Quarterly Report on EMF Monitoring

(July - September 2024)

Bhutan InfoComm and Media Authority

Royal Government of Bhutan

Name: Phul Tika Rai (STD) **Chief (STD)**

Date: 24/10/2024

Director

Table of Contents

1. Background

Electromagnetic Field (EMF) Emissions are the electric and magnetic fields that are produced by radios, microwaves, mobile phones and base stations (mobile towers). Telecommunications transmitters generate electromagnetic fields at radio and microwave frequencies. Transmitters have proliferated with siting of wireless communication networks often co-located among other transmitters and the transmitter used in contact with human bodies. If the EMF exposure is prolonged there may be issues of possible health risks. Such risks must be managed and prevented. Currently International Commission on Non-Ionizing Radiation Protection (ICNIRP) standards and various other standards are adopted on the assessment and compliance of the exposure levels radiated from different electromagnetic spectrum sources according to the permissible levels in order to protect the people from exposure to higher RF radiations. The most sources of exposure include the cellular network using GSM, WCDMA, LTE and others which occupy the VHF, UHF, L and S band frequencies.

The Bhutan InfoComm and Media Authority have always been monitoring and measuring the EMF radiation level of each Telecommunication Base Transceiver station (towers) in the country based on the EMF emission standards. The Authority also certifies the EMF compliance of the mobile towers in the country mainly in urban areas and satellite towns areas.

The EMF emission standard is derived from the EMF radiation threshold developed by ICNIRP and the Authority has standardized the threshold level of EMF radiation exposure based on the regional threshold.

2. Monitoring

The Authority has monitored the EMF from July to September, 2024 in following places;

Sl.No	Name of the Monitored Places	Number of tower Monitored
1	Punakha	8
2	Wangdue	14
3	Trongsa	8
4	Bumthang	6
5	Mongar	9
6	Lhuentse	4

The Authority will continue to monitor and measure the mobile towers in the country and will be issued with the certificate of EMF threshold compliance respectively.

3. Objective of the Monitoring

The main objective of the EMF measurement monitoring is:

- To ensure the safe and reliable communication services.
- To test the exposure levels produced by any transmitter or emitter such as telecommunication facilities and mobile telephone base stations for safety purposes and maintain the EMF emission within the standard threshold.
- To ensure that all telecommunication equipment is safe and secure.

4. Details of the Equipment used for EMF Compliance Test

The details of existing EMF monitoring equipment of the Authority are as mentioned below:

Equipment Make/Model:	Narda Safety test solution
Type of the Antenna:	Isotropic Antenna/Type (3-Axis), 420 MHz-6GHz
Spectrum Analyzer:	SRM3006 (9kHz-6GHz)
Calibration details:	Calibrated on 7-03-2024 and valid up to 2 to 3 years

5. Specification of the Equipment/ Instrument

The specification of the above equipment are as mentioned below:

- 3-axis, E-field antenna: 420 MHz to 6 GHz
- Spectrum analyzer SRM 3006: 9 kHz to 6GHz
- A 1.5 meter cable to separate the antenna from the meter
- Tripod to hold the antenna

Figure 1: EMF Monitoring

6. Measurement Parameter

The following quantities are measured while monitoring:

- Electric Field strength E in **V/m**

7. Methodology

The following methodology processes are followed while carrying out the monitoring:

- The measurement is done around 10 meters to 30 meters away from the sectoral antenna's BTS towers facing towards the measurement equipment which is based on the ICNIRP standards measurement.
- The measurement result is taken as the average/Max over a time period of 6 minutes.
- The measurement is done for 2G, 3G, 4G and 5G BTS Tower for both the telecom operators.
- Measurement values will be recorded and compare the measurement values with the reference level as per the international standard ICNIRP.
- Measurement is done through broadband measurement and if the exposure ratio is higher than the exposure ratio limits, the frequency selective measurement is recommended.

8. Reference Standards and Regulation/ICNIRP limits

According to Section 10(1), and 10(2) of the "Standard for the Establishment of Telecommunications Tower"

- 10 (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.*

- 10(2): *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^2)**	
	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)	NA	NA

>30 – 400 MHz	$27.7/10^{0.5}$	$61/10^{0.5}$	0.2	1
>400 - 2000 MHz	$(1.375f^{0.5}$(MHz) $)/10^{0.5}$	$(3f^{0.5}$ (MHz))$/10^{0.5}$	(f/2000)	(f/400)
>2 - 300 GHz	19.289	43.323	1	5

9. Findings and Permissible limits of Electric Field and Exposure Ratio

The EMF measurement of the BTS tower was carried out in **Punakha, Wangdue, Trongsa, Bumthang, Mongar, and Lhuentse** town Area. It is found that the maximum exposures around all of the base stations are **very low** than exposure limits. The detailed measurement readings , findings, electric field and exposure ratio results are attached below in **Annexure 1** and screenshots of each measurement result are attached in **Annexure 2.**

10. Satellite View of the Measurement Location/Telecom site

The satellite view of the measurement location of each telecom site or transmitter is attached in **Annexure 3.**

Annexure 1 (Measurement Results)

The detailed measurement readings of Electric Field and Exposure Ratio are attached below;

1. Punakha (Bhutan Telecom Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)$^{\wedge 2}$	Exposure Ratio Limits	Remark
1	lumitsawa	27°31'14.1'' N	89°47'29.1" E	GSM 900	0.07506	13.044	0.005	**0.5**	**Below the Limits**
				LTE 1800	0.443	18.44	0.0240		
2.	Lobesa	27°30'51.9'' N	89°52'01.2" E	LTE 1800	1.617	18.44	0.0876	**0.5**	**Below the Limits**
				TDD2300	0.08725	19.289	0.0045		
				5G 3.5-3.6	3.746	19.289	0.194		
3	Khurungthang	27°32'59.8'	89°52'15.7" E	LTE 1800	1.296	18.44	0.070		

		' N		TDD2300	1.28	19.289	0.066	**0.5**	**Below the Limits**
				5G 3.5-3.6	4.083	19.289	0.211		
4	Dzong area	27°35'08.3'' N	89°51'34.2" E	GSM 900	1.052	13.044	0.0806	**0.5**	**Below the Limits**
				LTE 1800	1.485	18.44	0.0805		
				UMTS 850	0.08133	12.678	0.00641		
				5G 3.5-3.6	1.495	19.289	0.077		
5	Dzong BTS	27°35'11.7'' N	89°51'54.5" E	LTE 1800	0.7476	18.44	0.0405	**0.5**	**Below the Limits**
				UMTS 850	1.617	12.678	0.127		
				TDD2300	1.173	19.289	0.0608		
				5G 3.5-3.6	0.4895	19.289	0.0253		
				UMTS1900	0.05017	19.289	0.0260		
6	Telecom Exchange	27°33'05.4'' N	89°52'14.0" E	LTE 1800	0.896	18.44	0.0485	**0.5**	**Below the Limits**
				TDD2300	1.81	19.289	0.09383		

2. Punakha (Tashi InfoComm Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)^2	Exposure Ratio Limits	Remark
1	Lobesa	27°31'00.7" N	89°52'01.3" E	LTE 1800	0.2012	18.44	0.01091	0.5	Below the Limits
				5G 3.5-3.6	1.605	19.289	0.0832		
2	Khuruthang	27°33'01.6" N	89°52'16.0" E	LTE 1800	0.2354	18.44	0.0731	0.5	Below the Limits
				5G 3.5-3.6	6.572	19.289	0.3407		

3. Wangdue (Bhutan Telecom Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)^2	Exposure Ratio Limits	Remark

1	Wangdue Exchange	27°28'40.2" N	89°53'54.9" E	GSM 900	0.6977	13.044	0.05348	**0.5**	**Below the Limits**
				LTE 1800	1.232	18.44	0.0668		
				LTE700	0.5019	12.0658	0.04159		
				UMTS 850	0.6049	12.678	0.0477		
				5G 3.5-3.6	0.2803	19.289	0.01453		
2.	Army Camp	27°29'00.2" N	89°54'04.9" E	LTE 1800	0.9705	18.44	0.05263	**0.5**	**Below the Limits**
				TDD2300	0.8928	19.289	0.04628		
				5G 3.5-3.6	0.8928	19.289	0.04628		
3	Hospital	27°29'16.3" N	89°53'34.7" E	LTE 1800	1.917	18.44	0.1039	**0.5**	**Below the Limits**
				5G 3.5-3.6	1.032	19.289	0.055350		
4	Rinchengang	27°29'32.9" N	89°53'34.3" E	GSM 900	0.1505	13.044	0.01153	**0.5**	**Below the Limits**
				LTE 1800	0.2832	18.44	0.01535		

