Ruckus vs Cisco

SOLUTION OVERVIEW

Ruckus Core Values

• Predictable wireless connections
• Maximum capacity and reliability
• RF innovation
• Ease of use, intuitive setup
• High value solutions at low cost

Cisco Core Values

• Unified Architecture
• Competitive performance
• End-to-end infrastructure
• Company stability
• Deployment services expertise

Questions to Consider

• Would your users be more productive with better performance and reliability?
• Is total solution cost over time an important decision criteria?
• Is ease of use a key issue for your IT staff?
• Do you want a Wi-Fi implementation that adapts to fix RF problems for you?
• Would these features add value to your network?

• Adaptive antenna patterns
• Mobile app management
• Integrated zero-touch user onboarding

• Band balancing
• Zero-touch mesh
• Adaptive channel selection

• Per-user PSK
• Time-based SSIDs
• Integrated client test tools

Ruckus Solutions

• ZoneFlex or SCG appliances
• Full lineup of indoor and outdoor APs and bridges
• SmartCell Insight analytics and reporting
• SPoT cloud LBS service
• FlexMaster NMS

Cisco Solutions

• AireOS or IOS WLAN Controllers (WLC)
• Full lineup of indoor and some outdoor APs
• MSE location appliance
• Cisco Prime Infrastructure NMS
• IOS Converged Ethernet switches
• Identity Services Engine (ISE) policy control
**Ruckus vs Cisco**

**PRODUCT LINE**

### Wireless Controllers

**Ruckus**

- Full range of wireless controllers scaling from the entry level ZoneDirector 1200 which supports up to 75 AP’s, all the way up to the SmartCell™ Gateway controller which, with available clustering support, is capable of managing tens of thousands of AP’s and providing access for hundreds of thousands of mobile devices

  - SmartCell™ Gateway 200
    - Single SCG 200 - up to 10,000 APs, up to 100,000 clients.
    - 20-Gbps aggregate throughput
    - SCG 200 cluster of 4 - up to 30,000 Aps, up to 300,000 clients

  - Key functions:
    - Support for Hotspot 2.0
    - WISPr 1.0 authentication
    - Built in Element Management System (EMS)
    - REST API with JSON format
    - Bonjour Gateway
    - RBAC

- Virtual
  - Virtual SmartZone
    - High Scale (vSZ-H) - up to10,000 APs, up to 100,000 clients
    - vSZ-H cluster of 4 - up to 30,000 Aps, up to 300,000 clients

- ZoneDirector Controllers
  - ZoneDirector 1200 – up to 75 Aps, 2000 clients
  - ZoneDirector 3000 – up to 500 Aps, 10000 clients
  - ZoneDirector 5000 – up to 1000 APs, 20000 clients
  - SmartZone 100 – up to 1024 Aps, 25000 clients

**Cisco**

- Extensive range of standalone controllers, controller modules for network switches, virtual controllers, converged access switches with integrated wireless controllers

- Controllers with Central switching and FlexConnect™ Modes:
  - Cisco 8540 – 6000 APs, 64000 clients, 40-Gbps throughput optimized for 802.11ac Wave2 performance
  - Cisco 8510 - 6000 APs, 64000 clients, 2x10 GE ports

  - Integrated services
    - Application Visibility and Control
    - Policy classification engine
    - Location-aware Bonjour and Chromecast

- Cisco 5760 - 1000 APs, 12000 clients
- Cisco 5500 – 500 APs, 7000 clients
- Cisco 2500 – up to 75 APs, 1000 clients

- Controller Modules:
  - ISR G2 – up to 200 APs, 1000 clients
  - WI SM2 – up to 1000 APs, 15000 clients

- FlexConnect Mode capable:
  - Flex 7500 – 6000 APs, 64000 clients

- Virtual
  - Virtual Wireless Controller – 200 APs, 6000 clients

- Converged Access Switches
  - Catalyst 3650 Series - 25 APs, 1000 clients
  - Catalyst 3850 Series - 50 APs, 2000 clients

**Important Takeaways**

Ruckus wireless controllers address deployments of any size i.e. from a very small Field Sales Office to a Managed Service Provider solution. Clustered SCG 200s offer one of the highest scalability levels and are available in an appliance form factor as well as a virtual controller. EMS functions are built-in and integration via REST API is supported.

