

Disable RRM? Ain't Nobody Got Time for That!

Kenneth Fernandes

Product Manager, Wireless Technology and Strategy
ADTRAN, Inc.



@wifiblogdotcom



www.WiFiBlog.com



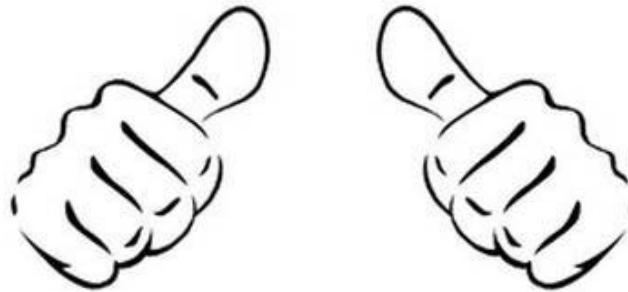
IT Professional Wi-Fi Trek 2016



How Many Disable RRM?



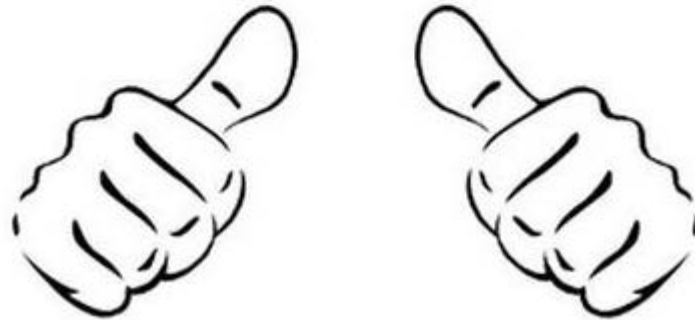
THIS GUY



How Many Leverage RRM?



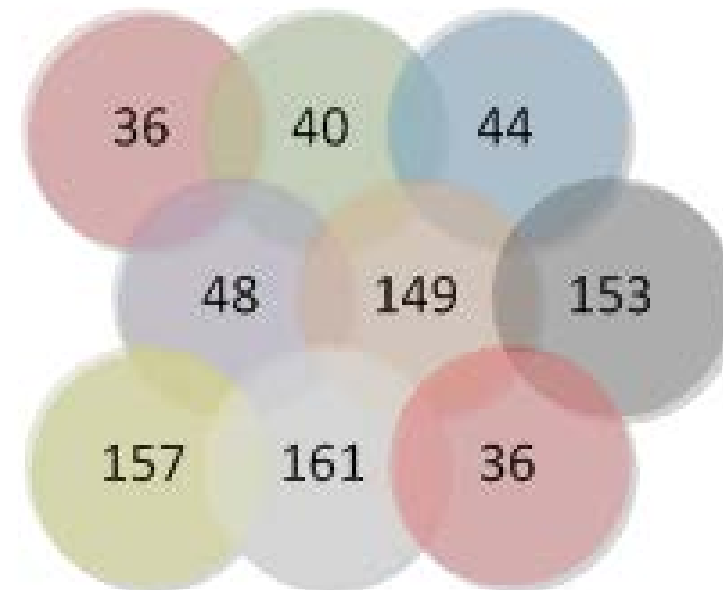
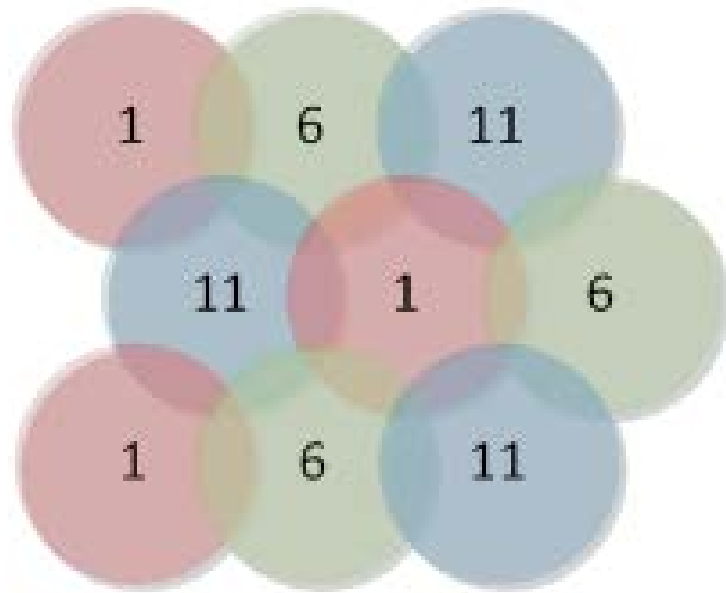
THIS GUY



