



COMMUNICATIONS (ELECTRO MAGNETIC FIELD) RULES

DRAFT 2021

ARRANGEMENT OF RULES

COMMUNICATIONS (ELECTRO MAGNETIC FIELD) RULES,2021

IN EXERCISE of the powers conferred by section 201 of the Communications Act, 2016, the MALAWI COMMUNICATIONS REGULATORY AUTHORITY make the following Rules-

1. Citation

These Rules shall be cited as the apply to Communications (Electro Magnetic Field) Rules, 2020.

2. Interpretation

In these Rules, unless the context otherwise requires –

“controlled (or occupational) exposure” means exposure to electromagnetic field experienced by an individual in the course of doing radiocommunication infrastructure work;

“electromagnetic field” means waves of electric and magnetic energy moving together through space;

“ICNIRP” means International Commission on Non-Ionizing Radiation Protection;

“licensee” means a communication services licensee who is using the radiocommunication infrastructure;

“uncontrolled (or general public) exposure” means exposure to electromagnetic field experienced by members of the general public;

“exceedance zone” means an area where potential exposure to electromagnetic field exceeds the applicable limits for both controlled (or occupational) exposure and uncontrolled (or general public) exposure;

“occupation zone” means an area where potential exposure to electromagnetic field is below the applicable limits for controlled (or occupational) exposure but exceeds the applicable limits for uncontrolled (or general public) exposure;

“compliance zone” means an area where potential exposure to electromagnetic field is below the applicable limits for both controlled (or occupational) exposure and uncontrolled (or general public) exposure;

3. Application

These Rules shall apply to all electronic communication licensees using Radiocommunication Infrastructure operating in 3 kHz to 300 GHz frequency range.

4. Submission of information

- (1) A licensee shall submit information to the Authority to facilitate compliance assessment of electromagnetic field exposure
 - (a) prior to the construction of radiocommunication infrastructure ; and
 - (b) when requested by the Authority from time to time.
- (2) The information required under subrule (1) shall include the following-
 - (a) radiocommunication infrastructure type: shall state whether the infrastructure is a tower/pole or rooftop;
 - (b) radiocommunication infrastructure identity;
 - (c) physical address of the radiocommunication infrastructure ;
 - (d) geographical coordinate in decimal format;
 - (e) effective antenna height in meters;
 - (f) antenna tilt in degrees;
 - (g) antenna gain in dB;
 - (h) antenna vertical beamwidth in degrees;
 - (i) antenna side lobe attenuation in dB;
 - (j) antenna type, model and manufacturer;
 - (k) feeder length in meters;
 - (l) feeder attenuation in dB/100m;
 - (m) transmitter power output (TPO) in watts;
 - (n) date of commissioning; and
 - (o) any other information specified by the Authority.

5. EMF Safety Limits

- (1) A licensee shall comply with the electromagnetic field exposure limits set by the Authority from time to time.
- (2) A licensee shall ensure that all radiocommunication infrastructure operating in the range 3 KHz to 300 GHz shall comply with electromagnetic field limits as specified in First Schedule.
- (3) Where the electromagnetic field limits of frequencies used by a licensee are not covered in First Schedule, then ICNIRP limits shall apply.
- (4) A licensee shall comply with the horizontal distances specified in the Second Schedule.

6. Procedure for assessment of electromagnetic field exposure

- (1) The Authority shall use any of the following methods for assessing electromagnetic field exposure compliance:
 - (a) Calculation method;
 - (b) Measurement method; or
 - (c) any other method determined by the authority
- (2) In assessing electromagnetic field exposure limits using the calculation method, the Authority, shall use simple or complex formulae.
- (3) The Authority may use the following simple calculation formula for single transmitter radiocommunication infrastructure -

$$E (V/m) = \frac{\sqrt{30 EIRP}}{r}$$

Where; E(V/m) - the RMS Electrical Field Strength.

$r(m)$ - is the distance between the point of investigation and center of the antenna.

EIRP (W) – Effective Isotropic Radiated Power.