Cisco has wide range of wireless controllers and large selection of network routing and switching products, in combination there are additional options for converged access solutions as well as for plug-in modules. Following that path may lock customers to the hardware and features specific to the Cisco switches and complicate infrastructure upgrades in the future.
### Ruckus vs Cisco

#### Mobility Services

**Ruckus SPoT**
- Ruckus Smart Positioning Technology (SPoT™) is a solution for providing presence or location metrics for Wi-Fi enabled devices
- SPoT Levels of service:
  - SPoT Point – with venue calibration expected 5-8m accuracy with 90% confidence, ~10m accuracy without calibration
  - SPoT Presence – device positioning at the AP proximity accuracy level
- SPoT Architecture advantages:
  - Up to near-real-time positioning with selectable update intervals
  - Cloud-based SPoT Location Engine – subscription service with virtually unlimited scalability
  - Virtual SPoT (vSPoT) - a standalone instance as a customer hosted deployment option
  - SPoT Engagement API – RESTful with JSON
- Location detection using Wi-Fi probes and data packets
- SPoT Analytics:
  - Traffic visualization heat-map
  - Real-time and historical data
  - Graphs on unique visitors, average dwell time, repeat visitors

**Cisco CMX**
- Cisco Connected Mobile Experiences (CMX) is a modular solution that includes combination of technologies for enhancing Wi-Fi based mobility services. CMX is built on the Cisco Mobility Services Engine (MSE) platform.
- Key components:
  - Location services for Wi-Fi devices, RFID tags, RF interferers; open API
  - CMX Connect - on-boarding platform, location enabled captive portal for guest access
  - CMX Analytics – Wi-Fi based location analytics with an API option
  - CMX for Facebook Wi-Fi – venue Wi-Fi access with Facebook credentials check-in, automatic access for returning users
  - Wireless Intrusion Prevention System

<table>
<thead>
<tr>
<th>Virtual or Physical appliance</th>
<th>Cisco MSE Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>REST API</td>
<td>MSE scalability levels for CMX 10</td>
</tr>
<tr>
<td>CMX Base License</td>
<td>• Low-end vMSE – 2000 APs, 25000 tracked devices</td>
</tr>
<tr>
<td>CMX Advanced License</td>
<td>• Standard vMSE – 5000 APs, 75000 tracked devices</td>
</tr>
<tr>
<td>License for Adaptive wIPS</td>
<td>• High-end vMSE – 10000 APs, 150000 tracked devices</td>
</tr>
<tr>
<td>CMX SDK for location aware applications</td>
<td>• MSE 3365 appliance – 10000 APs for CMX, 150000 tracked devices</td>
</tr>
</tbody>
</table>

**What to Consider**

Ruckus SPoT offers true cloud architecture without extra software to deploy and with minimal configuration on wireless controllers and in the cloud. The Cisco claims on MSE scalability levels for the number of tracked devices come with exceptions i.e. maximum limits have to be reduced depending on user behavior and location technology implementation; enabling Cisco FastLocate requires the Wireless Security Modules in participating APs, it also significantly lowers MSE capacity to handle large number of tracked devices. Additionally, MSE has complex licensing structure for enablement different CMX services, it offers no subscription option for a cloud based service.
**11ac Performance**

**What:** Croatian Academic and Research Network (CARNet) conducted independent Wi-Fi performance testing with top 802.11n and 802.11ac APs from different vendors within real classroom environment

**How:** Downlink TCP throughput tests using 1 MB file and IxChariot. Mix of 802.11ac and 802.11n dual-band clients placed inside of ~39ft by ~33ft classroom with AP outside the classroom separated by a drywall with 5dB loss

**Why:** By testing traffic patterns with multiple clients, we can accurately measure an AP’s ability to handle real-world mixed traffic types and maintain high-quality performance as load increases

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**Multi-Client Downlink Tests by CARNet**

