



## **GUIDELINES ON THE USE OF RADIO FREQUENCY SPECTRUM BY SHORT RANGE DEVICES**

**8<sup>TH</sup> JULY 2016**

### **1. INTRODUCTION**

Short Range Radio Devices (SRDs) are transmitters or receivers or both that generate and use radio frequencies. These devices are designed to operate over a short range, at low power levels and have low capability of causing harmful interference to other radio communication services. Such devices are permitted to operate on secondary basis on non-interference and non-protected basis subject to national regulations and relevant technical standards.

These guidelines provide technical and operating parameters and spectrum use for short range radiocommunication devices in Kenya.

### **2. APPLICATIONS**

SRDs are used to provide low cost communication solutions. They include many different types of wireless equipment used in data collection with auto identification systems or item management in warehousing, retail and logistic systems, baby monitors, access control i.e. door and gate openers, wireless home, data telemetry and/or security systems, Local Area Networks (LANs), medical implants, Ultra Wideband (UWB) sensors and radars, keyless automobile entry systems and hundreds of other types of common electronic equipment that rely on such transmitters to function.

The authorised E.I.R.P powers are expected to self-limit the coverage of SRDs, and where necessary, will be reviewed by the Authority, to ensure that SRDs operate as expected. SRDs shall be used within premises or campuses and can be broadly categorized as follows:

- Private networks where the supply of services to the public is not involved such as in company LANs, educational institutions and residential premises.
- Networks where the service is provided to the public within a limited geographical location, such as in airports, train stations, bus stations, hotels, shopping centres, residential premises, libraries and parks.

Wireless Access Systems (WAS) operating on shared non-protected basis, are not covered by these guidelines and shall attract an annual frequency fee. The WAS include Point to Point microwave links in the 5 GHz band. Currently, the annual frequency fee is KShs. 10,000 per terminal/sector.

### 3. CATEGORIES OF SRDs

Due to the many different applications provided by these devices, no description can be exhaustive; however, the following categories are amongst those regarded as SRDs:

- a. **Tele command:** The use of radiocommunication for the transmission of signals to initiate, modify or terminate functions of equipment at a distance.
- b. **Telemetry:** The use of radiocommunication for indicating or recording data at a distance.
- c. **Voice and video:** These are voice applications like walkie-talkie, baby monitoring and similar use. Citizen band (CB) and private mobile radio (PMR 446) equipment is excluded. With video applications, non-professional cordless cameras are meant mainly to be used for controlling or monitoring purposes.
- d. **Broadband radio local area networks:** Broadband radio local area networks (RLANs) are replacement of physical cables for the connection of data networks within a building, thus providing networks within the business and industrial environments. These systems use spread spectrum modulation or other redundant (i.e. error correction) transmission techniques. To ensure compatibility with other radio applications in the 2.4 GHz and 5 GHz band a number of restrictions and mandatory features are required. In these bands, simple licensing requirements are applied or license exemption similar to SRDs.
- e. **Railway applications:** These are applications specifically intended for use on railways and comprise mainly automatic vehicle identification (AVI) system, Balise system and Loop system used to provide automatic and unambiguous identification of a passing vehicle and transmission of data between train and track.
- f. **Road transport and traffic telematics:** Road transport and traffic telematics (RTTT) systems are systems providing data communication between two or more road vehicles and between road vehicles and the road infrastructure for various information-based travel and transport applications, including automatic toll-collection, route and parking guidance, collision avoidance and similar applications.
- g. **Equipment for detecting movement and equipment for alert:** Equipment for detecting movement and equipment for alert are low power radar systems for radio determination purposes. Radio determination means the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves.
- h. **Alarms:** The use of radiocommunication for indicating an alarm condition at a distant location.
- i. **Inductive applications:** Inductive loop systems are communication systems based on magnetic fields generally at low radio frequencies. Inductive applications include for example car immobilizers, car access systems or car detectors, animal identification, alarm

systems, item management and logistic systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, anti-theft systems including RF anti-theft induction systems, data transfer to handheld devices, automatic article identification, wireless control systems and automatic road tolling.

- j. Radio microphones:** Radio microphones (also referred to as wireless microphones or cordless microphones) are small, low power (50 mW or less) unidirectional transmitters for the transmission of sound over short distances for personal use.
- k. RF identification systems:** The object of any RF identification (RFID) system is to carry data in suitable transponders, generally known as tags, and to retrieve data, by hand- or machine-readable means, at a suitable time and place to satisfy particular application needs.
- l. Ultra low power active medical implants:** The ultra-low power active medical implant (ULP-AMIs) are part of a medical implant communication systems (MICS) for use with implanted medical devices, like pacemakers, implantable defibrillators, nerve stimulators, and other types of implanted devices.
- m. Wireless audio applications:** Applications for wireless audio systems include the following: cordless loudspeakers, cordless headphones, cordless headphones for portable use, i.e. portable compact disc players, cassette decks or radio receivers carried on a person, cordless headphones for use in a vehicle, for example for use with a radio or mobile telephone, etc., in-ear monitoring, for use in concerts or other stage productions.

