TEST REPORT

Tolly.

#211110
February 2011

Commissioned by
Meraki, Inc.

Meraki MR24 Cloud-Managed Access Point vs. Cisco Aironet 3502i Access Point
Wireless LAN 802.11n MIMO Single-Client Performance

Executive Summary

Wireless LANs are a strategic element of network infrastructure for companies large and small. Recent advances made with the 802.11n WLAN standard provide for advanced techniques involving multiple transmit and receive antenna configurations and multiple traffic streams per antenna. Systems implementing these features allow for throughput levels many times greater than the 54 Mbps data rate of early 802.11a/g networks.

Meraki Inc. commissioned Tolly to evaluate the throughput of its Meraki MR24 Cloud-managed Access Point and compare that to a Cisco Aironet 3502i Access Point solution.

The Meraki solution outperformed the Cisco Aironet 3502i in every test at distances ranging from 15 to 150 feet in tests with and without encryption.

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The Bottom Line

The Meraki MR24 Access Point:

1 Consistently outperformed the Cisco Aironet 3502i

2 Sustained over 200 Mbps system throughput at distances up to 100 feet

3 Delivered 2.4x throughput improvement compared to Fast Ethernet speeds at 15 feet and 1.9x improvement at 150 feet

4 Delivered throughput that, at the longest ranges tested, exceeded Cisco's fastest short-range throughput with and without encryption enabled

802.11n WLAN Access Point Throughput: Meraki MR24 vs. Cisco Aironet 3502i
Windows 7 WLAN, Single-Client Downstream Throughput - No Encryption
(as reported by WLAN-connected iPerf system)
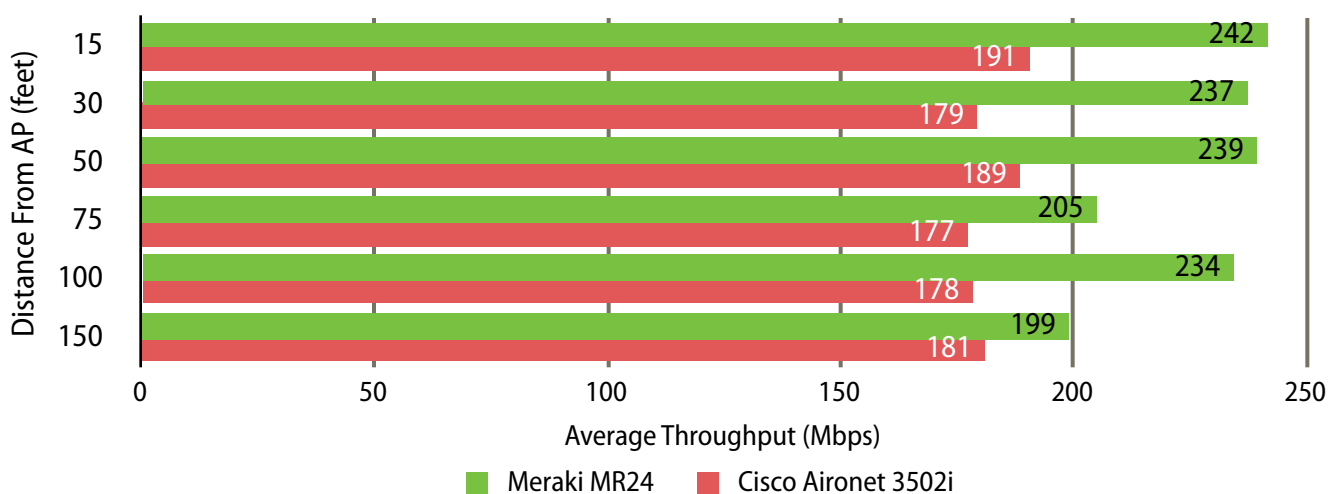
Notes: Line-of-sight testing in unoccupied, unobstructed office space. Client used Atheros AR938x 3x3 Wireless Network Adapter. The Meraki AP implements MIMO 3x3 with 3 spatial streams, Cisco implements 2x3 with 2 spatial streams. Both APs were configured for 5 GHz 802.11a/n-only and Channel 36+ 40MHz channel mode. The Cisco AP was connected to a Cisco 5508 Wireless Controller.

Source: Tolly, February 2011 — Figure 1

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Test Results

All test scenarios involved a single station connected to a wired Ethernet network transmitting data to a "downstream" wireless LAN station using the open source iPerf utility to generate traffic. Tables 1 and 2 provide details of the test infrastructure and systems under test.

Tests were run in two different configurations: without encryption and with WPA2. Tests were run five times with the best and worst results eliminated and the remaining results averaged.

All tests were run in an unoccupied office with no obstructions between the AP under test and the WLAN client. That is, the testing was line-of-sight.