![Graph showing performance of Ruckus and Cisco APs with varying number of clients.](image-url)
**11ac Performance**

**What:** Ruckus R700 vs Cisco 3700 11ac access points supporting MacBook Pro (11ac or 11n) laptops

**How:** Test downlink and uplink at multiple distances using Chariot high throughput script

**Why:** Maximum per client performance has a direct affect on WLAN service quality:

- High throughput at range enables fixed wired clients to transition to wireless only
- With the right solution, mobile devices can have reliable service at all ranges
- Efficient airtime utilization increases capacity and maximizes spectrum resources
- Clients are on and off the medium faster, improving battery life for mobiles
**11ac Performance**

What: Ruckus R700 vs Cisco 3700 11ac access points supporting 50 clients (11ac and 11n)

How: Test downlink, uplink, and bi-directional TCP traffic using Chariot high throughput script

Why: Many enterprises depend on APs to deliver reliable high performance Wi-Fi at scale:

- Demonstrates an AP’s ability to handle load from mixed client types and capabilities
- Efficient airtime utilization increases capacity and maximizes spectrum resources
- More clients can be supported by fewer APs, which simplifies deployment and lowers cost
- Enterprises can be confident in their ability to handle high density or BYOD

### TCP Throughput (Mbps)

<table>
<thead>
<tr>
<th></th>
<th>Ruckus R700</th>
<th>Cisco 3702i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downlink</td>
<td>120</td>
<td>96</td>
</tr>
<tr>
<td>Uplink</td>
<td>154</td>
<td>91</td>
</tr>
<tr>
<td>Bi-Directional</td>
<td>129</td>
<td>96</td>
</tr>
</tbody>
</table>

1 AP

Ruckus R700

Cisco 3700

10 MacBooks

40 iPads

50 Clients

120

91

96
**Low Cost 11n Performance**

What: Ruckus R300 vs Cisco 700 11n (2x2) access points supporting 30 clients (11n iPad Mini)

How: Test downlink, uplink, and bi-directional TCP traffic using Chariot high throughput script

Why: Many enterprises want low-cost APs that can still deliver high performance Wi-Fi at scale:

- Efficient airtime utilization increases capacity and maximizes spectrum resources
- More clients can be supported by fewer APs, which simplifies deployment and lowers cost
- Enterprises can be confident in their ability to handle high density or BYOD
- Customers know

### TCP Throughput (Mbps)

<table>
<thead>
<tr>
<th></th>
<th>Ruckus R300</th>
<th>Cisco 702i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downlink</td>
<td>102</td>
<td>68</td>
</tr>
<tr>
<td>Uplink</td>
<td>127</td>
<td>82</td>
</tr>
<tr>
<td>Bi-Directional</td>
<td>116</td>
<td>71</td>
</tr>
</tbody>
</table>

**1 AP**

- **Ruckus R300**
- **Cisco 702i**

**30 Clients**

- **2.4 GHz 10 iPads**
- **5 GHz 20 iPads**
What: Ruckus vs Cisco 11n uplink performance consistency

How: Test uplink throughput. Rotate iPad by 45° and repeat.

Why: Users hold mobile devices in different orientations:
- Well-designed APs perform consistently regardless of how the mobile device is held or positioned
- Uplink performance is increasingly important
- Antenna systems should maintain strong and stable receive behavior with a predictable user experience

Enterprise 3-stream APs

2.4GHz (Mbps)  |  5GHz (Mbps)
--- | ---
Other | Other
Cisco 3602 | Cisco 3602
Cisco 2602 | Cisco 2602
Ruckus 7982 | Ruckus 7982

Mid-Priced 2-stream APs

2.4GHz (Mbps)  |  5GHz (Mbps)
--- | ---
Other | Other
Cisco 1602 | Cisco 1602
Ruckus 7982 | Ruckus 7982
Ruckus vs Cisco

RELIABLE PERFORMANCE

May 2015

What: Ruckus vs Cisco 11n uplink performance consistency
How: Test uplink throughput with multiple client orientations
Why: Users hold mobile devices in different orientations:
  • Well-designed APs perform well in all mobile device orientations
  • Antenna systems should maintain strong and stable behavior with a predictable user experience across both radio bands