				UMTS 850	0.2281	12.678	0.01799		
				TDD2300	3.024	19.289	0.1567		
				5G 3.5-3.6	0.3914	19.289	0.02029		
5	CNR	27°30'06.8" N	89°52'43.8" E	LTE 1800	2.954	18.44	0.1601	**0.5**	**Below the Limits**
6	CNR Girl Hostel	27°29'49.8" N	89°52'34.4" E	LTE 1800	0.7928	18.44	0.04299	**0.5**	**Below the Limits**
				TDD2300	1.509	19.289	0.07823		
				5G 3.5-3.6	1.08	19.289	0.0559		
7	Bajo Customer care	27°29'36.0" N	89°53'59.7" E	LTE 1800	1.85	18.44	0.0959	**0.5**	**Below the Limits**
8	Bajo Town Upper	27°29'42.0" N	89°54'05.3" E	LTE 1800	0.7846	18.44	0.0425	**0.5**	**Below the Limits**
9	Bajo Town Lower	27°29'41.0" N	89°54'00.0" E	LTE 1800	1.429	18.44	0.0774		**Below the Limits**
				TDD2300	0.4406	19.289	0.0228		
10	Near BOd Bajothang	27°29'43.2" N	89°53'53.6" E	LTE 1800	1.429	18.44	0.07749	**0.5**	**Below the Limits**

				TDD2300	0.4406	19.289	0.0228		

4. Wangdue (Tashi InfoComm Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m $(1.375f^{0.5}(MHz))/10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)^2	Exposure Ratio Limits	Remark
1	Nezergang	27°28'34.9" N	89°54'25.5" E	GSM 900	0.2826	13.044	0.02166	**0.5**	**Below the Limits**
				LTE 1800	0.4061	18.44	0.02202		
				UMTS 850	0.5556	12.678	0.0438		
2	Above Hospital	27°29'21.6" N	89°53'29.9" E	GSM 900	0.09028	13.044	0.00692	**0.5**	**Below the Limits**
				5G 3.5-3.6	0.7519	19.289	0.03898		
				LTE 1800	1.262	18.44	0.06843		
3	Bajo town	27°29'39.9" N	89°54'04.8"	LTE 1800	0.622	18.44	0.03373		

	rooftop		E	5G 3.5-3.6	1.209	19.289	0.0626	**0.5**	**Below the Limits**
4	Bajo Town top	27°30'03.4" N	89°53'32.8" E	LTE 1800	0.3927	18.44	0.0212	**0.5**	**Below the Limits**
				5G 3.5-3.6	0.9432	19.289	0.0488		

5. Trongsa (Bhutan Telecom Limited)

Sl. No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)^2**	**Exposure Ratio Limits**	**Remark**
1	Main Telecom Exchange	27°30'10.4" N	90°30'26.4" E	GSM 900	0.386	13.044	0.02959	**0.5**	**Below the Limits**
				LTE 1800	0.7747	18.44	0.0420		
				LTE700	0.1349	12.0658	0.01118		
				TDD2300	1.165	19.289	0.06039		
				UMTS 850	0.09614	12.678	0.000758		

				5G 3.5-3.6	0.3571	19.289	0.01851		
				UMTS1900	0.04559	19.289	0.00236		
2.	District Court	27°30'21.5" N	90°30'30.8" E	LTE 1800	0.863	18.44	0.0468	**0.5**	**Below the Limits**
				GSM 900	0.1657	13.044	0.01232		
3	Ta Dzong	27°29'52.2" N	90°30'32.7" E	LTE 1800	0.8323	18.44	0.0451	**0.5**	**Below the Limits**
				LTE700	0.5605	12.0658	0.04645		
				TDD2300	0.4277	19.289	0.02217		
				GSM 900	0.2937	13.044	0.0225		
				UMTS 850	0.08231	12.678	0.000649		
				5G 3.5-3.6	0.3486	19.289	0.01807		
4	Bubja	27°24'55.1" N	90°29'25.0" E	GSM 900	1.426	13.044	0.1119		
				LTE 1800	0.5518	18.44	0.0299		
				LTE700	1.501	12.0658	0.01244		**Below the Limits**

				UMTS 850	0.07751	12.678	0.000611	**0.5**	
				UMTS1900	0.02463	19.289	0.001276		
5	Taktsi	27°26'49.8" N	90°28'48.0" E	GSM 900	0.2114	13.044	0.0162	**0.5**	**Below the Limits**
				LTE 1800	0.5593	18.44	0.03033		
				LTE700	0.4704	12.0658	0.0371		
				UMTS 850	0.07524	12.678	0.0005934		
				5G 3.5-3.6	0.3599	19.289	0.01865		
				TDD2300	0.4855	19.289	0.0251		

6. Trongsa (Tashi InfoComm Private Limited)

Sl. No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)^2**	**Exposure Ratio Limits**	**Remark**
1	Trongsa	27°30'05.8" N	90°30'27.8" E	LTE 1800	0.1681	18.44	0.009116		

	town rooftop			UMTS 850	0.1807	12.678	0.01425	**0.5**	**Below the Limits**
				5G 3.5-3.6	3.109	19.289	0.161179		
2.	Ta Dzong	27°29'52.2" N	90°30'32.7" E	LTE 1800	0.6447	18.44	0.0349	**0.5**	**Below the Limits**
				GSM 900	0.0734	13.044	0.005627		

7. Bumthang (Bhutan Telecom Limited)

Sl. No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)^2**	**Exposure Ratio Limits**	**Remark**
1	Chamkhar	27°32'50.5'' N	90°45'13.2" E	LTE 1800	2.070	18.49	0.111	**0.5**	**Below the Limits**
				5G	2.301	19.29	0.119		
2.	District Court	27°32'43.6'' N	90°44'52.1" E	900 GSM	0.2787	13.44	0.020		

				850 UMTS	0.2237	12.87	0.017	**0.5**	**Below the Limits**
				LTE 700	0.9644	12.14	0.079		
				LTE 1800	1.060	18.49	0.057		
				TDD2300	0.4042	19.29	0.020		
				5G 3.5-3.6	0.8247	19.29	0.042		
3	Gangkhar	27°32'45.5'' N	90°45'39.3" E	LTE 1800	1.334	18.49	0.072	**0.5**	**Below the Limits**
				5G 3.5-3.6	0.1077	19.29	0.0055		
4	Jambay Lhakhang	27°34'17" N	90°44'13.4" E	GSM 900	0.5404	13.27	0.040	**0.5**	**Below the Limits**
				LTE 700	0.7998	12.14	0.065		
				LTE 1800	1.485	18.44	0.080		
				UMTS 850	0.5091	12.87	0.039		

				TDD 2300	0.5034	19.29	0.026		
				5G 3.5-3.6	1.46	18.49	0.078		

8. Bumthang (Tashi InfoCom Private Limited)

Sl. No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)$^{\wedge 2}$**	**Exposure Ratio Limits**	**Remark**
1	District Court	27°32'43.3" N	90°44'52.4" E	GSM 900	1.105	13.34	0.082	**0.5**	**Below the Limits**
				LTE 1800	1.518	18.64	0.081		
				5G 3.4-3.5	1.78	19.29	0.092		
2	Tekarshing	27°34'11.5" N	90°44'49.8" E	GSM 900	0.7598	13.34	0.056	**0.5**	**Below the Limits**
				UMTS 850	0.3062	12.79	0.023		
				LTE 700	0.4666	11.95	0.039		

				TDD 2300	0.02982	19.29	0.0015		
				LTE 1800	0.5982	18.64	0.032		
				5G 3.4-3.5	0.9291	19.29	0.048		

9. Mongar (Bhutan Telecom Limited)

Sl. No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)^2**	**Exposure Ratio Limits**	**Remark**
1	Gyelposhing	27°13'55.2" N	91°11'45.9" E	GSM 900	0.4347	13.044	0.033	**0.5**	**Below the Limits**
				LTE 1800	1.043	18.44	0.056		
				LTE700	0.4086	12.658	0.032		

