



## **WPJ344/WPJ558 + 11ac Radios**

**11ac Test Reports**

**Rev 1.4**

**May, 2014**

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## **Revision History**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1.0	November, 2013	Initial Release
1.1	November, 2013	Added DFS Testing
1.2	December, 2013	Added 3x3 Testing (Indoor)
1.3	January, 2014	Added WPJ558 Testing
1.4	May, 2014	Added Samsung Note 3 (11ac 1x1) Testing with AP (11ac, 3x3) Added Multiple (11ac 2x2) Stations Testing with AP (11ac, 3x3) Added WPJ344+11ac Outdoor 9KM testing

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# 1 Introduction

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This document describes the CompexWRT firmware used on WPJ344 6A03 with WLE600V5-23/WLE900VX/WLE600VX in 11ac Mode. This document is mainly used for those who wished to use 802.11ac outdoor for PTP scenario and indoor environment.

The information related to test samples includes the following:

1. CompexWRT version : wpj344\_mimoap\_v141\_b140424.img
2. Testing Place (Outdoor) : Suzhou Factory
3. Antennas Used (Outdoor) : MME5N19 (19dBi Dual Polarity)
4. Testing Place (Indoor / Samsung Phone Tests) : Singapore Office RF Area
5. Equipments Used (Indoor): RF Box + Attenuators
6. Supported Modes: 11ac VHT80, VHT40, VHT20
7. Operating Modes: AP WDS, Station WDS.
8. Encryption: WPA2-PSK
9. Auto-ACK Timeout Enabled (For both indoor and outdoor)

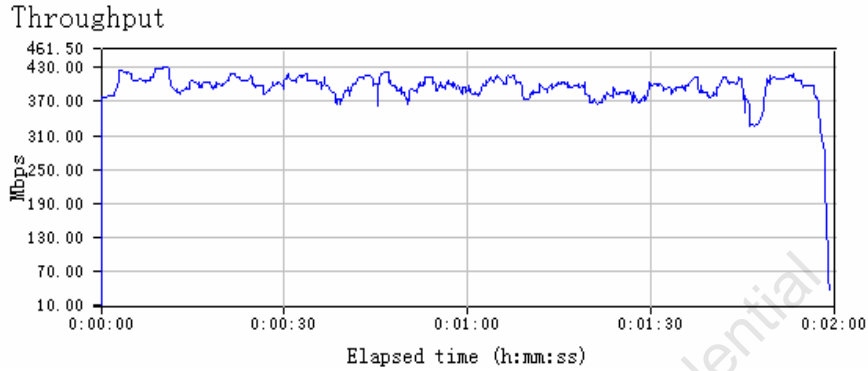
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## 2 Outdoor Tests @ 3.2KM (WPJ344+WLE600V5-23, 2x2)

### 802.11ac 80MHz

Point to Point @ 3.2KM

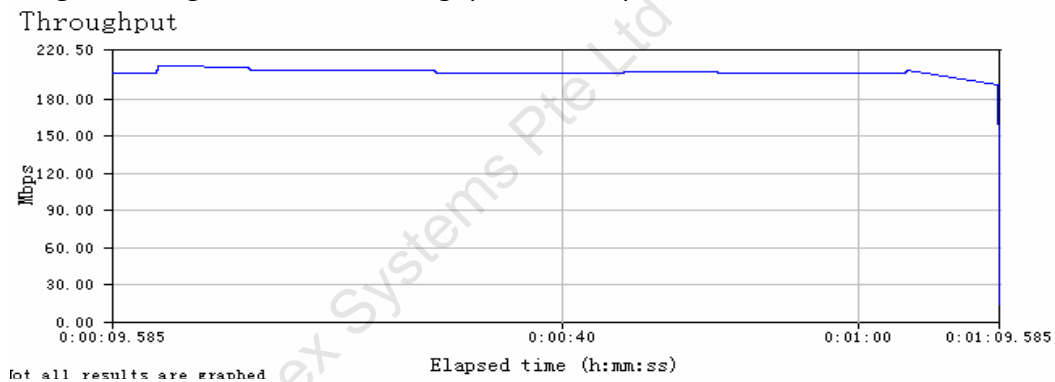
5.745GHz, Signal Strength: -64dBm, Throughput: 420Mbps.



### 802.11ac 40MHz

Point to Point @ 3.2KM

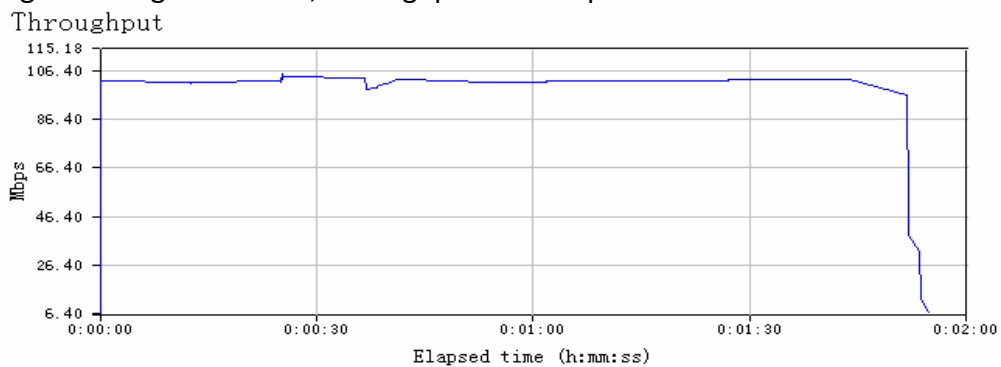
5.745GHz, Signal Strength: -63dBm, Throughput: 210Mbps.



### 802.11ac 20MHz

Point to Point @ 3.2KM

5.745GHz, Signal Strength: -60dBm, Throughput: 100Mbps.

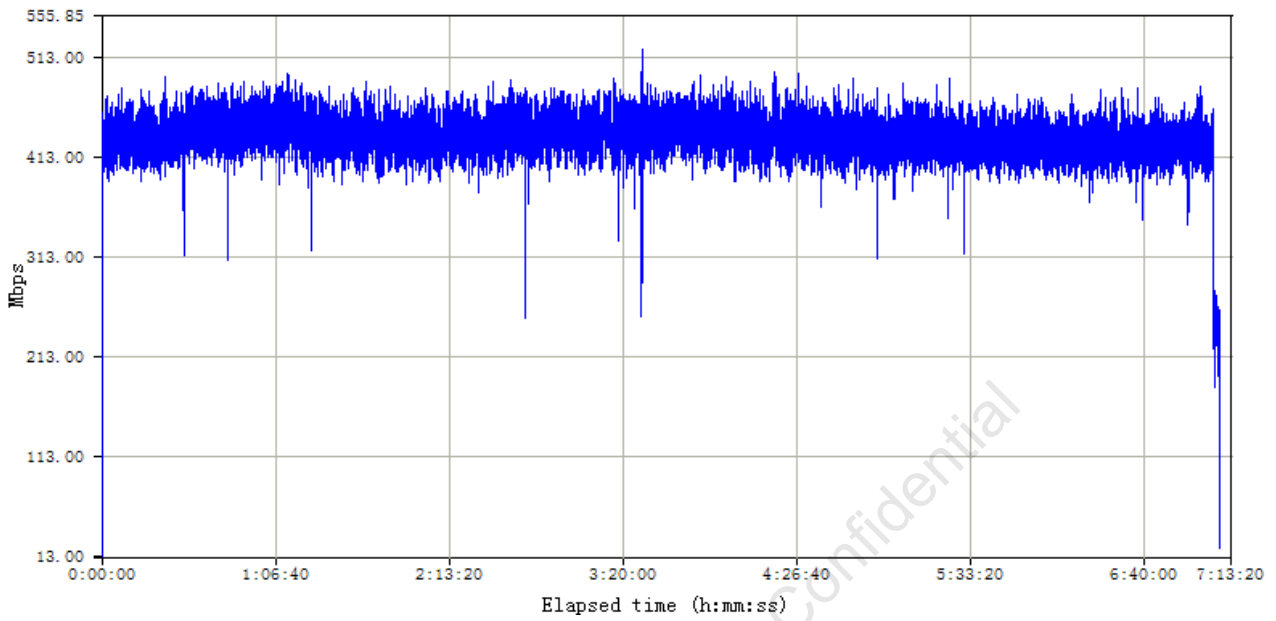


## Burn In Tests @ 802.11ac 80MHz

Point to Point @ 3.2KM

5.52GHz, Signal Strength: -64dBm, Throughput: 420Mbps.

