

# APPENDIX I: IEEE 802.11AX RU SAR EXCLUSION

## 1.1 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 and 996T.

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.

## 1.2 IEEE 802.11ax RU Target Powers

### 1.2.1 Maximum 802.11ax RU WLAN Output Power

| Tones |         | SISO (Ant 1) /in dBm                    |                           |  |            |
|-------|---------|---|---------------------------|--|------------|
|       |         | 2.4GHz                                  | 5GHz/20MHz                | 5GHz/40MHz                               | 5GHz/80MHz |
| 26T   | Maximum | 13                                      | 11                        | 11                                       | 11         |
|       |         | ch. 12 8.0<br>ch. 13 2.0                | ch. 48 8.0                |  |            |
|       | Nominal | 12                                      | 10                        | 10                                       | 10         |
|       |         | ch. 12 7.0<br>ch. 13 1.0                | ch. 48 7.0                |  |            |
| 52T   | Maximum | 14                                      | 12                        | 12                                       | 12         |
|       |         | ch. 12 8.0<br>ch. 13 2.0                | ch. 48 11.0               |  |            |
|       | Nominal | 13                                      | 11                        | 11                                       | 11         |
|       |         | ch. 12 7.0<br>ch. 13 1.0                | ch. 48 10.0               |  |            |
| 106T  | Maximum | 14                                      | 12                        | 12                                       | 12         |
|       |         | ch. 12 8.0<br>ch. 13 2.0<br>ch 13: 15.5 | ch 1:<br>ch 11:<br>ch 13: |  |            |
|       | Nominal | 13                                      | 11                        | 11                                       | 11         |
|       |         | ch. 12 7.0<br>ch. 13 1.0<br>ch 13: 14.5 | ch 1:<br>ch 11:<br>ch 13: |  |            |
| 242T  | Maximum | 15                                      | 12                        | 12                                       | 12         |
|       |         | ch. 12 8.0<br>ch. 13 2.0                | ch 3: 13                  |  |            |
|       | Nominal | 14                                      | 11                        | 11                                       | 11         |
|       |         | ch. 12 7.0<br>ch. 13 1.0                | ch 3: 12.0                |  |            |
| 484T  | Maximum |   |                           | 12                                       | 12         |
|       |         |   |                           | ch. 38: 11.0<br>ch. 62: 11.0             |            |
|       | Nominal |   |                           | 11                                       | 11         |
|       |         |   |                           | ch. 38: 10.0<br>ch. 62: 10.0             |            |
| 996T  | Maximum |   |                           | 12                                       | 12         |
|       |         |   |                           | ch. 42: 9.0<br>ch. 58 9.0<br>ch. 106 9.0 |            |
|       | Nominal |   |                           | 11                                       | 11         |
|       |         |   |                           | ch. 42: 8.0<br>ch. 58 8.0<br>ch. 106 8.0 |            |

|  |   |                       |   |                                 |
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### 1.3 IEEE 802.11ax Measured Powers

Table 1  
Maximum 2.4 GHz 802.11ax RU Output Power

| Freq [MHz] | Channel | Tones | RU Index | Avg Conducted Powers (dBm) | Freq [MHz] | Channel | Tones | RU Index | Avg Conducted Powers (dBm) |
|------------|---------|-------|----------|----------------------------|------------|---------|-------|----------|----------------------------|
| 2412       | 1       | 26T   | 0        | 12.74                      | 2412       | 1       | 52T   | 37       | 13.64                      |
|            |         |       | 4        | 12.81                      |            |         |       | 38       | 13.75                      |
|            |         |       | 8        | 12.76                      |            |         |       | 40       | 13.63                      |
| 2437       | 6       | 26T   | 0        | 12.99                      | 2437       | 6       | 52T   | 37       | 13.85                      |
|            |         |       | 4        | 12.61                      |            |         |       | 38       | 13.98                      |
|            |         |       | 8        | 12.99                      |            |         |       | 40       | 13.66                      |
| 2462       | 11      | 26T   | 0        | 12.99                      | 2462       | 11      | 52T   | 37       | 13.76                      |
|            |         |       | 4        | 12.85                      |            |         |       | 38       | 13.86                      |
|            |         |       | 8        | 12.61                      |            |         |       | 40       | 13.89                      |

