Kerrisdale Capital: Wi-Fi Adjacent Channel Interference

10/14/2014

Testing the impact of operations using Channel 14 on neighboring networks in Channel 11 (tested inside anechoic chamber)

1. Baseline performance of Ch. 11 (20MHz) with a single client and AP
    *   Macbook Pro (3x3 802.11ac model)
    *   Test with residential grade AP (NETGEAR R7000)
    *   Repeat with enterprise grade AP (Cisco 1262)
2. Introduce interference on Ch. 14
    *   Additional client(s) and AP(s) will be placed in the same room running iperf traffic
    *   Interference will gradually be increased by adding more APs and clients on Ch. 14 (up to four)
    *   Interference APs are to be attenuated out to simulate "nearby" neighboring APs (targeting -60 to -70dBm of RSSI)
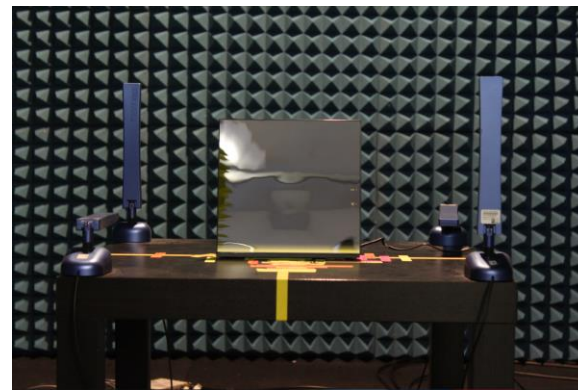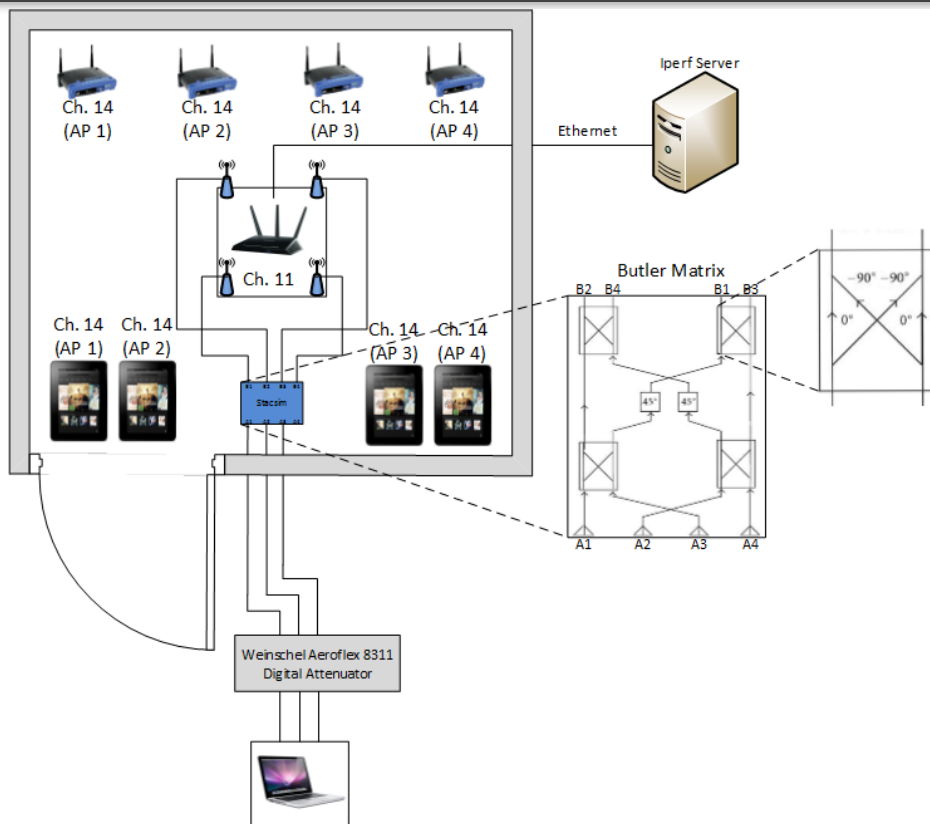   *   Measure throughput on Ch. 11

AP / Client Overview

AP Used

Vendor	NETGEAR	Cisco	Linksys
Model	R7000	1262	WRT54GL
FW Version	V.1.0.3.68_1.1.31	12.4(25d)JA1	Tomato v 1.28

