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## **1. Legal Basis**

In accordance with Section 51(2) of the Information, Communications and Media Act of Bhutan 2018 (“the Act”), the Bhutan InfoComm and Media Authority (“the Authority”) hereby issues this Standard for the Establishment of the Telecommunications Towers.

## **2. Title and Commencement**

This standard shall be called the Standard for the Establishment of the Telecommunications Towers and shall come into force on the 1st July 2021 corresponding to the 22nd Day of Fifth month of the Bhutanese Female Iron Ox Year 2021.

## **3. Scope of Application**

The rapid development of wireless services and networks require the construction of network infrastructures such as telecommunication Base Transceiver Station (BTS) stations, repeaters and monopole stations to cater the growth in demand of telecommunication services. However, such infrastructure establishments require compliance with certain technical standards and location compliance. Therefore, this standard shall apply to all licensed ICT Facility and Service Providers who plan to build new telecommunications BTS, towers, repeaters and monopole stations and is aimed at:

- Protecting the general public from exposure to Radio Frequency (RF) electromagnetic fields (EMF)
- Providing a clear guidance on the compliance requirements of establishing any such telecommunication infrastructures
- Minimise aesthetic and environmental impacts
- Ensuring that relevant agencies are informed and consulted before such infrastructures are deployed

## **4. Amendment**

This standard is an amendment of “Standard for the Establishment of the Telecommunications Towers 2018”. And any amendment hereafter to this Standard shall be made according to the change in technologies, national priorities, policies and industry trends.

## **5. Definition**

Unless the context otherwise requires, the following words and terms used in this Standard shall have the following meanings assigned to them:

**Antenna:** means any structure or device used to receive or radiate electromagnetic waves for transmitting or receiving radio or television waves. Antennas may consist of metal, carbon fibre, or other electronically conductive rods or elements. It includes, but is not limited to

personal wireless service, microwave, radio and television broadcasting and transmitting and receiving and short wave radio equipment.

**Camouflaged Tower:** means a tower constructed to simulate a natural feature, such as a tree, thereby reducing the aesthetic impact to the surrounding area.

**Co-Location:** means locating one or more cellular antennas for more than one provider on a single cellular antenna tower or alternative cellular antenna tower structure on a single lot.

**Residential area:** means a land use in which housing predominates, as opposed to industrial and commercial areas.

**Tower:** means a structure intended to support wireless communications equipment used to receive and/or transmit electromagnetic waves.

**Tower Accessory Structure:** means a structure located at the base of the tower housing base receiving/transmitting equipment.

**Electromagnetic Waves:** refers to the waves (or their quanta, photons) of the electromagnetic field, propagating (radiating) through space time, carrying electromagnetic radiant energy. It includes radio waves, microwaves, infrared, (visible light), Ultraviolet, X-rays and Gamma rays.

**International Commission on Non-Ionizing Radiation Protection (ICNIRP):** is an independent scientific body which has produced an international set of Procedures and Standards for public exposure to radio frequency waves.

**Site:** means a prepared facility where Telecommunications and Broadcasting Equipment is located. It includes the Tower, Equipment Space, and a secure boundary.

**Telecommunications Equipment:** means a passive or active equipment used to provide cellular mobile services, including transmission devices, outside receivers for wireless devices, and transmitting antennas.

## **6. General Provision**

1. Any installation or construction of telecommunication towers in Bhutan shall be in compliance with this standard.
2. For the installation or construction of such telecommunication infrastructure in the government/public land, the operators shall consult the relevant agencies for location clearance.
3. Any proposed telecommunications and broadcasting tower within the flight path, flight funnel and flight holding area shall be installed or constructed only after obtaining prior approval from Bhutan Civil Aviation Authority. And all towers (fixed objects) in such areas shall be marked, whenever practicable or be coloured red, except for the objects that are sufficiently conspicuous by their shape and size.
4. In order to encourage infrastructure sharing, the sharing of a common tower infrastructure should be explored, as far as possible, especially when there is a need to install multiple transmitter sites at a specific locality.

## **7. Locations of Installations**

1. In commercial areas, the installation of telecommunications towers shall be encouraged to be carried out on the rooftop of the existing buildings, rather than creating new installations/sites on the ground.
2. The aerial distance between any residential building and the directly facing 2G sector antennas on the tower should not be less than 20 m distance.
3. The aerial distance between any residential building and directly facing 3G/4G/5G sector antennas on the tower should not be less than 15 m distance.
4. Installation of Base Station Antennas and broadcasting antennas in narrow lanes should be avoided in order to reduce the risks caused by any earthquake or wind related disaster.

