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Arlington, Virginia
March 20, 2009

## BUCKING DISTANCE

Since the distance at which potential bucking interference could occur is closely tied to the propagation effects of the frequency bands in use, the bucking distance should be decreased on a sliding scale as frequency increases.

Radyn proposes the following formula to determine the bucking distance D in miles at frequency F in GHz:

$$D = 0.5 * (3/F)$$

Here the frequency F is the average of the interfering transmit frequency $F_{tx}$ and the victim receive frequency $F_{rx}$; in other words,

$$F = (F_{tx} + F_{rx})/2$$

In addition, $F_{tx}$ and $F_{rx}$ must be in the same band because bucking interference is not a concern for out-of-band interfering signals.

## BUCKING DISTANCE CHART

| Average Frequency F (GHz) | Bucking Distance D | |
|---|---|---|
| | Miles | Feet |
| 3.000 | 0.5 | 2,640 |
| 6.175 | 0.243 | 1,283 |
| 11.200 | 0.134 | 707 |
| 18.700 | 0.08 | 422 |
| 22.400 | 0.067 | 354 |

## ANTENNA NEAR-FIELD DISTANCE

While bucking interference is tied to the near-field distance of the antennas involved, calculation of these distances for individual cases can be cumbersome. Radyn's proposed formula gives an easily computed alternative that works for reasonable antenna sizes used in the various frequency bands. This is shown in the chart below, with antenna sizes whose near-field distance exceeds the bucking distance formula highlighted in yellow.

| Average Frequency F (GHz) | Antenna Near-Field Distance, miles | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 ft Antenna | 2 ft Antenna | 3 ft Antenna | 4 ft Antenna | 6 ft Antenna | 8 ft Antenna | 10 ft Antenna |
| 2.000 | 0.000774 | 0.003097 | 0.006968 | 0.012387 | 0.027871 | 0.049548 | 0.077420 |
| 4.000 | 0.001548 | 0.006194 | 0.013936 | 0.024774 | 0.055742 | 0.099097 | 0.154839 |
| 6.175 | 0.002390 | 0.009561 | 0.021513 | 0.038245 | 0.086052 | 0.152981 | 0.239033 |
| 11.200 | 0.004335 | 0.017342 | 0.039019 | 0.069368 | 0.156078 | 0.277472 | 0.433549 |
| 18.700 | 0.007239 | 0.028955 | 0.065149 | 0.11582 | 0.260594 | 0.463278 | 0.723872 |
| 22.400 | 0.008671 | 0.034684 | 0.078039 | 0.138736 | 0.312155 | 0.554943 | 0.867099 |

## CONCLUSION

In order to more realistically address the bucking interference potential of high frequency microwave radios (e.g. 23 GHz), a sliding scale based on average frequency within a band should be used. Radyn's position on current bucking criteria is that the above minimum distances can be implemented without causing additional reflection interference cases. Formal adoption of bucking distance criteria would aid the frequency coordination process. Current disagreements on bucking distance criteria only serve to slow clearance of frequency coordinations without any actual proof of potential interference. Agreement on a standard for bucking distances would provide a concrete basis for negotiations.