Throughput



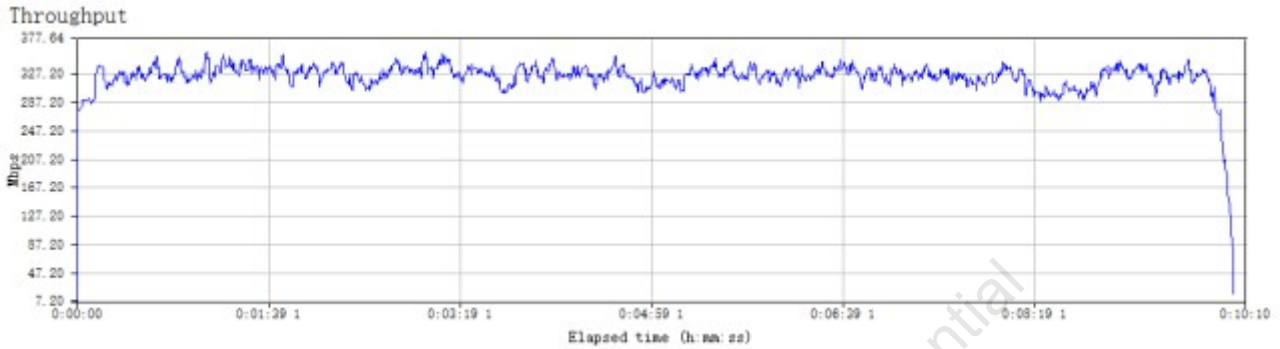
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### 3 Outdoor Tests @ 9KM (WPJ344+WLE600V5-23, 2x2)

#### 802.11ac 80MHz

Point to Point @ 9KM

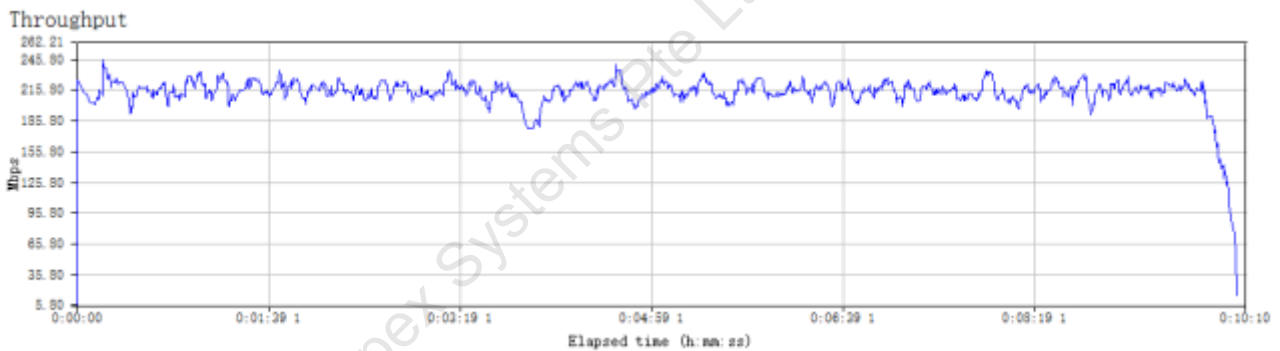
5.5GHz, Signal Strength: -70dBm, Throughput: 310Mbps.



#### 802.11ac 40MHz

Point to Point @ 9KM

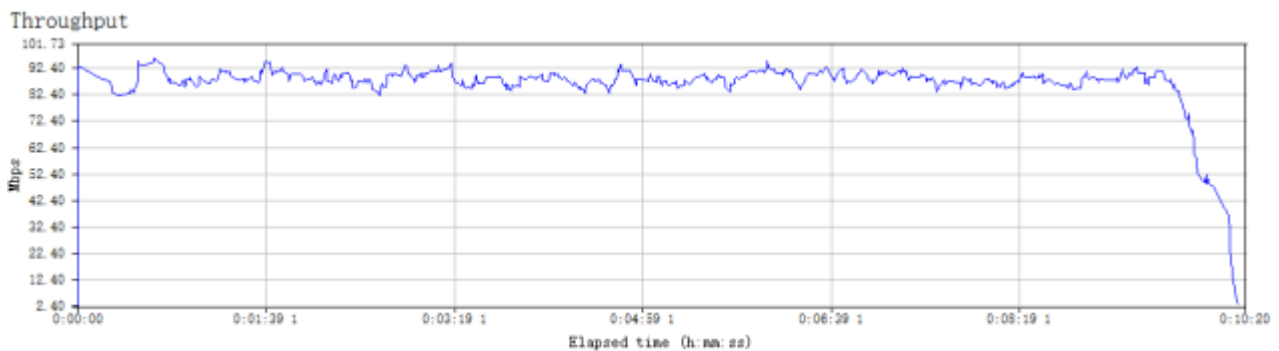
5.5GHz, Signal Strength: -67dBm, Throughput: 210Mbps.



#### 802.11ac 20MHz

Point to Point @ 9KM

5.5GHz, Signal Strength: -64dBm, Throughput: 85Mbps.

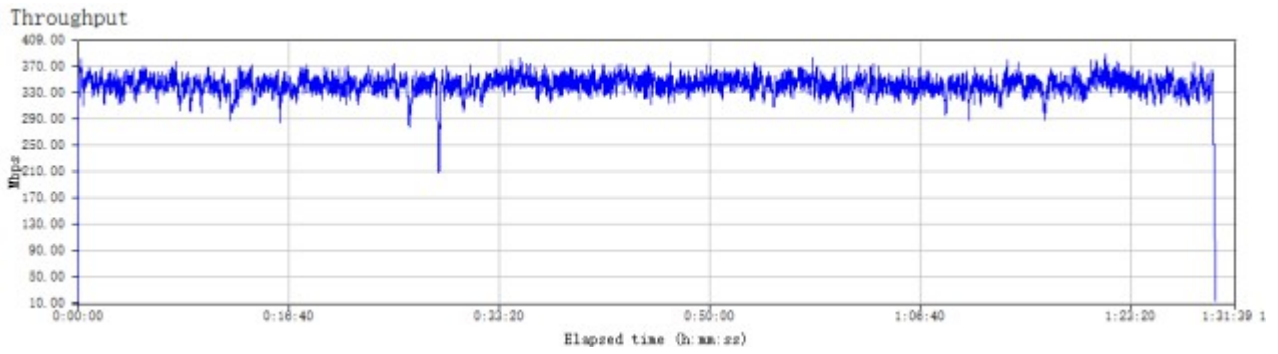




## Burn In Tests @ 802.11ac 80MHz

Point to Point @ 9KM

5.5GHz, Signal Strength: -70dBm, Throughput: 310Mbps.

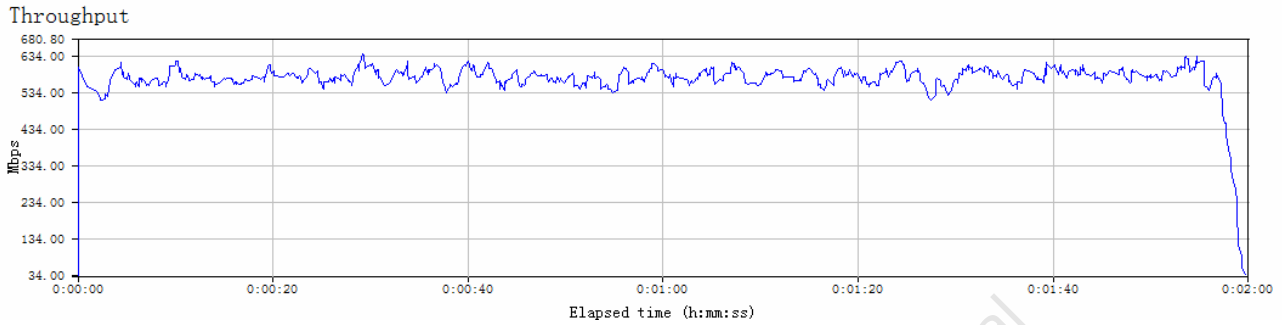


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# 4 Indoor Tests (WPJ344+WLE600VX, 2x2)

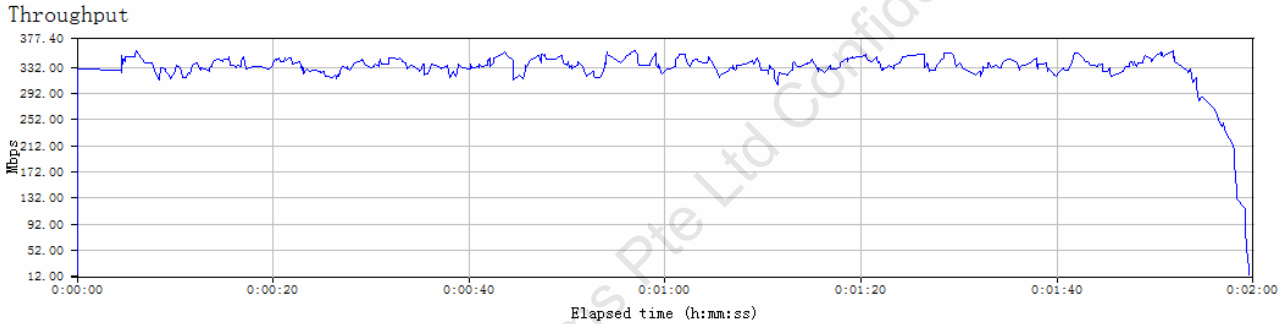
## 802.11ac 80MHz

5.6GHz, Signal Strength: -57dBm, Throughput: 600Mbps.



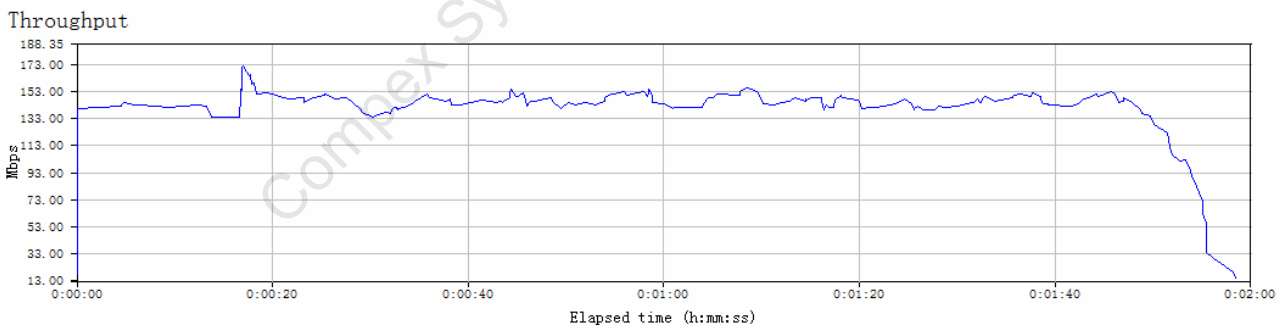
## 802.11ac 40MHz

5.6GHz, Signal Strength: -55dBm, Throughput: 330Mbps.



