmicks or band-aid fixes. Finally, they need to continually find the means to drive down the cost of operations.

However, as IT leverages 802.11n WLANs for business- or operational-critical infrastructure, they are faced with a challenge: network congestion.

ABSTRACT

Wi-Fi Performance Progression

With 802.11n the wireless performance dramatically increases which may lead to congestion on dependent hub and spoke architectures.
Can the Back-End Wired Network Handle a Tenfold Increase in Access Network Traffic from 802.11n?

Most wired core networks do not have the capacity to support 802.11n. Consequently, they will likely require an expensive forklift upgrade.

First-generation wireless LANs were built on fat or autonomous access points (APs). This evolved to a second-generation, centralized switch/controller architecture (invented by Motorola), which significantly improved the wireless LAN with central management, security, quality of service (QoS), radio frequency (RF) management and AP-to-AP roaming. While this was a significant advance and an appropriate architecture for many operations, it is not the optimal architecture for operations moving to high-performance 802.11n wireless networks.

The centralized WLAN is actually a hub-and-spoke architecture that requires backhaul of virtually all wireless traffic to a controller (the hub). This hub-and-spoke architecture can create costly scalability and performance issues for 802.11n networks including:

- **Increased burden on the wired network**: Backhauling traffic across the wired network significantly increases the load and support costs.
- **Throughput bottleneck**: Wired network congestion and general health can limit wireless network performance.
- **Reliability**: Networks are susceptible to single points of failure as they are more or less dependent on a single path and control.
- **Scalability**: The dependent hub-and-spoke network can only scale to the processing limitations of the controller and available bandwidth of the network, which requires additional, larger, more expensive controllers supported by bigger and more expensive switches.
- **Limited investment protection**: The increased traffic on 802.11n will likely require costly upgrades to the supporting wired infrastructure.
- **Peak traffic times**: Latency- and bandwidth-sensitive voice and video application performance must be maintained during peak conditions, including when a high density of users are competing for quality network resources.
INTRODUCING MOTOROLA WiNG 5 WLAN

The Motorola WiNG 5 architecture is a solution designed for 802.11n networking. It leverages the best aspects of independent and dependent architectures to create a smart network that meets the connectivity, quality and security needs of each user and their applications, based on the availability of network resources — including wired networks.

Motorola WiNG 5 WLANs are specifically designed to overcome key 802.11n challenges by providing:

**Less Congestion. More Performance.**

By distributing intelligence and control between the wireless controllers and APs, the WiNG 5 network can route traffic directly via the best path, as determined by factors including the user, the location, the application and the available wireless and wired resources. As a result, the additional load placed on the wired network from 802.11n is virtually cut in half as traffic does not require unnecessary backhaul to a central controller.

Also, up to 80% of the network traffic can remain on the wireless mesh and never touch the wired network, so the 802.11n load impact on the wired network is negligible. In addition, latency and associated costs are reduced while reliability and scalability are increased substantially. WiNG 5 networking allows for the creation of dynamic wireless traffic flows, so that any bottleneck or chokepoint in the network is avoided, and the destination is reached, without latency and performance degradation. This behavior delivers a better quality of experience for the end user.

**Less Worry. More Trust.**

The same distributed intelligence enables more resilience and survivability, because the access points can keep users connected and traffic flowing with full QoS, security and mobility even if the connection to the wireless controller is interrupted due to a wired network or T1/E1 line backhaul problem.

Even when the network is fully operational, outside sources of RF interference or unbalanced wireless network loading can be automatically corrected by the WiNG 5 application-aware SMART RF system. SMART RF senses interference or potential client-connectivity problems and makes the required changes to channels and access point radio power, while minimizing the impact to latency-sensitive applications like VoIP.

In addition, built-in sensors on the access points work together with AirDefense Network Assurance to alert administrators of interference and network coverage problems, which shortens response times and boosts overall reliability and network availability.

Hub and Spoke vs. Motorola WiNG 5 WLAN

The ‘Hub and Spoke’ architecture requires traffic backhaul to a controller, which adds congestion and latency.

The WiNG architecture is free to route traffic directly via the best quality path, minimizing wired traffic and accelerating applications.
KEY MESSAGING

25-Word Description
In an 11n world, our WiNG 5 WLAN solutions are the less complicated, less expensive way to more capacity, more agility, and more satisfied users.

50-Word Description
Motorola’s WiNG 5 WLAN solutions offer all the benefits of 11n—and then some. Our distributed architecture extends QoS, security and mobility services to the APs so you get better direct routing and network resilience. Let us show you the less complicated, less expensive way to more capacity, more agility, and more satisfied users.

100-Word Description
Motorola’s WiNG 5 WLAN solutions offer all the benefits of 11n—and then some. Our distributed architecture extends QoS, security and mobility services to the APs so you get better direct routing and network resilience. That means no bottleneck at the wireless controller, no latency issues for voice applications, and no jitter in your streaming video. And with our broad selection of access points and flexible network configurations, you get the network you need with less hardware to buy. Let us show you the less complicated, less expensive way to more capacity, more agility, and more satisfied users.

Value Proposition
Less is More. The WiNG 5 WLAN solution is the less complicated, less expensive way to more performance, more agility, and more satisfied users.

