Detailed Lab Testing Report

DR140731D

Access Point Competitive Testing

Xirrus XR-620

Xirrus XR-630

19 December 2014

Miercom
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1.0 Executive Summary

Xirrus, Inc. engaged Miercom to provide an independent evaluation of the performance capabilities of the Xirrus XR-620 and XR-630 802.11ac indoor wireless access points (APs) and compare them to similar products offered by Aerohive, Aruba, Cisco, Meraki and Ruckus. Performance testing focused on the wireless capacity of the 11ac AP solutions.

The Xirrus XR-620 and XR-630 Wireless Access Points were compared to the Aerohive AP230 and AP370, Aruba IAP-225, Cisco Aironet 2702i and controller, Meraki MR34 AP, and Ruckus ZoneFlex R700 solutions.

In evaluating test results, Miercom found that the Xirrus XR-600 Access Points delivered superior flexibility and performance when compared to similar solutions by supporting an integrated controller with high performance design and software programmable radios enabling 802.11ac operation on both radios, not just one.

Key Findings

- Xirrus XR-620 and XR-630 Access Points support two radios operating in 802.11ac mode in 5GHz.
- Achieved 73% greater aggregated throughput than the competitor's average, on tests utilizing 16 802.11ac clients per AP.
- Consistently achieved highest performance throughput among all competing products in dual radio tests and all but one competitor in single radio tests.
- Xirrus XR-620 price/performance was at least 56% better than the price/performance of other competitive access points tested.

Test results clearly show that the Xirrus XR-620 and XR-630 access points provide robust wireless connectivity and superior aggregated throughput. Miercom independently substantiated the superior performance of the Xirrus XR-620 and XR-630 access points with regard to 802.11ac dual radio performance. The Xirrus XR-620 and XR-630 access points are awarded the ***Miercom Performance Verified Certification***.

Robert Smithers

CEO

Miercom

2.0 About the Xirrus XR-620 and XR-630 Access Points

XR-620: 2x2 MIMO dual 802.11ac Radio Access Point

The XR-620 is a low cost, high performance AP designed to ease the transition to 802.11ac. Features of the XR-620 include dual 802.11ac radios, software programmable radios, integrated controller, application-level intelligence, automated provisioning, and cloud or on-premise management options.

The XR-620 delivers high speed wireless across a wide range of environments. Built with 2x2 MIMO technology, the AP is suitable for environments where users will usually connect to wireless using tablets and smart phones that use 1x1 and 2x2 antenna technologies.

The XR-620 supports ACExpress that optimizes wireless performance by automatically segmenting faster 802.11ac clients from slower Wi-Fi clients. Because Wi-Fi is a shared medium, this division ensures 802.11a/b/g/n clients will not prevent 802.11ac clients from achieving high performance.

Key Features of the Xirrus XR-620 are

- Dual radio 2x2 802.11ac AP with 1.7Gbps total Wi-Fi bandwidth
- Two software programmable radios for mixed 2.4/5GHz or dual concurrent 5GHz operation
- 802.11ac speed optimization using ACExpress
- Two times the performance of a 3x3 802.11n AP
- Supports up to 240 users and two 1Gbps uplinks
- Easily upgraded from 802.11n to 802.11ac with software
- Integrated Controller with ArrayOS
- On-premise or cloud-based management

XR-630: 802.11ac AP Performance Optimized with ACExpress

The XR-630 is a high performance 802.11ac AP. Features of the XR-630 include dual 802.11ac radios, software programmable radios, integrated controller, application-level intelligence, automated provisioning, and cloud or on-premise management options.

The XR-630 delivers high speed wireless across a wide range of environments. Built with 3x3 MIMO technology, the AP is suitable for all types of environments with a wide variety of users.

The XR-630 supports ACExpress that optimizes wireless performance by automatically segmenting faster 802.11ac clients from slower Wi-Fi clients. Because Wi-Fi is a shared medium, this division ensures 802.11a/b/g/n clients will not slow down 802.11ac clients from achieving high performance.