## 802.11ac 20MHz

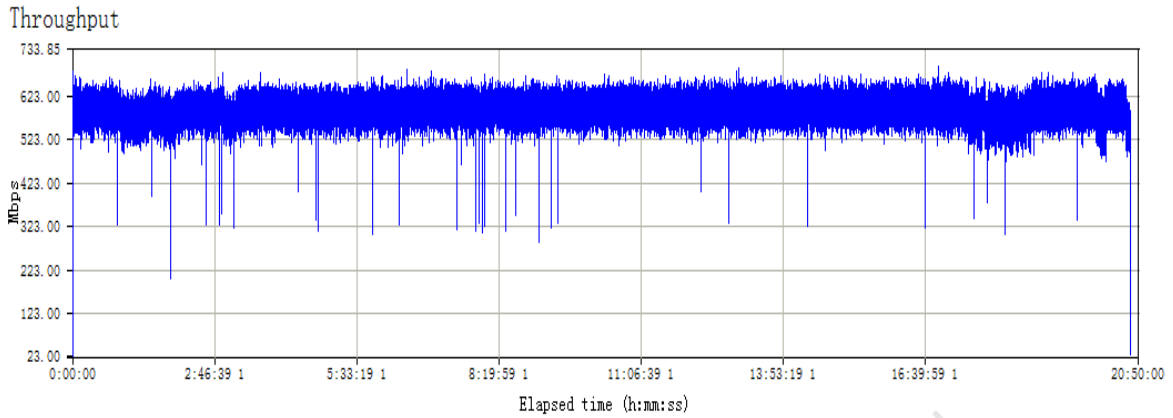
5.6GHz, Signal Strength: -52dBm, Throughput: 140Mbps.



### **Burn In Tests @ 802.11ac 80MHz**

RF Box Tests for 20 Hours

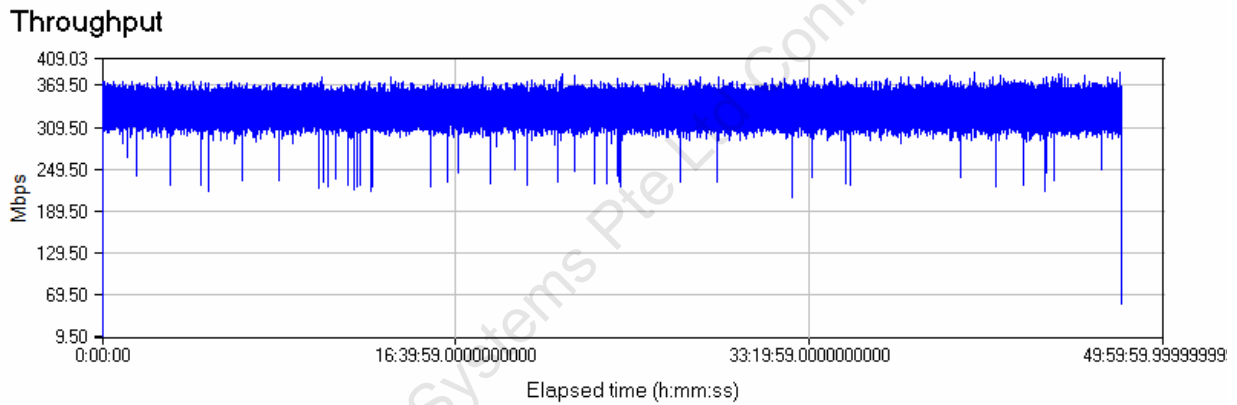
5.6GHz, Signal Strength: -57dBm, Throughput: 600Mbps



### **Burn In Tests @ 802.11ac 40MHz**

RF Box Tests for 48 Hours

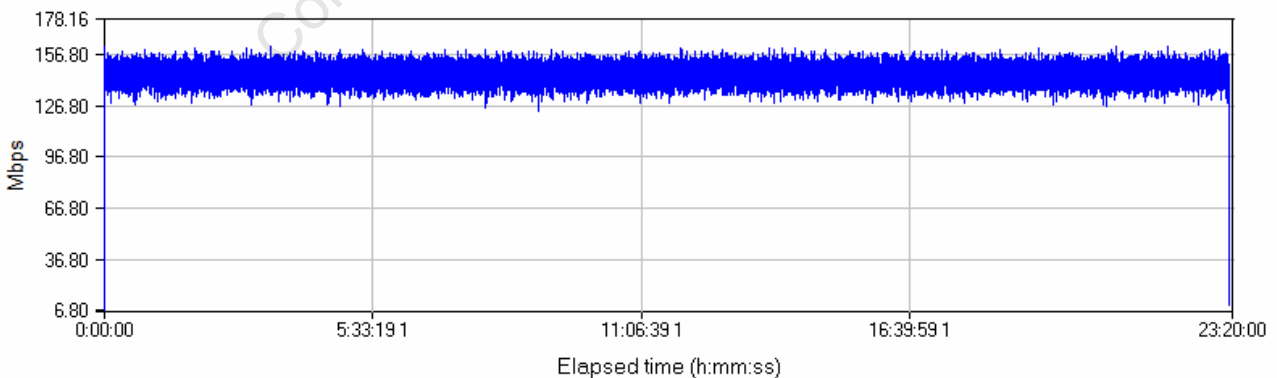
5.6GHz, Signal Strength: -55dBm, Throughput: 335Mbps



### **Burn In Tests @ 802.11ac 20MHz**

RF Box Tests for 24 Hours

Throughput



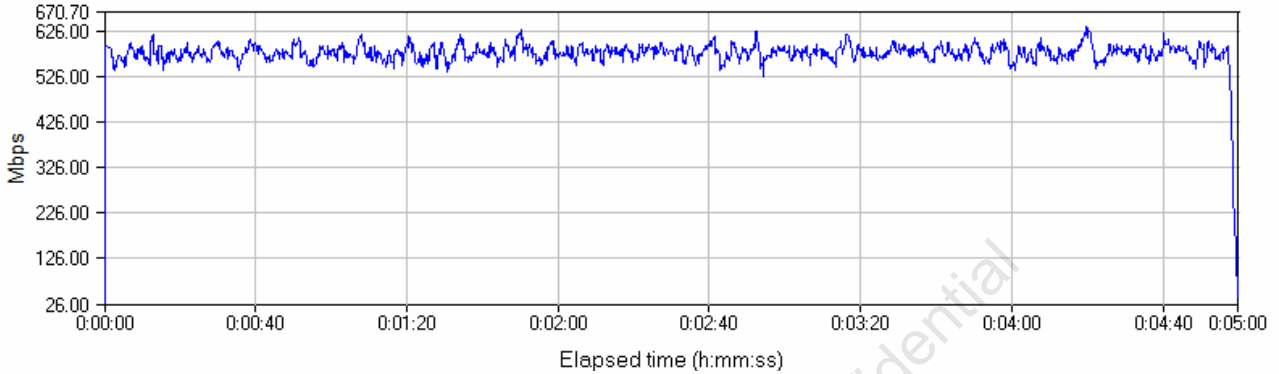
5.6GHz, Signal Strength: -52dBm, Throughput: 145Mbps

# 5 Indoor Tests (WPJ344+WLE900VX, 3x3)

## 802.11ac 80MHz

5.52GHz, Signal Strength: -55dBm, Throughput: 600Mbps.

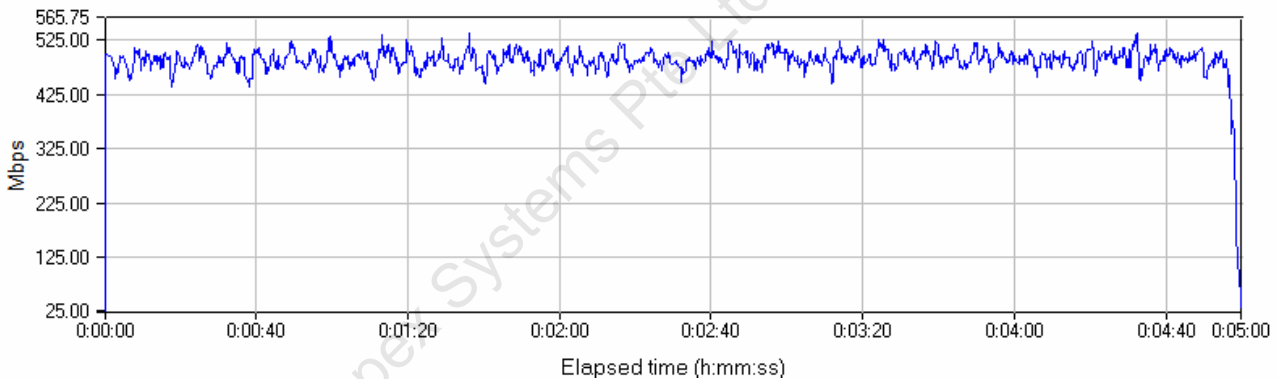
### Throughput



## 802.11ac 40MHz

5.52GHz, Signal Strength: -52dBm, Throughput: 500Mbps.