| Freq [MHz] | Channel | Tones | RU Index | Avg Conducted Powers (dBm) | Freq [MHz] | Channel | Tones | RU Index | Avg Conducted Powers (dBm) |
|------------|---------|-------|----------|----------------------------|------------|---------|-------|----------|----------------------------|
| 2412       | 1       | 106T  | 53       | 13.79                      | 2412       | 1       | 242T  | 61       | 14.77                      |
|            |         |       | 54       | 13.64                      |            |         |       |          |                            |
| 2437       | 6       | 106T  | 53       | 13.85                      | 2437       | 6       | 242T  | 61       | 14.69                      |
|            |         |       | 54       | 13.92                      |            |         |       |          |                            |
| 2462       | 11      | 106T  | 53       | 13.82                      | 2462       | 11      | 242T  | 61       | 14.89                      |
|            |         |       | 54       | 13.79                      |            |         |       |          |                            |

Table 2  
Maximum 5 GHz 802.11ax RU Output Power

| 20MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |       | 20MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |       |
|----------|------|------------|---------|-------|---------------------------|-------|-------|----------|------|------------|---------|-------|---------------------------|-------|-------|
|          |      |            |         |       | RU Index                  |       |       |          |      |            |         |       | RU Index                  |       |       |
|          |      |            |         |       | 0                         | 4     | 8     |          |      |            |         |       | 37                        | 39    | 40    |
| 20MHz BW | 1    | 5180       | 36      | 26T   | 10.99                     | 10.60 | 10.99 | 20MHz BW | 1    | 5180       | 36      | 52T   | 11.96                     | 11.72 | 11.77 |
|          |      | 5200       | 40      | 26T   | 10.62                     | 10.62 | 10.99 |          |      | 5200       | 40      | 52T   | 11.95                     | 11.70 | 11.84 |
|          |      | 5240       | 48      | 26T   | 7.72                      | 7.75  | 7.61  |          |      | 5240       | 48      | 52T   | 10.87                     | 10.65 | 10.79 |
|          | 2A   | 5260       | 52      | 26T   | 10.80                     | 10.80 | 10.78 |          | 2A   | 5260       | 52      | 52T   | 11.68                     | 11.92 | 11.99 |
|          |      | 5280       | 56      | 26T   | 10.95                     | 10.99 | 10.90 |          |      | 5280       | 56      | 52T   | 11.87                     | 11.98 | 11.69 |
|          |      | 5320       | 64      | 26T   | 10.70                     | 10.79 | 10.67 |          |      | 5320       | 64      | 52T   | 11.59                     | 11.82 | 11.97 |
|          | 2C   | 5500       | 100     | 26T   | 10.86                     | 10.91 | 10.85 |          | 2C   | 5500       | 100     | 52T   | 11.67                     | 11.91 | 11.99 |
|          |      | 5600       | 120     | 26T   | 10.74                     | 10.85 | 10.74 |          |      | 5600       | 120     | 52T   | 11.98                     | 11.71 | 11.84 |
|          |      | 5720       | 144     | 26T   | 10.99                     | 10.99 | 10.91 |          |      | 5720       | 144     | 52T   | 11.76                     | 11.89 | 11.60 |
| 3        | 5745 | 149        | 26T     | 10.69 | 10.76                     | 10.59 | 3     | 5745     | 149  | 52T        | 11.92   | 11.60 | 11.73                     |       |       |
|          | 5785 | 157        | 26T     | 10.98 | 10.99                     | 10.83 |       | 5785     | 157  | 52T        | 11.85   | 11.94 | 11.99                     |       |       |
|          | 5825 | 165        | 26T     | 10.66 | 10.72                     | 10.99 |       | 5825     | 165  | 52T        | 11.99   | 11.99 | 11.72                     |       |       |




