

Appendix E: Simultaneous Transmission Analysis

E.1. Introduction

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

Table E-1 - Supported Simultaneous Transmission Scenarios

#	Scenario	Head	Extremity
1	LTE-M + 2.4 GHz WIFI + 5 GHz WIFI	Yes	Yes
2	LTE-M + 5 GHz WIFI + 2.4 GHz Bluetooth	Yes	Yes

E.2. Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D04v01 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds for the equivalent test cases.

E.3. Simultaneous Transmission Analysis

Table E-2 – WWAN Maximum Reported SAR Values

Exposure Condition	Position	WWAN Maximum SAR (W/kg)
Head (1g)	Front	0.419
Extremity (10g)	Back	0.758

Table E-3 – Maximum Bluetooth/WLAN Simultaneous Transmission Scenarios

Exposure Condition	Band/Mode	2.4 GHz WIFI SAR (W/kg)	5 GHz WIFI SAR (W/kg)	2.4 GHz Bluetooth SAR (W/kg)	2.4 GHz WIFI + 5 GHz WIFI SAR (W/kg)	2.4 GHz Bluetooth + 5 GHz WIFI SAR (W/kg)	Max BT/WIFI Simultaneous SAR (W/kg)
Head (1g)	Front	0.466	0.151	0.058	0.617	0.209	0.617
Extremity (10g)	Back	1.270	0.345	0.125	1.615	0.470	1.615

Table E-4 – WWAN + BT/WLAN Simultaneous

Exposure Condition	Position	Max WWAN SAR (W/kg)	Max BT/WIFI SAR (W/kg)	Σ SAR _{1g} (W/kg)	Σ SAR _{10g} (W/kg)
Head	Front	0.419	0.617	1.036	-
Extremity	Back	0.758	1.615	-	2.373

The above analysis of the simultaneous transmission scenarios is sufficient to show that simultaneous transmission cases will not exceed the SAR limit. Therefore, no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01 and IEEE 1528- 2013 Section 6.3.4.1.