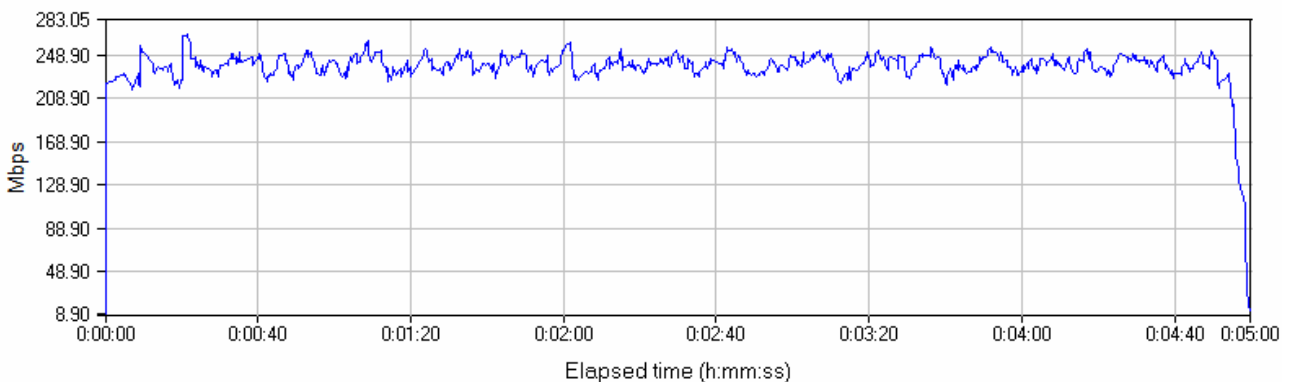
### Throughput



## 802.11ac 20MHz

5.52GHz, Signal Strength: -48dBm, Throughput: 240Mbps

### Throughput

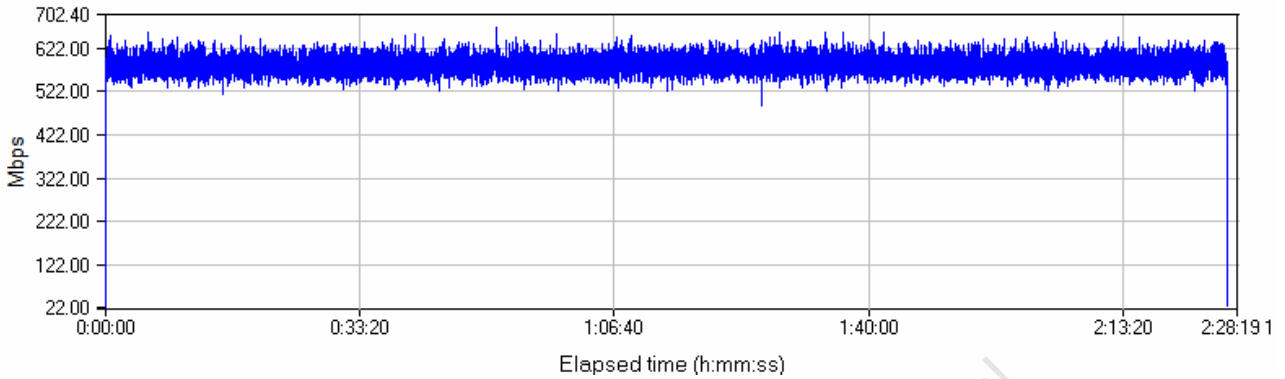


### **Burn In Tests 802.11ac 80MHz**

RF Box Tests for 2.5 Hours

5.52GHz, Signal Strength: -55dBm, Throughput: 600Mbps

#### **Throughput**

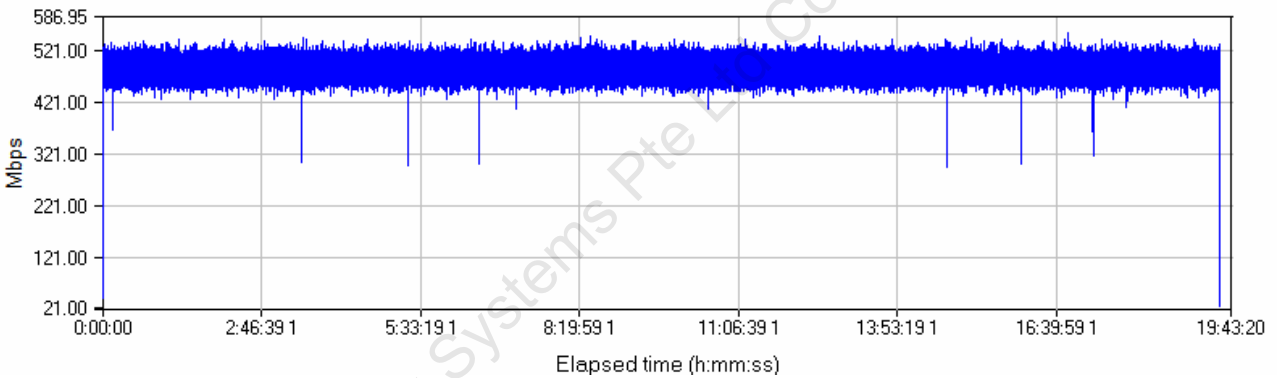


### **Burn In Tests 802.11ac 40MHz**

RF Box Tests for 19.5 Hours

5.52GHz, Signal Strength: -51dBm, Throughput: 490Mbps

#### **Throughput**

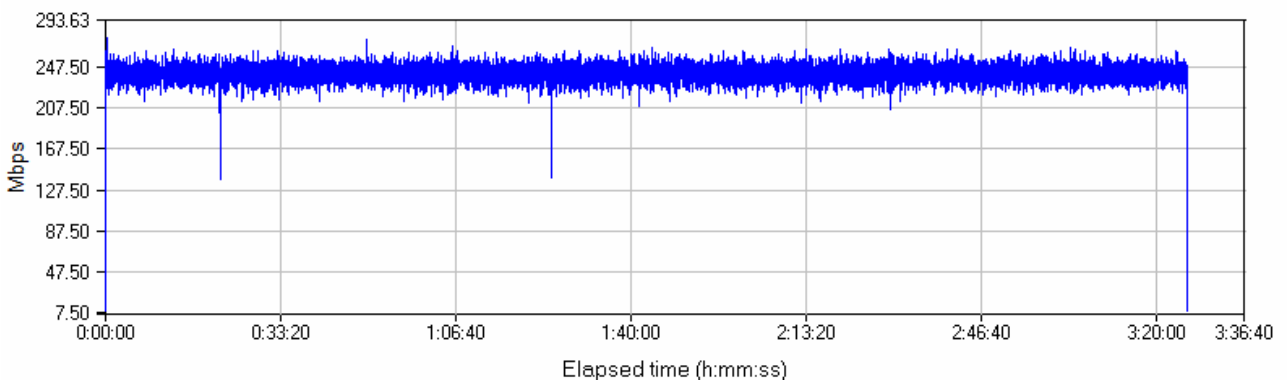


### **Burn In Tests 802.11ac 20MHz**

RF Box Tests for 3.5 Hours

5.52GHz, Signal Strength: -48dBm, Throughput: 240Mbps

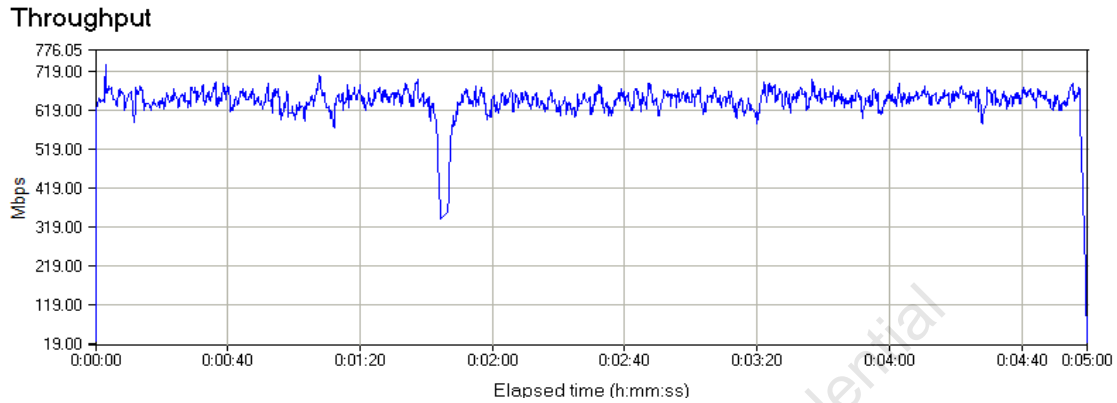
#### **Throughput**



## 6 Indoor Tests (WPJ558+WLE600VX, 2x2)

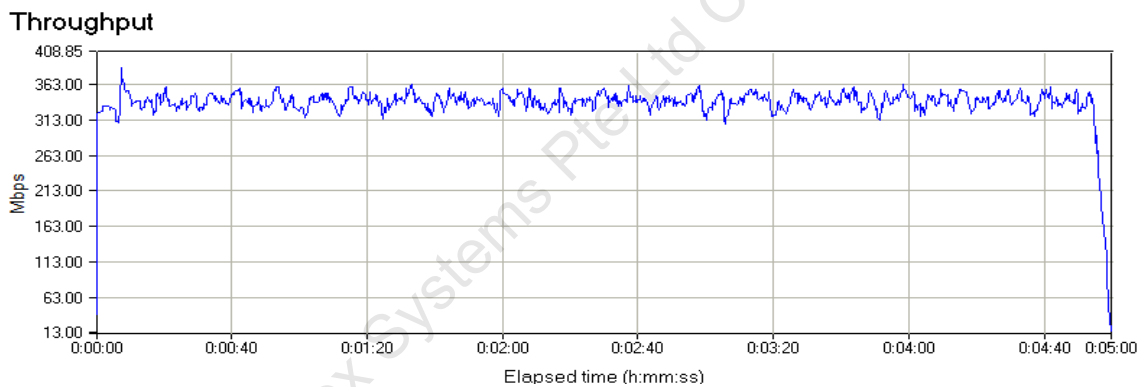
### 802.11ac 80MHz

5.22GHz, Signal Strength: -56dBm, Throughput: 650Mbps.



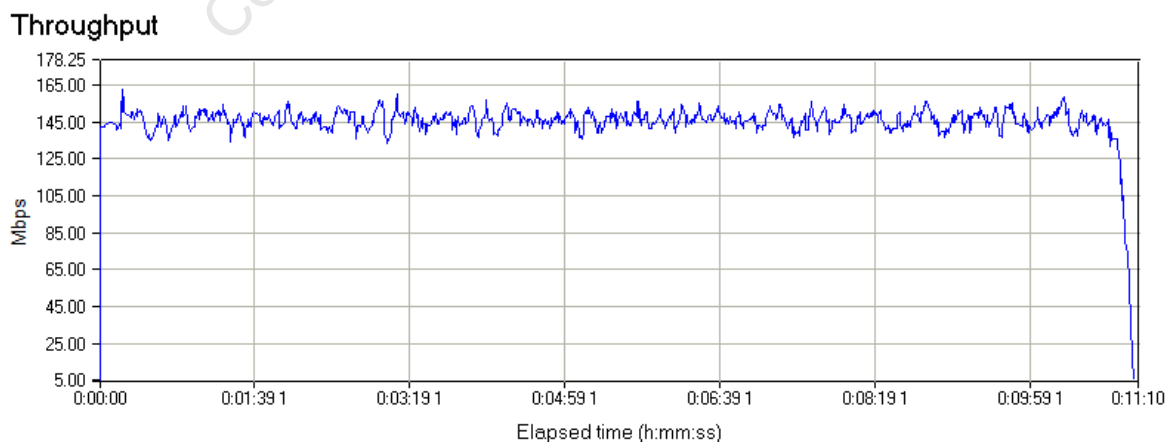
### 802.11ac 40MHz

5.22GHz, Signal Strength: -55dBm, Throughput: 340Mbps.