|  |   |                       |   |                                 |
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| 20MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |    |     | 20MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |     |     |
|----------|------|------------|---------|-------|---------------------------|----|-----|----------|------|------------|---------|-------|---------------------------|-----|-----|
|          |      |            |         |       | RU Index                  |    |     |          |      |            |         |       | RU Index                  |     |     |
|          |      |            |         |       | 53                        | 54 | N/A |          |      |            |         |       | 61                        | N/A | N/A |
| 1        | 5180 | 36         | 106T    | 11.97 | 11.93                     |    | 1   | 5180     | 36   | 242T       | 11.87   |       |                           |     |     |
|          | 5200 | 40         | 106T    | 11.99 | 11.96                     |    |     | 5200     | 40   | 242T       | 11.84   |       |                           |     |     |
|          | 5240 | 48         | 106T    | 11.97 | 11.82                     |    |     | 5240     | 48   | 242T       | 11.90   |       |                           |     |     |
| 2A       | 5260 | 52         | 106T    | 11.70 | 11.61                     |    | 2A  | 5260     | 52   | 242T       | 11.60   |       |                           |     |     |
|          | 5280 | 56         | 106T    | 11.87 | 11.69                     |    |     | 5280     | 56   | 242T       | 11.72   |       |                           |     |     |
|          | 5320 | 64         | 106T    | 11.66 | 11.99                     |    |     | 5320     | 64   | 242T       | 11.99   |       |                           |     |     |
| 2C       | 5500 | 100        | 106T    | 11.61 | 11.60                     |    | 2C  | 5500     | 100  | 242T       | 11.59   |       |                           |     |     |
|          | 5600 | 120        | 106T    | 11.99 | 11.97                     |    |     | 5600     | 120  | 242T       | 11.97   |       |                           |     |     |
|          | 5720 | 144        | 106T    | 11.87 | 11.68                     |    |     | 5720     | 144  | 242T       | 11.71   |       |                           |     |     |
| 3        | 5745 | 149        | 106T    | 11.99 | 11.94                     |    | 3   | 5745     | 149  | 242T       | 11.87   |       |                           |     |     |
|          | 5785 | 157        | 106T    | 11.94 | 11.77                     |    |     | 5785     | 157  | 242T       | 11.74   |       |                           |     |     |
|          | 5825 | 165        | 106T    | 11.99 | 11.89                     |    |     | 5825     | 165  | 242T       | 11.92   |       |                           |     |     |

| 40MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    | 40MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |    |    |
|----------|------|------------|---------|-------|---------------------------|-------|----|----------|------|------------|---------|-------|---------------------------|----|----|
|          |      |            |         |       | RU Index                  |       |    |          |      |            |         |       | RU Index                  |    |    |
|          |      |            |         |       | 0                         | 8     | 17 |          |      |            |         |       | 37                        | 40 | 44 |
| 1        | 5190 | 38         | 26T     | 10.67 | 10.89                     | 10.99 | 1  | 5190     | 38   | 52T        | 11.81   | 11.99 | 11.99                     |    |    |
|          | 5230 | 46         | 26T     | 10.95 | 10.62                     | 10.79 |    | 5230     | 46   | 52T        | 11.99   | 11.74 | 11.74                     |    |    |
| 2A       | 5270 | 54         | 26T     | 10.91 | 10.58                     | 10.72 | 2A | 5270     | 54   | 52T        | 11.97   | 11.60 | 11.62                     |    |    |
|          | 5310 | 62         | 26T     | 10.99 | 10.58                     | 10.79 |    | 5310     | 62   | 52T        | 11.54   | 11.77 | 11.83                     |    |    |
| 2C       | 5510 | 102        | 26T     | 10.89 | 10.99                     | 10.73 | 2C | 5510     | 102  | 52T        | 11.83   | 11.54 | 11.64                     |    |    |
|          | 5590 | 118        | 26T     | 10.61 | 10.82                     | 10.99 |    | 5590     | 118  | 52T        | 11.70   | 11.89 | 11.96                     |    |    |
|          | 5710 | 142        | 26T     | 10.73 | 10.96                     | 10.53 |    | 5710     | 142  | 52T        | 11.81   | 11.99 | 11.99                     |    |    |
| 3        | 5755 | 151        | 26T     | 10.60 | 10.73                     | 10.81 | 3  | 5755     | 151  | 52T        | 11.68   | 11.83 | 11.71                     |    |    |
|          | 5795 | 159        | 26T     | 10.92 | 10.99                     | 10.52 |    | 5795     | 159  | 52T        | 11.99   | 11.67 | 11.56                     |    |    |