Test Orientations:

1. Flat
2. Landscape
3. Portrait
4. Upright 45°

Enterprise 3-stream APs

Mid-Priced 2-stream APs

UNDERSTANDING THE RESULTS

Jagged Line
Straight Line
Bad (inconsistent)
Good (consistent)
<table>
<thead>
<tr>
<th>Feature</th>
<th>Cisco Claim</th>
<th>Ruckus Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>CleanAir</td>
<td>CleanAir is an RF spectrum visibility/monitoring/reporting technology that is</td>
<td>CleanAir is a good solution for spectrum monitoring after a problem, but the</td>
</tr>
<tr>
<td></td>
<td>built into Cisco's Wi-Fi chip ASICs. Coming from a long history of leading</td>
<td>bigger issue with interference is how it affects connectivity and how a system</td>
</tr>
<tr>
<td></td>
<td>spectrum intelligence (as far back as the Cognio acquisition), CleanAir</td>
<td>can adapt in real-time. Ruckus BeamFlex and ChannelFly optimize Wi-Fi</td>
</tr>
<tr>
<td></td>
<td>provides interference detection, mitigation, location, and classification</td>
<td>stability in the presence of interference and adapt to RF changes to optimize</td>
</tr>
<tr>
<td></td>
<td>capabilities in a distributed platform as part of the network infrastructure.</td>
<td>RF for each user. We also include spectrum monitoring and capacity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reporting tools in the administrator dashboard as well as mobile apps with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vivid spectrum displays for troubleshooting. Cisco also requires MSE server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and Prime for many CleanAir features.</td>
</tr>
<tr>
<td>ClientLink</td>
<td>ClientLink is a proprietary implicit beamforming technique that improves</td>
<td>In independent testing, ClientLink has shown to provide no performance</td>
</tr>
<tr>
<td></td>
<td>signal quality, throughput, and reliability for all clients by using extra</td>
<td>gain, and may actually harm performance due to the lack of client feedback</td>
</tr>
<tr>
<td></td>
<td>transmit antennas to provide signal combining at the client. It is</td>
<td>and calibration. All types of chip-based TxBF require a tradeoff in spatial</td>
</tr>
<tr>
<td></td>
<td>backward compatible with pre-11n devices and does not require client</td>
<td>streams and provide no value to multi-stream devices. Implicit TxBF in 11n</td>
</tr>
<tr>
<td></td>
<td>support, feedback, or calibration.</td>
<td>has many caveats that the IEEE highlights (but Cisco ignores) while 802.11ac</td>
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<tr>
<td></td>
<td></td>
<td>abandoned implicit TxBF entirely because explicit TxBF with client</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feedback works more reliably.</td>
</tr>
<tr>
<td>VideoStream</td>
<td>VideoStream offers an array of video management features to optimize video</td>
<td>VideoStream requires the administrator to do a lot of the heavy lifting for</td>
</tr>
<tr>
<td></td>
<td>delivery across the WLAN. Features include multicast-to-unicast conversion,</td>
<td>configuration of priority. Mcast to Ucast conversion is supported by Ruckus</td>
</tr>
<tr>
<td></td>
<td>resource reservation control, and video traffic prioritization.</td>
<td>along with CAC, but Cisco is missing heuristics to detect and prioritize</td>
</tr>
<tr>
<td>Wireless Mesh</td>
<td>Cisco's experience in outdoor Wi-Fi networking enables them to extend Wi-Fi</td>