### 802.11ac 20MHz

5.22GHz, Signal Strength: -50dBm, Throughput: 145Mbps.

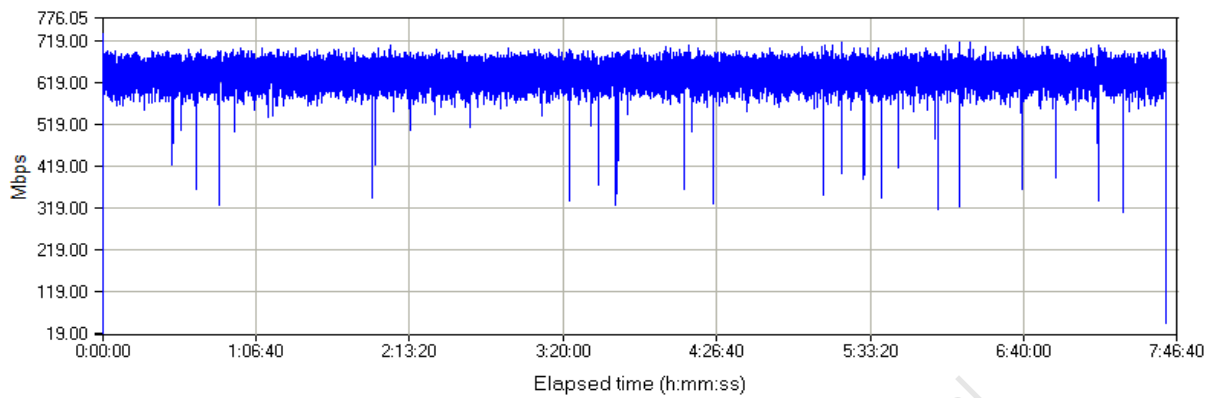


### **Burn In Tests 802.11ac 80MHz**

RF Box Tests for 7.5 Hours

5.22GHz, Signal Strength: -56dBm, Throughput: 650Mbps

Throughput

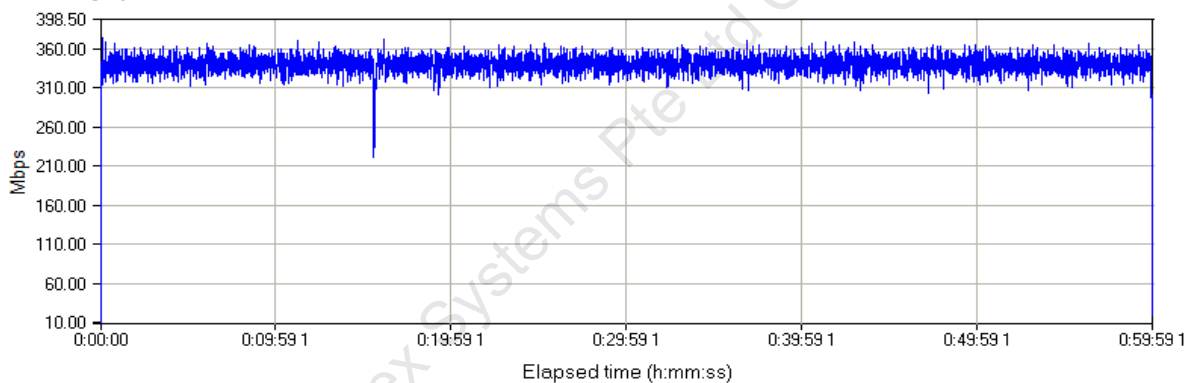


### **Burn In Tests 802.11ac 40MHz**

RF Box Tests for 1 Hours

5.22GHz, Signal Strength: -55dBm, Throughput: 340Mbps

Throughput

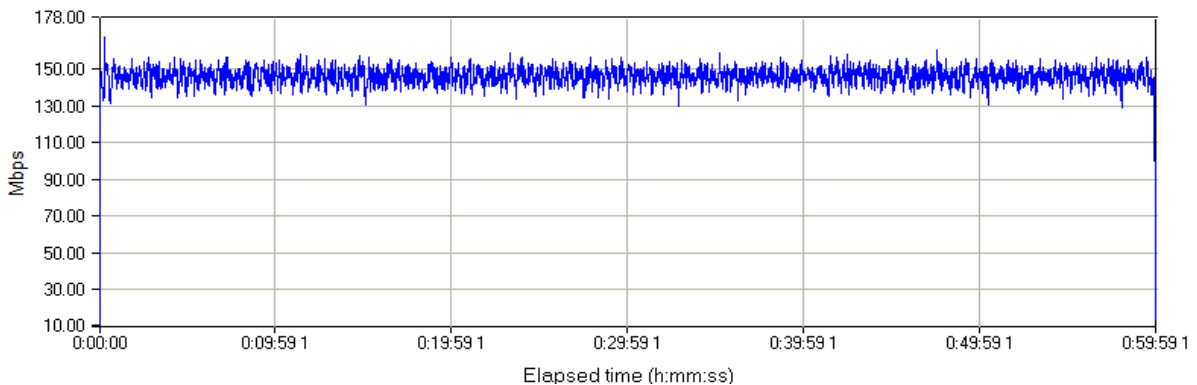


### **Burn In Tests 802.11ac 20MHz**

RF Box Tests for 1 Hours

5.22GHz, Signal Strength: -50dBm, Throughput: 145Mbps

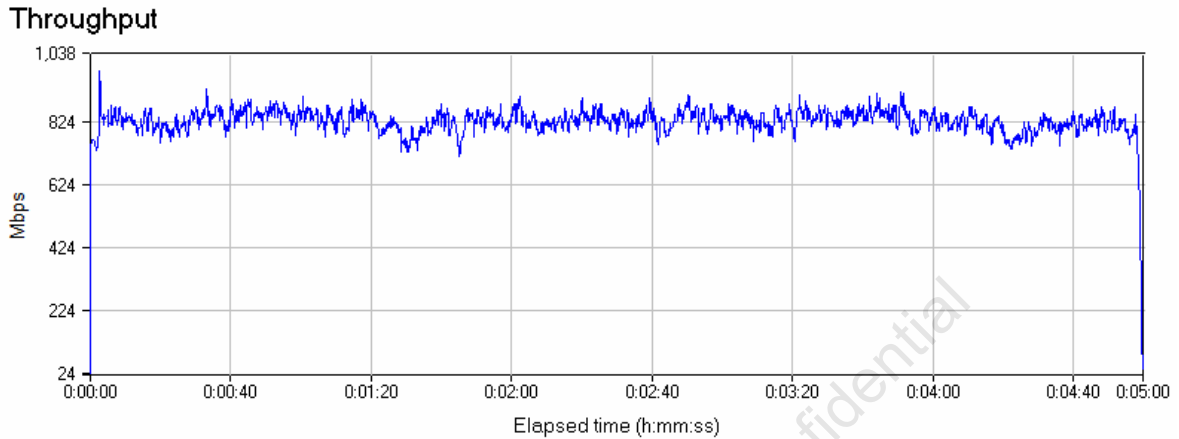
Throughput



# 7 Indoor Tests (WPJ558+WLE900VX, 3x3)

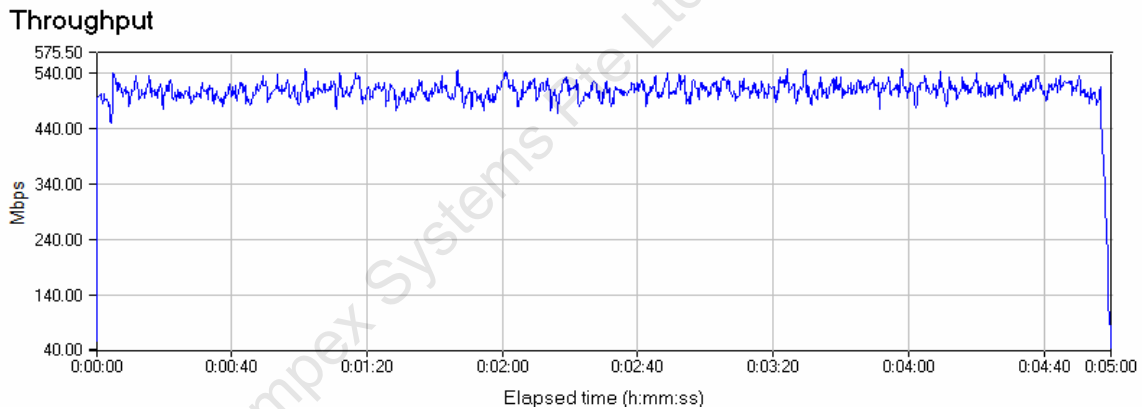
## 802.11ac 80MHz

5.22GHz, Signal Strength: -53dBm, Throughput: 820Mbps.



