REGULATIONS ON THE USE OF UNLICENSED FREQUENCY SPECTRUM FOR THE DELIVERY OF TELECOMMUNICATION SERVICES
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PREAMBLE

The Regulatory Board of Rwanda Utilities Regulatory Authority;

Pursuant to Law n° 44/2001 of 30 November 2001 governing telecommunications, especially in Articles 10, 32 and 33

Pursuant to Law No. 09/2013 of 01/03/2013 establishing the Rwanda Utilities Regulatory Authority, especially in Article 2;

Pursuant to the Presidential Order n° 04/01 of 15/03/2004 determining specific duties of the Regulatory Board in telecommunication matters, especially in Article 7;

Pursuant to the Ministerial order n° 3/dc/04 of 07/06/2004 on telecommunications networks and Services not requiring a telecommunications license, especially in Articles 8 and 9;

Pursuant to the Ministerial Decree n° 03 /RURA/2005 determining fees for radiocommunications licenses, especially in it article 8;

Considering ITU Resolution 229 (Revised by the WRC-12) “Use of the bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz by the mobile service for the implementation of wireless access systems including radio local area networks”;

Considering the ITU Recommendation M.1450-4 “Characteristics of broadband radio local area networks”;

And after considerations and deliberations in its meeting of __ / __ /2013;

Hereby issues the following Regulations;
CHAPTER ONE: GENERAL PROVISIONS

Article One: Purpose of these Regulations

These regulations govern the use of unlicensed frequency spectrum for the deployment of telecommunication services.

The frequency bands considered under this regulation are 2.4GHz and 5 GHz.

Article 2: Definitions of Terms

For the purpose of these regulations, the following terms shall have the following meanings:

- **ARIB**: Association of Radio Industries and Businesses
- **Channelization**: Bandwidth of each channel and number of channels that can be contained in the RF bandwidth allocation
- **Channel Indexing**: The frequency difference between adjacent channel center frequencies
- **DAA**: Detect And Avoid
- **dB**: DeciBell
- **DFS**: Dynamic frequency selection
- **e.i.r.p.**: Equivalent isotropically radiated power
- **ETSI**: European Telecommunications Standards Institute
- **Frequency band**: Nominal operating spectrum of operation
- **GHz**: Giga Hertz
- **HiSWANa**: High speed wireless access network – type a
- **IEEE**: Institute of Electrical and Electronics Engineers
- **ITU**: International Telecommunication Union
- **KHz**: Kilo Hertz
- **LAN**: Local area network
- **LBT**: Listen before talk
- **MU**: Medium Utilisation
- **mW**: Milli Watt
- **OFDM**: Orthogonal frequency division multiplexing
- **RLAN**: Radio local area network
- **TPC**: Transmit power control
- **W**: Watt
- **WLAN**: Wireless Local Area Network
- **WRC-12**: World Radio Conference of 2012

Article 3: Scope of application

These regulations shall apply to the use of unlicensed frequency spectrum for the deployment of telecommunication services in the Republic of Rwanda.
**Article 4: Objectives**

These regulations shall have the following objectives:

a) To ensure that the unlicensed spectrum is utilized in compliance with technical parameters set by these regulations;

b) To avoid interference between users by placing appropriate limits on parameters such as network standards, radiated power levels and frequencies of operation.

**CHAPTER II: REQUIREMENTS TO DEPLOY TELECOMMUNICATION SERVICES IN THE UNLICENSED SPECTRUM**

**Article 5: Operating conditions**

A licensed telecommunication Company wishing to deploy a network and service for the public using an unlicensed band must, two (02) months prior to the deployment of the network, make a declaration to the Regulatory Board according to the procedures set in the Ministerial Decree N° 3/DC/04 of 07/06/2004.

Operation in the unlicensed band is on the basis that no interference is caused to licensed radiocommunication users and no protection from interference is offered to the unlicensed users.

**Article 6: Networks not subject to declaration**

The following use of spectrum is exempted from acquiring a license or an authorization:

- WLANs used where supply to the public is not involved;

- Wireless networks in airport lounges, hotels, shopping centres and Internet cafes where the service is provided in a single place.

**Article 7: Technical requirements for the use of WLAN devices**

The utilization of WLAN using the unlicensed frequency bands in 2.4GHz and 5GHz bands shall comply with the technical requirements specified in the Appendix of these regulations in order to avoid destructive interference between users.

**Article 8: Spectrum fees**

Frequencies used within the specifications set in these regulations are not subject to frequency fee and individual frequency coordination.
**Article 9: Backhaul frequencies**

Any operator wishing to deploy a backhaul link using the unlicensed frequency shall comply with the Power level and the Standard set in the Appendix of these regulations.

**Article 10: Enforcement Action**

If the Authority determines that unlicensed frequency spectrum user has failed to comply with any term or condition of these regulations, the Authority shall send a written warning to the concerned operator including a deadline for correction.

After receipt of the warning from the Regulatory Authority, if the user does not cure the non-compliance, the Regulatory Authority may proceed for further sanctions which may consist of suspending such right until he/she complies with these regulations.