<td>multcast application flows automatically. Ruckus also optimizes overall WLAN</td>
</tr>
<tr>
<td></td>
<td>networks to areas where wiring is difficult or costly. Cisco provides</td>
<td>utilization.</td>
</tr>
<tr>
<td></td>
<td>flexible deployment models, fast and easy installation, and simple management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with a unified Cisco outdoor and indoor mesh protocol.</td>
<td></td>
</tr>
<tr>
<td>RRM</td>
<td>Cisco's RRM software acts as a built-in RF engineer to provide real-time RF</td>
<td>Cisco's RRM function has many knobs and dials for admin tuning, but RRM is</td>
</tr>
<tr>
<td></td>
<td>management of the wireless network. RRM monitors and adjusts for traffic</td>
<td>often difficult to tune for consistency across a large organization. TPC is</td>
</tr>
<tr>
<td></td>
<td>load, interference, noise, and coverage, and attempts to optimize coverage</td>
<td>almost always unnecessary, and Cisco's channel selection is a purely</td>
</tr>
<tr>
<td></td>
<td>and capacity. It periodically reconfigures RF characteristics, such as</td>
<td>passive background scanning technique, which assesses channel quality by</td>
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<tr>
<td></td>
<td>transmit power control (TPC) and dynamic channel assignment (DCA), and also</td>
<td>seeing less than 0.2% of all traffic on a given channel. Ruckus provides</td>
</tr>
<tr>
<td></td>
<td>provides coverage hold detection and correction.</td>
<td>options for RRM using background scanning (akin to Cisco) or ChannelFly,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>which performs active real-time channel testing and selection, evaluating</td>
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<tr>
<td></td>
<td></td>
<td>channel capacity with a convergence time less than 15 seconds. Cisco's RRM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>algorithm runs every 10 minutes.</td>
</tr>
<tr>
<td>Adaptive wIPS</td>
<td>Cisco's Adaptive Wireless Intrusion Prevention System (wIPS) provides</td>
<td>Complex WIPS solutions like Cisco's are almost always misconfigured or</td>
</tr>
<tr>
<td></td>
<td>wireless-specific network threat detection and mitigation against malicious</td>
<td>underutilized, especially for enterprises with small non-specialist IT staffs.</td>
</tr>
<tr>
<td></td>
<td>attacks security vulnerabilities, and sources of performance disruption. It</td>
<td>Typically, the more “advanced” WIPS solutions will detect more DOS attacks</td>
</tr>
<tr>
<td></td>
<td>also provides the ability to visualize, analyze, and identify wireless</td>
<td>(of which there are always more) and provide more alerts (with lots of false</td>
</tr>
<tr>
<td></td>
<td>threats, and centrally manage mitigation and resolution of security/performance</td>
<td>positives), but cannot prevent most attacks. Ruckus provides essential WIPS</td>
</tr>
<tr>
<td></td>
<td>issues.</td>
<td>features (rogue detection/mitigation, wired-side correlation, mitigation,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rogue DHCP detection, excessive auth request blocking, and more) in a</td>
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<tr>
<td></td>
<td></td>
<td>built-in package that enterprises will use. Cisco's wIPS also requires an MSE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>appliance as well as Prime for management, which adds cost and complexity.</td>
</tr>
</tbody>
</table>
**CMX**