Key Features of the Xirrus XR-630 are

- Dual radio 3x3 802.11ac AP with 2.6Gbps total Wi-Fi bandwidth
- Two software programmable radios for mixed 2.4/5GHz or dual concurrent 5GHz operation
- 802.11ac speed optimization using ACExpress
- Three times the performance of a 3x3 802.11n AP
- Supports up to 240 users and two 1Gbps uplinks
- Easily upgraded from 802.11n to 802.11ac with software license
- Integrated Controller with ArrayOS
- On-premise or cloud-based management

3.0 How We Did It

A set of three tests was conducted to determine the maximum capacity of each access point. One test was based on eight clients on 802.11n 2.4GHz radio and eight clients on 802.11ac 5GHz radio; the second test used eight clients on 802.11ac 5GHz radio and eight clients on a second 802.11ac 5GHz radio (if supported). The third test was based on all 16 clients on a single 802.11ac 5GHz radio.

In all tests, Layer 3 traffic was generated by the Ixia IxChariot server running version 7.1 Service Pack 5, hosted on a HP ProLiant DL360 G7 server that was running Windows Server 2008 R2. IxChariot utilized the script "Throughput.scr" to generate and send a 100-MB file from a server to each of 16 wireless clients simultaneously. All tests measured the average throughput (in Mbps) to transfer a total of 1.6GB to the 16 clients. Two out of three tests were conducted on all eight wireless access points. Both Xirrus APs have the ability to run both radios on 802.11ac and therefore one set of the tests was conducted exclusively for Xirrus XR-620 and XR-630 APs with dual 802.11ac radios.

A spectrum analyzer, inSSIDer from MetaGeek, was used to monitor the radio traffic throughout the testing process. The APs operated in both 802.11n and 802.11ac modes. There was minimal interference on the 802.11n 2.4GHz radio from neighboring Wi-Fi hot spots and no interference on the 802.11ac 5GHz radio. Of the total of 16 clients, 14 were HP Mini 5103 Netbooks, running Windows Professional 7, and two MacBook Air notebook computers, running OS X 10.9.4. All of the 14 Netbooks were connected using Netgear A6200 WiFi USB 2.0 Adapter while the MacBooks used their internal network adapters. All clients utilized in the test supported two spatial streams with IXIA Performance Endpoint 7.1 software installed on them.

The heart of the test network, a Cisco Catalyst 3750 switch, was connected to the HP ProLiant server hosting the server portion of the IxChariot, as well as connected to each combination of access points and wireless controller through the power injector. Each wireless client hosted the client portion of the IxChariot server.

In all tests, the AP sat on the top of an 8-foot, 4-tier plastic shelving unit while the clients were located in tradeshow-type closet bins, set up in a circular design, 10 feet away from the access point.

