

Linksys EA7300 Max-Stream AC1750 MU-MIMO Gigabit Router Comparative Wireless LAN Performance

EXECUTIVE SUMMARY

Busy home networks are now the rule rather than the exception with multiple clients demanding multiple high-bandwidth services - like video streaming - simultaneously. Multi-user MIMO (MU-MIMO) technology can deliver significantly more throughput to multiple users than the prior generation single-user MIMO (SU-MIMO). The Linksys EA7300 Max-Stream AC1750 MU-MIMO Gigabit Router is a home entertainment Wi-Fi router optimized for online gaming and streaming.

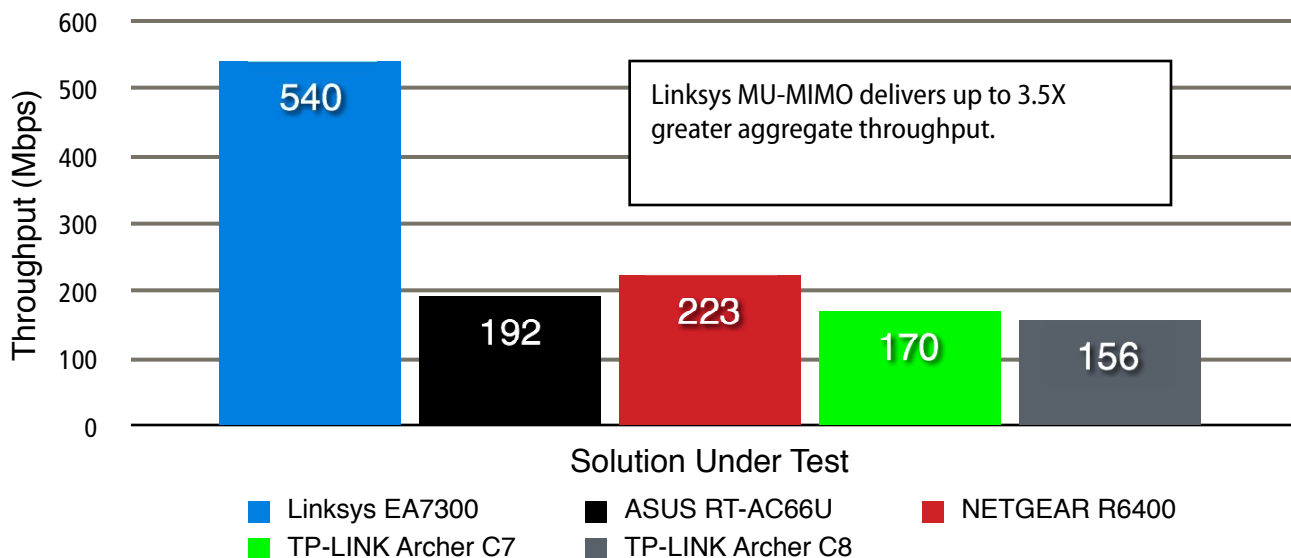
Linksys, Inc. commissioned Tolly to benchmark the throughput of the Linksys EA7300 and compare that to the aggregate throughput of several competing dual-band, AC1750 wireless LAN (WLAN) solutions. The Linksys solution can deliver up to 3.5X the multi-client, aggregate throughput of competing solutions. See Figure 1. ...<continued on next page>

THE BOTTOM LINE

Linksys EA7300 Max-Stream AC1750 MU-MIMO Gigabit Router provides:

- 1 Up to 3.5X greater aggregate throughput in line-of-sight tests
- 2 Up to 3.5X greater per client average throughput in line-of-sight tests
- 3 Up to 4.4X greater individual client average throughput in long distance tests

Wireless LAN MU-MIMO Multi-Client Downstream Performance
Four Clients, Line-of-Sight Aggregate Throughput,
(as reported by Ixia IxChariot v7.10 SP3)



Notes: Dual-band devices provide a 2.4GHz radio and a 5GHz radio. All testing used 5GHz band. Average of three runs.

Source: Tolly, October 2016

Figure 1



Tests were conducted in a residential environment and benchmarked two different client configurations. All tests were run against four other WLAN 802.11ac (AC1750) dual-band solutions running 3x3 MIMO.

In the first test, four clients were situated equidistant (eight feet) from the access point (AP) under test. This scenario illustrates the benefits that MU-MIMO can offer across a group of clients situated at similar distances.

In the second test, a single client was used and placed at a greater distance from the

AP under test to illustrate throughput when a client is a greater distance and the signal must pass between rooms.