A combination of multiple features, Cisco's Connected Mobile Experience (CMX) is a way to utilize network and location intelligence from the Cisco MSE to personalize the interactions and experiences of users on a network. This includes CMX venue analytics, easy guest access and customized landing experiences with CMX Connect, social login with CMX for Facebook Wi-Fi, and engagement with CMX Engage. Cisco’s CMX solution is fairly comprehensive, as you’d expect from Cisco. One notable drawback is the requirement for a dedicated Cisco’ MSE appliance for each of the CMX services (e.g. CMX for Facebook Wi-Fi requires its own MSE appliance and cannot support multiple services on one appliance). Distributed sites also each require an appliance and service, adding cost and complexity. Further, Cisco’s location engine itself is less accurate (8-10m) than Ruckus’s (5-8m) at 90% confidence. Finally, Ruckus’ location and engagement solution is cloud-based, making it more scalable for long-term data analytics, friendlier to distributed organizations, and more cost effective with better analytics features.

**ISE**

Cisco’s Identity Services Engine (ISE) provides a central point of policy management and enforcement for network devices. Key features include accurate ID of users/devices; onboarding, provisioning; and securing devices; centralized, context-aware policy management to control user access; security compliance; integration with MDM/MAM providers. Where ISE is critical to deployments, certain components of the ISE architecture (such as RADIUS and 802.1X) can be leveraged for third-party (i.e. Ruckus) WLAN solutions. But for the majority of customers, ISE functionality can be offered to enterprises both by native Ruckus features (Zero-IT, client prioritization, role-based policies, DPSK, and more) and through partnerships with best-of-breed 3rd party solutions: MDM/MAM, network-based next-generation firewalls, IDSs, and NAC, user directory services, content filters, and many others.

**AVC**

Cisco's application layer visibility stems from a Cisco-designed NBAR2 (network-based application recognition 2) engine, which is a next-generation DPI approach to app visibility. Recognizing over 1000 applications, AVC improves quality of service via application-level optimization and control, proactive monitoring of end-to-end traffic, better network management and planning with greater visibility, and prioritization of critical business apps. The major value of L7 visibility is to provide admin insight to user applications. Ruckus supports this function and reports app usage per AP/user/network/app; Ruckus also integrates controls to deny unwanted traffic and prioritize critical traffic. Cisco’s AVC requires data tunneling through the controller, which makes it untenable for FlexConnect or distributed sites, whereas Ruckus’ L7 features operate directly in the AP. But most enterprises look outside their WLAN provider for best-of-breed L7 solutions (e.g. Palo Alto Networks) to cover the entire network (wired and wireless). Ruckus integrates with these solutions to extend their more specialized solutions (e.g. extensive application signatures, etc) to Wi-Fi traffic without duplicating effort on the WLAN config.

**High Density Experience**

With the demand of mobile devices and high-density venues, Cisco has a new feature package called “High Density Experience” designed to maximize capacity and efficiency in these environments. It is comprised of multiple features, including CleanAir 80 MHz, ClientLink 3.0, RF Noise Reduction, Smart Roam, and RF Turbo Performance. High-density is a Ruckus’ specialty due to features like BeamFlex, ChannelFly, PD-MRC, SmartCast, SmartRoam, band balancing, load balancing, scalable RF design, custom scheduling and queuing software, and much more. High density competitive performance consistently shows a unique advantage for Ruckus. Cisco’s high density experience feature set may improve their solution, but some components are misguided. First, 80 MHz are not recommended in high density, and CleanAir can’t solve the problems of Wi-Fi contention. ClientLink has proven to have little benefit. Cisco’s smartroam feature sounds akin to Ruckus feature (of the same name) to steer clients to the best AP.

**Modular Hardware**

Cisco’s 11ac strategy enables customers to buy an AP now with a module slot and then upgrade to 11ac in the future by purchasing a modular 11ac hardware radio and a software upgrade to the AP. This type of investment protection allows customers to buy premium products today when their buying cycles occur and then upgrade to the forthcoming technologies in the future when requirements, budgets, and timelines allow. This provides confidence that a purchase today will not outdate too soon. The only Cisco APs to offer modules are high-priced APs, at $1,495. Modules then cost $495, making the total investment nearly the same price as buying a purpose-built Ruckus AP now and then another one in the future with the newer technology. Adding a module to a 3-4 year old AP (typically when modules are available) tries to extend the life of an AP with older hardware components like CPU, RAM, flash, and antenna designs. Further, modules require additional power to operate, have constrained physical designs based on space limitations, potential compatibility issues, and Cisco’s modules have always exhibited poorer performance than purpose-built designs (from Cisco and Ruckus). Labor time/cost of module installation is another critical concern.
# Ruckus vs Cisco

