

## 5.5 WIFI Combined Gain, FCC Gain and Beamforming Gain

We have calculated the WIFI Combined Gains, FCC Gains and Beamforming Gains with the measurements for all the antenna combinations.

- 1) The H & V results are sorted for each antenna in separate pages (e.g. 0\_2G4\_H&V)
- 2) The absolute gain of each antenna is calculated with these formulas (e.g. 0\_2G4\_Abs\_dB):

$$P_H = 10^{P_{HdBm}}$$

$$P_V = 10^{P_{VdBm}}$$

$$G_{ant} = 10 * \log(P_H + P_V)$$

- 3) Combined, FCC and BF gain are calculated for all combinations of the antennas

$$Combined\ Gain_{i\_antennas} = 10 * \log\left(\frac{\left(10^{\frac{G_{anto}}{10}} + 10^{\frac{G_{ant1}}{10}} + 10^{\frac{G_{ant2}}{10}} + \dots + 10^{\frac{G_{ant_i}}{10}}\right)}{Number\ of\ antennas}\right)$$

$$FCC\ Gain_{i\_antennas} = 10 * \log\left(\frac{\left(10^{\frac{G_{anto}}{20}} + 10^{\frac{G_{ant1}}{20}} + 10^{\frac{G_{ant2}}{20}} + \dots + 10^{\frac{G_{ant_i}}{20}}\right)^2}{Number\ of\ antennas}\right)$$

$$BF\ Gain_{i\_antennas} = FCC\ Gain_{i\_antennas} - Combined\ Gain_{i\_antennas}$$

Table 14: Calculated WIFI Combined Gain, FCC Gain and Beamforming Gain with the measurements

WIFI2G4 @ 2437MHz	MIMO4x4
	ANT0-1-2-3
Uncorrelated Combined Gain	2.63
Gain FCC (correlated Combined Gain)	6.64
BeamForming Gain	4.01
WIFI5G @ 5180MHz	MIMO4x4
	ANT0-1-2-3
Uncorrelated Combined Gain	1.02
Gain FCC (correlated Combined Gain)	5.72
BeamForming Gain	4.70
WIFI5G @ 5500MHz	MIMO4x4
	ANT0-1-2-3
Uncorrelated Combined Gain	0.76
Gain FCC (correlated Combined Gain)	5.52
BeamForming Gain	4.76
WIFI5G @ 5825MHz	MIMO4x4
	ANT0-1-2-3
Uncorrelated Combined Gain	1.06
Gain FCC (correlated Combined Gain)	5.79
BeamForming Gain	4.73