**CHAPTER III: TRANSITIONAL AND FINAL PROVISIONS**

**Article 11: Transitional period**

Any existing activity related to the use of unlicensed frequency spectrum conducted by any natural or legal person, must comply with these Regulations within three (3) months of the effective date of these regulations;

Any other person who commences the use of unlicensed frequency spectrum after the effective date of these regulations shall comply with these Regulations prior to commencing operations.

**Article 12: Interpretations of these regulations**

Upon request, the Authority shall provide an interpretation of these Regulations to assist the user of the unlicensed frequency spectrum in ensuring its compliance with these regulations.

**Article 13: Repealing provision**

All prior provisions contrary to these regulations are hereby repealed.

**Article 14: Commencement**

These regulations shall come into force on the date of their signature.

Kigali, on / / 2013

Eng. Coletha U. RUHAMYA
CHAIRPERSON OF THE REGULATORY BOARD
<table>
<thead>
<tr>
<th>General band designation</th>
<th>Specific frequency band (MHz)</th>
<th>Transmitter output power (e.i.r.p)</th>
<th>Standard characteristics</th>
<th>Interference mitigation</th>
<th>Spectrum mask (Bandwidth)</th>
<th>Channel indexing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 GHz</td>
<td>2400 – 2483 MHz</td>
<td>100 mW</td>
<td>IEEE Std 802.11-2012 (Clause 17, commonly known as 802.11b)</td>
<td>LBT</td>
<td>802.11b mask (Fig. 3)</td>
<td>5 MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IEEE Std 802.11-2012 (Clause 19, commonly known as 802.11g)</td>
<td>LBT</td>
<td>OFDM mask (Fig. 1)</td>
<td>5 MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IEEE Std 802.11-2012 (Clause 20, commonly known as 802.11n)</td>
<td>LBT/DFS/TPC</td>
<td>OFDM mask (Fig. 2A and 2B)</td>
<td>5 MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ETSI EN 300 328</td>
<td></td>
<td>DAA/LBT, DAA/non-LBT, MU</td>
<td></td>
</tr>
<tr>
<td>5GHz</td>
<td>5150 – 5250 MHz</td>
<td>200 mW 10 mW/MHz</td>
<td>IEEE Std 802.11-2012 (Clause 18, commonly known as 802.11a)</td>
<td></td>
<td>DAA/LBT, DAA/non-LBT, MU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5250 – 5350 MHz</td>
<td>200 mW 10 mW/MHz</td>
<td>IEEE Std 802.11-2012 (Clause 18, Annex D and Annex E, commonly known as 802.11j)</td>
<td></td>
<td>OFDM mask (Fig. 1)</td>
<td>5 MHz</td>
</tr>
<tr>
<td></td>
<td>5470 – 5725 MHz</td>
<td>1 000 mW 50 mW/MHz</td>
<td>IEEE P802.11ac</td>
<td></td>
<td>OFDM mask (Fig. 2A and 2B)</td>
<td>5 MHz and 20 MHz</td>
</tr>
<tr>
<td></td>
<td>5725 – 5825 MHz</td>
<td>1 000 mW 50.1 mW/MHz</td>
<td>ETSI EN 301 893 (Only for 5150 – 5350 MHz &amp; 5470 - 5725 MHz)</td>
<td></td>
<td>ARIB HiSWANa (Only for 5150 – 5250 MHz)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Pursuant to ITU Resolution 229 (WRC-12), operation in the 5 150-5 250 MHz band is limited to indoor use
- The maximum allowable channel width is 20 MHz

Regulations for the use of unlicensed spectrum
FIGURE 1
OFDM transmit spectrum mask for 802.11a, 11g, 11j, HIPERLAN2 and HiSWANa systems

Power spectral density (dBr) ▲ Relative to maximum
Transmit spectrum mask (not to scale)
Typical signal spectrum (an example)

Note 1 – The outer heavy line is the spectrum mask for 802.11a, 11g, 11j, HIPERLAN2 and HiSWANa and the inner thin line is the envelope spectrum of OFDM signals with 52 subcarriers.

Note 2 – The measurements shall be made using a 100 kHz resolution bandwidth and a 30 kHz video bandwidth.

Note 3 – In the case of the 10 MHz channel spacing in 802.11j, the frequency scale shall be half.

FIGURE 2a
Transmit spectral mask for 20 MHz 802.11n transmission in 2.4 GHz band

Note 1 – Maximum of –45 dBr and –53 dBm/MHz at 30 MHz frequency offset and above.

M.1450-01
Power spectral density (dBr)
Transmit spectrum mask
(not to scale)
Typical signal spectrum
(an example)

Frequency (MHz)
–40 dBr
–28 dBr
–20 dBr
0 dBr
PSD

Frequency (MHz)
–45 dBr
–28 dBr
–20 dBr
0 dBr
PSD

Regulations for the use of unlicensed spectrum
Figure 3: Transmit spectrum mask for 802.11b

Transmit spectrum mask

Figure 2b
Transmit spectral mask for a 20 MHz 802.11n transmission in 5 GHz band and transmit spectral mask for 802.11ac