## Ruckus Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ruckus Feature</th>
<th>Cisco Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Antenna (BeamFlex)</td>
<td>Ruckus intelligently adapts transmissions using directional antenna patterns that maximize signal quality, minimize interference, and benefit reliability and capacity.</td>
<td>ClientLink is chip-based TxBF that provides little-to-no real-world performance gain, requires tradeoffs with spatial multiplexing, and doesn't work for multi-stream users.</td>
</tr>
<tr>
<td>Active Channel Selection (ChannelFly)</td>
<td>Ruckus actively operates on and measures channel capacity for each channel, collecting valid, real-use statistics and increasing capacity for the entire WLAN.</td>
<td>Cisco's RRM algorithm passively measures channel quality by going off-channel, capturing less than 0.1% of traffic on a channel.</td>
</tr>
<tr>
<td>Native User Onboarding (Zero-IT Activation)</td>
<td>Built-in to the Ruckus solution is an onboarding tool that auto-provisions client devices with a connection profile. Easy access with no admin intervention.</td>
<td>By combining Cisco WLAN and ISE and then integrating with non-Cisco backend solutions, Cisco offers an expensive and complex onboarding option for enterprises.</td>
</tr>
<tr>
<td>Per-User PSK (DPSK™)</td>
<td>Dynamic PSK technology allows Ruckus customers to provision a unique PSK for each user. It's secure, scalable, and easy to provision and manage.</td>
<td>Cisco does not offer a per-user PSK option and requires tradeoffs between PSK or 802.1X.</td>
</tr>
<tr>
<td>SmartMesh Networking</td>
<td>SmartMesh is enabled by adaptive BeamFlex antennas, capacity-based path selection, adaptive wire failover, self-healing and -forming algorithms, and one-click setup.</td>
<td>Cisco's offers mesh as a static AP mode, with deployment limitations. No antenna adaptation, slow convergence, no wire failover, and complex setup.</td>
</tr>
<tr>
<td>Polarization Diversity with MRC</td>
<td>Smart antenna design by Ruckus incorporates by horizontal and vertical adaptive polarization to match client device orientation and improve predictability.</td>
<td>Due to ClientLink design limitations, Cisco's antenna orientations are all vertical, leaving a lot to be desired for portable clients with variable orientations.</td>
</tr>
<tr>
<td>Application-detection (voice/video) heuristics</td>
<td>In addition to L7 features, Ruckus SmartCast profiles applications and re-prioritizes or de-prioritizes specific types of voice/video traffic to improve reliability.</td>
<td>Cisco's AVC feature includes some prioritization components, but requires a lot of configuration and tuning by administrators to get it right.</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>Ruckus features are designed to be automated, self-learning, self-optimizing, and adaptive. This improves solution performance and reliability with low IT overhead.</td>
<td>Focusing on large enterprises, Cisco's solution may be useful to experts, but most features require admin education and expertise for optimization.</td>
</tr>
<tr>
<td>Band Balancing</td>
<td>Controlling user connectivity to preferred bands in high capacity environments enables the solution to maximize capacity and intelligently spread client load.</td>
<td>Cisco's BandSelect is a band steering feature that attempts to steer all dual-band clients to 5 GHz, regardless of capacity and client load.</td>
</tr>
<tr>
<td>Spectrum Analysis</td>
<td>Available in the ZD GUI as well as a mobile application for Android, with Real-Time FFT, duty cycle, and spectrogram visualizations.</td>
<td>Strong spectrum visuals, but may require additional solution components (MSE and Cisco Prime) to maximize all features.</td>
</tr>
<tr>
<td>Time-based SSID Schedule</td>
<td>Offers user-configurable WLAN schedules, making some SSIDs only available when desired.</td>
<td>No SSID schedules offered.</td>
</tr>
<tr>
<td>Integrated Test Tools</td>
<td>Administrators often need to test connectivity and link quality between APs and clients. Integrated speedtest tools enable them to easily do so.</td>
<td>No integrated speed or reliability test tools for clients or APs. Requires third-party test tools.</td>
</tr>
<tr>
<td>Mobile Apps</td>
<td>Enhancing “ease of use,” Ruckus has designed mobile apps for site survey validation, throughput and reliability tests, and system monitoring/management/configuration.</td>
<td>No ease of use apps to improve management, performance testing, or planning/deployment.</td>
</tr>
</tbody>
</table>
**Ruckus vs Cisco**

**ARCHITECTURE OVERVIEW**

**Ruckus Architecture**

**ZoneFlex**
- Easy to setup, manage, optimize, and upgrade
- ZoneDirector appliance(s) are both scalable AND cost effective
- Designed for distributed data, but enables tunneling as needed (guests, voice, L3 mobility)
- Industry-leading features (BeamFlex, Zero-IT, DPSK, ChannelFly, SmartMesh, SmartCast)