- (4) Where there are two or more antennas or transmitters, the Authority may use the following complex calculation formula with or without simulation software -

$$E (V/m) = \frac{\sqrt{30 P G_i}}{r} f(\theta, \phi)$$

Where;

- E(V/m) - the RMS Electrical Field Strength.
- $r (m)$ - is the distance between the point of investigation and center of the antenna.
- P (W) - Input Power .
- $G_i (dB_i)$ - Antenna Maximum Gain.
- $f(\theta, \phi)$ - Antenna Amplitude Radiation Pattern (θ, ϕ - Azimuth and Elevation Angle)

- (5) The Authority may use the measurement method where the electromagnetic field exposure limits are difficult to calculate, and where the calculations yield values that are near the exposure limit threshold.
- (6) When using the measurement method under subrule (5), the Authority shall use measuring equipment in line with ITU standards or any applicable international best practices.
- (7) In assessing electromagnetic field compliance using any method under these Rules, the Authority shall take into consideration the following factors -
- (a) effective radiated power of the transmitter;
 - (b) operating frequency of the transmitter;

- (c) antenna orientation;
- (d) antenna directivity; and
- (e) operating environment.

7. **Mitigating Techniques for Electromagnetic Field Exposure**

- (1) A licensee shall restrict access to radiocommunication infrastructure in areas where the electromagnetic field limits exceed the exposure levels set under these Rules.
- (2) A licensee shall restrict access by the general public to the exceedance zone.
- (3) A licensee may provide access to workers to the exceedance zone.
- (4) Where it is necessary for workers to enter the exceedance zone, the licensee shall take steps to mitigate against electromagnetic field exposure which shall include the following-
 - (a) temporarily reducing power of the transmitter;
 - (b) controlling the duration of the exposure so that the time average is within the safety limits; and
 - (c) use of shielding or protective gear.
- (5) A licensee shall take steps to mitigate against electromagnetic field exposure in the occupational zone, which shall include the following:
 - (a) restricting access by the general public through erecting a perimeter fence, putting physical barriers, establishing lockout procedures and placing adequate signs; and
 - (b) permitting entry to workers with adequate knowledge of effects of electromagnetic field exposure.
- (6) There shall be no restriction of access to the compliance zone.
- (7) A Licensee shall ensure that transmission in the compliance zone is within the electromagnetic field compliance limits at all times.

7. **Public Awareness**

- (1) A licensee shall conduct public awareness activities on the effects of electromagnetic field exposure.
- (2) Where a Licensee installs radiocommunication infrastructure in a residential area, it shall, from time to time, sensitize the community on the dangers of electromagnetic field exposure.

8. Labeling of Radiocommunication Infrastructure

- (1) A Licensee shall ensure that radiocommunication infrastructure is clearly and properly labeled at all times in accordance with subrule (2).
- (2) The labeling under subrule (1) shall include-
 - (a) name of the radiocommunication infrastructure ;
 - (b) identity of the radiocommunication infrastructure ;
 - (c) exceedance zone warning sign; and
 - (d) occupation zone exposure warning sign.
- (3) the label made pursuant to subrule (1) shall -
 - (a) be printed on waterproof material;
 - (b) be made with clearly visible signs and words;
 - (c) be displayed at in conspicuous places; and
 - (d) include any information directed by the Authority

8. Power to Investigate and Inspect

- (1) Where the Authority has reasonable grounds to believe to that a Licensee is contravening or has contravenes these Rules the Authority shall conduct an investigation for the purpose of securing compliance.
- (2) The Authority or it's authorized officers may at any reasonable time enter and inspect the premises of a licensee or any place where radiocommunication infrastructure is located for the purposes of monitoring compliance with these Rules

8. Regulatory Sanctions

- (1) The Authority may impose the following regulatory sanctions for any breach of these Rules-
- (a) issue a compliance order;
 - (b) issue a cease and desist;
 - (c) issue a warning;
 - (d) impose a fine;
 - (e) revoke a Licensee’s service licence; or
 - (f) make any other order it considers the appropriate.
- (2) In imposing any regulatory sanctions under subrule (1) the Authority may take into account any of the following factors-
- (a) the gravity of the breach;
 - (b) the duration of the breach;
 - (c) whether the breach resulted in injury to any person;
 - (d) whether the Licensee acted knowingly, recklessly or in a negligent manner; or
 - (e) any other relevant consideration deemed necessary by the Authority