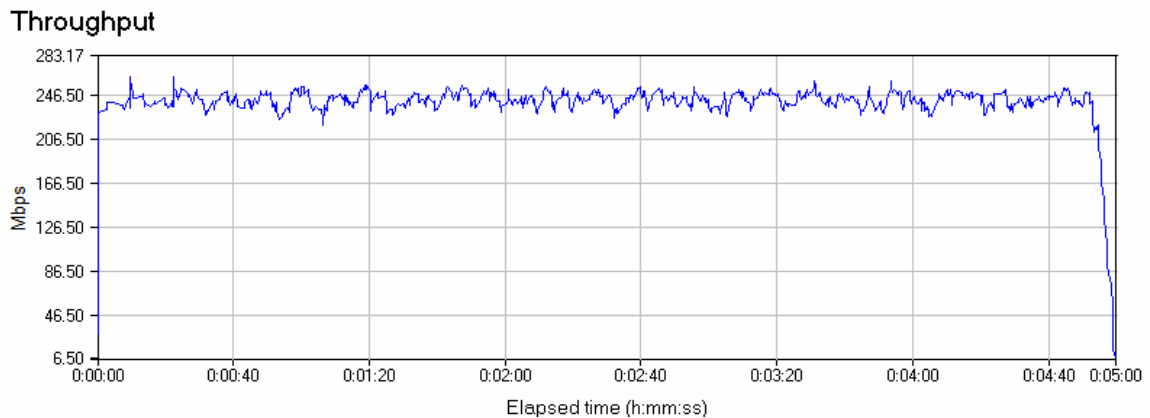
## 802.11ac 40MHz

5.22GHz, Signal Strength: -52dBm, Throughput: 505Mbps.



## 802.11ac 20MHz

5.22GHz, Signal Strength: -48dBm, Throughput: 240Mbps.



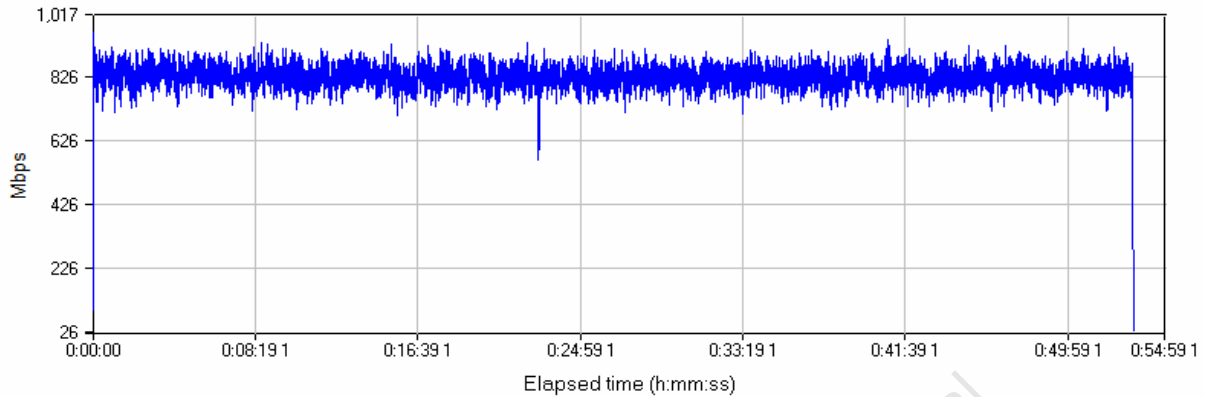


### **Burn In Tests 802.11ac 80MHz**

RF Box Tests for 1 Hour

5.22GHz, Signal Strength: -53dBm, Throughput: 820Mbps

Throughput

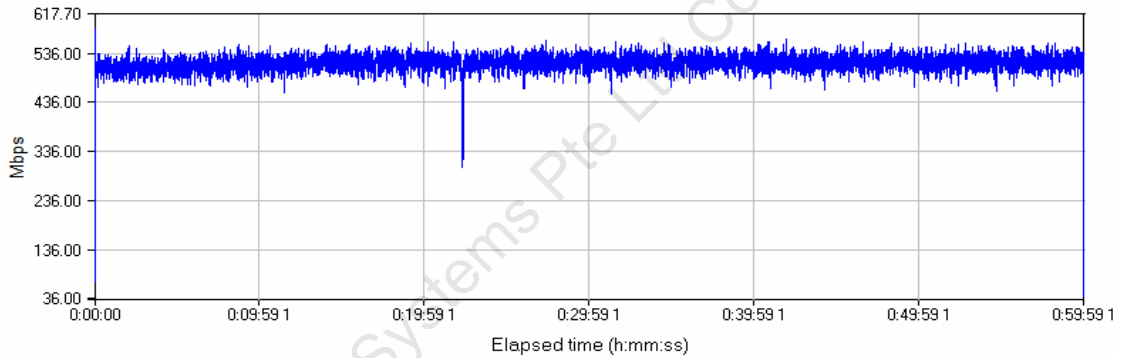


### **Burn In Tests 802.11ac 40MHz**

RF Box Tests for 1 Hour

5.22GHz, Signal Strength: -52dBm, Throughput: 505 Mbps

Throughput

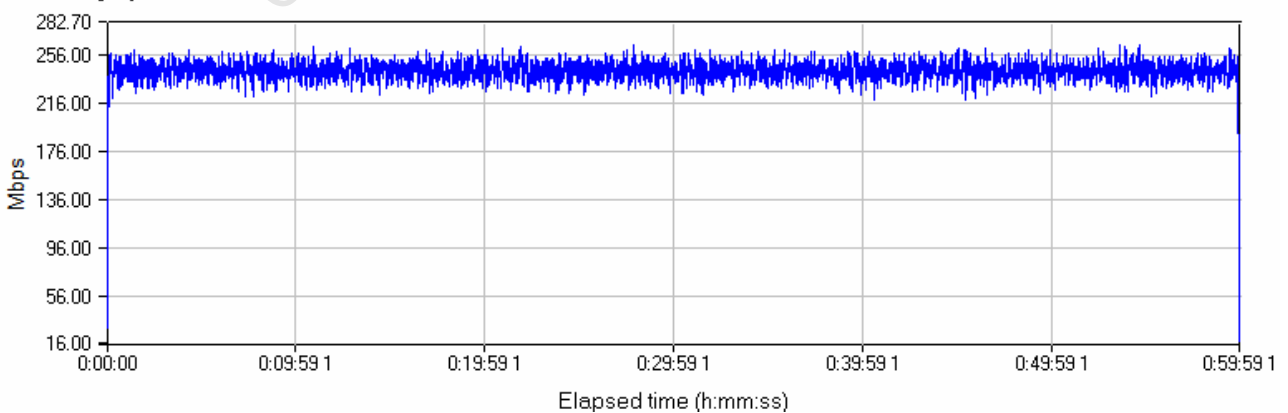


### **Burn In Tests 802.11ac 20MHz**

RF Box Tests for 1 Hour

5.22GHz, Signal Strength: -48dBm, Throughput: 240Mbps

Throughput



## 8 Max Number of Clients Tests (WPJ344+WLE900VX, 3x3)

Tested with LanForge CT523-600, we added WPA security to each client. This is tested in Anechoic Chamber, where CT523-600 simulated 119 DHCP Clients to connect to the WPJ344+WLE900V5-18. However, in real-life scenario, where there exist interference, the actual clients might be lesser. We estimate to be around 100.

Associated Stations (119)

MAC-Address	Network	Device Name	Last IP	Signal	Signal/Chains	Noise	TX Rate	RX Rate	TX-CCQ
00:88:00:00:00:4C	Mimo_Clients			-44 dBm	-57,-59,-57	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	50 %
00:88:00:11:11:0E	Mimo_Clients			-44 dBm	-52,-53,-51	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	95 %
00:88:00:22:22:04	Mimo_Clients			-43 dBm	-55,-57,-55	-95 dBm	6.0 Mbit/s	14.4 Mbit/s	85 %
00:88:00:11:11:0F	Mimo_Clients			-44 dBm	-51,-53,-51	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	90 %
00:88:00:22:22:13	Mimo_Clients			-44 dBm	-51,-52,-51	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	79 %
00:88:00:22:22:0C	Mimo_Clients	http://192.168.1.1/cgi-bin/luci;/stok=64252b2050577b2bebae431a63ef7704/admi		-52,-51	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	62 %	
00:88:00:22:22:12	Mimo_Clients	n/network/wireless/wifi1.network1		-53,-51	-95 dBm	6.0 Mbit/s	180.0 Mbit/s	90 %	

Total Number of Clients that can be connected to the AP  $\approx$  100.

# 9 Max Number of Concurrent Clients Tests [TCP Traffic]

Tested with LanForge CT523-600, we added WPA security to each client. This is tested in Anechoic Chamber, where CT523-600 simulated 119 DHCP Clients to connect to the WPJ344+WLE900VX. Then we run TCP throughput between some of the clients to obtain the maximum number of concurrent clients, limited to a certain latency and data rate.

Concurrent Clients Criteria:

1. Each Client Uploading and Downloading **384kbps to 768kbps** of TCP at the same time.
2. Latency of around 100ms
3. Mean Upload Rate and Download Rate ~ 400kbps.

However, in real-life scenario, where there exist interference, the actual concurrent clients might be lesser. We estimate to be around 40.