Differentiators
More Quality of Experience

More capacity through WiNG 5 direct routing of network traffic with full video/voice QoS and security. No bottleneck at the wireless controller.

More resilient network services throughout outages: continued local QoS prioritization, authentication, security policies and direct routing, as well as backhaul failover to 3G.

Application-aware, self-healing with SMART RF for solid network coverage and availability.

Client battery life and connectivity enhanced with Motorola mobile computing devices.

More Agility

More flexible architecture allows a mix of local site or remote NOC wireless controller locations in a single distributed network.

More choice with thin, high-power outdoor, wallplate and adaptive APs, wireless controllers for small sites and large distributed organizations.

Easier deployment with no VLAN re-architecting of wired network and zero-touch AP installation.
Less Cost

Less Capital Cost

• Distributed network intelligence drives lower controller-to-AP ratio.
• Higher-power APs cover more area, so fewer are needed.
• Built-in sensors for WIPS or network assurance: band-unlocked radio on the access point.
• Save in equipment through better predictive design with LANPlanner.

Less Operating Cost


More Quality of Experience

What Our Customers Need

• Critical applications accessible at any time as users make calls and roam, regardless of the number of users on an AP. (Motorola can support 100 simultaneous multimedia sessions on a single AP.)
• Assurance of optimal network resource use that is based on the user, user location, application and available end-to-end network.
• Network control, optimal routing, security, reliability, authentication and application optimization.
• Assurance that when failures occur, they quickly can be identified for mitigation — especially if they are not wireless problems.

What Motorola Wing 5 WLANs Deliver

• More Capacity: Distributes network and security intelligence to the AP. Each network element (WiNG 5 access point) is a self-contained, network-aware node with built-in intelligence, control, security, application acceleration and processing. Ensures top voice and video quality despite congestion and interference. This is accomplished by collaborative packet routing in which decision making (control) is shared between APs and controllers to create the best paths directly from peer-to-peer or mobile-user-to-server for each user and application.
• More Resilience: Having QoS, stateful firewall inspection, mobility and routing intelligence in the access points means that the network can continue running even when the connection to the wireless controller is intermittently lost due to a network issue. So users can stay connected and continue using critical applications.
• Application Aware Self Healing: SMART RF adjusts power and channels to enable the WiNG 5 network to heal itself from AP failures, dynamic RF dead spots, and interference from Wi-Fi and non-Wi-Fi sources; and to provide coverage to meet the needs of wireless users at the fringe of the network. Airtime fairness is provided at a granular radio level based on users and their applications.
• Better Motorola client performance: Motorola mobile computing devices have software that is designed to work with Motorola WLAN features. The synergy provides faster roaming and better power management for longer battery life.
More Agility

WLANs usually face changes in the various branch sites of an enterprise as well as new application demands from users. These challenges often happen at isolated locations within branch sites and require solutions that are difficult to plan for, manage, maintain and optimize within legacy hub-and-spoke WLANs.

Hub-and-spoke WLANs — with their dependence on controllers — are rarely designed to seamlessly scale or adapt to new applications such as voice. As operationally critical applications are introduced, IT departments are often forced to compromise and implement fractured or non-integrated solutions to address indoor and outdoor wireless deployments, security, locationing, voice, video and other network services. Over time these patchwork networks become a burden to manage and create challenges that inhibit IT’s ability to build scalable and manageable architectures.

In addition, as enterprises increase their use of WLANs for business, they have increasing regulatory and other requirements to maintain, such as payment card industry (PCI) security standards, the Health Insurance Portability and Accountability Act (HIPAA) and the Sarbanes-Oxley Act (SOX).

What Our Customers Need

• Wireless network architecture that is very easy and does not require expensive core wired network upgrades or extensive virtual LAN (VLAN) and switched architecture changes.

• An adaptable network that can scale with the needs of their mission, operations and changes in their business, indoors and outdoors.

• The flexibility to create and scale a seamless, manageable wireless infrastructure to meet the growing user and application needs of the company, without the limitations of hub-and-spoke networks. A solution that allows IT departments to easily migrate to 802.11n without disrupting operations and users.

• A complete, scalable and secure wireless solution from a single vendor — even if that means adopting and extending the life of legacy and other vendors’ architectures.

A Flexible Range of Deployment Options

Headquarters/Campus/NOC - collaborative packet routing delivers

- Secure peer-to-peer communication with traffic firewall at every ingress/egress
- Efficient wired/wireless bandwidth usage
- Efficient WAN usage
- Unburdened networks due to unnecessary traffic routes

Site-to-site traffic flow is optimally routed without congesting the core, with security and network services available at the edge.

Redundancy is local, built into every AP (self-healing/self-forming mesh links, self optimizing RF, dynamic client load balancing) as well as provided by the NDC controller for a local controller deployment, so there is no need for a secondary local controller for redundancy.
What Motorola WiNG 5 WLAN Solutions Deliver

• **More Flexible Architecture:** Our tools allow customers to mix deployment types and manage all of them as one network. They can use adaptive APs with a remote controller at NOC; a local controller with a back up in NOC or only a local controller.

• **More Choice:** Our portfolio gives many access point and controller choices for different environments, site sizes and applications. We offer thin, adaptive, wall-plate and high-power outdoor access points, with a small to large controller selection.