| 40MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    | 40MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |    |     |
|----------|------|------------|---------|-------|---------------------------|-------|----|----------|------|------------|---------|-------|---------------------------|----|-----|
|          |      |            |         |       | RU Index                  |       |    |          |      |            |         |       | RU Index                  |    |     |
|          |      |            |         |       | 53                        | 54    | 56 |          |      |            |         |       | 61                        | 62 | N/A |
| 1        | 5190 | 38         | 106T    | 11.85 | 11.61                     | 11.99 | 1  | 5190     | 38   | 242T       | 11.60   | 11.98 |                           |    |     |
|          | 5230 | 46         | 106T    | 11.99 | 11.89                     | 11.81 |    | 5230     | 46   | 242T       | 11.95   | 11.66 |                           |    |     |
| 2A       | 5270 | 54         | 106T    | 11.94 | 11.73                     | 11.58 | 2A | 5270     | 54   | 242T       | 11.76   | 11.53 |                           |    |     |
|          | 5310 | 62         | 106T    | 11.52 | 11.88                     | 11.76 |    | 5310     | 62   | 242T       | 11.94   | 11.70 |                           |    |     |
| 2C       | 5510 | 102        | 106T    | 11.95 | 11.76                     | 11.63 | 2C | 5510     | 102  | 242T       | 11.73   | 11.53 |                           |    |     |
|          | 5590 | 118        | 106T    | 11.67 | 11.97                     | 11.91 |    | 5590     | 118  | 242T       | 11.99   | 11.90 |                           |    |     |
|          | 5710 | 142        | 106T    | 11.80 | 11.58                     | 11.98 |    | 5710     | 142  | 242T       | 11.63   | 11.94 |                           |    |     |
| 3        | 5755 | 151        | 106T    | 11.66 | 11.93                     | 11.73 | 3  | 5755     | 151  | 242T       | 11.99   | 11.69 |                           |    |     |
|          | 5795 | 159        | 106T    | 11.54 | 11.85                     | 11.58 |    | 5795     | 159  | 242T       | 11.92   | 11.55 |                           |    |     |

| 40MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |     |     |
|----------|------|------------|---------|-------|---------------------------|-----|-----|
|          |      |            |         |       | RU Index                  |     |     |
|          |      |            |         |       | 65                        | N/A | N/A |
| 1        | 5190 | 38         | 484T    | 10.55 |                           |     |     |
|          | 5230 | 46         | 484T    | 11.82 |                           |     |     |
| 2A       | 5270 | 54         | 484T    | 11.62 |                           |     |     |
|          | 5310 | 62         | 484T    | 10.14 |                           |     |     |
| 2C       | 5510 | 102        | 484T    | 11.58 |                           |     |     |
|          | 5590 | 118        | 484T    | 11.82 |                           |     |     |
|          | 5710 | 142        | 484T    | 11.99 |                           |     |     |
| 3        | 5755 | 151        | 484T    | 11.83 |                           |     |     |
|          | 5795 | 159        | 484T    | 11.68 |                           |     |     |