Name	Type	State	PktTxA->B	PktTxA<-B	Rate A->B	Rate A<-B	Rx Drop % A	Rx Drop ...	Drop Pkts A	Drop Pkts B	Avg RTT	Rpt Timer	EID	Endpoints (A <-> B)
TCP	LF/TCP	Run	1,552	1,577	397,871	404,290	0	0.193	0	0	99	1000	2.160	TCP-A <-> TCP-B
TCP1	LF/TCP	Run	2,280	1,654	584,501	424,020	0	0.175	0	4	88	1000	2.162	TCP1-A <-> TCP1-B
TCP19	LF/TCP	Run	1,697	2,122	435,057	544,270	0	0.177	0	3	99	1000	2.180	TCP19-A <-> TCP19-B
TCP2	LF/TCP	Run	1,935	2,069	496,073	530,426	0	0.155	0	3	99	1000	2.163	TCP2-A <-> TCP2-B
TCP20	LF/TCP	Run	1,693	1,633	434,031	418,649	0	0.118	0	2	94	1000	2.181	TCP20-A <-> TCP20-B
TCP21	LF/TCP	Run	1,625	2,205	416,585	566,300	0	0.123	0	2	86	1000	2.182	TCP21-A <-> TCP21-B
TCP22	LF/TCP	Run	1,695	1,816	434,544	465,565	0	0.236	0	4	92	1000	2.183	TCP22-A <-> TCP22-B
TCP23	LF/TCP	Run	2,310	2,214	592,211	564,069	0	0	0	0	85	1000	2.184	TCP23-A <-> TCP23-B
TCP24	LF/TCP	Run	1,528	2,175	389,052	553,771	0	0.065	0	1	99	1000	2.185	TCP24-A <-> TCP24-B
TCP25	LF/TCP	Run	2,193	2,218	558,354	564,719	0	0.137	0	3	89	1000	2.186	TCP25-A <-> TCP25-B
TCP26	LF/TCP	Run	1,655	1,993	417,511	502,900	0	0.121	0	2	100	1000	2.187	TCP26-A <-> TCP26-B
TCP27	LF/TCP	Run	2,122	1,777	535,467	448,410	0	0.094	0	2	96	1000	2.188	TCP27-A <-> TCP27-B
TCP28	LF/TCP	Run	1,738	1,754	438,568	442,606	0	0	0	0	99	1000	2.189	TCP28-A <-> TCP28-B
TCP29	LF/TCP	Run	1,687	1,716	425,699	433,017	0	0.119	0	2	87	1000	2.190	TCP29-A <-> TCP29-B
TCP3	LF/TCP	Run	1,749	1,535	441,358	387,355	0	0.114	0	2	102	1000	2.164	TCP3-A <-> TCP3-B
TCP30	LF/TCP	Run	1,973	1,754	497,884	442,619	0	0.051	0	1	96	1000	2.191	TCP30-A <-> TCP30-B
TCP31	LF/TCP	Run	1,869	1,873	471,625	472,634	0	0.161	0	3	103	1000	2.192	TCP31-A <-> TCP31-B
TCP32	LF/TCP	Run	1,996	1,549	502,697	390,119	0	0.1	0	2	95	1000	2.193	TCP32-A <-> TCP32-B
TCP33	LF/TCP	Run	2,059	1,576	518,563	396,919	0	0.049	0	1	104	1000	2.194	TCP33-A <-> TCP33-B
TCP34	LF/TCP	Run	1,729	1,748	435,452	440,237	0	0.058	0	1	97	1000	2.195	TCP34-A <-> TCP34-B
TCP35	LF/TCP	Run	1,804	1,559	454,355	391,630	0	0.222	0	4	96	1000	2.196	TCP35-A <-> TCP35-B
TCP36	LF/TCP	Run	1,805	1,616	454,593	406,993	0	0.055	0	1	94	1000	2.197	TCP36-A <-> TCP36-B
TCP37	LF/TCP	Run	1,659	1,748	417,822	439,734	0	0.06	0	1	95	1000	2.198	TCP37-A <-> TCP37-B
TCP38	LF/TCP	Run	1,968	1,689	495,660	425,391	0	0.152	0	3	96	1000	2.199	TCP38-A <-> TCP38-B
TCP39	LF/TCP	Run	1,755	1,846	442,014	464,933	0	0.114	0	2	91	1000	2.200	TCP39-A <-> TCP39-B
TCP4	LF/TCP	Run	1,963	2,031	494,401	511,527	0	0.153	0	3	99	1000	2.165	TCP4-A <-> TCP4-B
TCP40	LF/TCP	Run	1,844	1,574	454,429	396,427	0	0.108	0	2	90	1000	2.201	TCP40-A <-> TCP40-B
TCP41	LF/TCP	Run	2,036	1,763	512,771	442,457	0	0	0	0	96	1000	2.202	TCP41-A <-> TCP41-B
TCP42	LF/TCP	Run	1,863	1,763	468,336	443,700	0	0.054	0	1	90	1000	2.203	TCP42-A <-> TCP42-B
TCP43	LF/TCP	Run	1,800	2,203	452,499	553,557	0	0.111	0	2	90	1000	2.204	TCP43-A <-> TCP43-B
TCP44	LF/TCP	Run	1,722	1,749	432,891	439,678	0	0.058	0	1	98	1000	2.205	TCP44-A <-> TCP44-B
TCP45	LF/TCP	Run	1,697	1,841	425,223	461,263	0	0	0	0	92	1000	2.206	TCP45-A <-> TCP45-B
TCP46	LF/TCP	Run	1,771	2,215	443,724	554,969	0	0.113	0	2	94	1000	2.207	TCP46-A <-> TCP46-B
TCP47	LF/TCP	Run	1,890	2,123	473,540	532,920	0	0.159	0	3	91	1000	2.208	TCP47-A <-> TCP47-B
TCP48	LF/TCP	Run	1,992	2,195	499,096	549,958	0	0.1	0	2	90	1000	2.209	TCP48-A <-> TCP48-B
TCP49	LF/TCP	Run	1,675	1,805	419,684	478,315	0	0.179	0	3	99	1000	2.212	TCP49-A <-> TCP49-B
TCP5	LF/TCP	Stopped	669	584	336,203	293,468	0	0	0	0	100	1000	2.166	TCP5-A <-> TCP5-B
TCP50	LF/TCP	Run	1,749	2,538	438,226	635,916	0	0.057	0	1	90	1000	2.213	TCP50-A <-> TCP50-B
TCP51	LF/TCP	Run	1,829	1,655	458,284	414,686	0	0.164	0	3	97	1000	2.214	TCP51-A <-> TCP51-B
TCP52	LF/TCP	Run	1,980	1,496	496,120	385,736	0	0	0	0	92	1000	2.215	TCP52-A <-> TCP52-B
TCP53	LF/TCP	Run	2,054	1,887	529,614	486,553	0	0.195	0	4	85	1000	2.216	TCP53-A <-> TCP53-B
TCP54	LF/TCP	Run	1,607	1,941	414,357	500,477	0	0.311	0	5	96	1000	2.217	TCP54-A <-> TCP54-B
TCP55	LF/TCP	Run	1,901	1,796	490,179	463,104	0	0.105	0	2	96	1000	2.218	TCP55-A <-> TCP55-B
TCP56	LF/TCP	Run	1,735	1,613	447,375	417,464	0	0.115	0	2	96	1000	2.219	TCP56-A <-> TCP56-B
TCP57	LF/TCP	Run	2,014	2,163	519,316	557,478	0	0.199	0	4	92	1000	2.220	TCP57-A <-> TCP57-B
TCP58	LF/TCP	Run	1,772	1,971	456,916	508,228	0	0.169	0	3	93	1000	2.221	TCP58-A <-> TCP58-B
TCP59	LF/TCP	Run	2,214	1,930	570,905	497,672	0	0.226	0	5	97	1000	2.222	TCP59-A <-> TCP59-B
TCP6	LF/TCP	Run	2,148	1,574	553,886	405,376	0	0.047	0	1	94	1000	2.167	TCP6-A <-> TCP6-B
TCP60	LF/TCP	Run	1,533	1,700	394,816	437,826	0	0.261	0	4	95	1000	2.223	TCP60-A <-> TCP60-B
TCP61	LF/TCP	Run	1,722	1,645	443,506	423,661	0	0.116	0	2	97	1000	2.224	TCP61-A <-> TCP61-B
TCP7	LF/TCP	Run	1,738	1,723	447,332	444,473	0	0.058	0	1	89	1000	2.168	TCP7-A <-> TCP7-B
TCP8	LF/TCP	Run	2,113	1,603	543,817	412,559	0	0.047	0	1	102	1000	2.169	TCP8-A <-> TCP8-B

Total Concurrent Clients that can run with the AP ~ 40.

# 10 Max Number of Concurrent Clients Tests [UDP Traffic- 2Mbps up & down]

Tested with LanForge CT523-600, we added WPA security to each client. This is tested in Anechoic Chamber, where CT523-600 simulated 119 DHCP Clients to connect to the WPJ344+WLE900VX. Then we run UDP throughput between some of the clients to obtain the maximum number of concurrent clients, limited to a certain latency and data rate.

Concurrent Clients Criteria:

1. Each Client Uploading and Downloading **2Mbps** of UDP at the same time.
2. Latency of around 100ms
3. Mean Upload Rate and Download Rate ~ 2Mbps.

Measured in Anechoic Chamber = 25 Concurrent Clients

However, in real-life scenario, where there exist interference, the actual concurrent clients might be lesser. We estimate to be around 20.