				UMTS 850	0.08962	12.678	0.007		
				5G 3.5-3.6	0.4347	19.29	0.022		
2.	BCTA office below	27°16'22.4" N	91°14'02.2" E	LTE 1800	2.571	18.49	0.139	**0.5**	**Below the Limits**
3	Main Town	27°16'37.9" N	91°14'21.2" E	GSM 900	0.6465	13.27	0.048	**0.5**	**Below the Limits**
				UMTS 850	0.7036	12.87	0.054		
				TDD 2300	0.7021	19.29	0.036		
				LTE 700	0.8449	12.14	0.069		
				LTE 1800	1.188	18.49	0.064		
				5G 3.5-3.6	0.6807	19.29	0.035		
4	Chongshing	27°16'23.1" N	91°14'51.7" E	LTE 1800	1.163	18.49	0.062	**0.5**	**Below the Limits**
				5G 3.5-3.6	0.07034	19.29	0.0036		

5	Hospital	27°16'44.5" N	91°14'20.6" E	LTE 1800	3.568	18.49	0.192	**0.5**	**Below the Limits**
6	Kilkhar	27°15'46.5" N	91°15'41.5" E	LTE 1800	0.781	18.49	0.042	**0.5**	**Below the Limits**

10. Mongar (Tashi InfoComm Limited)

Sl.No	**Site Name**	**Latitude**	**Longitude**	**Frequency Band**	**Field Strength Measurement Value (V/m)**	**BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$**	**Exposure Ratio SQRT (Measured V/Limit Value)^2**	**Exposure Ratio Limits**	**Remark**
1	Kilikar	27°15'42.4" N	91°15'55.5" E	GSM 900	0.06396	13.34	0.0047	**0.5**	**Below the Limits**
				LTE 1800	1.71	18.64	0.091		
				LTE 700	0.05174	11.95	0.0043		
				TDD 2300	0.02898	19.29	0.0015		
				5G 3.4-3.5	0.06831	19.29	0.0035		

				UMTS 850	0.0556	12.79	0.0043		
2	Limithang	27°15'39.6" N	91°1025.8" E	5G 3.5-3.6	0.063829	19.29	0.0033	**0.5**	**Below the Limits**
				LTE 1800	0.1123	18.64	0.0060		
3	Main Town	27°16'37.2" N	91°14'20.5" E	GSM 900	0.1281	13.34	0.0096	**0.5**	**Below the limits**
				UMTS 850	0.685	12.79	0.053		
				LTE 700	0.07492	11.95	0.0062		
				TDD 2300	0.02843	19.29	0.0014		
				LTE 1800	0.5227	18.64	0.028		
				5G 3.5-3.6	4.805	19.29	0.249		

11. Lhuentse (Tashi InfoCom Private Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m $(1.375f^{0.5}(MHz))/10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)^2	Exposure Ratio Limits	Remark
1	Above district court	27°40'14.2" N	91°11'00.5" E	GSM 900	0.07169	13.34	0.0053	**0.5**	**Below the Limits**
				LTE 1800	0.1374	18.64	0.0073		
				LTE700	0.03986	11.95	0.0033		
				TDD2300	0.02738	19.29	0.0013		
				UMTS 850	0.06427	12.79	0.0050		
				5G 3.4-3.5	0.1538	19.29	0.0079		

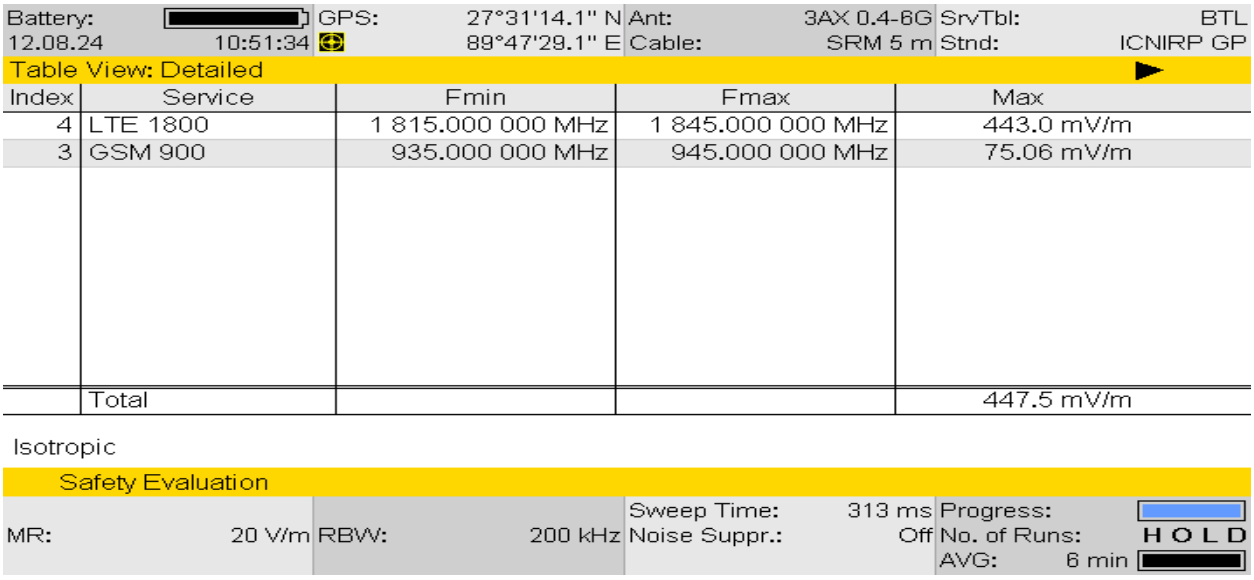
12. Lhuentse (Bhutan Telecom Limited)

Sl. No	Site Name	Latitude	Longitude	Frequency Band	Field Strength Measurement Value (V/m)	BICMA Limits V/m ($1.375f^{0.5}$(MHz))/$10^{0.5}$	Exposure Ratio SQRT (Measured V/Limit Value)$^{\wedge 2}$	Exposure Ratio Limits	Remark
1	above dzong area	27°39'41.1" N	91°11'17.4" E	LTE 1800	0.7839	18.49	0.042	**0.5**	**Below the Limits**
				LTE 700	0.03894	12.14	0.0032		
				GSM 900	0.02832	13.27	0.0021		
				UMTS 1900	0.01605	19.29	0.0083		
				TDD 2300	0.02802	19.29	0.0021		
				UMTS 850	0.02892	12.87	0.0022		
				5G 3.5-3.6	0.06541	19.29	0.0033		
2.	Near Dzong area	27°26'38.0" N	91°10'22.5" E	LTE 1800	1.085	18.49	0.058	**0.5**	**Below the Limits**

3	Autsho	27°26'38.0" N	91°10'22.5" E	LTE 1800	0.9359	18.49	0.050	**0.5**	**Below the Limits**

Annexure 2 (Screenshot of the result)

The following are the screenshot images of measurement result;



Battery:		GPS:	27°31'14.1" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
12.08.24	10:51:34		89°47'29.1" E	Cable:	SRM 5 m	Stnd:	ICNIRP GP

Table View: Detailed

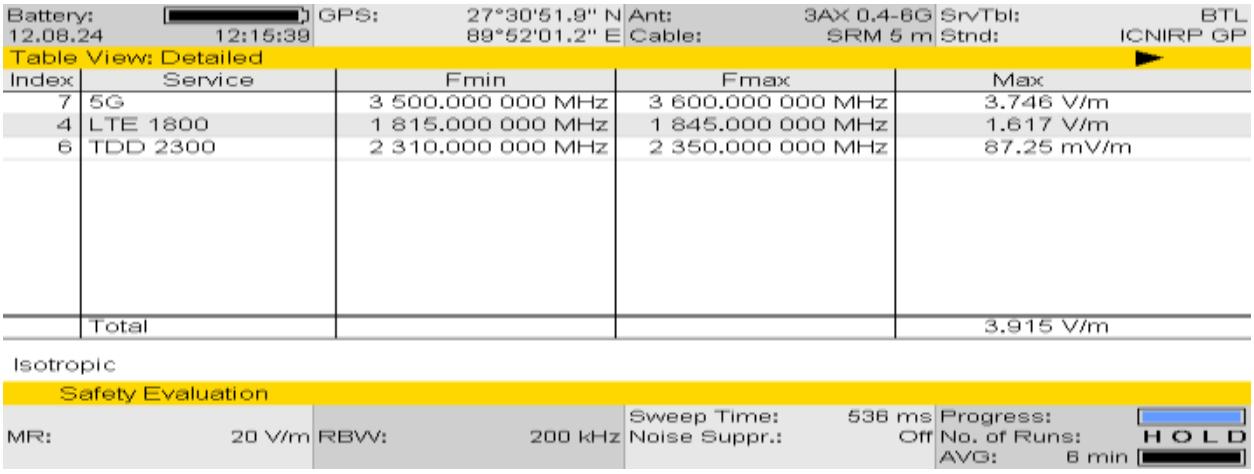
Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	443.0 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	75.06 mV/m
	Total			447.5 mV/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	313 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.1: BTL, lumitsawa, Punakha