• **Easier Deployment:** Access points receive over-the-network configuration instructions based on where they are connected to the network. The WiNG 5 network intelligence also does not require any changes to the existing wired network (especially VLANs) extending the zero-touch benefit network-wide.

**Less Cost**

Customers need to be aware of the total cost they might incur when purchasing wireless networks. There are fairly significant additional expenses for infrastructure associated with security, redundancy and performance assurance, as well as for the required maintenance and management. In addition, 802.11n may increase capacity performance tenfold, which could require customers to perform forklift upgrades to their supporting distribution and core networks (particularly in hub-and-spoke architectures).

Business, government and schools need WLANs to be as trusted as a wired network. But they typically do not have the necessary tools to analyze and diagnose problems remotely, thereby requiring technicians to be dispatched, an expensive and slow proposition.

**What Our Customers Need**

• Controlled costs: visible and hidden IT costs that are reduced, predictable and controlled
• No forklift upgrades, and the ability to extend the life of existing legacy architectures
• Easier IT installation and administration of the WLAN

What Motorola WiNG 5 WLAN Solutions Deliver

**Less Capital Cost**

• Little or no forklift upgrades to the wired core network
• Higher power APs (27.7dBm vs. 23 for competitors) can increase coverage by 60%, requiring fewer access points (up to 40% less)
• Slashed controller costs since each can support up to four times the number of APs
• Zero-port licensing for redundant AP controller ports
• No additional sensors and cabling are needed if built-in, band-unlocked radios in access points are used for security and network assurance
• Optimized equipment deployment through use of LANPlanner predictive designs

**Less Operating Cost**

• Less expense on the help desk due to AirDefense advanced troubleshooting
• Lower staffing requirements and onsite-visit costs due to remote troubleshooting capability
• Lower maintenance costs (pursuant to lower hardware costs)
Solution Components

Motorola WiNG 5 Networks comprise the WiNG 5 operating system; AirDefense Services Platform, including Infrastructure Management, Security & Compliance, and Network Assurance; LANPlanner, and 802.11a/b/g/n APs and controllers that enable network intelligence, processing, security and control at the wireless edge. This combination provides fast, secure and reliable networks that pamper the application and assure outstanding quality of experience for agile IT operations.

The WiNG 5 architecture puts network intelligence and control right in the AP so that it can collaborate with the controller. The AirDefense management, security and network assurance suite in the solution enables IT management, visibility, and control just like the wired network. The WiNG 5 operating system enables the advanced capabilities of the access point and controller. These includes:

1. Adaptive Access Points

The WinG 5 access point is intelligent and network-aware. It operates in a wireless networking cooperative with all other WiNG 5 APs and controllers. This cooperative control enables critical services to be performed even at the network edge, including processing, security, application optimization and pathing automation. APs (dependent and site survivable modes) provide secure local forwarding and policy enforcement capabilities and distributed intelligence across the network edge.

- Independent: AP 7131, AP 6532, and AP 6521 802.11n Access Points
- Dependent: AP 650 and AP 621 802.11n Dual Radio Access Points
- Wall plate: AP 6511 multi-dwelling unit access point
- Outdoor: Extend the network with AP 7181, AP 5181 and AP 7161 high-power outdoor APs.

2. Wireless Services Controller

The controller now serves as a management agent for network and security policy, VLAN bridging/ extensions and termination, and quality of service. It also hosts other services that are unnecessary AP burdens. RFS Integrated Services Controllers running the WiNG 5 operating system can cluster up to 24 controllers. Therefore, IT now has a single point of configuration, assurance and real-time control network-wide. This capability significantly increases the scalability of the controller by a factor of four.

- Branch: RFS 4010/4011 802.11n Integrated Services Controller (RFS 4011 has dual-radio access point built-in)
- Campus: RFS 6000 802.11n Integrated Services Controller
- Enterprise: RFS 7000 802.11n Integrated Services Controller
- HQ/NOC: NX 9000 Integrated Services Controller for large distributed organizations
3. The AirDefense Solutions

Wireless management now moves to a level of utility that empowers IT to run its wireless network with the same efficiency and effectiveness as a mature wired network infrastructure. From a single management system for multiple vendors and architectures (hub-and-spoke and WiNG 5), IT can manage security and compliance policy, monitoring, management and scanning. Additionally, they have network assurance that includes truly innovative and easy-to-use troubleshooting, spectrum analysis, forensic analysis, Live RF and vulnerability assessment from virtually any radio in the network.

**AirDefense Infrastructure Management**
- Multi-vendor Management

**AirDefense Security & Compliance**
- Rogue Mitigation
- Comprehensive Intrusion Prevention
- Enterprise and Regulatory Compliance
- Wireless Vulnerability Assessment Module

**AirDefense Network Assurance**
- Advanced Troubleshooting
- Spectrum Analysis
- Live RF
- Advanced Forensics

4. LANPlanner

802.11n has significantly different characteristics than legacy networks, which often require unique AP configuration to get optimal performance. Just placing new APs in old brackets may exacerbate existing problems that users have with the WLAN. In addition, the 802.11n network may need to be designed to consider increases in power and coverage, the effects of MIMO, and latency/interference-sensitive voice and video applications that are becoming increasingly critical. LANPlanner is a unique tool enabling IT to design 802.11n networks that are best suited for their unique facilities and applications. The technology also includes migration planning to help IT create solutions that support legacy WLAN networks and devices while optimizing 802.11n networking and devices. In addition, it can create optimal architectures based on the limitations of the IT budget.
Motorola WiNG 5 WLAN