No Encryption

In all tests, the Meraki AP throughput was greater than the Cisco Aironet. Even when the client was 100 feet from the AP, the Meraki system delivered throughput of over 200 Mbps.

At 15 feet, the Meraki AP throughput was over 50 Mbps greater than Cisco. At 150 feet, the Meraki AP throughput was 18 Mbps greater than Cisco.

In fact, Cisco's best throughput of the test - 191 Mbps at 15 feet - was 8 Mbps lower than the lowest throughput scenario for Meraki - 199 Mbps at 150 feet. See Figure 1.

Encryption

Virtually every business network will be configured to use encryption to secure

the network and Wi-Fi Protected Access II (WPA2) is a popular security protocol. Engineers re-ran the tests with security enabled. The results profile was the same with Meraki outperforming Cisco in every test. Here, too, the best throughput for Cisco was lower than the lowest scenario for Meraki. See Figure 2.
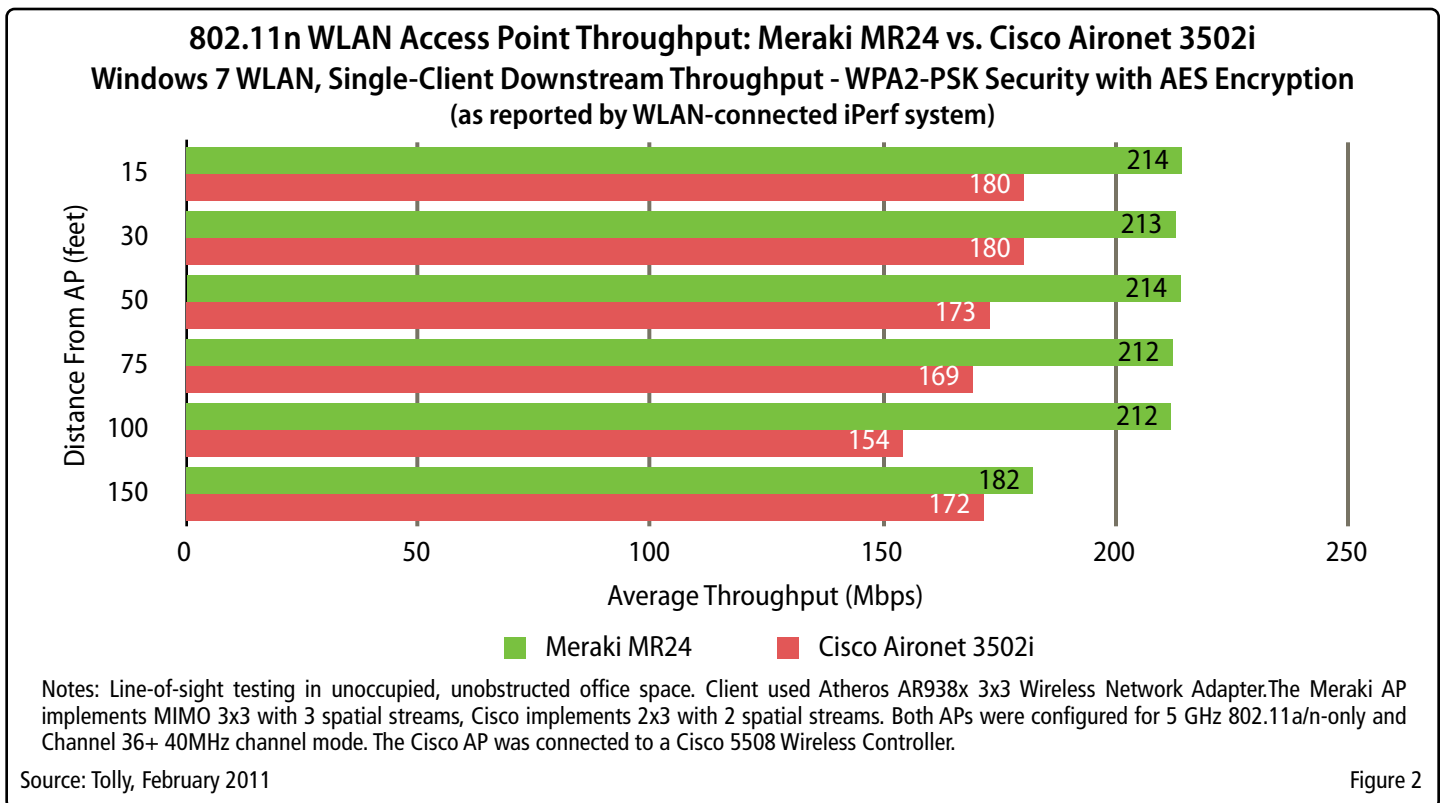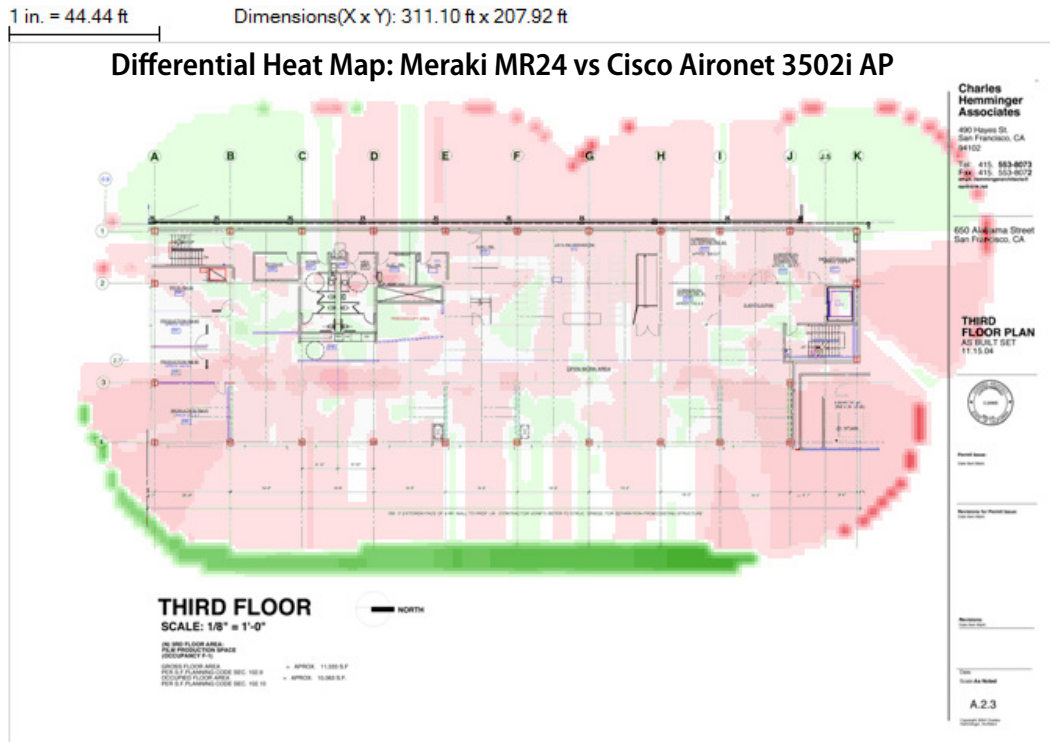
Meraki, Inc.