Battery:		GPS:	27°30'51.9" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
12.08.24	12:15:39		89°52'01.2" E	Cable:	SRM 5 m	Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	3.746 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.617 V/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	87.25 mV/m
	Total			3.915 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	536 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.2: BTL, Lobesa Punakha

Battery:		GPS:	27°32'59.8" N	Ant:	3AX 0.4-6G
12.08.24	14:08:13		89°52'15.7" E	Cable:	SRM 5 m

SrvTbl:	BTL			
Stnd:	ICNIRP GP			

Table View: Detailed

Index	Service	Fmin	Fmax	Max
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	4.083 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.296 V/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	1.280 V/m
	Total			4.218 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	536 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.3: BTL, Khuruthang Punakha

Battery:		GPS:	27°35'08.3" N	Ant:	3AX 0.4-6G
12.08.24	14:42:46		89°51'34.1" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	1.495 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.485 V/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	1.052 V/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	81.33 mV/m
	Total			1.694 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	631 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.4: BTL, Dzong area Punakha

Battery:		GPS:	27°35'11.7" N	Ant:	3AX 0.4-6G
12.08.24	15:01:07		89°51'54.5" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	1.617 V/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	1.173 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	747.6 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	489.5 mV/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	50.17 mV/m
	Total			1.866 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	785 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.5: BTL, Dzong BTS Punakha

Battery:		GPS:	27°33'05.4" N	Ant:	3AX 0.4-6G
12.08.24	15:29:35		89°52'14.0" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	1.813 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	896.3 mV/m
	Total			1.856 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	340 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.6: BTL, Telecom Exchange Punakha

Battery:		GPS:	27°31'00.7" N	Ant:	3AX 0.4-6G
12.08.24	12:32:41		89°52'01.3" E	Cable:	SRM 5 m

SrvTbl:	TICPL		
Stnd:	ICNIRP GP		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	1.605 V/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	201.2 mV/m
	Total			1.611 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	383 ms
				Noise Suppr.:	Off
				AVG:	6 min

Progress:	
No. of Runs:	HOLD

Figure 1.7: TIPL, Lobesa Punakha

Battery:		GPS:	27°33'01.6" N	Ant:	3AX 0.4-6G
12.08.24	14:19:12		89°52'16.0" E	Cable:	SRM 5 m

SrvTbl:	TICPL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	6.572 V/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	235.4 mV/m
	Total			6.573 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	385 ms
				Noise Suppr.:	Off
				AVG:	6 min

Progress:	
No. of Runs:	HOLD

Figure 1.8: TIPL, Khuruthang

Battery:		GPS:	27°28'40.2" N	Ant:	3AX 0.4-6G
13.08.24	09:29:35		89°53'54.9" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.232 V/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	697.7 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	604.9 mV/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	501.9 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	280.3 mV/m
	Total			1.433 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	758 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.9: BTL, Wangdue Exchange

Battery:		GPS:	27°29'00.2" N	Ant:	3AX 0.4-6G
13.08.24	09:49:25		89°54'04.9" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	1.125 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	970.5 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	892.8 mV/m
	Total			1.266 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	536 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.10: BTL, Army Camp Wangdue

Battery:		GPS:	27°29'16.3" N	Ant:	3AX 0.4-6G
13.08.24	11:06:24		89°53'34.7" E	Cable:	SRM 5 m

SrvTbl:	BTL		
Stnd:	ICNIRP GP		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.917 V/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	1.032 V/m
	Total			1.927 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	382 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.11: BTL, Hospital Wangdue

Battery:		GPS:	27°24'55.1" N	Ant:	3AX 0.4-6G
15.08.24	15:27:43		90°29'25.0" E	Cable:	SRM 5 m

SrvTbl:	BTL		
Stnd:	ICNIRP GP		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
1	LTE 700	783.000 000 MHz	803.000 000 MHz	1.501 V/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	1.426 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	551.8 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	77.51 mV/m
	Total			1.935 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	562 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.12: BTL, Rinchengang Wangdue

Battery:		GPS:	27°29'49.8" N	Ant:	3AX 0.4-6G
13.08.24	12:49:41		89°52'34.4" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	1.509 V/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	1.080 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	792.8 mV/m
	Total			1.530 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	536 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.13: BTL, CNR Girl Hostel Wangdue

Battery:		GPS:	27°30'06.8" N	Ant:	3AX 0.4-6G
13.08.24	12:25:56		89°52'43.8" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	2.954 V/m
	Total			2.954 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	185 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.14: BTL, CNR Wangdue

Battery:		GPS:	27°29'36.1" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
13.08.24	14:28:54		89°53'59.6" E	Cable:	SRM 5 m	Stnd:	ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.850 V/m
	Total			1.850 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	185 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.15: BTL, Bajo Customer care

Battery:		GPS:	27°29'42.0" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
13.08.24	14:59:09		89°54'05.3" E	Cable:	SRM 5 m	Stnd:	ICNIRP GP

Table View: Detailed

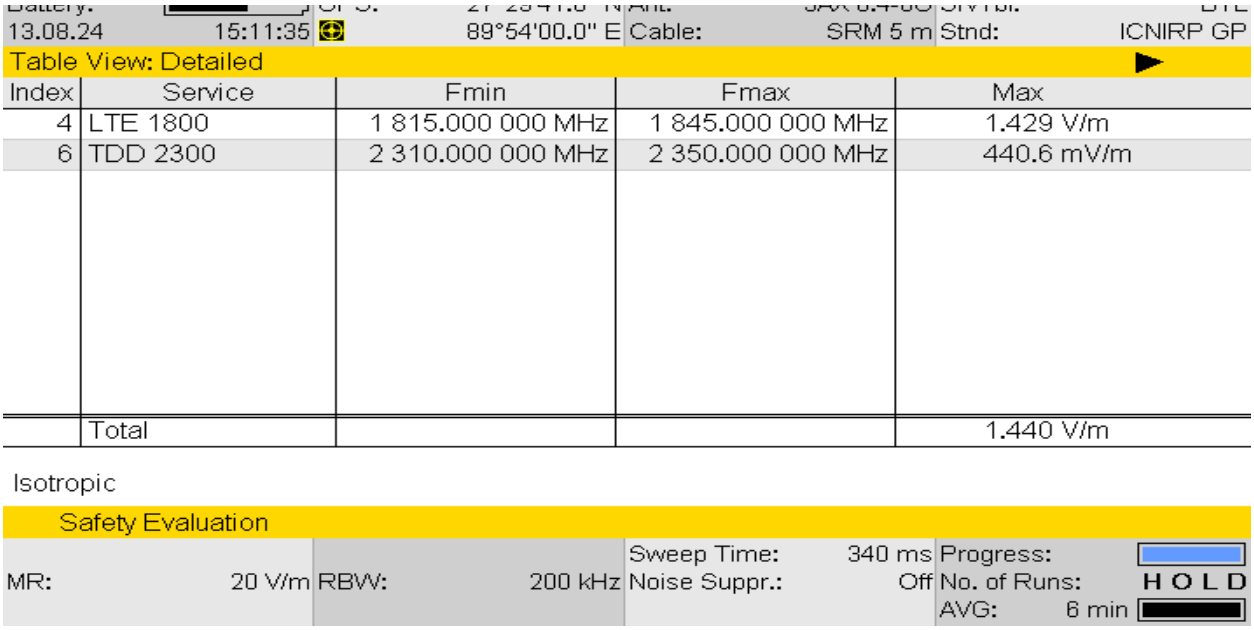
Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	784.6 mV/m
	Total			784.6 mV/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	189 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.16: BTL, Bajo Town Upper