**FEATURE** | **DESCRIPTION**
--- | ---
Faster Direct Path Packet Routing | Access points are network-aware and route data packets along the optimal direct paths, avoiding a bottleneck at the wireless controller. Full QoS and security are applied to direct traffic streams.
QoS Intelligence at the Edge | Voice and video QoS is implemented at the access point so that application performance is not bottlenecked at the wireless controller.
Authentication and Security Intelligence at the Edge | Client authentication, layer 2-7 firewall and role-based security policy is enforced at the access point.
SMART RF for Self-healing Coverage | Continuously adjusting power and channels for self-healing if an AP fails, if a dead spot is detected, if interference is detected or if a client is at the fringe of the network.
Built-in WIPS Sensor and Spectrum Analyzer | AP radios are band-unlocked and can be dynamically used by AirDefense solutions as a full spectrum wireless IPS sensor and spectrum analyzer.
Built-in Connection Testing | AP radios can be dynamically used by AirDefense solutions to remotely test client connectivity to the access point, through the network and to the application server.
Motorola MAX Client Performance Optimization | Motorola mobile computing devices used on Motorola Wireless LAN are optimized for faster and more stable connections, faster roaming and time synchronization.
High Efficiency Architecture for Lean Scalability | Architecture supports more users per AP and more APs per controller, all as part of a unified, easy-to-manage wireless LAN that supports your entire organization.
Zero Touch AP Installation | Network-aware access points adapt to their environment and use over-the-air configuration and firmware management from the AirDefense Infrastructure Management solution.
Access Point as Local Controller | Adaptive access point serves as a primary or back-up local wireless controller.
Backhaul Failover to 3G | Both adaptive access points and wireless controllers have a 3G card slot that enables backhaul fail-over to a 3G network for continued connectivity in case of a primary backhaul outage.

**KEY DIFFERENTIATORS**

Motorola

1. Motorola is a proven innovation leader that is highly trusted in the WLAN space with many first-to-market, leading-edge solutions.
2. Motorola has extensive experience in helping enterprises plan and deploy WLANs. Motorola has managed the installation of more than 240,000 APs.
3. Motorola is a leading solution provider dedicated to solving industry challenges (for retail, healthcare, public safety, etc.) with business-critical solutions.
4. Breadth of portfolio offers the ability to deliver one indoor/outdoor network solution with holistic management and security.

Motorola WiNG 5 WLAN

1. Intelligent direct routing with QoS, security and mobility (Motorola's is the only direct-routing architecture to include these services)
2. WLAN survives outages while still achieving direct routing with QoS, security and mobility.
3. SMART RF is application-aware.
4. Motorola devices perform better with Motorola WLAN.
5. Broadest WLAN portfolio that includes indoor and outdoor APs, and RF controllers for greater flexibility and choice
6. No architecting of VLANs required
7. Sensors integrated into access points
8. Access points have band-unlocked radios that can be set to 2.4 or 5 GHz.
9. Higher-power APs (not relevant in EMEA, where power has lower regulatory limits)
10. AirDefense built on an integrated platform that delivers security, network assurance and management.
COMPETITIVE POSITIONING AND FEATURE COMPARISON

Key Competitors

• Cisco Systems: market leader with 62% share
• Aruba Networks
• HP Networking

Secondary Competitors

• Trapeze (Juniper Networks)
• Aerohive

Market Substitutions

Cisco and Aruba both sell hub-and-spoke architectures (currently the most common WLAN architecture) that include a centralized controller or many distributed controllers to which each AP must backhaul virtually all traffic. Both offer some limited form of distributed networking (local bridging) for remote locations without a local controller; however, neither is scalable. Both open significant security holes (no IPS), have limited services (QoS, mobility) and cannot operate without connectivity to the controller.

Similar Market Solutions

• HP Procurve Optimized WLAN Architecture
• HP purchased Colubris, which has a similar architecture, although the company direction is unclear as per their pending acquisition of 3-COM (which has an extensive wireless portfolio).
• Trapeze Smart Mobile Architecture
• Trapeze literature sounds very close to WiNG 5.
• Aerohive Cooperative Control Wireless LAN Architecture
• Aerohive’s solution puts all controller function in the AP. Without a virtual controller, we believe this limits functions and scalability.

Competitive Differentiators

The legacy hub-and-spoke architectures provided by Cisco and Aruba require backhaul to a controller, which is not as reliable or secure and presents single points of failure. In addition, traffic cannot be routed from user-to-user, which can introduce latency and reduce routing optimization for applications. Scalability is limited by the size and distribution of controllers and availability of the wired network. Often, controllers need to be put on each site to retain service quality, which is expensive in terms of upfront cost, operations and power consumption.
**Quality of Experience**

Cisco and Aruba both sell hub-and-spoke networks with limited AP intelligence. They cannot distribute control to the APs and cannot make dynamic-route and alternate-routing decisions or apply security at the edge. While they can perform remote bridging, they cannot apply rich security or application support to remote traffic. Also, their scalability is highly limited, as is their ability to provide full network and security services without direct controller access.