#### **4. TECHNICAL AND OPERATING CONDITIONS FOR SRDs.**

##### **4.1. Scope**

This Specification defines the minimum technical requirements for SRD transmitters and receivers to operate in authorized frequency bands or frequencies, and transmit within the corresponding output power levels given in the Annex attached to these guidelines. Short range devices are intended for communications in confined areas of buildings as well as for localized on-site operations. Short range devices may be fixed, mobile or portable stations that come with a radio frequency output connector and dedicated antenna or an integral antenna.

##### **4.2. General Requirements**

Annex I attached lists the frequency bands in which SRDs are allowed to operate and the maximum allowed power limits and the following conditions shall apply;

- a.** The SRDs operate on secondary basis on unprotected and shared frequency bands subject to not causing interference to other authorized radio communication services and accepting interference from other radio communication services including Industrial, Scientific, and Medical (ISM) equipment.
- b.** Short range device vendors require to be registered with the Authority and shall be issued with a vendor's license. SRDs are required to operate in the relevant spectrum segment on a shared basis. These guidelines specify the frequencies that can be used, equipment

standards/features, technical and operational parameters. The authorization is a general class license and does not have to be applied individually.

- c. The device shall not be constructed with any external or readily accessible control which permits the adjustments of its operation parameters in a manner that is inconsistent with these guidelines.

### **4.3. Marking Requirements**

The equipment shall be marked with the following information;

- a. Supplier/manufacturer's name or identification mark;
- b. The equipment's trade name, model name and serial number;
- c. Other markings such as compliance label for equipment as required by the relevant standards. The markings shall be legible, indelible and readily visible. All information on the marking shall be in English Language.

### **4.4. Technical Requirements**

#### **4.4.1. General Requirements**

The SRDs shall comply with the maximum Effective Isotropic Radiated Power (EIRP) and transmitter and receiver spurious emissions given in Annex I, operating in its intended frequency band or frequencies. The authorised EIRP powers are expected to self-limit the transmission coverage of SRDs, and where necessary, will be reviewed by the Authority, to ensure that SRDs operate as expected.

#### **4.4.2. Spectrum Allocations**

SRDs are deployed in both bands designated for ISM applications and other bands not designated for ISM applications. The Authority designates a frequency band for use short by SRDs based on ITU-R Radio Regulations, Kenya Table of Frequency Allocations, and other prevailing international standards.

The frequency bands designated for short range devices are indicated in Annex I of these guidelines. However, it should be noted that short-range radio-communication devices may generally not be permitted to use bands allocated to the following services namely passive services and those ensuring safety of life and search and rescue operations according to the relevant ITU Radio Regulations provisions:

- Radio astronomy;
- Aeronautical mobile;
- Safety of life services including radio navigation;

#### **4.4.3. Emission masks for the Short-Range Devices**

Short-range devices shall conform to the spurious domain emission limits given in ITU Radio Regulations Appendix 3. Specifically, Table II of RR Appendix 3 lists the attenuation values used to calculate maximum permitted spurious domain emission power levels for use with radio

equipment. For example, low power radio device equipment intended for short-range communication or control purposes and operating at output power less than 100 mW, must meet an attenuation level of  $56 + 10 \log(P)$ , or 40 dBc, whichever is less stringent.

#### **4.4.4. Antenna requirements**

Basically three types of transmitter antennas are used for short-range radiocommunication transmitters namely Integral (no external antenna socket), dedicated (type approved with the equipment) or external (equipment type approved without antenna). In most cases SRD transmitters are equipped with either integral or dedicated antennas.

The Authority shall only allow short-range radiocommunication transmitters that are designed in such way that no type of antenna can be used other than one which has been designed and approved by the manufacturer to show conformity with the appropriate emission level. This would help in preventing the interference problems to the authorized radiocommunication services.

#### **4.4.5. Interference Mitigation**

The SRDs shall not cause interferences to other radio communications services. Upon notification by the Authority, the SRDs shall cease all transmissions until the interference is eliminated. SRDs users shall be required to comply with these guidelines and shall take reasonable measures to ensure that no interference is caused to other users within or outside the designated band for use by SRDs.

The SRDs shall not be accorded any protection from interferences by other radio communications services and the Authority shall not investigate complaints of interferences. It is however recommended that best practice implementation be adhered to, in order to retain value in the quality of service of the SRDs. The Authority may from time to time carry out tests to ensure that best practice implementation is adhered to.

### **5. AUTHORISATION**

The Authority exempts from type approval and approves the use of the relevant SRDs in Kenya subject to the terms and conditions in these guidelines and the following conditions:

- The frequencies, transmitting power and external high-gain antenna of these radio apparatus must not be altered.
- The radio apparatus must be operated within and must not exceed the technical parameters set out in each of the applicable columns of the table in Annex I with respect to the frequency band, maximum radiated power or field strength limits and channel spacing, relevant standard and duty cycles and antennas to be used.
- The antenna of the radio apparatus must not be higher above average ground level than the lowest point of the place where the radio apparatus operates effectively.
- The radio apparatus must not cause interference to any authorized network issued with a radio frequency spectrum license by the Authority.
- The user of the radio apparatus in the license-exempt frequency spectrum operates on non-interference and no protection basis from interference.