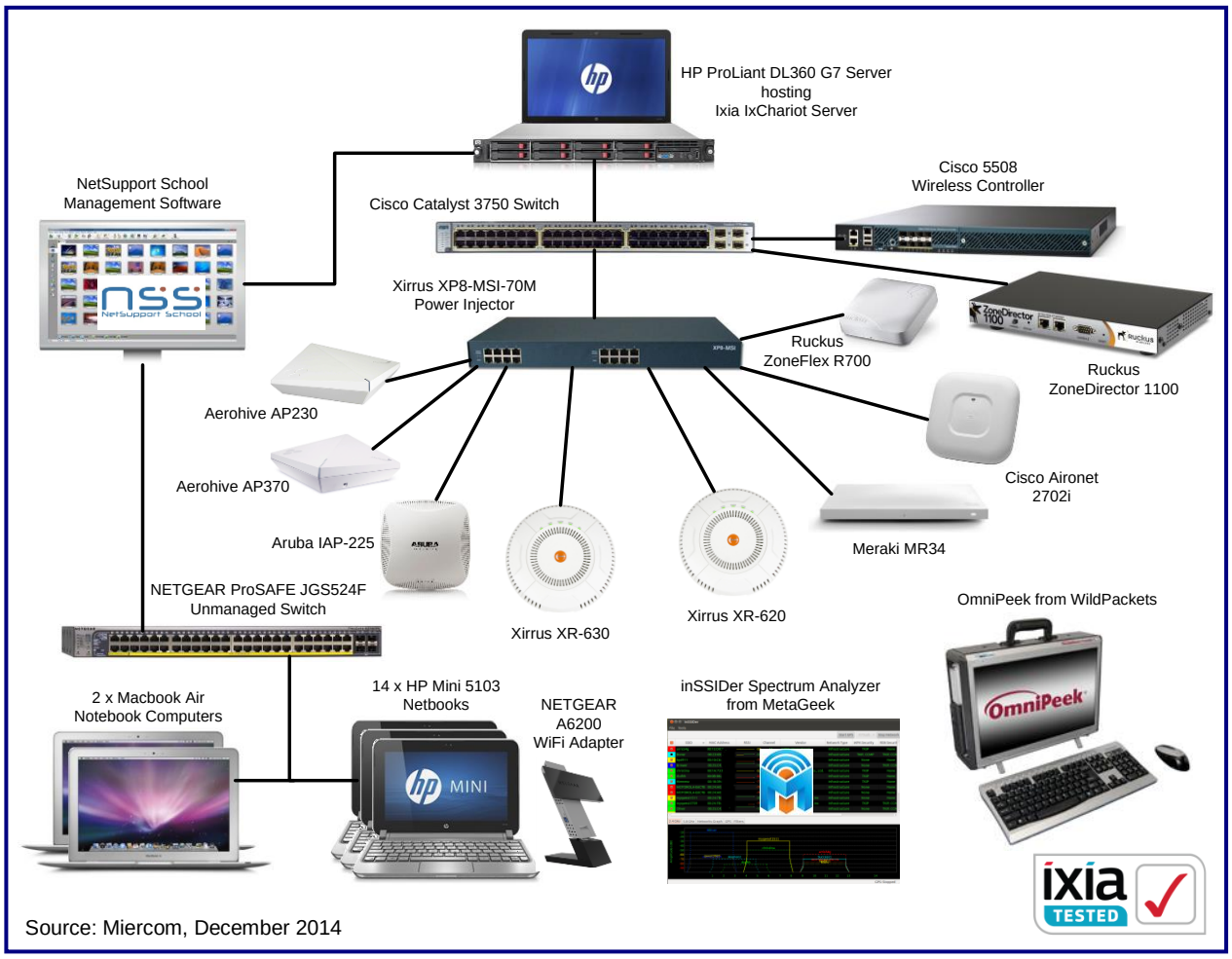
All products tested used the default configuration settings unless otherwise noted.

The Xirrus XR-620, XR-630, Aerohive AP230 and AP370, Aruba IAP-225, and Meraki MR34 were managed through their web interface via a cloud-based management platform. The Cisco Aironet 2702i was managed by a separate hardware-based controller, the Cisco 5508 Wireless Controller, Version 7.6.120.2. The Ruckus ZoneFlex R700 was managed by the Ruckus ZoneDirector ZD-1100, version 9.8.1.0 build 101. The table on *page 7* lists all the test equipment used along with their functions and version numbers.

Xirrus Power Injector XP8-MSI-70M was utilized to power each access point via PoE. All 16 clients were connected to the Layer 2 Netgear ProSAFE switch and were remotely operated/monitored/controlled through the HP ProLiant server that hosted NetSupport School management software. The software was primarily used to remotely turn on/off the clients to conduct different variations of the test. Additionally, Angry IP Scanner, open source network scanner software, was utilized to check connectivity to the client devices.

All tests were run five times and the results for each Device Under Test (DUT) are the average of the best three test runs. Default parameters were used where applicable, for both 2.4GHz and 5GHz radios using WPA2 with PSK security for all SSIDs.

4.0 Test Bed Diagram



Miercom recognizes IxChariot by IXIA (www.ixiacom.com) as a leading test tool for simulating real-world applications for predicting device and system performance under practical load conditions. Consisting of the IxChariot console, performance endpoints and the IxProfile, the IxChariot product family provides network performance assessment and device testing by testing hundreds of protocols across several kinds of network endpoints. IxChariot is used to accurately access the performance characteristics of any application running on wired and wireless networks.

OmniPeek, a portable network analyzer from WildPackets (www.wildpackets.com) was used for capturing and monitoring the traffic between the IxChariot server and the endpoint clients residing on the Windows and MacBook workstations. The OmniPeek has an intuitive graphical interface for analyzing and troubleshooting enterprise networks. Managing and monitoring network performance is handled by real-time observation of network statistics, such as application vs. network latency, aggregating multiple files and exact drill-down to packets using an interactive dashboard.

The tests in this report are intended to be reproducible for customers who wish to recreate them with the appropriate test and measurement equipment. Current or prospective customers interested in repeating these results may contact reviews@miercom.com for details on the configurations applied to the Device Under Test and test tools used in this evaluation. Miercom recommends customers conduct their own needs analysis study and test specifically for the expected environment for product deployment before making a product selection.

