

# **Telecommunications Regulatory Commission of Sri Lanka**

## **Regulatory Guidelines for the Use of 2.4 GHz and 5GHz Bands to Deploy Outdoor Wireless Local Area Networks (WLAN)**

### **1. Introduction**

1.1 Radio Frequency Spectrum is a limited natural scarce resource which should be used efficiently and effectively without interference among users.

1.2 The World Radiocommunication Conference (WRC) of International Telecommunication Union (ITU) which is held every 3 to 4 years to decide the usage of bands of spectrum for different services. The National Regulatory Authorities allocate frequencies to different industries on country basis with proper regards to ITU guidelines.

1.3 In accordance with the above mandate, the Telecommunications Regulatory Commission of Sri Lanka (hereinafter referred to as Commission) has developed the guidelines for the outdoor use of 2400.00 MHz – 2483.50 MHz (2.4GHz), 5470.00 MHz – 5725.00 MHz and 5725.00MHz – 5875.00MHz (5GHz) bands to deploy Wireless Local Area Networks (WLAN) in Sri Lanka employing the Wireless Fidelity (Wi-Fi) technology in order to ensure rapid deployment of services and increase the penetration of Internet.

### **2 Objective of the Guidelines**

2.1 The main objective of setting up of the Regulatory Guidelines is to ensure interference-free operation by all users of the band and to ensure that a guaranteed grade of service is available to the subscribers through established quality of service benchmarks, and consumer code of practice.

2.2 The 2.4GHz and 5GHz bands have been used internationally on non-interference and unprotected basis. These guidelines illustrate the terms and conditions for the use of these bands in Sri Lanka.

### **3. Frequency Assignments and Conditions of Operation**

- 3.1 Access to the spectrum will be on shared basis. There will be no exclusive assignment to any individual or organizations, whether for private, public or commercial use.
- 3.2 There will be no individual frequency planning or co-ordination function undertaken by the Commission but the licensee is obliged to furnish details of the Wi Fi access points two weeks prior to deployment and shall keep accurate installation records of the Wi-Fi access points. The Commission reserves the right to reject any deployment if there is potential to cause harmful interference to other systems by the deployment.
- 3.3 The operation of WLAN shall be on a secondary use basis, whereby WLAN shall not claim any protection, and shall not cause any interference to other Radio services in the same bands. No interference shall be caused to any systems operating in any of the primary allocations in the band (e.g. Fixed Satellite Services and Radiolocation). In all cases of harmful interference, the licensee of WLAN shall be required to cease the operation of the equipment.
- 3.4 Wide Area deployment will not be allowed on the 2.4G and 5G bands, maximum coverage or transmission distance from a single hotspot should not exceed more than 200 meters. Transmit power, antenna height and gain should be selected in order to keep emission within stipulated distance.
- 3.5 The use of the 2.4G and 5G bands is on a non-interference and unprotected basis.
- 3.6 All equipment to be deployed should be type approved by the Commission.
- 3.7 In certain cases of outdoor WLAN, the Commission may impose further technical restrictions on the air interface to ensure interference free operation.

#### **4. Frequency Bands for Outdoor WLAN Applications**

4.1 The use of 2.4 GHz and 5 GHz bands for outdoor WLAN is permitted only upon obtaining a frequency license from the Commission. The equipment with output power more than 200mW is considered as outdoor application.

4.2 The channel plans with 20 MHz channel bandwidths are applicable for 2.4 GHz and 5 GHz bands. The following technical parameters are applicable for deployment of outdoor WLANs in these bands:

##### **4.2.1 2.4GHz Band**

###### **a. 2400.00–2483.50 MHz:**

Licensees using 2400–2483.5 MHz band for outdoor deployments shall adhere to the following emission standards and technical specifications or requirements:

- i. Maximum mean Equivalent Isotropic Radiated Power (EIRP) for Frequency Hopping Spread Spectrum(FHSS)
  - 1000mW (For systems employing at least 75 non-overlapping hopping channels)
  - 200mW (For all other systems)
- ii. Maximum mean EIRP for Direct Sequence Spread Spectrum (DSSS): 1000mW
- iii. For Point-to-Point operations, transmitting antennas with directional gain greater than 6 dBi shall be deployed subject to the maximum peak output power and the maximum conducted output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.
- iv. IEEE 802.11b & IEEE 802.11g and newer versions shall be backward compatible with 802.11b & IEEE 802.11g and/or
- v. EN 60950, EN 50385, EN 300 328, EN 301 489-1,EN 301 489-17

## 4.2.2 5GHz Band

### b. 5470.00 – 5725.00 MHz:

Licensees using 5470.00 – 5725.00 MHz band for outdoor deployments shall adhere to the following emission standards and technical specifications or requirements:

- i. Maximum mean EIRP of 1000mW.
- ii. Maximum mean density of 50 mW/MHz in any 1 MHz band.
- iii. WLANs operating in the band 5470 – 5725 MHz shall either deploy Transmit Power Control (TPC) of at least 3dB on the maximum power or if TPC is not used then the maximum EIRP and mean power density shall be reduced by 3 dB.
- iv. WLANs operating in the 5470 – 5725 MHz band shall use dynamic frequency selection (DFS).
- v. Deployment in the vicinity of Airports/Radar Stations is not permitted.
- vi. IEEE 802.11a & IEEE 802.11n and/ or
- vii. EN 301 893s, EN 60950, EN 50385, EN 301 893, EN 301 489-1, EN 301 489-17

### c. 5725.00.00 – 5875 MHz:

Licensees using 5725.00 – 5875.00MHz band for outdoor deployments shall adhere to the following emission standards and technical specifications or requirements:

- i. Maximum mean EIRP of 2000mW
- ii. Maximum mean EIRP density 23 dBm/MHz
- iii. Both DFS and TPC (12 dB range) should be implemented.
- iv. IEEE 802.11a & IEEE 802.11n and/ or
- v. EN 301 893s, EN 60950, EN 50385, EN 301 893, EN 301 489-1, EN 301 489-17
- vi. EIRP spectral density of the transmitter emissions should not exceed the following values for the elevation angle  $\theta$  (degrees) above the local horizontal plane (of the Earth) to protect FSS GSO satellite receivers.

For sectorised (e.g. Point- to -Multi Point Central or Base Station) and Omni-directional deployments:

- $-7 \text{ dB(W/MHz)}$  for  $0^\circ \leq \theta < 4^\circ$
- $-2.2 - (1.2*\theta) \text{ dB(W/MHz)}$  for  $4^\circ \leq \theta \leq 15^\circ$
- $-18.4 - (0.15*\theta) \text{ dB(W/MHz)}$  for  $\theta > 15^\circ$

For Point -to- Multi Point Customer Terminal Station and Point – to- Point deployments:

- -7 dB(W/MHz) for  $0^\circ \leq \theta < 8^\circ$
- $-2.68 - (0.54 * \theta)$  dB(W/MHz) for  $8^\circ \leq \theta < 32^\circ$
- -20 dB(W/MHz) for  $32^\circ \leq \theta \leq 50^\circ$
- $-10 - (0.2 * \theta)$  dB(W/MHz) for  $\theta > 50^\circ$

## 5. DFS & TPC Parameters for 5G Band Operation

5.1 The Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC) requirements as stipulated in ITU-R Recommendation M.1652 should apply as follows on the use of 5 GHz band (5150-5350 MHz, 5470 – 5725 MHz, 5725-5850 MHz) applications.

Parameter	Value
DFS Detection Threshold	-62 dBm
Channel Availability Check Time	60 sec prior to channel use
Non Occupancy Period	30 min
Channel Move Time	10 sec
Automatic Transmit Power Control	At least 3dB on average (all devices)

## 6. Backhaul Network

6.1 For the purpose of connecting Wi-Fi hotspots to the nearest switch/router for onward connection to the licensed Systems (Internet or other national networks), the under-listed point-to- point backhaul methods will be permitted.

- Fixed Wireless Access
- Leased Backhaul Links
- High Capacity DSL/ADSL links

6.2 The licensee shall not have the right to establish its own new radio links to connect Wi-Fi base stations to the licensed Systems. The licensee shall obtain these links from the Operators who are licensed by the Commission for this purpose

## **7. Definitions and Abbreviations**

### **EN**

EN means European Standards

### **Harmful Interference**

Harmful Interference means Interference which impairs the functioning of a radio communications service or which materially degrades or obstructs or repeatedly interrupts radio communication.

### **IEEE**

IEEE means an acronym for the Institute of Electrical and Electronics Engineers, a non-profit organization having a standards association (IEEE-SA).

### **Secondary Services**

Secondary Services means Radiocommunication Services which shall not cause harmful interference to stations of Primary Services Primary Services” means Radio services having a higher priority and protection from harmful interference when notified than secondary Radio Services.

### **Wireless Local Area Network (WLAN)**

A wireless local area network (WLAN) is a wireless computer network that links two or more devices using a wireless distribution method (often spread-spectrum or OFDM radio) using IEEE 802.11 family of standards.

### **Wireless Fidelity (Wi-Fi)**

Wireless Fidelity (Wi-Fi) is a wireless networking technology that allows computers and other devices to communicate over a wireless signal.

### **Wi-Fi Hotspot**

Wi-Fi Hotspot means a wideband transmission system using spread spectrum modulation techniques (and for the avoidance of doubt, the use of the label “Wi-Fi” in this definition shall not imply any particular standard or technology);

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