We Are In the Age of Self Driving Cars

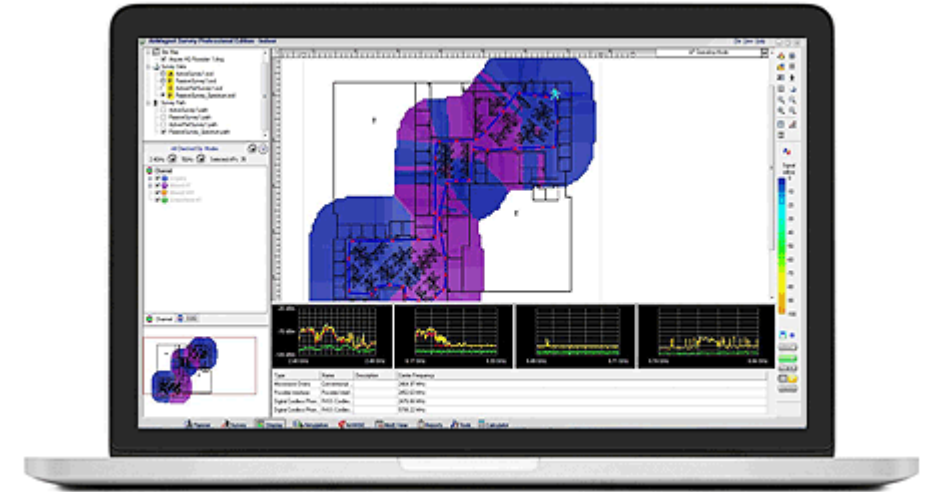


Surely We Can Get This Right!



RRM Does NOT Take the Place of Predictive Designs, Onsite Surveys and Policies!

- Engineering and design required
 - Determines requirements, AP placement/installation locations
- Leverage knobs and dials of RRM to stay within bounds
- Strong corporate policies allow you to remove interference sources – printers, rogue APs, video cameras, etc.



Look for Flexible Modes of Operation

1. Dual AP/Sensor Mode, Continuous
2. Dual AP/Sensor Mode, Continuous - App/Client Aware
3. Dedicated Security/Scanning Radios
4. AP Mode, Set Once and Hold

Per Radio Setting	
Attribute	802.11b/g/n (2.4 GHz)
Radio Mode	AP/Sensor Mode ▾
DynamicRF Profile	default ▾

802.11a/n/ac (5 GHz)	
Radio Mode	AP/Sensor Mode ▾
DynamicRF Profile	default ▾

Edit DynamicRF Profile

Name

DynamicRF Mode
Setting to Continuous mode will cause all associated AP Templates in AP Mode to move to AP/Sensor Mode.

Enable Dynamic Channel Configuration ☒

Enable Dynamic Transmit Power Configuration ☒

Advanced

[Show](#) | [Delete](#) | [Create](#) | [Back](#)



Dual AP/Sensor Mode, Continuous

Responsive to changes in RF environment but may impact real-time applications and high throughput environments

- Services clients on the current channel while non-intrusively performing off-channel background scanning on other channels for sources of interference (802.11 and non-802.11)
 - Scanning performed every X seconds with a dwell time of Y milliseconds – Understand what X and Y is for your vendor!
 - While scanning is non service impacting, does allocate minimal airtime to performing scans and as such may result in a negligible performance decrease
- Continuously adapts to changes in the RF environment by auto changing channel and TX power settings as appropriate
 - Channel Switch Announcement (CSA) sent to notify clients of channel change. Make sure your vendor sends out CSA!
 - May impact real-time applications and high throughput environments
 - Optional Set Once and Hold mode provides suggestions to admin to be applied on demand or scheduled

Dual AP/Sensor Mode, Continuous – App/Client Aware

Responsive to changes in RF environment when there are no active clients or specific apps such as voice