SCHEDULES

FIRST SCHEDULE– STANDARD REFERENCE LEVELS FOR EMF EXPOSURE

Reference levels for controlled (or occupational) exposure to time-varying electric and magnetic fields (unperturbed rms values).

| Frequency range | E-field strength (V m ⁻¹) | H-field strength (A m ⁻¹) | B-field (μT) | Equivalent plane wave power density S_{eq} (W m ⁻²) |
|-----------------|---------------------------------------|---------------------------------------|-----------------------|---|
| up to 1 Hz | - | 1.63×10^5 | 2×10^5 | - |
| 1-8 Hz | 20,000 | $1.63 \times 10^5 / f^2$ | $2 \times 10^5 / f^2$ | - |
| 8-25 Hz | 20,000 | $2 \times 10^4 / f$ | $2.5 \times 10^4 / f$ | - |
| 0.025-0.82 kHz | $500 / f$ | $20 / f$ | $25 / f$ | - |
| 0.82-65 kHz | 610 | 24.4 | 30.7 | - |

| | | | | |
|---------------|------------|----------------|---------------|--------|
| 0.065-1 MHz | 610 | $1.6/f$ | $2.0/f$ | - |
| 1-10 MHz | $610/f$ | $1.6/f$ | $2.0/f$ | - |
| 10-400 MHz | 61 | 0.16 | 0.2 | 10 |
| 400-2,000 MHz | $3f^{1/2}$ | $0.008f^{1/2}$ | $0.01f^{1/2}$ | $f/40$ |
| 2-300 GHz | 137 | 0.36 | 0.45 | 50 |

Reference levels for uncontrolled (or general public exposure to time-varying electric and magnetic fields (unperturbed rms Values)

| Frequency range | E-field strength ($V\ m^{-1}$) | H-field strength ($A\ m^{-1}$) | B-field (μT) | Equivalent plane wave |
|-----------------|----------------------------------|----------------------------------|---------------------|--|
| | | | | power density S_{eq} ($W\ m^{-2}$) |
| up to 1 Hz | - | $3.2\ 3\ 10^4$ | $4\ 3\ 10^4$ | - |
| 1-8 Hz | 10,000 | $3.2\ 3\ 10^4/f^2$ | $4\ 3\ 10^4/f^2$ | - |
| 8-25 Hz | 10,000 | $4,000/f$ | $5,000/f$ | - |
| 0.025-0.8 kHz | $250/f$ | $4/f$ | $5/f$ | - |
| 0.8-3 kHz | $250/f$ | 5 | 6.25 | - |
| 3-150 kHz | 87 | 5 | 6.25 | - |
| 0.15-1 MHz | 87 | $0.73/f$ | $0.92/f$ | - |
| 1-10 MHz | $87/f^{1/2}$ | $0.73/f$ | $0.92/f$ | - |
| 10-400 MHz | 28 | 0.073 | 0.092 | 2 |
| 400-2,000 MHz | $1.375f^{1/2}$ | $0.0037f^{1/2}$ | $0.0046f^{1/2}$ | $f/200$ |
| 2-300 GHz | 61 | 0.16 | 0.20 | 10 |

SECOND SCHEDULE

RECOMMENDED HORIZONTAL DISTANCES FOR SINGLE SECTORIZED CELLULAR BASE STATION TO MEET ELECTROMAGNETIC FIELD EXPOSURE LIMITS

| Effective Radiated Power (watts) per channel based on maximum total of 21 channels per sector. | Effective Isotropic Radiated Power (watts) per channel based on maximum total of 21 channels per sector. | Horizontal distance (feet) that should be maintained from a single sectorized cellular antenna. |
|--|--|---|
| 0.5 | 0.82 | 1.6 |
| 1 | 1.6 | 2.3 |
| 5 | 8.2 | 5 |
| 10 | 16.4 | 7.1 |
| 25 | 41 | 11.3 |
| 50 | 82 | 16 |
| 100 | 164 | 22.6 |