13.08.24 15:11:35 89°54'00.0" E Cable: SRM 5 m Stnd: ICNIRP GP

Table View: Detailed

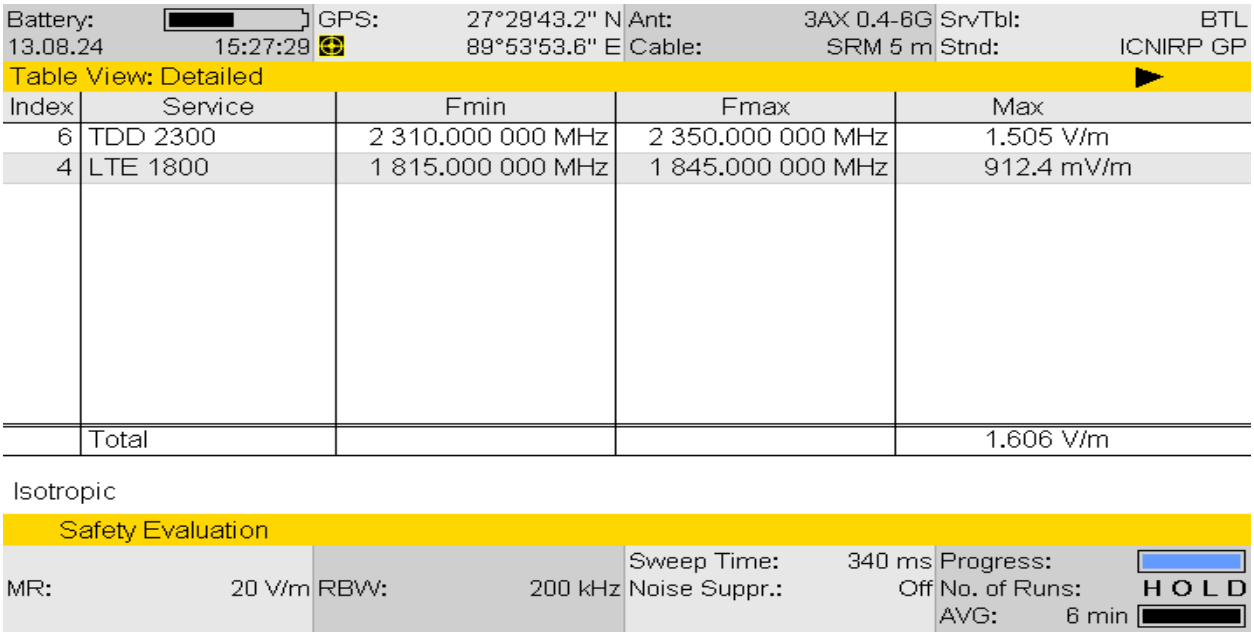
Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.429 V/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	440.6 mV/m
	Total			1.440 V/m

Isotropic

Safety Evaluation

MR: 20 V/m RBW: 200 kHz Sweep Time: 340 ms Noise Suppr.: Off Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.17: BTL, Bajo Town Lower



Battery: GPS: 27°29'43.2" N Ant: 3AX 0.4-6G SrvTbl: BTL

13.08.24 15:27:29 89°53'53.6" E Cable: SRM 5 m Stnd: ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	1.505 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	912.4 mV/m
	Total			1.606 V/m

Isotropic

Safety Evaluation

MR: 20 V/m RBW: 200 kHz Sweep Time: 340 ms Noise Suppr.: Off Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.18: BTL, Near BOd Bajothang

13.08.24	10:19:58	89°54'25.5" E	Cable:	SRM 5 m
Stnd:	ICNIRP GP			

Table View: Detailed

Index	Service	Fmin	Fmax	Max
2	UMTS 850	869.000 000 MHz	879.000 000 MHz	555.6 mV/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	406.1 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	282.6 mV/m
	Total			620.2 mV/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	437 ms
Noise Suppr.:	Off	Progress:			
No. of Runs:	HOLD				
AVG:	6 min				

Figure 1.19: TIPL, Nezergang

Battery:		GPS:	27°29'21.6" N	Ant: 3AX 0.4-6G
SrvTbl:	TICPL			
13.08.24	11:30:14	89°53'29.9" E	Cable:	SRM 5 m
Stnd:	ICNIRP GP			

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	1.262 V/m
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	751.9 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	90.28 mV/m
	Total			1.297 V/m

Isotropic

Safety Evaluation

MR:	20 V/m	RBW:	200 kHz	Sweep Time:	510 ms
Noise Suppr.:	Off	Progress:			
No. of Runs:	HOLD				
AVG:	6 min				

Figure 1.20: TIPL, Above Hospital

13.08.24 14:48:11 89°54'04.8" E Cable: SRM 5 m Stnd: ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	1.209 V/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	622.0 mV/m
	Total			1.259 V/m

Isotropic

Safety Evaluation

MR: 20 V/m RBW: 200 kHz Sweep Time: 385 ms Noise Suppr.: Off Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.21: TIPL, Bajo town rooftop

Battery: GPS: 27°30'03.4" N Ant: 3AX 0.4-6G SrvTbl: TICPL
13.08.24 15:54:21 89°53'32.8" E Cable: SRM 5 m Stnd: ICNIRP GP

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	943.2 mV/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	799.0 mV/m
	Total			1.090 V/m

Isotropic

Safety Evaluation

MR: 20 V/m RBW: 200 kHz Sweep Time: 384 ms Noise Suppr.: Off Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.22: TIPL, Bajo Town town

Battery:		GPS:	27°32'50.5" N	Ant:	3AX 0.4-6G
26.09.24	10:03:03		90°45'13.2" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	2.301 V/m
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	2.070 V/m
	Total			2.374 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	327 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.23: Bumthang Chamkhar BTL

Battery:		GPS:	27°32'43.6" N	Ant:	3AX 0.4-6G
26.09.24	10:47:34		90°44'52.1" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.060 V/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	964.4 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	824.7 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	404.2 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	278.7 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	223.7 mV/m
	Total			1.209 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	822 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.24: District Court Bumthang BTL

Battery:	GPS: 27°32'43.3" N	Ant: 3AX 0.4-6G	SrvTbl: TICPL
26.09.24 10:36:02	90°44'52.4" E	Cable: SRM 5 m	Stnd: U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	1.780 V/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	1.518 V/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	1.105 V/m
	Total			2.100 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time: 448 ms Noise Suppr.: Off	Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.25: District Court Bumthang TPIL

Battery:	GPS: 27°32'45.5" N	Ant: 3AX 0.4-6G	SrvTbl: BTL
26.09.24 11:54:19	90°45'39.3" E	Cable: SRM 5 m	Stnd: U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.334 V/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	107.7 mV/m
	Total			1.335 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time: 330 ms Noise Suppr.: Off	Progress: No. of Runs: HOLD AVG: 6 min

Figure 1.26: Ghankhar Bumthang BTL

Battery:		GPS:	27°34'17.0" N	Ant:	3AX 0.4-6G
26.09.24	12:19:13		90°44'13.4" E	Cable:	SRM 5 m

SrvTbl:	BTL		
Stnd:	U_BICMA		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.460 V/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	799.8 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	540.4 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	509.1 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	503.4 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	64.81 mV/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	17.12 mV/m
	Total			1.565 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	939 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	HOLD
AVG:	6 min

Figure 1.27: Ghankhar Bumthang BTL

Battery:		GPS:	27°34'11.5" N	Ant:	3AX 0.4-6G
26.09.24	11:25:43		90°44'49.8" E	Cable:	SRM 5 m

SrvTbl:	TICPL		
Stnd:	U_BICMA		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	929.1 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	759.8 mV/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	598.2 mV/m
1	LTE 700	758.000 000 MHz	778.000 000 MHz	466.6 mV/m
2	UMTS 850	869.000 000 MHz	879.000 000 MHz	306.2 mV/m
5	TDD 2300	2 350.000 000 MHz	2 390.000 000 MHz	29.82 mV/m
	Total			1.190 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	823 ms
				Noise Suppr.:	Off