MR24 Cloud-Managed Access Point

802.11n AP Performance

Tested February 2011

802.11n WLAN Access Point Throughput: Meraki MR24 vs. Cisco Aironet 3502i
Windows 7 WLAN, Single-Client Downstream Throughput - WPA2-PSK Security with AES Encryption
(as reported by WLAN-connected iPerf system)

Distance From AP (feet)	Meraki MR24	Cisco Aironet 3502i
15	214	180
30	213	180
50	214	173
75	212	169
100	212	154
150	182	172

Average Throughput (Mbps)

■ Meraki MR24   ■ Cisco Aironet 3502i

Notes: Line-of-sight testing in unoccupied, unobstructed office space. Client used Atheros AR938x 3x3 Wireless Network Adapter. The Meraki AP implements MIMO 3x3 with 3 spatial streams, Cisco implements 2x3 with 2 spatial streams. Both APs were configured for 5 GHz 802.11a/n-only and Channel 36+ 40MHz channel mode. The Cisco AP was connected to a Cisco 5508 Wireless Controller.

Source: Tolly, February 2011   Figure 2

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1 in. = 44.44 ft Dimensions(X x Y): 311.10 ft x 207.92 ft

Differential Heat Map: Meraki MR24 vs Cisco Aironet 3502i AP

Differential coverage map, generated with AirMagnet Survey Solution Professional Edition 8.0, indicating the difference in signal strength between the Cisco 3502i AP and the Meraki MR24 operating in 5 GHz mode. The areas with shades of color pink indicates stronger coverage from the Meraki AP, and areas with shades of light green color indicate stronger coverage with Cisco. The Meraki MR24 delivered equal or better coverage in almost all areas generally providing a stronger signal to wireless clients.