Cisco and Aruba cannot scale to support high numbers of quality multimedia sessions (more than 50) or provide quality of service (QoS) over mesh or over mixed wired and wireless networks.

Cisco and Aruba do not have the on-board resilience or alternate-routing capabilities of WiNG 5. Neither has band-unlocked radios, although Aruba announced that a radio in its AP105 can also function as a sensor. Neither has Motorola’s rich suite of network assurance tools, and Cisco depends on AirMagnet/Fluke for network analysis or Cisco Spectrum Expert (similar to AirDefense Spectrum Analysis) that is costly and requires a dedicated sensor. Neither can troubleshoot an application that originates on a mobile device back to the root cause to solve the connectivity issue – they are limited to analyzing their own wireless products only.

**Agility**

Neither Cisco nor Aruba offers:

- Outdoor 802.11n
- Rich integrated networking, security and assurances services
- A single access point that supports both 802.11n bands and a single sensor that also supports both bands for security AND network assurance.

Aruba offers rich security that is similar to Motorola’s, but requires additional licensing, and it is not distributed to the edge. They also offer a second-class WIPS service for an additional licensing fee. Cisco has no edge security and primarily depends on the wired network for security. They can provide AirMagnet second-class WIPS and rogue detection.

Aruba and Cisco do not approach the scalability of the WiNG 5 network.

**Lowest TCO**

Cisco and Aruba’s hub-and-spoke architecture will likely congest the wired core because it has to backhaul traffic to the controller. Both will likely require more controllers and APs. Aruba licensing for networking and security features affect cost.

Cisco and Aruba wireless average installation is eight times longer than Motorola.

Cisco can only manage its own networks. A Cisco deployment often will require many different systems, including WCS for wireless, MARS for security monitoring, another for security management, CiscoWorks for switch and router management, and the list goes on. Cisco does not offer the rich integrated security and network assurance suite. Aruba’s AirWave solution offers multi-vendor management, although it requires users to access each vendor’s GUI to configure and manage. It too does not offer a comprehensive and integrated security and network assurance suite.
# VERTICAL MARKETS

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<th>MARKET</th>
<th>APPLICATIONS</th>
<th>USERS</th>
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| Retail              | • On-the-spot transactions – highest capacity for mobile devices; seamless roaming/authentication  
                        • Mobile access to voice, video and data applications – capacity, coverage and availability enable reliable mobile access to high-bandwidth communication services  
                        • Guest access – true solution for split tunnel access  
                        • Centralized administration with easy, no-touch expansion or extension to new facilities                          | • Sales associates  
                        • Store management  
                        • Customers  
                        • Back-room associates  
                        • Security |
| Manufacturing       | • Mobile access to voice, video and data applications – capacity, coverage and availability enable reliable mobile access to high-bandwidth communication services  
                        • Video stream instructions of line repair  
                        • Downtime minimization – site survivability ensures connectivity even when outside networks are down  
                        • Clear connectivity in high-interference environments (e.g. around manufacturing equipment)                          | • Engineers  
                        • Technicians |
| Transportation      | • Mobile access to voice, video and data applications – capacity, coverage and availability enable reliable mobile access to high-bandwidth communication services  
                        • Package tracking  
                        • Downtime minimization – site survivability ensures connectivity even when outside networks are down                          | • Shipping & receiving personnel  
                        • Floor managers |
| Education           | • Video learning  
                        • High-density coverage (many users/devices on a single AP)  
                        • Staff/student access – true solution for split tunneling                          | • Teachers  
                        • Administrators  
                        • Security  
                        • Students |
| Healthcare          | • Disaster preparedness – site survivability ensures connectivity even when outside networks are down  
                        • Mobile access to voice, video and data applications – capacity, coverage and availability enable reliable mobile access to high-bandwidth communication services  
                        • Clear connectivity in high-interference environments (e.g. around medical equipment)  
                        • Internal/guest/patient access – true solution for split tunneling                          | • Nurses  
                        • Doctors  
                        • Technicians  
                        • Maintenance  
                        • Security  
                        • Patients/Visitors |
| Hospitality         | • Facility-wide coverage via unrivaled portfolio including thin, high-power outdoor, wall plate and adaptive APs  
                        • High-density coverage (many users/devices on a single AP) – useful in convention/meeting facilities  
                        • Internal/guest access – true solution for split tunneling                          | • Guest Services staff  
                        • Management  
                        • Maintenance / Housekeeping  
                        • Security  
                        • Guests |
| Municipal Government | • Centralized administration with easy, no-touch expansion or extension to new facilities  
                        • Internal/guest access – true solution for split tunneling                          | • City Hall  
                        • Library  
                        • Public Works  
                        • Park District  
                        • Utilities  
                        • DOT  
                        • Teleworkers |
FREQUENTLY ASKED QUESTIONS (FAQs)

Q: What is WiNG 5 networking?

A: WiNG 5 networking is an architecture that uses intelligent 802.11n access points and controllers that literally “adapt” to their circumstances – from user needs and network changes to interference. The Motorola WiNG 5 Network creates a personalized cloud for each session comprising the best paths or routes (wireless traffic flows) based on the user, their location, the application and the best quality route available (wireless and wired). It assures end-to-end quality, reliability and security without latency and performance degradation. This solution features rapid application delivery, mixed-media application optimization and quality service assurance to provide a superior quality of experience (QoE).

