

APPENDIX I: IEEE 802.11AX RU SAR EXCLUSION

I.1 IEEE 802.11ax RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T, 996T and 996Tx2.

Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

I.2 IEEE 802.11ax RU Target Powers

I.2.1 Maximum 802.11ax RU WLAN Output Power

Tones		SISO (WiFi Main/Sub in MIMO Mode) /in dBm				
		2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz	5GHz/160MHz
26T	Maximum	9	9	9	9	9
52T	Maximum	11.5	11.5	11.5	11.5	11.5
106T	Maximum	14	11.5	11.5	11.5	11.5
242T	Maximum	14	11.5	11.5	11.5	11.5
484T	Maximum			11.5	11.5	11.5
996T	Maximum			11.5	11.5	11.5
996T*2	Maximum					9.5

	SISO (WiFi Main/Sub in MIMO Mode) /in dBm			
	6G 20MHz	6G 40MHz	6G 80MHz	6G 160MHz
26T	-3.5	-3.5	-3.5	-3.5
52T	-0.5	-0.5	-0.5	-0.5
106T	2.5	2.5	2.5	2.5
242T	5.0	5.0	5.0	5.0
484T		8.0	8.0	8.0
996T			11.5	11.5
996T X2				11.5

Note: In MIMO operations, each Wifi Main and Wifi Sub transmits at maximum allowed powers as indicated above.

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I.2.1 Reduced 802.11ax RU WLAN Output Power During Conditions with Simultaneous 2.4 GHz WLAN and 5 GHz WLAN

The below table is applicable during simultaneous conditions with 2.4 GHz and 5 GHz WLAN.

Tones		SISO (Wifi Main/Sub in MIMO Mode) /in dBm				
		2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz	5GHz/160MHz
26T	Maximum	9	9	9	9	9
						ch 50: 6.0 ch 114: 7.0
52T	Maximum	11	9.5	9.5	9.5	9.5
106T	Maximum	11	9.5	9.5	9.5	9.5
242T	Maximum	11	9.5	9.5	9.5	9.5
484T	Maximum			9.5	9.5	9.5
						ch 50: 9.0 ch 114: 8.0
996T	Maximum				9.5	9.5
						ch 114: 9.0
996T*2	Maximum					9.5
						ch 114: 9.0

	SISO (WiFi Main/Sub in MIMO Mode) /in dBm			
	6G 20MHz	6G 40MHz	6G 80MHz	6G 160MHz
26T	-3.5	-3.5	-3.5	-3.5
52T	-0.5	-0.5	-0.5	-0.5
106T	2.5	2.5	2.5	2.5
242T	5.0	5.0	5.0	5.0
	UNII-8: 6.5	UNII-8: 6.5	UNII-8: 6.5	UNII-8: 6.5
484T		8.0	8.0	8.0
		UNII-8: 9.5	UNII-8: 9.5	UNII-8: 9.5
996T			9.5	9.5
996T X2				9.5

Note: In MIMO operations, each Wifi Main and WiFi Sub transmits at maximum allowed powers as indicated above.

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I.3 IEEE 802.11ax Measured Powers

Table I-1
Maximum 2.4 GHz 802.11ax RU Output Power – MIMO

Freq [MHz]	Channel	Tones	RU Index	Conducted Power [dBm]		
				Antenna-1	Antenna-2	MIMO
2412	1	26T	4	8.75	7.54	11.20
2437	6	26T	4	8.91	7.44	11.25
2462	11	26T	4	8.55	7.86	11.23

Freq [MHz]	Channel	Tones	RU Index	Conducted Power [dBm]		
				Antenna-1	Antenna-2	MIMO
2412	1	52T	38	11.30	10.10	13.75
2437	6	52T	38	11.49	10.44	14.01
2462	11	52T	38	11.28	10.55	13.94

Freq [MHz]	Channel	Tones	RU Index	Conducted Power [dBm]		
				Antenna-1	Antenna-2	MIMO
2412	1	106T	53	13.41	12.85	16.15
2437	6	106T	53	13.99	13.29	16.66
2462	11	106T	53	13.89	13.21	16.57

Freq [MHz]	Channel	Tones	RU Index	Conducted Power [dBm]		
				Antenna-1	Antenna-2	MIMO
2412	1	242T	61	13.34	12.92	16.15
2437	6	242T	61	13.90	12.78	16.39
2462	11	242T	61	13.58	12.82	16.23