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| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    |
|----------|------|------------|---------|-------|---------------------------|-------|----|
|          |      |            |         |       | RU Index                  |       |    |
|          |      |            |         |       | 0                         | 18    | 36 |
|          |      |            |         |       | 1                         | 5210  | 42 |
| 2A       | 5290 | 58         | 26T     | 10.71 | 10.68                     | 10.95 |    |
| 2C       | 5530 | 106        | 26T     | 10.99 | 10.82                     | 10.59 |    |
|          | 5610 | 122        | 26T     | 10.78 | 10.84                     | 10.99 |    |
|          | 5690 | 138        | 26T     | 10.83 | 10.56                     | 10.99 |    |
| 3        | 5775 | 155        | 26T     | 10.81 | 10.99                     | 10.92 |    |

| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    |
|----------|------|------------|---------|-------|---------------------------|-------|----|
|          |      |            |         |       | RU Index                  |       |    |
|          |      |            |         |       | 37                        | 44    | 52 |
|          |      |            |         |       | 1                         | 5210  | 42 |
| 2A       | 5290 | 58         | 52T     | 11.56 | 11.93                     | 11.78 |    |
| 2C       | 5530 | 106        | 52T     | 11.69 | 11.87                     | 11.71 |    |
|          | 5610 | 122        | 52T     | 11.81 | 11.69                     | 11.88 |    |
|          | 5690 | 138        | 52T     | 11.86 | 11.54                     | 11.88 |    |
| 3        | 5775 | 155        | 52T     | 11.89 | 11.99                     | 11.84 |    |

| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    |
|----------|------|------------|---------|-------|---------------------------|-------|----|
|          |      |            |         |       | RU Index                  |       |    |
|          |      |            |         |       | 53                        | 56    | 60 |
|          |      |            |         |       | 1                         | 5210  | 42 |
| 2A       | 5290 | 58         | 106T    | 11.67 | 11.99                     | 11.77 |    |
| 2C       | 5530 | 106        | 106T    | 11.64 | 11.62                     | 11.64 |    |
|          | 5610 | 122        | 106T    | 11.83 | 11.80                     | 11.81 |    |
|          | 5690 | 138        | 106T    | 11.80 | 11.62                     | 11.83 |    |
| 3        | 5775 | 155        | 106T    | 11.89 | 11.63                     | 11.86 |    |




| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |       |    |
|----------|------|------------|---------|-------|---------------------------|-------|----|
|          |      |            |         |       | RU Index                  |       |    |
|          |      |            |         |       | 61                        | 62    | 64 |
|          |      |            |         |       | 1                         | 5210  | 42 |
| 2A       | 5290 | 58         | 242T    | 11.81 | 11.98                     | 11.71 |    |
| 2C       | 5530 | 106        | 242T    | 11.61 | 11.89                     | 11.67 |    |
|          | 5610 | 122        | 242T    | 11.80 | 11.73                     | 11.79 |    |
|          | 5690 | 138        | 242T    | 11.77 | 11.56                     | 11.90 |    |
| 3        | 5775 | 155        | 242T    | 11.88 | 11.67                     | 11.90 |    |

| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |      |     |
|----------|------|------------|---------|-------|---------------------------|------|-----|
|          |      |            |         |       | RU Index                  |      |     |
|          |      |            |         |       | 65                        | 66   | N/A |
|          |      |            |         |       | 1                         | 5210 | 42  |
| 2A       | 5290 | 58         | 484T    | 11.82 | 11.95                     |      |     |
| 2C       | 5530 | 106        | 484T    | 11.96 | 11.73                     |      |     |
|          | 5610 | 122        | 484T    | 11.70 | 11.73                     |      |     |
|          | 5690 | 138        | 484T    | 11.57 | 11.91                     |      |     |
| 3        | 5775 | 155        | 484T    | 11.65 | 11.90                     |      |     |

| 80MHz BW | Band | Freq [MHz] | Channel | Tones | Avg Conducted Power (dBm) |      |     |
|----------|------|------------|---------|-------|---------------------------|------|-----|
|          |      |            |         |       | RU Index                  |      |     |
|          |      |            |         |       | 67                        | N/A  | N/A |
|          |      |            |         |       | 1                         | 5210 | 42  |
| 2A       | 5290 | 58         | 996T    | 8.11  |                           |      |     |
| 2C       | 5530 | 106        | 996T    | 8.87  |                           |      |     |
|          | 5610 | 122        | 996T    | 11.70 |                           |      |     |
|          | 5690 | 138        | 996T    | 11.96 |                           |      |     |
| 3        | 5775 | 155        | 996T    | 11.97 |                           |      |     |

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