WiNG 5 networking applies security policy enforcement at the network's edge. It does not explicitly require traffic to travel through the controller for policy enforcement, as other WLAN vendor architectures do.

Q: What solution architectures does WiNG 5 networking support?

A: WiNG 5 networking provides immense flexibility in the WLAN architectures that can be deployed for geographically distributed deployment:

- Decentralized controllers with associated APs
- Centralized controllers with WiNG 5 APs associated over the WAN cloud

Redundancy for the networks, in a similar manner, can also be distributed across locations. For the decentralized model, local controllers can be placed at each location for local redundancy, or placed centrally at the NOC/HQ for centralized redundancy. And with Motorola’s unique license sharing model across the controllers, users don’t have to duplicate licenses across their primary and secondary controllers.

Q: What does the network do to the personalized session cloud in the event of congestion or failures?

A: The network will persistently monitor the quality of each session over the wired and wireless network and ‘tune’ network power and channels while maintaining airtime fairness. It also can load-balance traffic to relieve congestion. If the QoS on a session meets the minimum threshold, the WiNG 5 network will establish an alternate path if available.

Q: What is different about WiNG 5 versus the adaptive networking we’ve been selling for the past year?

A: It’s a mix of things. First the same Wi-NG operating system (V 5.0) now runs on the controller and the access points. This allows the AP to create, manage and optimize network paths with full QoS, security and mobility services. Second, there is an entire list of features, including mixed-media optimization, collaborative packet forwarding and self-learning configuration, that you should study and learn as they provide high value and set us apart from our competitors. And finally, because the previous adaptive offering was a first step into the new solution architecture, we positioned it as a feature; we are now positioning it as our solution.
Q: Is this solution really that important?
A: Absolutely. This is a game changer. 802.11n is the next evolution of Wi-Fi technology, and WiNG 5 is the next-generation architecture and solution specifically designed to optimize its promise. First, 802.11n will jam too much bandwidth into the wired core — it may get up to 600 Mbps as opposed to 54 for legacy 802.11b/g networks. Therefore, a wired network that currently supports 100 APs may only be able to support 15, and IT may be forced to upgrade the wired core (which is expensive) or offer bad network service. The WiNG 5 network resolves this in two ways:

- Traffic is not backhauled into the controller, which virtually cuts the load on the wired network in half.
- The dynamic application pathing will retain quite a bit of the network traffic on the wireless mesh. So, depending on the customer’s traffic and use, there could be minimal or no additional load on the wired core, which promises to be far less expensive than other solutions.

Q: What problem, in addition to congestion and cost, is Motorola WiNG 5 Networks solving?
A: There is a need for IT and users to trust their wireless networks as much as their wired networks. 802.11n was specifically developed with the promise of performance and reliability to replace the wires as the primary access network; therefore, it has to be trusted. Motorola WiNG 5 Networks helps IT and users trust the wireless network by providing features designed to handle interference, power, congestion and failures — despite the fact wireless suffers from radio interference and attenuation. Additionally, IT needs tools to remotely troubleshoot, diagnose and resolve issues with the same degree of confidence that they have with a wired network. The AirDefense Network Assurance Suite is integrated right into the APs, so it's easy for IT to gain the visibility, vigilance and mean-time-to-repair service levels of the wired network without extraordinary costs.

Q: What happens to existing installations of Motorola Wireless LAN?
A: The WiNG 5 network does not require a rip-and-replace approach. It enables simultaneous use of existing architectures from Motorola and other vendors, even if those other architectures are centralized hub-and-spoke models, so IT can retain and optimize legacy infrastructure while evolving to WiNG 5 networks where required. The adaptive access points can operate in a dependent environment and are field-upgradable to WiNG 5 (this may depend on the model number for certain AP 7131 access points as well as AP650 deployments). The RFS series wireless controllers can be upgraded to the WiNG 5 OS.

Q: What products will the WiNG 5 Operating System support?
A: At general availability (GA) it supports the RFS 4000 series and the AP650. WiNG 5.1, which will GA in Q2 2011, is scheduled to support the AP300, AP 7131, RFS 6000 and RFS 7000. New product such as AP 7161, AP6532, AP6521, AP 621, and NX 9000 will support WiNG 5 OS from their launch in Q2.

Q: What solutions are our main competitors selling?
A: Cisco and Aruba, which make up roughly 70% of the commercial wireless sold globally, are selling legacy hub-and-spoke architectures that do not relieve the congestion issues or the assurance challenges. While both will talk about a distributed architecture, it is a band-aid approach that is not scalable or reliable and introduces serious security gaps.
Q: How do we position Cisco and Aruba?

A: They are hub-and-spoke wireless vendors. They are taking a brute-force approach to solving the wired network congestion dilemma — Aruba sells bigger controllers and Cisco sells more controllers. Both will most likely require more money than a WiNG 5 network solution. Since most wireless customers are interested in, migrating to or are already purchasing 802.11n, it’s best to explain the following: Motorola WiNG 5 Networks have been designed for application excellence on 802.11n (fast, secure, reliable, manageable) and the competitors have hub-and-spoke architectures. The problem with hub-and-spoke architectures is they won’t scale: 802.11n will dump much more traffic on the wired core, causing congestion or required upgrades. They can avoid all that with Motorola WiNG 5 Networks. While we also sell hub-and-spoke, we offer a migration path (as the RFS, AP650 and AP 7131 will run on WiNG 4.X today and can be later upgraded when a company cuts over to WiNG 5).