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Table I-2
Maximum 5 GHz 802.11ax RU Output Power – MIMO

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 18		
					ANT1	ANT2	MIMO
	1	5210	42	26T	8.63	7.42	11.08
	2A	5290	58	26T	8.73	7.08	10.99
	2C	5530	106	26T	8.88	7.92	11.44
		5610	122	26T	8.48	8.82	11.66
		5690	138	26T	8.58	8.55	11.58
	3	5775	155	26T	8.66	8.99	11.84

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 44		
					ANT1	ANT2	MIMO
	1	5210	42	52T	11.40	10.27	13.88
	2A	5290	58	52T	11.49	9.86	13.76
	2C	5530	106	52T	11.48	10.63	14.09
		5610	122	52T	11.12	11.37	14.26
		5690	138	52T	11.12	11.19	14.17
	3	5775	155	52T	10.77	11.46	14.14

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 56		
					ANT1	ANT2	MIMO
	1	5210	42	106T	11.33	10.19	13.81
	2A	5290	58	106T	11.49	9.82	13.75
	2C	5530	106	106T	11.45	10.63	14.07
		5610	122	106T	11.12	11.25	14.20
		5690	138	106T	11.11	11.15	14.14
	3	5775	155	106T	10.63	11.43	14.06

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 62		
					ANT1	ANT2	MIMO
	1	5210	42	242T	11.39	10.23	13.86
	2A	5290	58	242T	11.49	9.90	13.78
	2C	5530	106	242T	10.99	10.10	13.58
		5610	122	242T	11.18	11.32	14.26
		5690	138	242T	11.17	11.22	14.21
	3	5775	155	242T	10.69	11.46	14.10

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 65		
					ANT1	ANT2	MIMO
	1	5210	42	484T	10.49	9.26	12.93
	2A	5290	58	484T	11.48	9.80	13.73
	2C	5530	106	484T	9.49	8.84	12.19
		5610	122	484T	11.15	11.49	14.33
		5690	138	484T	11.21	11.47	14.35
	3	5775	155	484T	10.83	11.49	14.18

80MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 67		
					ANT1	ANT2	MIMO
	1	5210	42	996T	11.48	10.46	14.01
	2A	5290	58	996T	11.49	10.05	13.84
	2C	5530	106	996T	10.99	10.44	13.73
		5610	122	996T	11.29	11.48	14.40
		5690	138	996T	11.32	11.49	14.42
	3	5775	155	996T	11.26	10.36	13.84

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Table I-3
Maximum 6 GHz 802.11ax RU Output Power – MIMO

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)								
					RU Index: 0 (L)			RU Index: 36 (L)			RU Index: 36 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
	5	6025	15	26T	-3.51	-4.06	-0.77	-3.57	-4.21	-0.87	-3.89	-4.42	-1.14
		6185	47	26T	-3.68	-4.89	-1.23	-3.74	-4.8	-1.23	-3.51	-4.29	-0.87
		6345	79	26T	-3.71	-5.41	-1.47	-3.56	-5.11	-1.26	-3.52	-5.07	-1.22
	6	6505	111	26T	-3.51	-4.48	-0.96	-3.84	-4.85	-1.31	-3.81	-5.09	-1.39
	7	6665	143	26T	-3.52	-4.38	-0.92	-3.61	-4.87	-1.18	-3.67	-4.99	-1.27
		6825	175	26T	-3.94	-4.21	-1.06	-3.7	-4.08	-0.88	-3.51	-3.87	-0.68
	8	6985	207	26T	-3.51	-3.98	-0.73	-3.66	-3.94	-0.79	-3.71	-3.58	-0.63

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)								
					RU Index: 37 (L)			RU Index: 52 (L)			RU Index: 52 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
	5	6025	15	52T	-0.57	-1.16	2.16	-0.55	-0.75	2.36	-0.53	-0.84	2.33
		6185	47	52T	-0.69	-0.64	2.35	-1.2	-1.44	1.69	-1.33	-1.66	1.52
		6345	79	52T	-0.69	-1.37	1.99	-0.52	-0.85	2.33	-0.92	-1.78	1.68
	6	6505	111	52T	-0.95	-1.5	1.79	-0.52	-0.87	2.32	-0.55	-1.08	2.20
	7	6665	143	52T	-0.72	-1.33	2.00	-0.55	-0.97	2.26	-0.51	-1.55	2.01
		6825	175	52T	-0.71	-0.66	2.33	-0.51	-0.833	2.34	-0.71	-1.32	2.01
	8	6985	207	52T	-0.51	-0.85	2.33	-0.66	-0.55	2.41	-1.34	-0.56	2.08