- Services clients on the current channel while non-intrusively performing off-channel background scanning on other channels for sources of interference (802.11 and non)
 - Scanning performed every X seconds with a dwell time of Y milliseconds – Understand what X and Y is for your vendor!
 - While scanning is non service impacting, does allocate minimal airtime to performing scans and as such may result in a negligible performance decrease
- Continuously adapts to changes in the RF environment by auto changing channel and TX power settings as appropriate but DOES NOT scan or change settings while there are active clients or voice calls
 - Channel Switch Announcement (CSA) sent to notify clients of channel change. Make sure your vendor sends out CSA!
 - Great option for high throughput and real time application environments
 - Optional Set Once and Hold mode provides suggestions to admin to be applied on demand or scheduled

Dedicated Security/Scanning Radio

Most Responsive to changes in RF environment

Services clients on 2.4 and 5 GHz radios while a dual band dedicated scanning/security radio performs scanning on other channels for sources of interference (802.11 and non)

- Scans through channels faster and can dwell longer with no performance impact since radio is dedicated to scanning.
- Continuously adapts to changes in the RF environment by auto changing channel and TX power settings as appropriate
 - Channel Switch Announcement (CSA) sent to notify clients of channel change. Make sure your vendor sends out CSA!
 - Can be Application or Client aware NOT changing settings while there are active clients or voice calls.
 - Best option for high throughput and real time application environments
 - Optional Set Once and Hold mode provides suggestions to admin to be applied on demand or scheduled



AP Mode, Set Once and Hold

Least responsive to changes in RF environment but most stable

- Performs foreground scanning (Sensor/Channel Scanning) during boot up, sets channel and TX power settings and holds thereafter
 - Does not perform off-channel background scanning on other channels after initial boot up period but instead only looks at the current channel it is on
- Will not continuously adapt to changes in the RF environment. Requires manual or scheduled off-channel background scan
- Can automatically change channel and TX power settings during manually run or scheduled background scan, or provide suggestions that can be applied manually or scheduled later
- Some vendors require you let RRM converge and then disable to accomplish

Multiple RRM Profiles

- Assign to groups of APs
 - Very High Density
 - High Density
 - Medium Density
 - Low Density
- Different profile for 2.4 GHz vs 5

Name
VHD
Medium Density
Low Density
HD
default

Showing 1 to 5 of 5 entries

[Create DynamicRF Profile](#)

Per Radio Setting	
Attribute	802.11b/g/n (2.4 GHz)
Radio Mode	<input type="text" value="AP/Sensor Mode"/>
DynamicRF Profile	<input type="text" value="default"/>
	802.11a/n/ac (5 GHz)
	<input type="text" value="AP/Sensor Mode"/>
	<input type="text" value="default"/>



RRM Statistics Build Trust – You Can’t Fix What you Don’t Monitor/Measure

- List of co-channel/adjacent channel interferers and number per channel
- Noise
- Channel Utilization
- Phy/Mac Errors
- Channel and TX Power changes and why
- Client Signal, TX Rate, Usage

DynamicRF Statistics

802.11b/g/n (2.4Ghz)

Channel	1	2	3	4	5	6	7	8	9	10	11
Co-Channel APs	36	0	0	1	0	42	1	2	0	0	47
Adjacent-Channel APs	1	79	80	81	82	4	92	91	92	92	3

802.11a/n/ac (5Ghz)

Channel	36	40	44	48	149	153	157	161
Co-Channel APs	1	1	2	1	2	2	0	1

Interfaces

Type	Radio Mode	Wireless Mode	Channel	Tx power	Noise Floor	Clients	Adjacent Aps	Co-Channel Aps	AdjacentChannel Aps	Channel Utilization
802.11b/g/n (2.4 GHz)	AP/Sensor Mode	b/g/n	1 (20 MHz)	19 dBm	-108 dBm	3	129	36	1	45%
802.11a/n/ac (5 GHz)	AP/Sensor Mode	a/n/ac	36 (40 MHz)	20 dBm	N/A	3	10	2		1%
Unified Access										
Total										