Name	Type	State	Pkt Tx A->B	Pkt Rx A<-B	Rate A->B	Rate A<-B	Rx Drop % A	Rx Drop % B	Drop Pkts A	Drop Pkts B	Avg RTT	Pkt Timer	EID	Endpoints (A <-> B)
UDP	LFUDP	Run	13,189	13,216	1,999,191	1,998,034	0	0	0	0	36	1000	1.27	UDP-A <-> UDP-B
UDP1	LFUDP	Run	8,072	8,094	1,999,208	1,989,797	0	0.025	0	0	38	1000	1.28	UDP1-A <-> UDP1-B
UDP10	LFUDP	Run	8,072	7,96	1,999,269	1,971,776	0	0.26	0	21	47	1000	1.37	UDP10-A <-> UDP10-B
UDP11	LFUDP	Run	8,072	7,96	1,999,269	1,970,290	0	0.173	0	14	43	1000	1.38	UDP11-A <-> UDP11-B
UDP12	LFUDP	Run	8,071	7,86	1,999,021	1,945,959	0	0.161	0	13	37	1000	1.39	UDP12-A <-> UDP12-B
UDP13	LFUDP	Run	8,071	7,86	1,998,960	1,944,720	0	0.235	0	19	40	1000	1.40	UDP13-A <-> UDP13-B
UDP14	LFUDP	Run	8,071	7,73	1,999,021	1,915,305	0	0.273	0	22	40	1000	1.41	UDP14-A <-> UDP14-B
UDP15	LFUDP	Run	8,071	7,70	1,999,021	1,908,122	0	0.074	0	6	42	1000	1.42	UDP15-A <-> UDP15-B
UDP16	LFUDP	Run	8,120	7,62	1,999,069	1,876,107	0	0.185	0	15	50	1000	1.43	UDP16-A <-> UDP16-B
UDP17	LFUDP	Run	8,121	7,47	1,999,195	1,840,412	0	0.209	0	17	45	1000	1.44	UDP17-A <-> UDP17-B
UDP18	LFUDP	Run	8,121	7,32	1,999,255	1,803,786	0	0.382	0	31	54	1000	1.46	UDP18-A <-> UDP18-B
UDP19	LFUDP	Run	8,121	7,01	1,999,255	1,727,222	0	0.172	0	14	54	1000	1.46	UDP19-A <-> UDP19-B
UDP2	LFUDP	Run	8,120	7,88	1,998,949	1,895,938	0	0	0	0	37	1000	1.29	UDP2-A <-> UDP2-B
UDP20	LFUDP	Run	7,901	6,36	1,999,165	1,608,745	0	0.152	0	12	61	1000	1.47	UDP20-A <-> UDP20-B
UDP21	LFUDP	Run	7,901	5,53	1,999,165	1,399,744	0	0.114	0	9	57	1000	1.48	UDP21-A <-> UDP21-B
UDP22	LFUDP	Run	7,901	4,28	1,999,165	1,084,726	0	0.165	0	13	71	1000	1.49	UDP22-A <-> UDP22-B
UDP23	LFUDP	Run	7,901	2,91	1,999,165	737,573	0	0.304	0	24	112	1000	1.50	UDP23-A <-> UDP23-B
UDP24	LFUDP	Run	7,901	1,50	1,999,227	380,564	0	0.329	0	26	261	1000	1.51	UDP24-A <-> UDP24-B
UDP3	LFUDP	Run	7,950	7,92	1,999,336	1,992,234	0	0.541	0	43	35	1000	1.30	UDP3-A <-> UDP3-B
UDP4	LFUDP	Run	7,974	7,94	1,996,607	1,990,347	0	0.251	0	20	35	1000	1.31	UDP4-A <-> UDP4-B
UDP5	LFUDP	Run	7,974	7,92	1,996,668	1,984,854	0	0.226	0	16	40	1000	1.32	UDP5-A <-> UDP5-B
UDP6	LFUDP	Run	7,986	7,93	1,999,062	1,986,546	0	0.213	0	17	38	1000	1.33	UDP6-A <-> UDP6-B
UDP7	LFUDP	Run	7,986	7,86	1,999,062	1,968,022	0	0.225	0	16	37	1000	1.34	UDP7-A <-> UDP7-B
UDP8	LFUDP	Run	7,986	7,87	1,999,001	1,971,717	0	0.25	0	20	34	1000	1.35	UDP8-A <-> UDP8-B
UDP9	LFUDP	Run	8,010	7,89	1,999,083	1,969,264	0	0.287	0	23	41	1000	1.36	UDP9-A <-> UDP9-B

Total Concurrent Clients that can run with the AP ~ 20.

## 11 DFS Testing (WPJ344+WLE600V5-23, 2x2)

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***This is NOT a real DFS test.*** Tests conducted are mainly to see what CompexWRT would have done if our software recognize the DFS signal. We used a command to simulate the radar signals. Thus this MAY differ from real DFS signals. Please refer to our DFS test reports for hardware tests on DFS.

Country Code: Czech Republic

Channel : 5500MHz

Test 1: Channel Availability Check Time (CAC)

(The time a system shall monitor a channel for the presence of RADAR prior to initiating a communications link on that channel)

Tested CAC time: 60s (For 5500MHz, 5520MHz,5540MHz,5560MHz)

Tested CAC time: 600s (For 5580MHz-5700MHz)

Status: Passed

Test 2: Channel Move Time

(The time for the system to clear the channel and measured from the end of the RADAR burst to the end of the final transmission on the channel.)

Tested Channel Move Time: 0.01s

Status: Passed

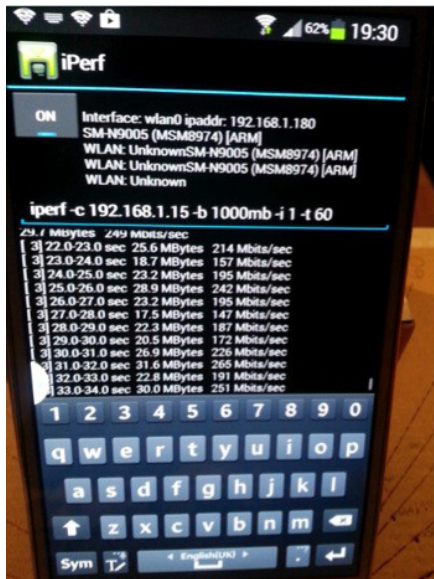
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## 12 Samsung Note 3 (11ac 1x1) Tests with AP (11ac, 3x3)

Tests conducted are mainly to show the throughput from 2 x Samsung Note 3 (1x1 11ac) to our AP (WPJ344+WLE900VX). Iperf is installed on the handphone and on the PC connected via ethernet cable to the AP. Commands used on the

Handphone: `iperf -c 192.168.1.15 -b 1000mb -i 1 -t 60`

PC: `iperf -s -u -i 1`



Each phone average about 200Mbit/s, with peak throughput around 260Mbit/s. Total throughput average around 400Mbit/s, which is near to the 1 stream 802.11ac theoretical data rate of 433.3Mbit/s.

# 13 Multiple Stations (11ac, 2x2) with AP (11ac, 3x3)

Tests conducted are mainly to show the throughput from 2 x WPJ344+WLE600VX (2x2 11ac) acting as Station to our AP (WPJ344+WLE900VX). PC is connected to each of the Station and AP. TCP and UDP tests is conducted from AP to all the Stations.

```

C:\Windows\system32\cmd.exe - iperf -c 192.168.1.15 -b 1000mb -i 1 -t 6000
[ 3]  8.0- 9.0 sec  88.0 MBytes  738 Mbits/sec
[ 3]  9.0-10.0 sec  87.9 MBytes  738 Mbits/sec
[ 3] 10.0-11.0 sec  89.9 MBytes  754 Mbits/sec
[ 3] 11.0-12.0 sec  89.4 MBytes  750 Mbits/sec
[ 3] 12.0-13.0 sec  89.5 MBytes  751 Mbits/sec
[ 3] 13.0-14.0 sec  89.1 MBytes  747 Mbits/sec
[ 3] 14.0-15.0 sec  86.5 MBytes  726 Mbits/sec
[ 3] 15.0-16.0 sec  91.0 MBytes  763 Mbits/sec
[ 3] 16.0-17.0 sec  88.8 MBytes  745 Mbits/sec
[ 3] 17.0-18.0 sec  89.9 MBytes  754 Mbits/sec
[ 3] 18.0-19.0 sec  88.8 MBytes  745 Mbits/sec
[ 3] 19.0-20.0 sec  89.7 MBytes  753 Mbits/sec
[ 3] 20.0-21.0 sec  93.3 MBytes  782 Mbits/sec
[ 3] 21.0-22.0 sec  92.7 MBytes  777 Mbits/sec
[ 3] 22.0-23.0 sec  93.0 MBytes  780 Mbits/sec
[ 3] 23.0-24.0 sec  92.5 MBytes  776 Mbits/sec
[ 3] 24.0-25.0 sec  92.1 MBytes  773 Mbits/sec
[ 3] 25.0-26.0 sec  90.1 MBytes  756 Mbits/sec
[ 3] 26.0-27.0 sec  93.2 MBytes  781 Mbits/sec
[ 3] 27.0-28.0 sec  93.4 MBytes  784 Mbits/sec
[ 3] 28.0-29.0 sec  91.1 MBytes  764 Mbits/sec
[ 3] 29.0-30.0 sec  93.5 MBytes  785 Mbits/sec
[ 3] 30.0-31.0 sec  91.0 MBytes  763 Mbits/sec
[ 3] 31.0-32.0 sec  92.4 MBytes  775 Mbits/sec

C:\Windows\system32\cmd.exe - iperf -c 192.168.1.15 -b 1000mb -i 1 -t 6000
connect failed: Interrupted system call
C:\Users\User\Desktop\iperf-2.0.5-2-win32>iperf -c 192.168.1.15 -b 1000mb -i 1 -t 6000
WARNING: option -b implies udp testing
-----
Client connecting to 192.168.1.15, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size: 64.0 KByte (default)
-----
[ 3] local 192.168.1.20 port 51488 connected with 192.168.1.15 port 5001
[ ID] Interval      Transfer      Bandwidth
[ 3]  0.0- 1.0 sec  90.5 MBytes  759 Mbits/sec
[ 3]  1.0- 2.0 sec  90.9 MBytes  763 Mbits/sec
[ 3]  2.0- 3.0 sec  90.5 MBytes  759 Mbits/sec
[ 3]  3.0- 4.0 sec  90.4 MBytes  758 Mbits/sec
[ 3]  4.0- 5.0 sec  90.0 MBytes  755 Mbits/sec
[ 3]  5.0- 6.0 sec  90.4 MBytes  758 Mbits/sec
[ 3]  6.0- 7.0 sec  89.9 MBytes  754 Mbits/sec
[ 3]  7.0- 8.0 sec  89.4 MBytes  750 Mbits/sec
[ 3]  8.0- 9.0 sec  89.6 MBytes  752 Mbits/sec
[ 3]  9.0-10.0 sec  89.7 MBytes  753 Mbits/sec
[ 3] 10.0-11.0 sec  91.0 MBytes  764 Mbits/sec
[ 3] 11.0-12.0 sec  91.9 MBytes  771 Mbits/sec
    
```

UDP tests shows that it is ~750Mbits/s per station to the AP.



TCP tests shows that the aggregated throughput is around 400Mbits/s. It is around 200Mbits/s per station to the AP.