Station System

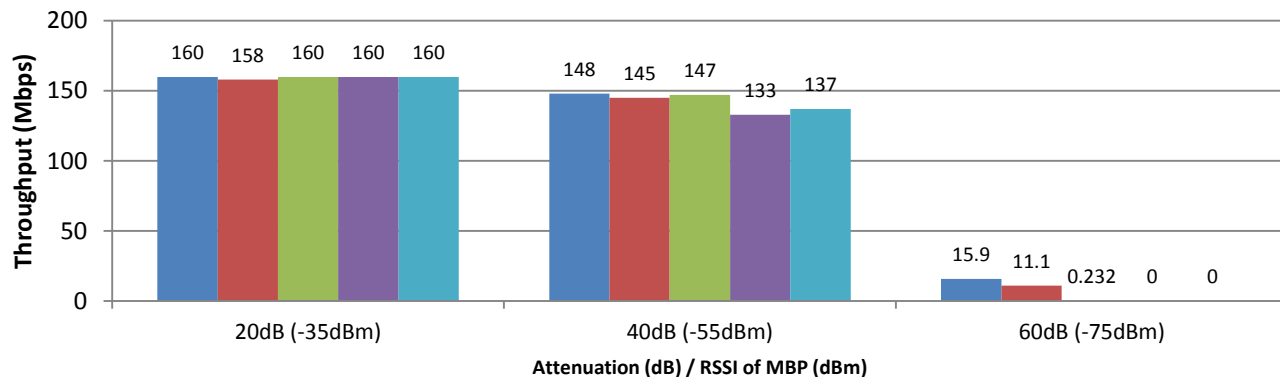| Vendor	Apple
Model	Mac Book Pro 13" (802.11a/b/g/n/ac)
FW Version	10.9.2 (13C64)

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Note:
- 1 client was associated per interfering AP
- MacBook Iperf flags: iperf –c <ip> -w 256K –l 1460 –fm –i1 –P4 –t30
- Tablet Iperf flags: iperf –c <ip> -w 256K –l 1460 –fm –i1 -r –t30

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AP TX (MacBook RX On Ch. 11)

Throughput (Mbps) vs. Attenuation (dB) / RSSI of MBP (dBm)

Attenuation	Baseline	1 interference AP ch. 14	2 interference AP ch. 14	3 interference AP ch. 14	4 interference AP ch. 14
20dB (-35dBm)	160	158	160	160	160
40dB (-55dBm)	148	145	147	133	137
60dB (-75dBm)	15.9	11.1	0.232	0	0

AP RX (MacBook TX On Ch. 11)

Throughput (Mbps) vs. Attenuation (dB) / RSSI of MBP (dBm)

Attenuation	Baseline	1 interference AP ch. 14	2 interference AP ch. 14	3 interference AP ch. 14	4 interference AP ch. 14
20dB (-35dBm)	137	134	137	131	127
40dB (-55dBm)	78	55.9	37.4	31.1	28.5
60dB (-75dBm)	8.78	6.69	0	0	0