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)								
					RU Index: 53 (L)			RU Index: 60 (L)			RU Index: 60 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
	5	6025	15	106T	2.03	2.33	5.19	2.20	2.45	5.34	1.85	2.34	5.11
		6185	47	106T	1.97	2.04	5.02	2.38	2.5	5.45	2.13	2.47	5.31
		6345	79	106T	2.45	2.09	5.28	2.39	1.89	5.16	2.45	1.78	5.14
	6	6505	111	106T	2.27	1.54	4.93	2.48	2.14	5.32	2.41	2.1	5.27
	7	6665	143	106T	2.49	1.78	5.16	2.49	1.52	5.04	2.49	1.64	5.10
		6825	175	106T	2.1	1.97	5.05	2.48	2.16	5.33	2.49	1.75	5.15
	8	6985	207	106T	2.29	2.12	5.22	2.01	2.15	5.09	2.02	2.48	5.27

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)								
					RU Index: 61			RU Index: 64 (L)			RU Index: 64 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
	5	6025	15	242T	4.65	4.55	7.61	4.70	4.78	7.75	4.55	4.62	7.60
		6185	47	242T	4.75	4.63	7.70	4.85	4.62	7.75	4.78	4.92	7.86
		6345	79	242T	4.35	4.52	7.45	4.55	4.49	7.53	4.55	4.48	7.53
	6	6505	111	242T	4.48	4.38	7.44	4.37	4.52	7.46	4.62	4.58	7.61
	7	6665	143	242T	4.55	4.59	7.58	4.53	4.63	7.59	4.52	4.45	7.50
		6825	175	242T	4.61	4.56	7.60	4.65	4.47	7.57	4.23	4.59	7.42
	8	6985	207	242T	6.49	6.03	9.28	6.23	5.78	9.02	5.91	5.89	8.91

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)								
					RU Index: 65			RU Index: 66 (L)			RU Index: 66 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
	5	6025	15	484T	7.78	7.95	10.88	7.82	7.93	10.89	7.78	7.89	10.85
		6185	47	484T	7.76	7.83	10.81	7.85	7.66	10.77	7.79	7.78	10.80
		6345	79	484T	7.72	7.52	10.63	7.75	7.67	10.72	7.62	7.66	10.65
	6	6505	111	484T	7.49	7.56	10.54	7.48	7.54	10.52	7.51	7.63	10.58
	7	6665	143	484T	7.83	7.59	10.72	7.41	7.68	10.56	7.34	7.72	10.54
		6825	175	484T	7.48	7.68	10.59	7.42	7.48	10.46	7.39	7.44	10.43
	8	6985	211	484T	9.07	9.10	12.10	9.11	9.42	12.28	9.10	9.15	12.14

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160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)					
					RU Index: 67 (L)			RU Index: 67 (U)		
					ANT1	ANT2	MIMO	ANT1	ANT2	MIMO
5		6025	15	996T	10.88	10.94	13.92	10.91	10.93	13.93
		6185	47	996T	11.49	11.33	14.42	11.36	11.26	14.32
		6345	79	996T	10.88	11.18	14.04	10.80	11.25	14.04
6		6505	111	996T	11.36	11.58	14.48	11.44	11.34	14.40
7		6665	143	996T	11.27	11.26	14.28	11.28	11.31	14.31
		6825	175	996T	10.97	11.16	14.08	10.93	11.08	14.02
8		6985	207	996T	10.54	10.78	13.67	10.44	10.92	13.70

160MHz BW	Band	Freq [MHz]	Channel	Tones	Average Conducted Power (dBm)		
					RU Index: 68		
					ANT1	ANT2	MIMO
5		6025	15	2x996T	10.65	10.99	13.83
		6185	47	2x996T	11.42	11.49	14.47
		6345	79	2x996T	10.84	10.99	13.93
6		6505	111	2x996T	11.16	11.05	14.12
7		6665	143	2x996T	11.48	11.3	14.40
		6825	175	2x996T	10.84	11.36	14.12
8		6985	207	2x996T	10.54	10.88	13.72

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