5.0 List of Equipment

The following list shows the hardware and software used in the testing.

Company	Product	Function	Version
Xirrus	XR-620	Access Point	6.8.0-4727
	XR-630	Access Point	6.8.0-4727
	XP8-MSI-70M	Power Injector	N/A
Aruba	IAP-225	Access Point	6.3.1.1
Aerohive	AP230	Access Point	6.1r6
	AP370	Access Point	6.0r2e
Cisco	Aironet 2702i	Access Point	7.6.120.0
	5508	Wireless Controller	7.6.120.0
	Catalyst 3750	Layer 3 Switch	Release 15.0
Meraki	MR34	Access Point	-
Ruckus	ZoneFlex R700	Access Point	9.8.1.0 build 101
	ZoneDirector 1100	Wireless Controller	9.8.1.0 build 101
IXIA	IxChariot	Lead Performance Test Tool	7.1 Service Pack 5
HP	Mini 5103 Netbook	Windows Client	Win 7 Professional
	ProLiant DL360 G7	Server housing IxChariot	Windows Server 2008 R2
Apple	MacBook Air	Mac OS Client	OS X 10.9.3
Netgear	A6200	802.11AC Wi-Fi Adapter	USB 2.0
	ProSAFE JGS524F	Layer 2 PoE Switch	9.0.1.29
MetaGeek	inSSIDer	Spectrum Analyzer	4.0.4.4
Anton Keks	Angry IP Scanner	Open Source Network Scanner	3.3.1

6.0 Additional Comments and Observations about Testing

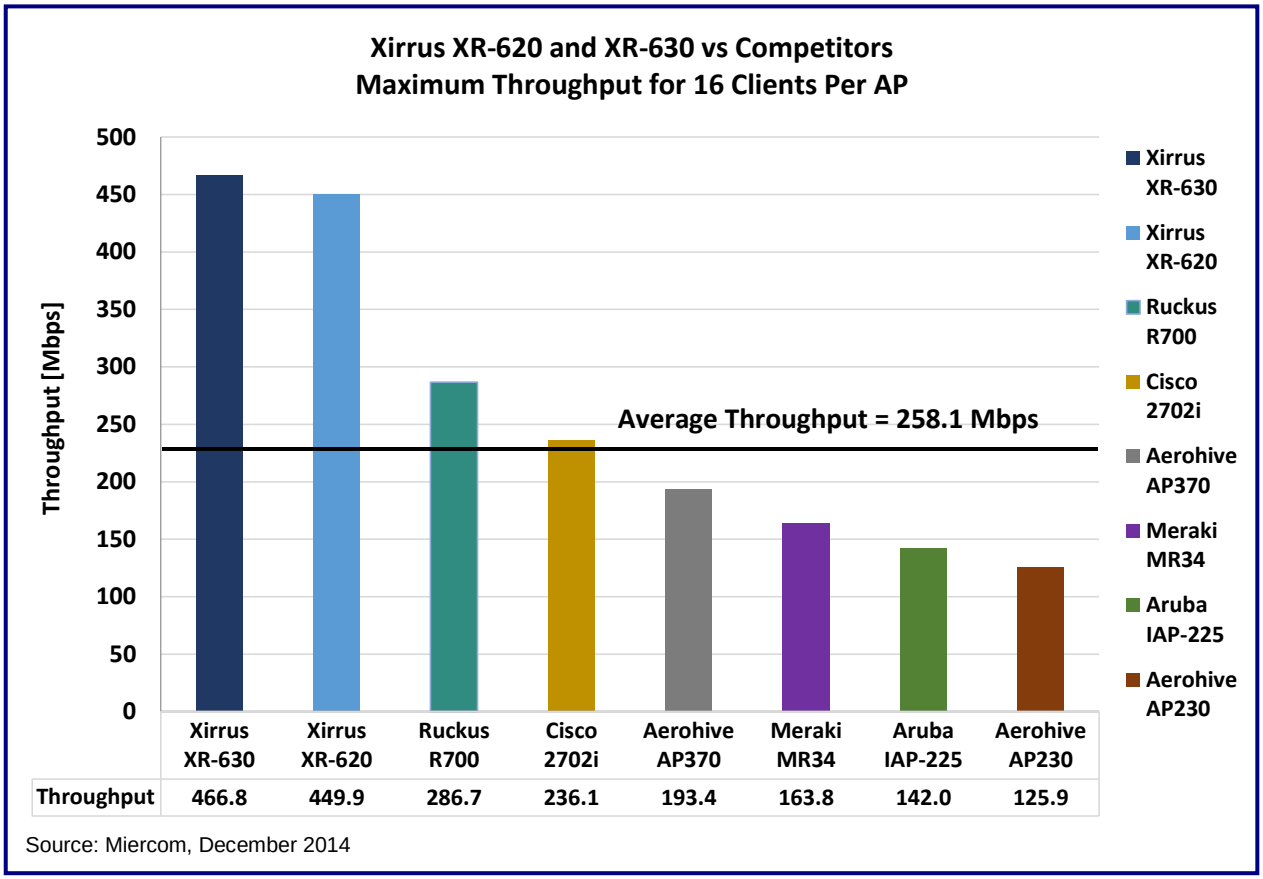
For all testing performed, the endpoint clients were connected to the access point utilizing a Netgear A6200 USB Wi-Fi adapter that supported USB 2.0. Because of this limitation, each client would not be able to reach the maximum performance speed of 802.11ac standards. However we believe that choosing a mix of old and new clients emulates mixed client scenarios common in organizations today.