## **8. Design Standards**

1. An appropriate demarcation of indelible or refectories marking lines on the floor for rooftop installation or fencing of the telecommunications stations shall be provided within the maximum safe distance (MSD) to avoid entry of unauthorized personnel.
2. To preserve the aesthetic value or beautification of the place, the visibility of the telecommunications equipment shall be minimized to the extent possible.
3. While designing the telecommunication infrastructure and tower, the facility and service providers shall ensure to follow the following general principles:

- (i) Define high level technical criteria for construction of cellular towers, sites and associated infrastructures that could be shared with other service providers
  - (ii) Healthy and safety criteria including limiting human exposure to radio frequency and electromagnetic fields as per the recommendation of International Commission on Non-Ionizing Radiation Protection (ICNIRP)
  - (iii) Environment criteria including preservation of aesthetic values
  - (iv) Tower loading based on wind, soil and seismic conditions. The wind load rating shall be based on the height of the tower, its location and any relevant local conditions; and
  - (v) Adequate power supply to meet its full operational capacity requirements including if applicable the provision for power sharing with other service providers wanting to share the tower
  - (vi) Any civil structure in tower construction shall be as per the relevant construction standards of Bhutan.
4. The local pattern of streets and spaces, building's traditional aesthetic and ecology shall be taken into consideration while planning, designing and installation of the telecommunication and broadcasting tower.
  5. The structural design, mounting, and installation of telecommunication towers including mounting of any antenna and support structure shall be in compliance with the manufacturer's specifications.
  6. All telecommunications towers shall be designed to ensure protection against unauthorized climbing and enclosed by fences with strands of barbed wire at the top with a locked gate.
  7. The telecommunication towers shall be equipped with appropriate warning lights in compliance with the Civil Aviation Regulation to facilitate identification to flying aircraft.
  8. The height of the telecommunications tower except monopoles shall not be equivalent to the height of the buildings located in the proximity areas; the tower height to exceed the heights of the surrounding buildings.
  9. The telecommunications towers shall be designed with sufficient space and loading capacity for co-location (infrastructure sharing) of at least one or two additional carriers of other service providers.

10. The minimum height of the telecommunication tower except for monopole shall be:

- (i) 30 metres in urban and commercial areas
- (ii) 15 metres in semi-urban and rural areas.

11. Any antenna mounted on a monopole tower shall not be less than 7 meters from the ground.

### 9. Signage for Telecommunication and Broadcasting Infrastructures

1. Sign boards and warning signs shall be provided at sites which should be clearly visible and identifiable. A warning sign should be placed at the entrance of such zones.
2. The sign board shall provide the information on the name of the site, year of built, tower height etc.
3. The “Warning Sign” should discourage longer stay in the zone, even for the maintenance personnel. The sign board may contain the following text :

- (i) Restricted Area!!! Do Not Enter

### 10. EMF Radiation Limits and Compliance

1. All telecommunication and broadcasting sites shall ensure compliance with the ICNIRP Procedures and Standards for general public exposure and take immediate actions to rectify any non-compliant Sites.
2. The antennas in all sites shall not emit the EMF radiation more than the standards shown in the table below:

Frequency range	Electric field-strength (V/m)		Equivalent plane wave power-density $S_{eq}$ (W/m <sup>2</sup> )	
	general public	occupational	general public	Occupational
0.1 - 30 Hz	$300/(10^{0.5} * f^{0.7})$ MHz)	$600/(10^{0.5} * f^{0.7})$ MHz z)	NA	NA
>30 – 400 MHz	$27.7/10^{0.5}$	$61/10^{0.5}$	0.2	1

>400 - 2000 MHz	$(1.375f^{0.5}(\text{MHz})/10^{0.5})$	$(3f^{0.5}(\text{MHz}))/10^{0.5}$	$(f/2000)$	$(f/400)$
>2 - 300 GHz	19.289	43.323	1	5

### **11. Prohibited Uses and Installation**

1. No temporary mobile cells are permitted except in the case of equipment failure, equipment testing, or in the case of emergency situations as authorized by the Authority.

### **12. Installation Reporting and Certification by the Authority**

1. The service provider shall ensure to provide the Authority with a database of the mobile cellular base stations sites including the power radiation and cell capacity and towers bi-annually in GIS or Excel sheet format, or both.
2. All telecommunication sites located in Urban, commercial and public sensitive areas shall be inspected, verified and certified for the EMF radiation by the Authority.

### **13. Offences, Penalties, Appeals and Indemnification**

#### **13.1 Offences and Penalties**

13.1.1 Any person installing the telecom towers in Bhutan not in compliance to these standards shall be guilty of an offence and the Authority may impose a fine not exceeding three years daily minimum national wage rate along with other regulatory actions that may be imposed.

13.1.2 Any person who contravenes any provision of the Act, Rules and Regulations, licence terms and conditions and the directives for which no penalty is specifically provided shall be guilty of an offence and shall be liable for a fine not exceeding one year daily minimum national wage rate along with other regulatory actions that may be imposed.

#### **13.2 Appeals**

13.2.1 Any appeal against the decision of the Authority shall be made to the Alternative Dispute Resolution Center within ten (10) working days from the decision of the Authority.

#### **13.3 Indemnification**

13.3.1 Any person shall indemnify, defend and hold harmless the Authority and its officials, agents, attorneys and representatives against any and at all costs, damages, expenses, claims, suits and actions, including but not limited to expenses for legal fees, whether suit brought or

not, and disbursement and liabilities incurred or assumed by the Authority in connection with:

(i) damage to persons or property, in any way arising out of its infrastructures, or through the acts or omissions of licensee, its officials, agents, attorneys, representatives or employees.

(ii) any or all claims arising out of failure to comply with the provisions of these Standards or any other law, or Rules applicable.