Heat Map: Meraki MR24

Heat Map: Cisco Aironet 3502i AP
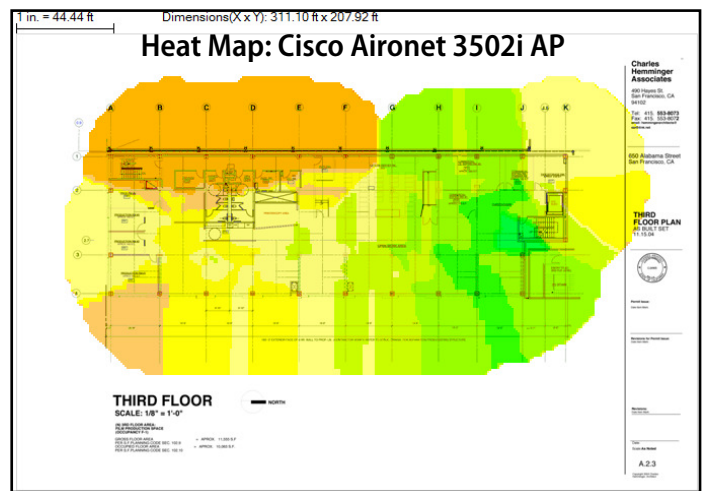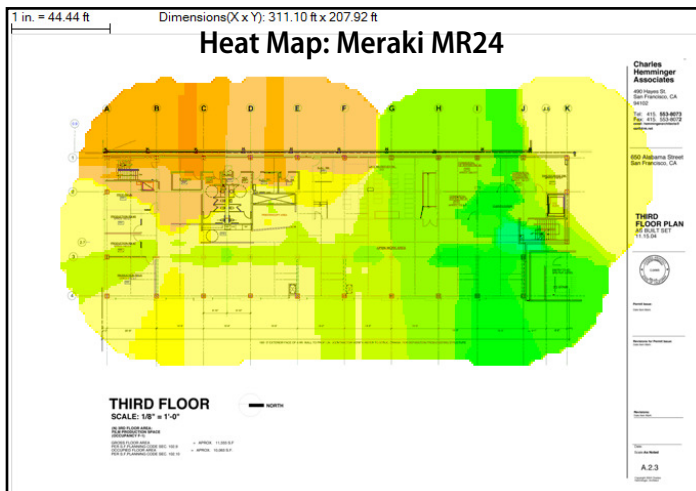
Systems Under Test and Infrastructure Component Details

System	Software
Meraki MR24 Access Point	r15test-11-safest (15-56413)
Meraki Cloud Controller	Enterprise License
Cisco Aironet 3502i Access Point (AIR-CAP3502I-A-K9)	Primary software version: 7.0.98.0 Boot version: 12.4.23 IOS version: 12.4(23c)JA Mini IOS version: 7.0.94.21 Hardware version: v01
Cisco 5508 Wireless Controller (AIR-CT5508-K9)	Hardware version: v01

The test methodology used for this report relies upon test procedures, metrics and documentation practices as defined in Tolly Common Test Plan #1060.

To learn more about Tolly Common Test Plans, go to:

http://www.CommonTestPlan.org

Function	Description	System Name	Software/Drivers	Settings
WLAN-connected Performance Client	iPerf server (The server receives data from the Ethernet-connected system.)	Dell Dimension 3100 • Intel Pentium 4 Dual Core 2.8 GHz • 1.25GB RAM	Microsoft Windows 7 Professional 32-bit iPerf v1.7.0 13Mar2001 inSSIDer version 2.0.7.0126	Command line: iperf -s -P 0 -i 10 -p 5001 -f m > results.txt
WLAN Adapter	Wireless network interface in performance system	Atheros AR938x 3x3 Wireless Network Adapter	Driver: 9.2.0.113, dated 11/13/2010	• 802.11b Preamble: Long and Short • Ad Hoc 11n: Disable • Dynamic MIMO Power Save: Disable • Receive Buffers: 256 • Scan Valid Interval: 60 • Transmit Buffers: 512
Wired Client	iPerf client (The client sends data out to the WLAN system via access point under test.)	Generic Laptop • Quad Core Intel Core i5 M520 2.4GHz • 2.92GB RAM • Intel 82577LM Gigabit Ethernet	Microsoft Windows XP SP2 iPerf client using JPERF 2.0.2 (iPerf version 1.7.0 13Mar2003)	bin/iperf.exe -c 10.0.0.31 -P 20 -i 10 -p 5001 -f m -t 60 (TCP, 20 parallel threads)

Note: Both systems were configured for Channel 36+ 40MHz channel mode operating in 5GHz, 802.11a/n-only mode.

Source: Tolly, February 2011　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Tables 1 and 2

About Tolly…

The Tolly Group companies have been delivering world-class IT services for more than 20 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company by email at sales@tolly.com, or by telephone at +1 561.391.5610.

Visit Tolly on the Internet at: http://www.tolly.com

Interaction with Competitors

In accordance with Tolly's Fair Testing Charter, Tolly personnel invited representatives from Cisco to review the testing.

Cisco representatives reviewed the methodology and did not offer any comments. Upon the completion of testing, Cisco was provided the test results for review and did not provide any comments.

For more information on the Tolly Fair Testing Charter, visit: http://www.tolly.com/FTC.aspx

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