Progress:	
No. of Runs:	461
AVG:	6 min

Figure 1.28: Tekarshing Bumthang TIPL

Battery:		GPS:	27°13'55.2" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
27.09.24	15:18:26		91°11'45.9" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.043 V/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	434.7 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	434.0 mV/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	408.6 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	89.62 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	27.33 mV/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	16.72 mV/m
	Total			1.094 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	940 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG: 6 min	

Figure 1.29:Gyelposhing Mongar BTL

Battery:		GPS:	27°16'22.4" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
29.09.24	11:53:28		91°14'02.2" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	2.571 V/m
	Total			2.571 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	169 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG: 6 min	

Figure 1.30: BCTA office MOngar BTL

BCTA Office Mongar BTL

Battery:		GPS:	27°16'37.9" N	Ant:	3AX 0.4-6G
29.09.24	10:33:28		91°14'21.2" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.188 V/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	966.9 mV/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	844.9 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	703.6 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	702.1 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	680.7 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	646.5 mV/m
	Total			1.627 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	940 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.31: BCTA Office Mongar BTL

Battery:		GPS:	27°16'37.9" N	Ant:	3AX 0.4-6G
29.09.24	10:33:28		91°14'21.2" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.188 V/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	966.9 mV/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	844.9 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	703.6 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	702.1 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	680.7 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	646.5 mV/m
	Total			1.627 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	940 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.32: Main Town Mongar BTL

Battery:		GPS:	27°16'23.1" N	Ant:	3AX 0.4-6G
29.09.24	11:33:44		91°14'51.7" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.163 V/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	70.34 mV/m
	Total			1.164 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	330 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.33: Chongshing Mongar BTL

Battery:		GPS:	27°16'44.5" N	Ant:	3AX 0.4-6G
29.09.24	12:07:34		91°14'20.6" E	Cable:	SRM 5 m

SrvTbl:	BTL
Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	3.568 V/m
	Total			3.568 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	169 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.34 Hospital Mongar BTL

Battery:		GPS:	27°15'46.5" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
29.09.24	11:00:24		91°15'41.5" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	781.0 mV/m
	Total			781.0 mV/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	169 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.35: Kilikhar Mongar BTL

Battery:		GPS:	27°15'42.4" N	Ant:	3AX 0.4-6G	SrvTbl:	TICPL
29.09.24	11:15:07		91°15'55.5" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	1.710 V/m
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	68.31 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	63.96 mV/m
2	UMTS 850	869.000 000 MHz	879.000 000 MHz	55.60 mV/m
1	LTE 700	758.000 000 MHz	778.000 000 MHz	51.74 mV/m
5	TDD 2300	2 350.000 000 MHz	2 390.000 000 MHz	28.98 mV/m
	Total			1.713 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	823 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	557
						AVG:	6 min

Figure 1.36: Power substation Kilikhar Mongar TIPL

Battery:		GPS:	27°15'39.6" N	Ant:	3AX 0.4-6G	SrvTbl:	TICPL
27.09.24	14:44:43		91°10'25.8" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	112.3 mV/m
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	63.82 mV/m
	Total			125.9 mV/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	331 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.37: Limithang Mongar TIPL

Battery:		GPS:	27°16'37.2" N	Ant:	3AX 0.4-6G	SrvTbl:	TICPL
29.09.24	10:16:17		91°14'20.5" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	4.805 V/m
2	UMTS 850	869.000 000 MHz	879.000 000 MHz	685.0 mV/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	522.7 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	128.1 mV/m
1	LTE 700	758.000 000 MHz	778.000 000 MHz	74.92 mV/m
5	TDD 2300	2 350.000 000 MHz	2 390.000 000 MHz	28.43 mV/m
	Total			4.830 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	823 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.38: Main Town rooftop TIPL

Battery:		GPS:	27°40'14.2" N	Ant:	3AX 0.4-6G	SrvTbl:	TICPL
28.09.24	13:09:11		91°11'00.5" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
6	5G	3 400.000 000 MHz	3 500.000 000 MHz	153.8 mV/m
4	LTE 1800	1 845.000 000 MHz	1 880.000 000 MHz	137.4 mV/m
3	GSM 900	945.000 000 MHz	955.000 000 MHz	71.69 mV/m
2	UMTS 850	869.000 000 MHz	879.000 000 MHz	64.27 mV/m
1	LTE 700	758.000 000 MHz	778.000 000 MHz	39.86 mV/m
5	TDD 2300	2 350.000 000 MHz	2 390.000 000 MHz	27.38 mV/m
	Total			204.6 mV/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	822 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.39: Above district court Lhuentse TIPL

Battery:		GPS:	27°39'48.1" N	Ant:	3AX 0.4-6G	SrvTbl:	BTL
28.09.24	12:53:38		91°11'17.4" E	Cable:	SRM 5 m	Stnd:	U_BICMA

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	783.9 mV/m
7	5G	3 500.000 000 MHz	3 600.000 000 MHz	65.41 mV/m
1	LTE 700	783.000 000 MHz	803.000 000 MHz	38.94 mV/m
2	UMTS 850	879.000 000 MHz	889.000 000 MHz	28.92 mV/m
3	GSM 900	935.000 000 MHz	945.000 000 MHz	28.32 mV/m
6	TDD 2300	2 310.000 000 MHz	2 350.000 000 MHz	28.02 mV/m
5	UMTS 1900	2 110.000 000 MHz	2 120.000 000 MHz	16.05 mV/m
	Total			787.4 mV/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	939 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.40: Above Dzong Lhuentse BTL

Battery:		GPS:	27°26'38.0" N	Ant:	3AX 0.4-6G
28.09.24	10:15:28		91°10'22.5" E	Cable:	SRM 5 m

SrvTbl:	BTL		
Stnd:	U_BICMA		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	1.045 V/m
	Total			1.045 V/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	168 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	HOLD
						AVG:	6 min

Figure 1.41: Autsho Lhuentse BTL

Battery:		GPS:	27°39'47.8" N	Ant:	3AX 0.4-6G
28.09.24	12:42:06		91°11'17.4" E	Cable:	SRM 5 m

SrvTbl:	BTL		
Stnd:	U_BICMA		

Table View: Detailed

Index	Service	Fmin	Fmax	Max
4	LTE 1800	1 815.000 000 MHz	1 845.000 000 MHz	753.7 mV/m
	Total			753.7 mV/m

Isotropic

Safety Evaluation

MR:	6.3 V/m	RBW:	1 MHz	Sweep Time:	169 ms	Progress:	
				Noise Suppr.:	Off	No. of Runs:	2 235
						AVG:	6 min

Figure 1.42: Near Dzong Area Lhuentse BTL

Annexure 3 (Satellite View of Location of Monitored Sites)

The following are the satellite view of the measurement location of the each Telecom site transmitter;

Figure 1: Lumitsawa, Punakha (BTL)

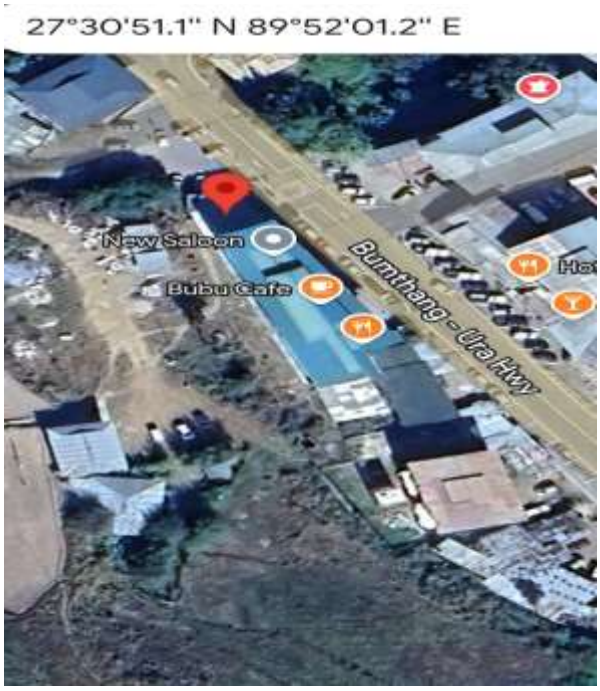


Figure 2: Lobesa, Punakha (BTL)

Figure 3: Khurungthan, Punakha (BTL)

Figure 4: Dzong area, Punakha (BTL)