Test Results

Multi-Client, Line-of-Sight

The per-client average for the Linksys EA7300 was 135Mbps with aggregate throughput of 540Mbps. The competing solutions per-client averages ranged between 39 and 56Mbps. See Figures 1 and 2 and Table 1.

Linksys, Inc.

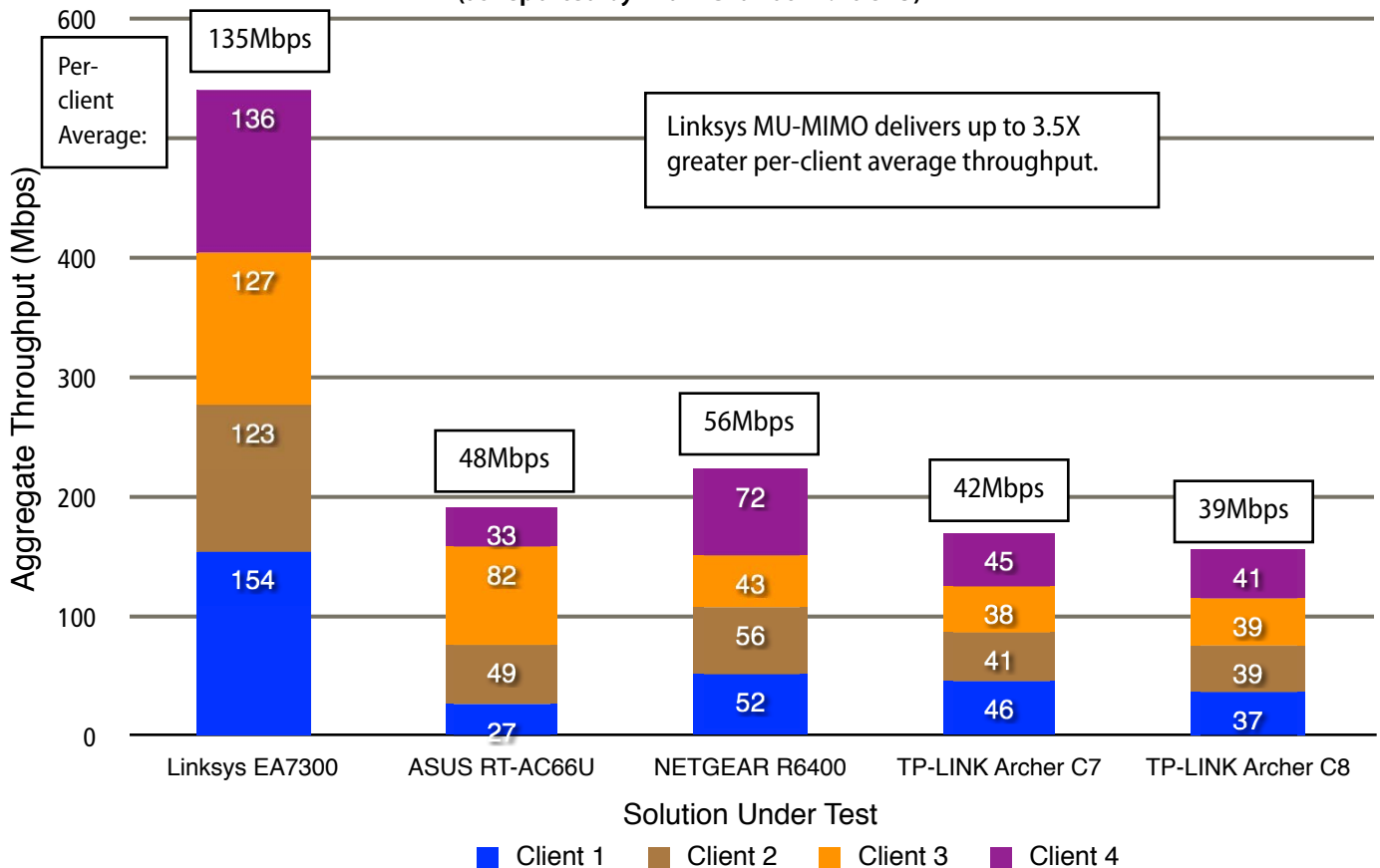
EA7300 Max-Stream AC1750 MU-MIMO Gigabit Router



MU-MIMO Wireless LAN Performance

Tested October 2016

Wireless LAN MU-MIMO Multi-Client Downstream Performance Four Clients, Line-of-Sight Average Client Throughput, (as reported by Ixia IxChariot v7.10 SP3)