Additionally, we observed that the Meraki MR34 had an issue with forcing the MacBook client to authenticate on the 802.11n 2.4GHz radio, and for the two-radio test, the distribution among the clients was uneven. Nine clients were connected to the 802.11ac radio, and only seven clients connected to the 802.11n radio.

During our analyses of the testing, we found that the Netgear A6200 802.11ac USB 2.0 Wi-Fi adapter operating in 802.11n mode had an incompatibility with the Cisco Aironet 2702i access points that resulted in reduced performance.

7.0 Test Results

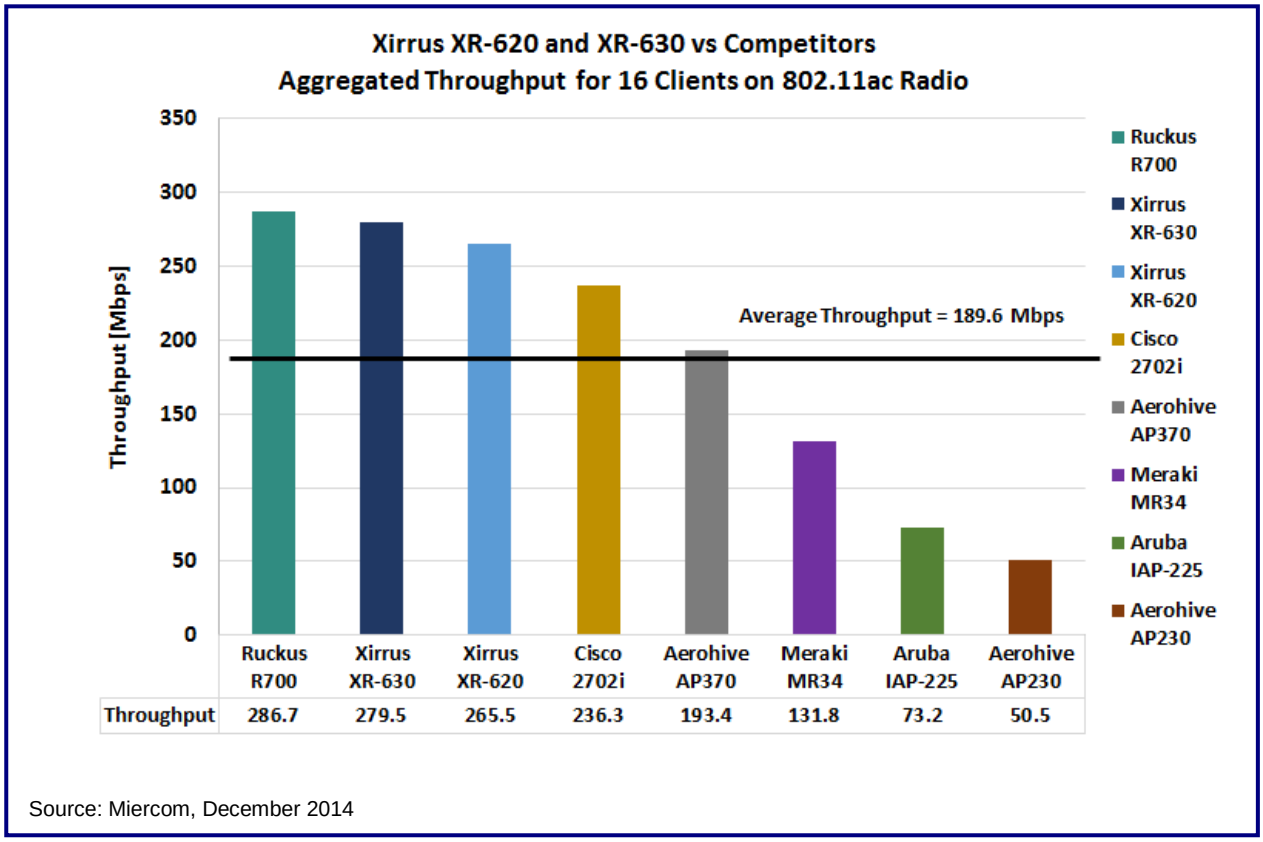
Access Point Performance Comparison
Maximum Throughput for 16 Clients Per AP