Q: Will this be easier to install than Cisco or Aruba?

A: Much easier. Even today, an Aruba site configuration averages two days while Motorola’s averages about two hours. And Cisco isn’t much easier than Aruba. But it will get even easier as the APs literally find themselves and the network and automatically build optimal routing tables without requiring any wired network (including VLAN) reconfiguration.

Q: Are there competitors selling a solution similar to Motorola WiNG 5 Networks?

A: As with any good idea there will be replication. While HP Colubris and Juniper Trapeze have a similar approach, their architectures, features and scalability are far different. Aerohive is a small company with an approach that uses no controllers, although they still rely on appliances for network features and are not highly scalable.

Q: How do we easily differentiate from these competitors?

A: We’ve found a unique way to run the same intelligence (OS) on our access points and controllers so we can do direct routing and network survivability with full QoS, security and mobility services. Beyond that, our AirDefense and overall WNS portfolio help us create entire wireless solutions.

Q: Is this really just a fat access point?

A: It’s quite the opposite. We’ve made it intelligent, network-aware and full-service. Fat APs were first-generation devices that were stand-alone network elements. Then we moved to thin (dependent) APs that operated through a controller.

Q: Does this architecture still require a controller?

A: Yes, although the functions have changed. Now, most of the routine and immediately critical operational, control and networking functions have been moved to the access point. But the APs do not control the network; that is still the function of the controller. The result is high intelligence at the network edge for better and faster service with high scalability (an order of magnitude higher than anyone else). And, it also delivers a single management agent (the controller) to manage network and security policy, VLANs, and services such as hotspot, locationing and RFID.

Q: What does this architecture do differently?

A: It routes the traffic directly from source to destination on the path with the best quality — across the wireless and the wired (no one else can do this) and maintains quality and security for each session. It applies quality and airtime fairness based on who the user is, where they are, the application quality requirements and the available mix of media (wired and wireless network). Ultimately, there are a multitude of traffic handling and intelligent learning and management features that make this the most advanced architecture.
Q: Is this next-generation architecture really innovative?

A: Motorola’s WiNG 5 Networks extend the differentiation that adaptive APs offered to the next level by having the services and security now available at every point in the network. The traffic flow is optimized to prevent wired congestion as well as wireless congestion. Traffic flows dynamically, based on user and application, and finds alternate routes to work around any possible network choke points. Mixed-media application optimization is the hallmark of WiNG 5 networks, which is based on the following three pillars:

**Collaborative Packet Routing**

Collaborative packet routing is enabled by the distributed intelligence within the APs and controllers. APs and controllers collaboratively determine the optimal network path for traffic flows based on the user, the user’s location, the application and the available wireless and wired resources.

IT administrators can design policies to securely route and bridge traffic where needed without adding any latency or congestion in the wired and wireless networks. Whether the controller is at the core over the Internet cloud at a network operations center (NOC), or placed in the distribution layer in a campus or enterprise location, all applications and services are available at the network edge. And in the event of loss of communication to the NOC, the security and RF services, as well as authentication for new users, continues to function without disruption to the network.

Motorola WiNG 5 Networks also provide fail-safe mechanisms for ensuring reliability of application sessions. Since each individual AP is network-aware, they all are able to collaborate to create dynamic mesh links for backhaul in case of a wired switch failure.

This superior quality of experience is delivered without any compromise to security. With the stateful wired/wireless firewall residing at the network edge, each traffic flow is inspected without added latency that would be typical of a hub-and-spoke architecture where security policies are enforced at the central controller. In the case of Motorola WiNG 5 Networks, security policies are enforced at every point in the network.

**Network Traffic Optimization**

Network traffic optimization protects Motorola WiNG 5 Networks from broadcast storms and minimizes congestion in the wired network. WiNG 5 Networks offer VLAN load balancing, WAN traffic shaping and optimizations in dynamic host configuration protocol (DHCP) responses and Internet group management protocol (IGMP) snooping for multicast traffic flows in wired and wireless networks. The result is that end users benefit from an extremely reliable network that adapts to meet their needs and delivers mixed-media applications.

Firmware and configuration updates to network elements can permeate through the network, from one AP to another, over the air or the wire. Controllers do not need to push firmware and configurations to each individual AP, which introduces unnecessary network congestion and is typical of hub-and-spoke architectures.

Motorola WiNG 5 Networks also have remote Authentication Dial-in User Service (RADIUS) synchronization capabilities between the core and the access layer. If the central authentication mechanism is not available, users can authenticate against the local RADIUS and continue operations with secure access.
Q: The AP650 is a thin, or dependent, access point. How does it operate in the WiNG 5 network?

A: It essentially operates with the same functions as the AP 7131, except it is dependent on the controller for operation (the AP 7131 can operate with complete autonomy). Other differences between the AP650 and the AP 7131 include:

- The AP650 has less power: the AP 7131 has 2.7 dBm and the AP650 has 24 dBm vs. competitors at 23 dBm.
- The AP650 has a 2x3 MIMO radio vs. 3x3 on the AP 7131.
- The AP650 comes with one or two radios, while the AP 7131 scales up to three. The AP 621 is also a thin AP, operating similar to the AP 650 and also requiring a controller.