Source MAC	SSID	Primary Channel	Channel Range	Signal (dBm)	Sensor Name	Last Seen
B2:CA:B5:E3:63:50	<no ssid>	11	11 (20 MHz)	-58	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
B6:CA:B5:E3:63:50	xfinitywifi	1	1 (20 MHz)	-58	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
46:32:C8:EA:69:09	<no ssid>	1	1 (20 MHz)	-58	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
44:32:C8:EA:69:08	HOME-6908	1	1 (20 MHz)	-58	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
46:32:C8:EA:69:0A	xfinitywifi	1	1 (20 MHz)	-59	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:10 UTC
BC:CA:B5:E3:63:50	HOME-6352	1	1 (20 MHz)	-62	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:10 UTC
B8:3E:59:84:4C:E9	<no ssid>	11	11 (20 MHz)	-63	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
00:31:73:9E:72:C8	snv	8	8 (20 MHz)	-68	BSAP2030-00-19-92-3d-17-80	2016-09-27 17:41:30 UTC
54:BE:F7:D6:E4:B0	HOME-1C18-2.4	6	6 (20 MHz)	-72	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
54:BE:F7:D6:E4:B1	<no ssid>	11	11 (20 MHz)	-73	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
54:BE:F7:D6:E4:B2	xfinitywifi	6	6 (20 MHz)	-73	BSAP2030-00-19-92-3d-17-80	2016-09-27 18:17:11 UTC
F0:AB:54:42:33:1D	The Bugs	1	1 (20 MHz)	-74	BSAP2030-00-19-92-3d-17-80	2016-09-16 22:18:22 UTC
92:87:7C:54:45:90	<no ssid>	1	1 (20 MHz)	-76	BSAP2030-00-19-92-3d-17-80	2016-09-25 16:26:31 UTC
58:23:8C:B3:BF:57	dreamcatchers	1	1 (20 MHz)	-76	BSAP2030-00-19-92-3d-17-80	2016-09-27 09:33:24 UTC

Knobs and Dials - Set Bounds

- Enable/disable channel and TX power independently
- TX Power Threshold
- Min/Max TX Power

Edit DynamicRF Profile

Name

DynamicRF Mode Setting to Continuous mode will cause all associated AP Templates in AP Mode to move to AP/Sensor Mode.

Enable Dynamic Channel Configuration ☒

Enable Dynamic Transmit Power Configuration ☒

Advanced

Transmit Power Interference Threshold dBm Enter a number from 35 to 94.

Minimum Transmit Power

Maximum Transmit Power When these are equal, DynamicRF will always use that specific power level for transmission.

[Show](#) | [Delete](#) | [Create](#) | [Back](#)



Smart Vendor Defaults or Tune it Up

- 20 or 40 MHz mode on 5 GHz
 - Not 80!
- Don't deploy 36+ and 40- on neighboring APs
- Higher TX Power on 5 GHz radios
 - 5 GHz is priority, 2.4 GHz is best effort!
- Small Min/Max TX power Range
 - Prevents small cell/big cell. Some suggest +-3 dB
- Min Transmit Rates
- Disable Excess 2.4 GHz radios

Attribute	802.11b/g/n (2.4 GHz)	802.11a/n/ac (5 GHz)
Radio Mode	AP/Sensor Mode ▾	AP/Sensor Mode ▾
DynamicRF Profile	default ▾	default ▾
Wireless Mode	802.11b/g/n ▾	802.11a/n/ac ▾
Minimum Transmit Rate	24 Mbps ▾	24 Mbps ▾ <small>802.11a/n/ac is treated as 802.11a/n for 1800 and 1900 series APs</small>
Channel Width	20 MHz ▾	40 MHz ▾ <small>For 2000/2100 Series APs, any value is treated as 'No Minimum'</small>
Enable Packet Aggregation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <small>A value that is larger than the AP supports will be treated as the highest supported value</small>
Beacon Interval (ms)	200	100 <small>Aggregation is always enabled on the 5 GHz radio for 2000/2100 series APs</small>



RRM Plays Nice with DFS

- Stagger DFS and non-DFS channels
- Channel picked by RRM or random/predefined?
- Automatically or manually exclude DFS channels with real events
- Returns back to original channel after event?
 - False positives are common and can wreak havoc on original channel plan over time
- Transmit Power Control (TPC)



Summary

- 1.Look for flexible modes of operation - avoid 1 size fits all approach
- 2.Understand your vendor's approaches and the tradeoffs
- 3.Leverage knobs and dials to set bounds
- 4.Look for smart vendor defaults or tune it up