Source: Miercom, December 2014

These are the best throughput observations for APs using suitable optimal configurations. Xirrus XR-620 and XR-630 used dual 802.11ac radios while the remaining vendors used either a single 802.11ac radio or mix of 802.11ac and 802.11n radios, depending on what produced maximum performance. The average throughput for this test was 258.1 Mbps.

Aggregated Throughput – 16 Clients – Single 802.11ac 5GHz Radio

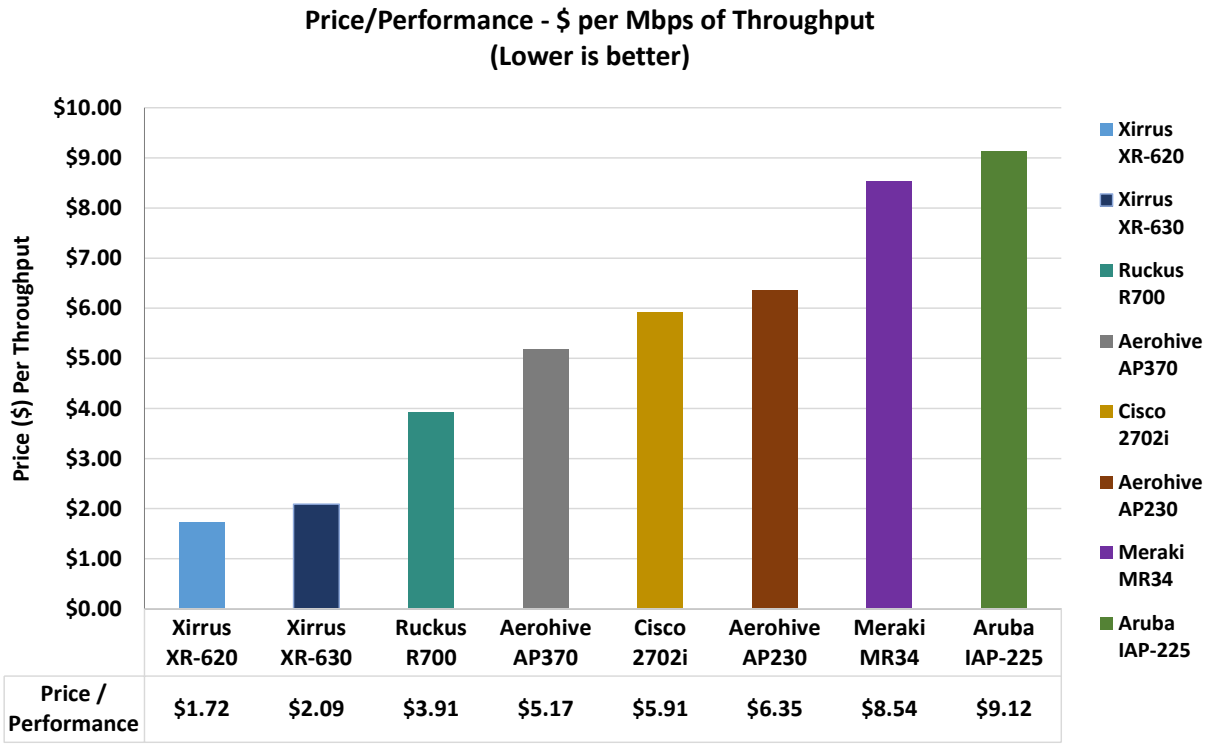


Source: Miercom, December 2014

Xirrus XR-620 and XR-630 exhibited exceptional performance transferring a 100-MB file with an average of 279.5 and 265.5Mbps. The average throughput for all products tested was 189.6. The XR-630 AP achieved a 73% greater performance over the average throughput obtained by the competitors. Ixia IxChariot server was configured to run a script and send a file to 16 clients consisting of 14 Windows and two MacBook workstations. Average aggregated throughput for all products tested was 189.6 Mbps.*

**(73% greater performance was calculated by subtracting the average throughput for the 6 competing vendors from the XR-630 throughput, then dividing by the competing vendors average throughput. (279.5-161.98)/161.98=.728 = 73%)*

Price/Performance – Cost ($) per Mbps of Throughput



Source: Miercom, December 2014

The following table shows the list prices of the access points, plus controller if needed:

AP Model	Radio Type	11ac Capable Radios	AP List	Controller List per AP	Max Tput (Mbps)
Xirrus XR-620	2x2	2	$775	$0	449.9
Xirrus XR-630	3x3	2	$975	$0	466.8
Ruckus R700	3x3	1	$995	$125	286.7
Aerohive AP370	3x3	1	$999	$0	193.4
Cisco Aironet 2702i	3x3	1	$1095	$300	236.1
Aerohive AP230	3x3	1	$799	$0	125.9
Meraki MR34	3x3	1	$1399	$0	163.8
Aruba IAP-225	3x3	1	$1295	$0	142.0

Controller list prices per AP are derived from dividing the cost of the controller by the maximum number of APs supported.

The prices listed above are published Manufacturer Suggested List Price. Actual pricing may vary due to discounts. By dividing the price of each AP by the maximum throughput achieved from the AP, the price/performance of each AP, or the cost per Mbps of performance, is determined. The above chart displays the price/performance for each AP.

The Xirrus AP XR-620 price/performance cost is a 56% cost savings over the price/performance cost of the closest competitor APs tested.

8.0 About Miercom

Miercom has published hundreds of network-product-comparison analyses in leading trade periodicals and other publications. Miercom's reputation as the leading, independent product test center is undisputed.