Figure 5: Dzong BTS, Punakha (BTL)

Figure 6: Telecom Exchange, Punakha (BTL)

Figure 7: Lobesa, Punakha (TICPL)

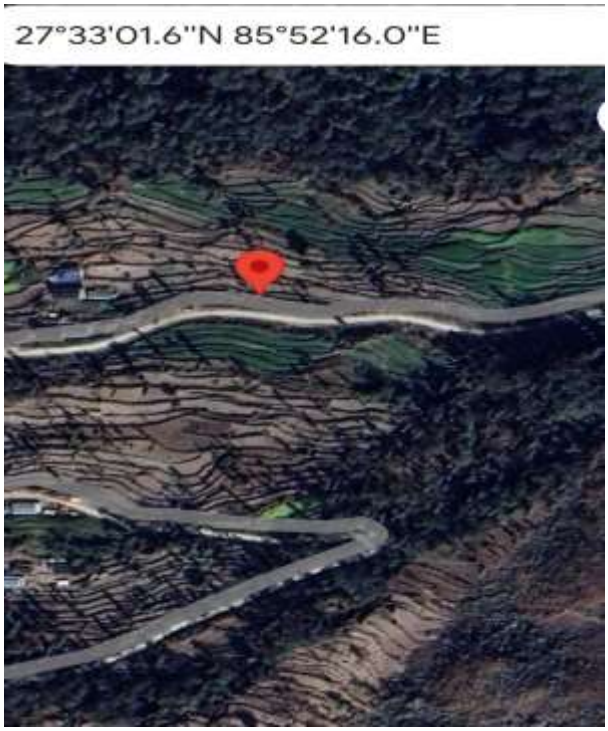


Figure 10: Khuruthang (TICPL)

Figure 11: Wangdue Exchange, Wangdue (BTL)

Figure 12: Army Camp, Wangdue (BTL)

Figure 11: Hospital, Wangdue (BTL)

Figure 12: Rinchengang, Wangdue (BTL)

Figure 13: CNR, Wangdue (BTL)

Figure 14: CNR Girl Hostel, Wangdue (BTL)

Figure 15: Near NPPF Colony(BTL)

Figure 16: Near BOD(TIPL)

Figure 17: Bajo Customer care, Wangdue (BTL)

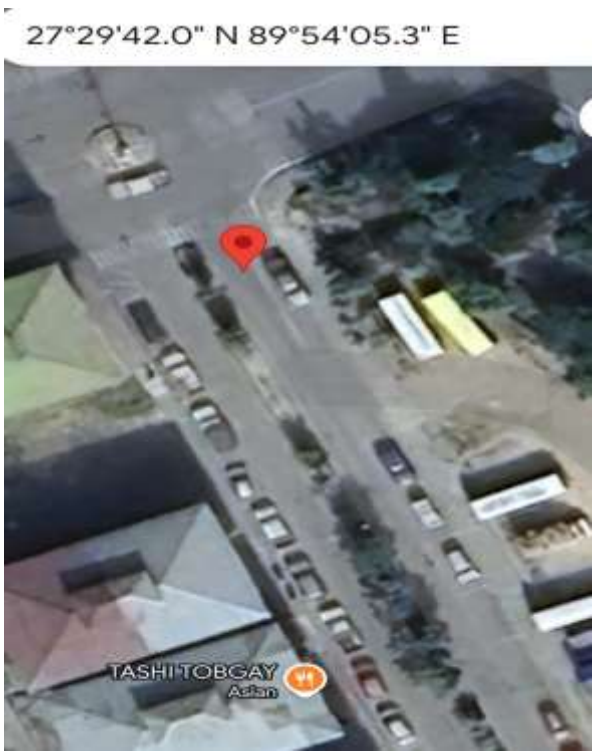


Figure 18: Bajo Town Uppe, Wangdue (TIPL)

Figure 19: Near BOd Bajothan,Wangdue (BTL)

Figure 20: Nezergang, Wangdue (TIPL)

Figure 21: Above Hospital,Wangdue (TIPL)

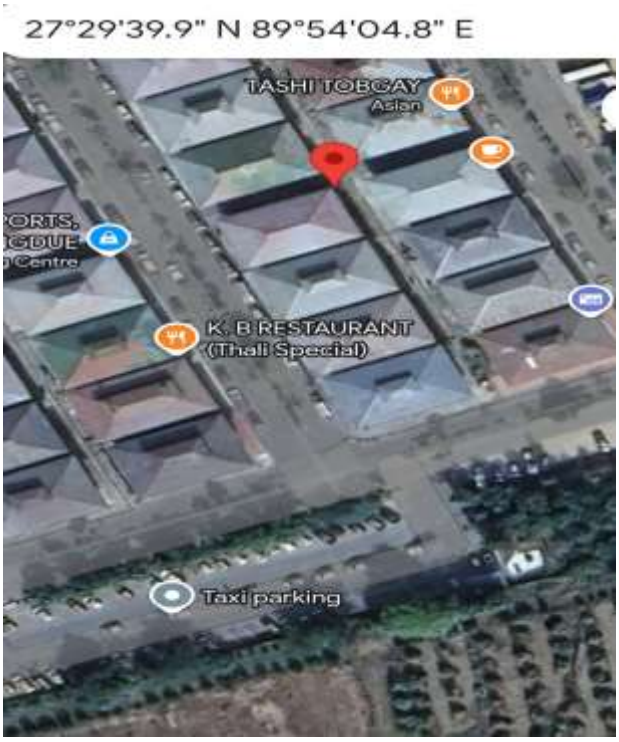


Figure 22: Bajo RoofTop, Wangdue (TIPL)

Figure 23: Bajo Town top,Wangdue (TIPL)

Figure 24: Main Telecom Exchange, Trongsa (BTL)

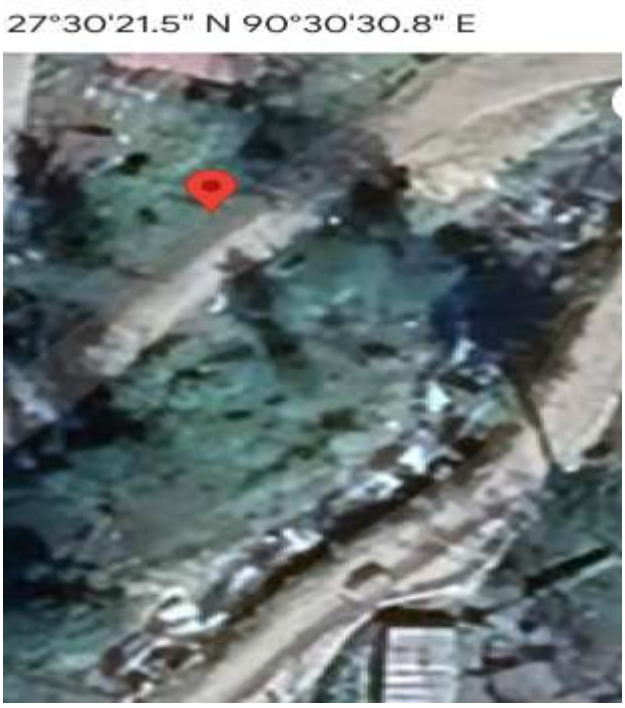


Figure 25: District Court, Trongsa (BTL)

Figure 26: Ta Dzong, Trongsa (BTL)

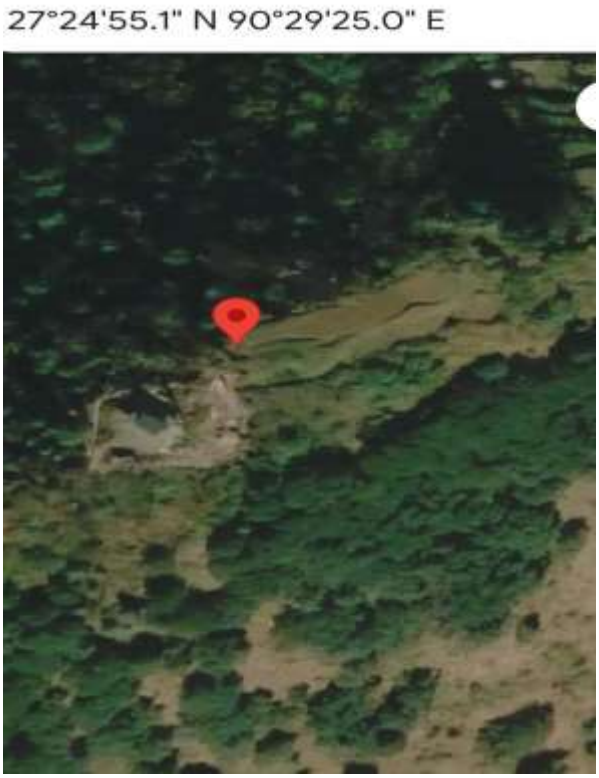


Figure 27: Bubja, Trongsa (BTL)