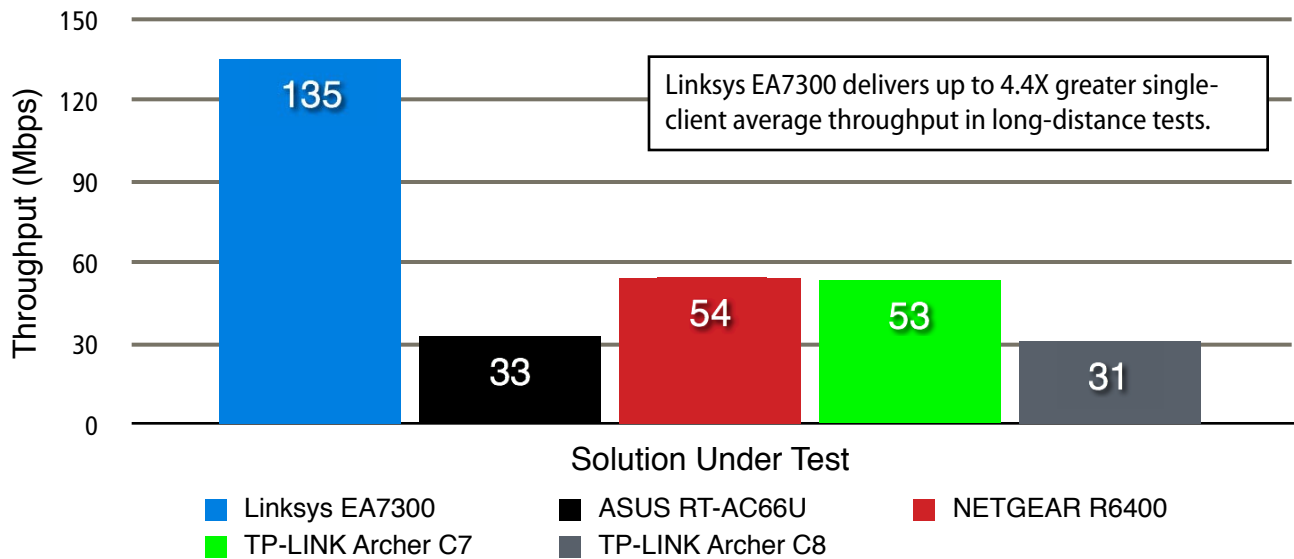


Notes: Dual-band devices provide a 2.4GHz radio and a 5GHz radio. All testing used 5GHz band. Average of three runs.

Source: Tolly, October 2016

Figure 2

Wireless LAN Single-Client Long Distance Performance
 Client Located Sixty-Five Feet From Access Point
 (as reported by Ixia IxChariot v7.10 SP3)



Notes: Dual-band devices provide a 2.4GHz radio and a 5GHz radio. All testing used 5GHz band. Average of three runs.

Source: Tolly, October 2016

Figure 3

Single-Client, Long Distance

This test of a single client in a distant location in the residence, in this instance the garage, again showed the benefit of the Linksys solution.

The Linksys solution delivered the highest results for a single client at 135Mbps. This was significantly greater than the 56Mbps of the nearest competitor. See Figure 3 and Table 1.

Test Setup & Methodology

Objective

The objective of the test was to benchmark the wireless LAN (WLAN) access points (APs) to determine their downstream throughput using MU-MIMO and non MU-MIMO clients.

Systems Under Test

All systems provided access point functionality and were marketed as consumer grade devices. All devices were upgraded to the most current firmware

available at time of test. Wherever possible, SUTs were configured with identical settings with respect to bandwidth, channels, transmit power and security. The SUT was connected to a router via a wired Ethernet connection and Gigabit Ethernet switch. The router provided DHCP addressing services for the test clients and was not used during the test runs. WPA2-PSK security was enabled on each of the systems under test.

All systems were running current firmware. The Linksys EA7300 was running firmware 1.0.5.175772. For additional details about the systems under test and the test clients, see Tables 2 and 3.