Q: Can I mix dependent and independent APs??

A: Yes, via wired Ethernet or mesh.

Q: Will any version of the AP 7131 or AP650 work in the WiNG 5 Network?

A: Yes. The one-, two- or three-radio (AP 7131 only) versions will work with WiNG 5.

Q: Isn’t an network much consisting of independent APs more expensive than a dependent network?

A: Not necessarily. It depends on the user requirements. Since full site “thrivability” vs. just “mere survivability” can be obtained with far fewer controllers, it could cost less. You have the ability to include lower-cost, yet full-featured dependent AP650s or AP 621 in concert with the autonomous AP 7131s, AP 6532, or AP 6521. See the WLAN Competitive TCO Calculator to help determine total cost options as per the user network and feature requirements. If a user requires the performance, scalability and reliability of WiNG 5 networking, the total cost of operation (including all infrastructure capital expenses) should be below that of Cisco and Aruba.

Q: What are some silver bullets I can use in selling?

A: 1. Motorola wireless innovation: Over 75 years of innovation and expertise in designing and developing wireless solutions
2. End-to-end integrated solution: planning, infrastructure, management, security, troubleshooting
3. Integrated AirDefense Security & Compliance: Best in class
4. Integrated AirDefense Network Assurance: Troubleshooting and analysis that is better than what companies have for wired networks
5. Band-unlocked radios: Reduce required sensors by half and cut POE port costs
6. More powerful radios: Require fewer APs and get better coverage
7. Better video throughput and quality: Proven to scale beyond Cisco and Aruba
8. Better network-wide application quality: Assures quality across the wired as well as the wireless network
9. Easy to deploy on a wired network: Self-learning with VLAN transparency
10. Scales to millions of users: Easy to grow with the company without huge expensive controllers
11. Multi-vendor management: Improves management for legacy Cisco and Aruba networks
12. Motorola MAX WLAN Connect: The best service for Motorola mobile computing devices – faster connections and 24% longer battery life
13. Lowest TCO: Cuts total 802.11n costs in half
14. TEAM VoWLAN Solution: Best-of-breed voice and collaboration
15. Wireless broadband: Inexpensive site interconnectivity and single pane of glass management
16. Wireless broadband: Broad WLAN portfolio: Indoor and outdoor APs and RF controllers at different price points for increased flexibility and choice
Q: What is the scalability that WiNG 5 networking provides?
A: WiNG 5 networking provides 4 times the scalability of a typical hub-and-spoke architecture, without compromising security, mobility or application assurance. And, no additional investment in larger controllers and service licenses is required.

Q: Does WiNG 5 networking support mesh for distribution?
A: WiNG 5 networking supports mesh for distribution. Mesh links are secured and dynamically created to ensure there is no disruption to traffic flows in the event of a mesh node failure.

Q: What are the solution components in a Motorola WiNG 5 Network?
A: Motorola WiNG 5 Networks include the following components:

- Wireless controllers for configuration, networking services and VLAN termination (extended VLANs)
- Access points (dependent and site survivable modes) with local forwarding and policy enforcement capabilities, and distributed intelligence across the network edge

For HIPAA, SOX and PCI compliance, proactive network troubleshooting, and network assurance with detailed reporting and multi-vendor network management, Motorola provides the AirDefense Services Platform, which is the network management solution for the Motorola WiNG 5 Networks.

Q: How does Motorola’s WiNG 5 architecture differ from Motorola adaptive networks?
A: Motorola’s adaptive architecture, introduced in 2008, laid the foundation for Motorola WiNG 5 Networks. Adaptive architecture was applied to the adaptive access point AP 7131 with secure local forwarding available only on these APs. Motorola WiNG 5 Networks expand this architecture to all Motorola 802.11n APs where all traffic is inspected by the stateful wired/wireless firewall at the network edge with WAN optimization and distributed intelligence network computing between access points and wireless controllers. Traffic is offloaded from the controller, where applicable, without any compromise on performance and security. VLANs termination is available on the controllers to prevent VLAN explosion by dragging VLANs to all APs. Therefore, the deployment and resiliency of traffic flows are flexible, ensuring the reliability of multimedia applications relayed over the wireless network.

Q: When is WiNG 5 networking available for orders?
A: RFS 4010/4011, AP650 and the AP 6511 will be the first hardware elements that run WiNG 5. In Q2 the AP 7131, RFS 6000 and RFS 7000 will also be rolled out to complete the product releases. In addition, the new products AP 7161, AP 6532, AP 6521, AP 621, and NX 9000 Integrated Services Controller all support WiNG 5.

Q: Do I need to be using a Motorola voice-enabled device to experience the benefits of the rapid application delivery?
A: Motorola WiNG 5 Networks offer optimal wireless traffic routing for all voice-enabled clients.

Q: Can the AirDefense platform manage any vendor’s products or only Motorola’s products?
A: The AirDefense platform has multi-vendor management capabilities and can manage multiple and varying architecture deployments through a single interface.

Q: Are partners required to get new certifications to sell the new controllers and access points?
A: No. However, we recommend taking the online training modules before conducting any installations.
# KEY RESOURCE PERSONNEL

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