APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	802.11b/g /n AP Router
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☐ Single antenna ☒ Multiple antennas 　　☐ Tx diversity 　　☐ Rx diversity 　　☒ Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 19.75 dBm(94.40 mW) IEEE 802.11g mode: 21.28 dBm(134.27 mW) draft 802.11n Standard-20 MHz Channel mode: 22.97 dBm(198.15 mW) draft 802.11n Wide-40 MHz Channel mode: 24.36 dBm(272.89 mW)
Antenna gain (Max)	1. Dipole Antenna / Gain: 5 dBi (Numeric gain: 3.16) 　　Antenna Calculation for MIMO Mode: 　　5dBi + 10 log (2) = 8.01 dBi (Numeric gain: 6.32) 2. Dipole Antenna / Gain: 2.51 dBi (Numeric gain: 1.78) 　　Antenna Calculation for MIMO Mode: 　　2.51dBi + 10 log (2) = 5.52 dBi (Numeric gain: 3.56)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is* <u>*24.36 dBm(272.89 mW) at 2437MHz (with 6.32 numeric antenna gain.)*</u>
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS
No non-compliance noted.

MPE EVALUATION
No non-compliance noted.

Calculation

Given $E = \dfrac{\sqrt{30 \times P \times G}}{d}$ & $S = \dfrac{E^2}{3770}$

Where   E = Field strength in Volts / meter
          P = Power in Watts
          G = Numeric antenna gain
          d = Distance in meters
          S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{\textit{Equation 1}}$$

Where   d = Distance in cm
          P = Power in mW
          G = Numeric antenna gain
          S = Power density in mW / cm^2

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$S = 0.000199 \times P \times G$

Where   P = Power in mW
          G = Numeric antenna gain
          S = Power density in mW / cm^2

IEEE 802.11b mode:

EUT output power = 94.40 mW

Numeric Antenna gain = 3.16

→ *Power density = 0.0593 mW / cm2*

IEEE 802.11g mode:

EUT output power = 134.27 mW

Numeric Antenna gain = 3.16

→ *Power density = 0.0844 mW / cm2*

draft 802.11n Standard-20 MHz Channel mode:

EUT output power = 198.15 mW

Numeric Antenna gain = 6.32

→ *Power density = 0.2492 mW / cm2*

draft 802.11n Wide-40 MHz Channel mode:

EUT output power = 272.89 mW

Numeric Antenna gain = 6.32

→ *Power density = 0.3432 mW / cm2*

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)