Miercom's private test services include competitive product analyses, as well as individual product evaluations. Miercom features comprehensive certification and test programs including: Certified Secure, Certified Green, Certified Interoperable and Certified Reliable. Products may also be evaluated under the Performance Verified program, the industry's most thorough and trusted assessment for product usability and performance.

9.0 Use of This Report

Every effort was made to ensure the accuracy of the data contained in this report. However, errors and/or oversights can occur. The information documented in this report may depend solely on various test tools, the accuracy of which is beyond our control. Furthermore, the document relies on certain representations by the vendors that were reasonably verified by Miercom, but beyond our control to verify with 100 percent certainty.

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10.0 Fair Test Notification

All vendors with products featured in this report were afforded the opportunity before, during, and after testing was complete to comment on the results and demonstrate the performance of their product(s). Any vendor with a product tested by Miercom in one of our published studies that disagrees with our findings is extended an opportunity for a retest and to demonstrate the performance of the product(s) at no charge to the vendor.

Cisco, Aerohive and Meraki have all provided feedback as to the content in this report. All three vendors object to the use of the Netgear USB adapter in this testing and prefer to use other Wi-Fi adapters. We agree performance may significantly vary with the Wi-Fi client and AP combination in testing. No efforts were made to produce an adverse outcome to any vendor however. We have not received any comments from Ruckus as of the date of this report.

Further, Aerohive provided additional information that Aerohive has a number of features, such as deep packet inspection, turned on by default that they would turn off for a straight performance test. Aerohive also provided wireless profile setting changes such as TxBF Enabled and Frame Burst Enabled for the USB adapters that they believe would dramatically improve their test performance. These are not the default settings of the device and would have required retesting.

All vendors are welcome to demonstrate their performance on their own to Miercom. Miercom will update these results if new data presents itself.