Figure 28: Taktsi, Trongsa (BTL)

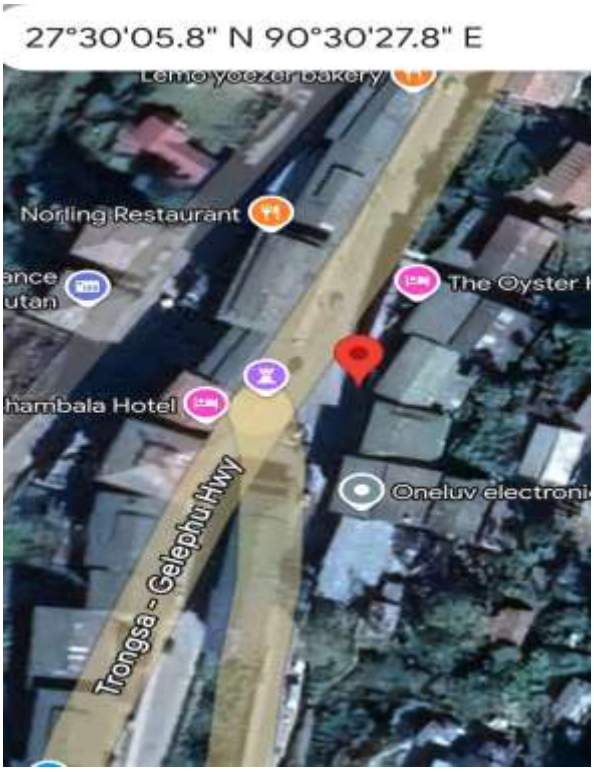


Figure 28: Trongsa town rooftop, Trongsa (TIPL)

Figure 29: Ta Dzong, Trongsa (TIPL)

Figure 30: Chamkhar, Bumthang(BTL)

Figure 31: District Court, Bumthang (BTL)

Figure 30: Chamkhar, Bumthang(BTL)

Figure 31: District Court, Bumthang (BTL)

Figure 32: Gangkhar, Bumthang(BTL)

Figure 33: Jambay Lhakhang, Bumthang (BTL)

Figure 34: District Court, Bumthang(TIPL)

Figure 35: Tekarshing, Bumthang (TIPL)

Figure 36: Gyelposhing, Mongar (BTL)

Figure 37: BCTA office below, Mongar (BTL)

Figure 38: Main Town , Mongar (BTL)

Figure 39: Chongshing, Mongar (BTL)

Figure 40: Hospital , Mongar (BTL)

Figure 41: Kilkha, Mongar (BTL)

Figure 42:Kilikar , Mongar (TIPL)

Figure 43: Limithang, Mongar (TIPL)

Figure 44: Main Town, Mongar (TIPL)

Figure 45: Above district court, Lhuentse (BTL)

Figure 46: above dzong area, Lhuentse (TIPL)

Figure 47: Near Dzong area, Lhuentse (TIPL)

Annexure 4 (Image of Monitored BTS)

The following are the images of the each Telecom BTS transmitters;

Figure 1: Lumithsawa(BTL)

Figure 2: Lobesa (TIPL)

Figure 3: Lobesa (BTL)

Figure 4: Khuruthang (BTL)

Figure 5: Khuruthang TIPL)

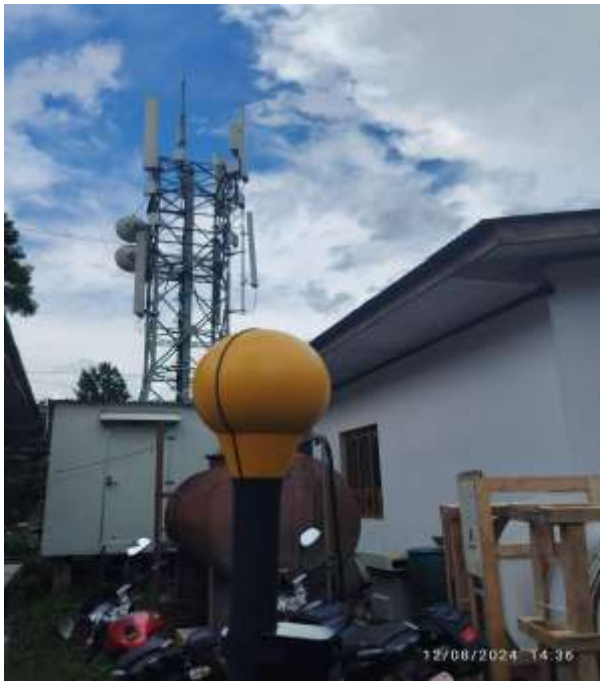


Figure 6: Above dzong area(BTL)

Figure 7: Near dzong area(BTL)

Figure 8:Khuruthang rooftop (BTL)

Figure 9: Wangdue Exchange (BTL)

Figure 10: Army camp area wangdue (BTL)

Figure 11: Wangdue, Nezergang(TIPL) (BTL)

Figure 12: Wangdue Hospital

Figure 13: Wangdue, above Hospital(TIPL)

Figure 14: Wangdue Rinchengang(BTL)

Figure 15: Wangdue, CNR area (BTL)

Figure 16: Wangdue girl Hostel area(BTL)

Figure 17: Wangdue, Bajo Customer care(BTL)

Figure 18: Bajo rooftop (TIPL)

Figure 19: Wangdue, Bajo Town Upper(BTL) Lower(BTL)

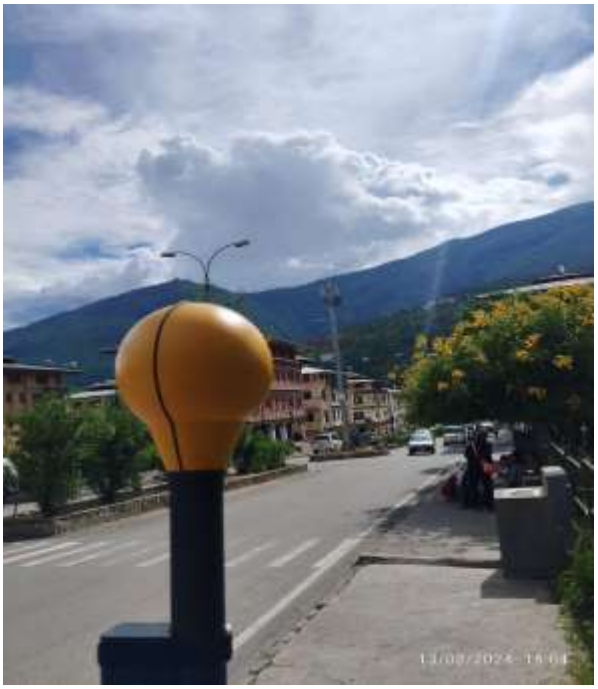


Figure 20: Wangdue Bajothang town

Figure 21: Wangdue, Bajo BOD (BTL)

Figure 22: Wangdue Bajothang Top (TIPLL)

Figure 23: Trongsa Exchange (BTL)

Figure 24: Trongsa Housing colony (BTL)

Figure 25: Trongsa Ta Dzong top (BTL)

Figure 26: Trongsa Ta Dzong top (TIPL)

Figure 27: Trongsa Bubja (BTL)

Figure 28: BTL Near district court Bumthang

Figure 29: TIPL Lhuentse above district court

Figure 30: BTL Mongar Main Town

Figure 31: BTL Lhuentse Above Dzong

Figure 32: BTL BCTA office Below Mongar

Figure 33: BTL Kilikhar Mongar

Figure 34: TIPLPower Substation Kilikhar Mongar

Figure 35: BTL Chongshing Mongar

Figure 36: BTL Authso Lhuentse