Legend: Baseline, 1 interference AP ch. 14, 2 interference AP ch. 14, 3 interference AP ch. 14, 4 interference AP ch. 14
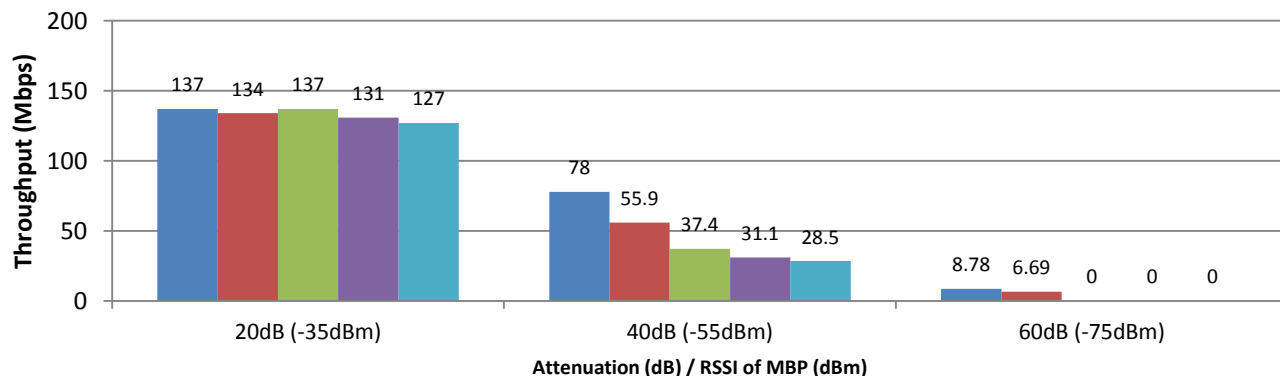
Overview:
- NETGEAR R7000 Settings:
  - Channel: 11 (HT-20)
  - 802.11 Mode: 802.11n
- Linksys WRT54GL:
  - Channel: 14
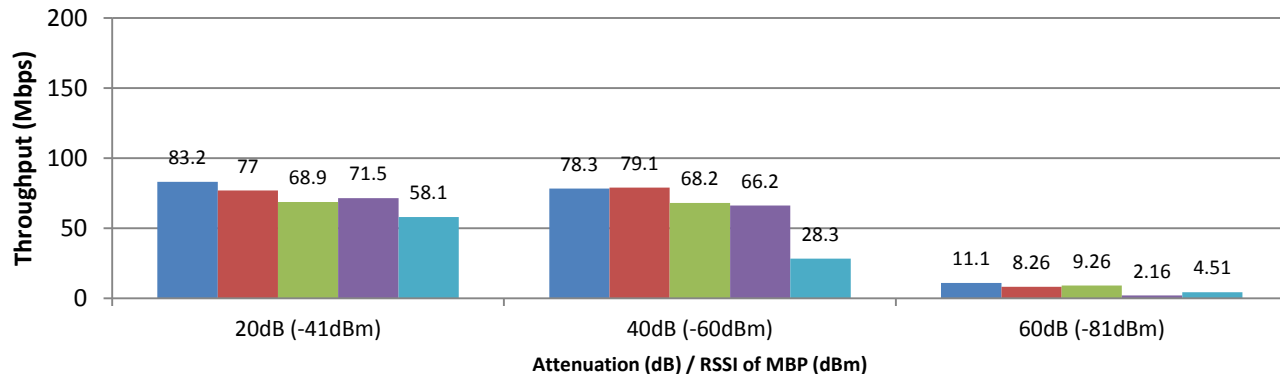 - 802.11 Mode: 802.11b

Observations:
- AP RX saw the largest impact with channel 14 interference
- MacBook was no longer able to pass traffic at 60dB when more than two Ch. 14 clients were running

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Cisco 1262

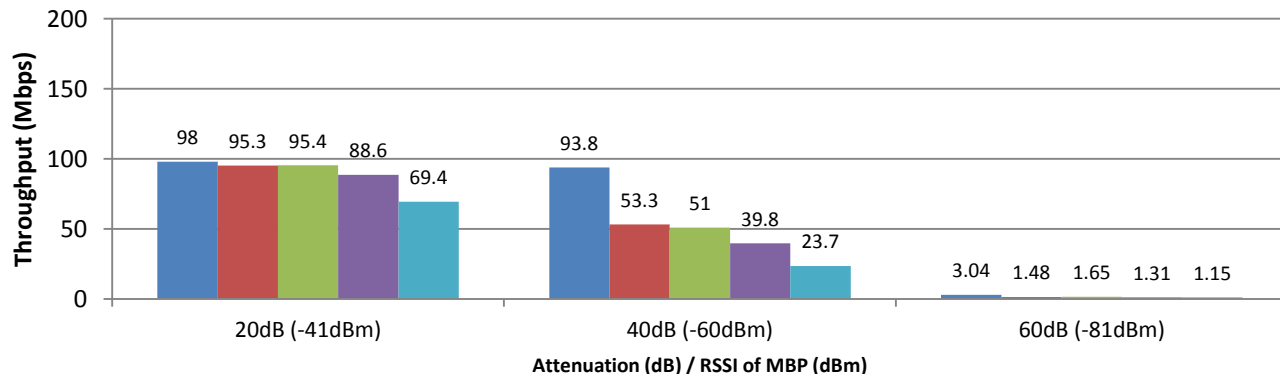## AP TX (MacBook RX On Ch. 11)

Overview:
- Cisco 1262 Settings:
  - Channel: 11 (HT-20)
  - 802.11 Mode: 802.11n
- Linksys WRT54GL:
  - Channel: 14
  - 802.11 Mode: 802.11b

Observations:
- AP RX saw the largest impact with channel 14 interference

AP RX (MacBook TX On Ch. 11)

Legend:
- Baseline
- 1 interference AP ch. 14
- 2 interference AP ch. 14
- 3 interference AP ch. 14
- 4 interference AP ch. 14

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Thank you!

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