WLAN MU-MIMO Downstream Throughput Test Result Details

(as reported by Ixia IxChariot v7.10 SP3)

(Data Summarized in Figures 1,2 & 3)

Wireless LAN MU-MIMO Multi-Client Downstream Performance Four Devices, Line-of-Site Aggregate Throughput					
	Linksys EA7300	ASUS RT-AC66U	NETGEAR R6400	TP-LINK Archer C7	TP-LINK Archer C8
Client 1	154.10	26.94	51.86	46.05	36.99
Client 2	122.92	49.42	55.87	40.69	38.78
Client 3	126.93	82.09	43.34	38.45	39.23
Client 4	135.84	33.27	72.33	44.69	41.00
Per-Client Average	135	48	56	42	39
Total Throughput	540	192	223	170	156
Wireless LAN Single-Client Long Distance Performance					
Per-Client Average	135	33	54	53	31

Notes: Linksys running MU-MIMO. Dual-band devices provide a 2.4GHz radio and a 5GHz radio. All testing used 5GHz band. Average of 3 runs.

Source: Tolly, October 2016

Table 1

Environment & Setup

All testing was conducted using the 5GHz band.

Four Client - Line of Sight Test

This test used 4 Acer Aspire V3-371-51UJ systems. All four Acer clients were enabled on one 5GHz band and were running Linksys WUSB6100M Max-Stream MU-MIMO USB adapters.

Testing was conducted in a residence with no other WLAN access points enabled in 5GHz band. All testing was line of sight (LOS). SUTs were positioned 8 feet from the clients. All systems used Channel 40 and

Dual-Mode, 802.11ac (AC1750) Systems Under Test

Vendor	Model	Firmware Version	MIMO Streams	Antenna Location
Linksys, Inc.	EA7300	1.0.5.175772	3x3	3 dual-band External
ASUS	RT-AC66U	3.0.0.4.380_4005	3x3	3 dual-band External
NETGEAR, Inc.	R6400	1.0.1.12_1.0.11	3x3	3 dual-band External
TP-LINK Technologies Co. Ltd	Archer C7	1.0.0	3x3	3 5GHz External & 3 2.4GHz Internal
TP-LINK Technologies Co. Ltd	Archer C8	4.0.0 Build 20160517 Rel. 44603	3x3	3 dual-band External

Source: Tolly, October 2016

Table 2

WLAN Client System Details

Function	Wired Chariot Endpoint & Console	Four Client Test: Wireless Chariot Endpoint	Long Distance, Single-Client Test: Wireless Chariot Endpoint
Quantity	1	4	1
Computer Brand	HP	Acer	Apple
Model	Envy 17	Aspire V3-371-51UJ	MacBook Pro A1502
CPU	Intel i7 2630QM	Intel i5 5200U	Intel Core i5-4258U
Operating System	Windows 7	Windows 8.1	OS X Yosemite 10.10.2
LAN/WiFi Card	Ethernet Realtek PCIe GBE Family Controller	Linksys WUSB6100M	AirPort Extreme (0x14E4, 0x112)
Driver	7.23.623.2010	11.1.0.49 (4/27/2016)	Broadcom BCM43xx 1.0 (7.15.159.13.12)
Chariot Version	Console & Endpoint 7.10 SP3	Endpoint 9.1	Endpoint 9.0

Source: Tolly, October 2016

Table 3

Channel 153 with a bandwidth on 80.

Clients were situated at the same distance from the AP under test and were situated at table level. The AP under test was placed at approximately two feet above the floor.

Test traffic was generated using the Ixia IxChariot benchmarking system. All testing used the IxChariot High Throughput script. Four WLAN clients running the IxChariot Endpoint software communicated with a single IxChariot Endpoint that was connected via wired Ethernet connection to the test network via the aforementioned Gigabit Ethernet switch. Run time for each test was one minute at each test location. Tests were run at least three times and the average result for each SUT was used. Tolly engineers monitored the AP under test to be certain that all clients were communicating with the appropriate SSID/radio being tested.

One Client - Long Distance

This test used one Apple, Inc. MacBook Pro A1502 with AirPort Extreme. The MacBook


Pro was enabled on the 5GHz band. This client was a not a MU-MIMO device.

Testing was conducted in a residence with no other WLAN access points enabled in 5GHz band. All systems used Channel 153 with a bandwidth set to 80. The MacBook Pro client was located in the garage, which was on the first floor of the home, and was 65 feet away from the access point under test.

Test traffic was generated. in the same manner as in the multi-client test.

Test Equipment Summary

The Tolly Group gratefully acknowledges the providers of test equipment/software used in this project.

Vendor	Product	Web
Ixia	IxChariot v7.10 SP3 Console & IxChariot Endpoint 7.10 & IxChariot Endpoint 9.x	 http://www.ixiacom.com



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Linksys, Inc.



For more information go to: <http://www.linksys.com/us/p/P-EA7300/>

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