**Cisco Architecture**

**AireOS**
- Fully centralized data path; potential bottleneck and leads to greater need for redundancy
- More expensive to scale for next-gen speeds
- AP modes are static and sacrifice flexibility (mesh, FlexConnect, local, spectrum, etc.)
- Not converged with Cisco IOS architecture
- No multi-tenancy in any Cisco architectures

**Ruckus SmartCell Architecture**
- Ultra scalable SCG clusters support tens of thousands of APs
- Fully redundant management, control, and data planes with failover/handoff; distributed AP operation if SCG cluster is unreachable
- Flexible distributed or centralized data path, including multiple “northbound” options: L2/L3 over GRE, 1Q VLAN, 3G/4G packet gateways
- Intuitive zone-based AP setup and configuration
- Multi-tenant framework for managed services

**IOS Converged Access**
- New Cisco architecture with goal of converging with IOS operating system and framework
- Immature solution development, lacking many features of AireOS and Ruckus solutions
- Poor management options with primitive GUI and weak support by Prime
- Fractured architecture requires multiple control points for scale, mobility, RRM
- Unnecessarily wedds Wi-Fi/Ethernet, promotes vendor lock, forces tradeoffs in upgrade cycles
**Ruckus vs Cisco**

**SOLUTION OVERVIEW**

*May 2015*

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### Ruckus RF Optimization

BeamFlex is a custom multi-element antenna array that adaptively selects the best antenna pattern(s) for each user and each individual packet

**Benefits**
- Improves SNR (up to 9 dB) and RF reliability
- Works at the same time as TxBF or spatial multiplexing on the same chain
- Directional power control reduces interference
- Fewer APs are required to support a network
- MRC with polarization diversity (PD-MRC) adapts to client antenna polarization

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### Cisco RF Design

Cisco ClientLink is a proprietary form of implicit TxBF that attempts to phase-align transmitted signals without client calibration or feedback

**Issues**
- Cannot do spatial multiplexing with same radio chains
- Does not work well with clients in motion
- Real-world testing shows no demonstrable benefit
- Still sends RF energy omni-directionally, causing interference with neighboring APs
- Offers no benefit to multi-stream clients

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### Investment Awareness

- Does the RF system automatically learn and adapt its operating behavior to the RF environment?
- Will the APs provide a reliable onramp to your network and its mission-critical services?
- Can your solution handle future capacity and performance demands, dynamic radio environments, or RF interference?

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### Ruckus Challenge

Don’t take our word for it. Set up our system, set up their system, and put the rhetoric to the test.

**Questions**
- Is it easy for your admins to use?
- Does it meet your performance and reliability requirements?
  - In your environment
  - With your applications
  - With your devices
- How long does it take to setup the management system, connect an AP, configure a guest and secure corporate network and connect a device?

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### Ruckus Support

- As a Wi-Fi centric company, we can commit to focusing on the features, performance, and reliability that matter to your users.
- As a smaller company, we can acknowledge and respond to your feature requests and support requirements more efficiently.
- The future of our solution will not be controlled by and tied to other business units that must be sustained as technologies evolve.
“Our previous Wi-Fi network was based on older technology and was simply no longer a viable infrastructure for delivering the robust, high-performance service users have come to expect within Silicon Valley. Fast and reliable wireless connectivity is no longer negotiable – it has become table stakes when trying to attract world-class events and businesses that want to come to San José. Recent technology advances in wireless signal controls and smart Wi-Fi meshing made by Ruckus enable us to deliver just that.”

Vijay Sammeta, Chief Information Officer

Ruckus Highlights

- Publicly traded on NYSE (RKUS)
- Formed: June 2004
- Customers 52,000+
- Solution Partners: 11,000+
- Worldwide market share leader in service provider Wi-Fi segment for both unit shipments and revenue (Dell’Oro)
- Recognized as leader in IDC MarketScape enterprise WLAN 2013-2014 vendor analysis