MPE Calculations – Professional Installation Concerns

The system will be factory calibrated, such that the intentional emissions remain under the 36 dBm (4000mW) max. EIRP as required by Part 15.247. When the system is configured with the Omni-Directional antenna (gain = 8dBi) the EIRP is 35.5dBm. When the system utilizes the 10dBi sector antenna the maximum EIRP is 36dBm.

FCC part 1.1310, Table 1 limits the power density for uncontrolled exposure to 1mW/ cm^2 . The distance, d(cm) from the antenna at which the power density, P_d (mW/cm^2) is below this limit is calculated from the maximum EIRP, P_t (mW) using the equation:

$$P_d = 0.75\, P_t /(4\, \pi d^2)$$

Re-arranging for the distance at which the power density is 1mW/cm2 gives:

$$d = \sqrt{(0.75\, P_t /(4\, \pi))}$$

For a single Omni-Directional antenna system the distance d is based on an EIRP of 35.5 dBm (3548 mW):

$$d = \sqrt{(0.75 \times 3548 /(4\, \pi))} = \mathbf{\underline{14.6\ cm\ (5.7")}}$$

For a single Sector antenna system (which would be the case for instances professional installation is required), the distance d is based on an EIRP of 36 dBm (4000 mW):

$$d = \sqrt{(0.75 \times 4000 /(4\, \pi))} = \mathbf{\underline{15.5\ cm\ (6.1")}}$$

For co-located installations (i.e. installations where more than one antenna is mounted in the same place), a distance of at least 1 meter (3 feet) between antennas is advised. The maximum power density 83cm from any one antenna is 0.05 mW/cm^2 and the maximum power density 1.17cm from an antenna is 0.02mW/cm^2. The contribution to the overall power spectral density 17cm (6.7") to any one antenna from any other antenna is, therefore, negligible given the separation distance of 1m.

The professional installation manual specifies a safety distance of at least 7 inches for single antenna systems and systems where co-located antennas are separated by more than 1m.

If antennas are co-located closer than the recommended 1 meter (3 feet) horizontal distance between antennas, the professional installation manual provides a table based on the equation below, where N is the number of co-located systems):

$$d = \sqrt{(0.75\ N\ P_t\ /(4\ \pi))}$$

The distances from co-located antennas (with EIRP of 4Watts each) at which the power density is below $1mW/cm^2$ are given in the table below:

Number of Antennas	MPE (cm)	MPE (in.)
1	15.5	6.1
2	21.9	8.6
3	26.8	10.5
4	30.9	12.2
5	34.5	13.6
6	37.8	14.9

Appendix C of the professional installation manual contains a table showing the above table, with all dimensions rounded up, as shown on the following pages.

APPENDIX C

Regulatory safety requirements

RF Exposure

In order to comply with FCC exposure guidelines, the antenna of the wireless router must be installed at a distance of 16cm (7 inches) from persons. If wireless rouers are installed closer than 1 meter (3 feet) apart horizontally, the exposure distance must be read from the table below.

NOTE: It is not recommended that wireless routers be installed closer than 1 meter apart horizontally, unless more than 1 meter vertical separation is used.

Antennas		**1**	**2**	**3**	**4**	**5**	**6**
MPE	**Cm**	16 cm	22 cm	27 cm	31 cm	35 cm	38 cm
Distance	**Inches**	7 inches	9 inches	11 inches	13 inches	14 inches	15 inches