

Demystifying the FCC Regulation 47cfr15.247

A short summary of relevant US
regulation for licence exempt usage
of 2.4 GHz and 5.8 GHz bands

Stephen Priestman, Consultant to Lufthansa Systems

Relevant provisions relating to allowable transmit powers

- The provisions contained within 47cfr15.247 are worded in terms of “maximum conducted output power of the intentional radiator”
- This is defined as total Tx power delivered to all antennas and antenna arrays
- The provisions cover many different categories
 - E.g. Freq hopping, digital modulation, pt-pt, etc.
- PDF file “US Reg_47cfr15.247_highlighted” shows those relevant to the alternative DA2GC system under consideration

Summary of resulting allowable EIRP

- “1 Watt rule” 15.247(b)(3) – starting point in all cases
- => EIRP limit = +30dBm + Gain of antenna
- 15.247(b)(4) – allows up to 6dBi antenna gain without any reduction in power to antenna
 - Above 6dBi, dB for dB reduction applies
 - Therefore, maximum EIRP allowed = +36dBm

Summary of allowable EIRP cont.

- However, if beamforming/“Smart Antenna Systems” with $G > 6\text{dBi}$ are used, 5.247(c)(2)(ii) stipulates 1 dB reduction for every 3dB increase in antenna gain
- This enables much higher EIRP for high gain antennas
- For multiple beams, 5.247(c)(2)(iii) allows total aggregate power up to 8dB $>$ each individual beam

Example of equipment already certified by FCC for 2.4 GHz band

- Number of antenna elements: 4
- Gain of each antenna element: 11.8 dBi
- Directional Gain, $G_m = 11.8 + 10\log 4 = 17.8$ dBi
- o/p power limit = $30\text{dBm} - (G_m - 6)/3 = 26.2\text{dBm}$
- Resulting EIRP = $26.2 + 17.8 = +44$ dBm
- For dual beams:
 - Total Aggregate EIRP limit = $+44 + 8 = +52$ dBm
- No further regulatory approvals reqd for deployment in US or Canada