- If an SRD does cause interference to authorized radio-communication services, even if the device complies with all the technical standards and equipment authorization requirements, then its operator will be required to cease its operation, at least until the interference problem is solved.

## **6. ADMINISTRATIVE REQUIREMENTS**

### **Verification**

The verification procedure requires that tests be performed on the transmitter to be authorized using an accredited laboratory by International Laboratory Accreditation Cooperation (ILAC) that has calibrated its test site or, if the transmitter is incapable of being tested at a laboratory, at the installation site. These tests measure the levels of radio frequency energy that are radiated by the transmitter into the open air or conducted by the transmitter on to the power lines. After these tests are performed, a report must be produced showing the test procedure, the test results, and some additional information about the transmitter including design drawings. The specific information that must be included in a verification report is detailed and the manufacturer (or importer for an imported device) is required to present a copy as evidence that the device meets the technical standards. The vendor must be able to produce this report whenever requested by the Authority.

## **7. USE OF SRDs ON-BOARD AIRCRAFT**

The use of SRDs on-board the Kenyan registered aircrafts may be authorized under the Aircraft radio Station License. Operation of both 2400–2483.5 MHz and 5725 – 5875 MHz bands is allowed provided that all transmissions remain strictly within the aircraft and are carried out at above 3000 meters altitude. The same restrictions apply to use of SRDs on-board foreign registered aircrafts while flying over the territory of Kenya, however, no license is required from the Authority in this regard.

## **8. BREACH OF GUIDELINES**

In order to maintain standards, users and vendors shall be required to ensure that SRD equipment used in Kenya complies with these guidelines especially with regard to minimum technical characteristics including but not limited to; operating frequency, frequency range, type of modulation and RF power.

SRD users and vendors are strictly required to comply with these guidelines. Any violation of these guidelines shall result in the Authority taking the necessary regulatory measures.

## **9. OTHER CONDITIONS**

These guidelines are subject to review by the Authority from time to time.

**ANNEX I**

<b>Column A</b>	<b>Column B</b>	<b>Column C</b>	<b>Column D</b>	<b>Column E</b>	<b>Column F</b>
<b>Frequency Bands</b>	<b>Type of Device</b>	<b>Maximum Radiated Power or Field Strength Limits &amp; Channel Spacing</b>	<b>Relevant Standard</b>	<b>Additional Requirements</b>	<b>Kenya TOFA Remarks</b>
9 – 59.75 kHz	Inductive Loop System	72 dB $\mu$ A/m @ 10m No duty cycle restriction; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	Meteorological Aids, Radio Navigation Coast radiotelegraphy
59.75 - 60.25 kHz 70 - 119 kHz	Inductive Loop System	42 dB $\mu$ A/m @ 10m No duty cycle restriction; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950 ISO 18000-2	CEPT/ERC/REC 70-03	Fixed Coast radiotelegraphy
60.25 - 70 kHz 119 - 135 kHz	Inductive Loop System	72 dB $\mu$ A/m @ 10m No restriction on duty cycle; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950 ISO/IEC 18047-2	CEPT/ERC/REC 70-03	Fixed Coast radiotelegraphy
7.4 – 8.8 MHz	Inductive Loop System	9 dB $\mu$ A/m @ 10m No restriction on duty cycle; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	Short Wave broadcasting Land/Maritime Mobile
6.765 - 6.795 MHz	Inductive Loop System	42 dB $\mu$ A/m @ 10m No restriction on duty cycle; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	ISM band under RR Nos. 5.138 and 5.150
13.553 - 13.567 MHz	Inductive Loop System	42 dB $\mu$ A/m @ 10m No restriction on duty cycle; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03 ASK, FSK & PSK	ISM band under RR Nos. 5.138 and 5.150
26.957 - 27.283 MHz	Inductive Loop System	42 dB $\mu$ A/m @ 10m No restriction on duty cycle; No channel spacing	EN 300 330 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	Citizen band, Low power devices ISM band under RR Nos. 5.138 and 5.150
26.995; 27.045; 27.095; 27.145; 27.195 MHz	Surface Model Control	100 mW erp. No restriction on duty cycle; 10kHz channel spacing	EN 300 220 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	Fixed Citizen band Low power devices ISM

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<b>Frequency Bands</b>	<b>Type of Device</b>	<b>Maximum Radiated Power or Field Strength Limits &amp; Channel Spacing</b>	<b>Relevant Standard</b>	<b>Additional Requirements</b>	<b>Kenya TOFA Remarks</b>
36.65 - 36.75 MHz	Wireless Microphones	100mW erp. 100% duty cycle No channel spacing	EN 300 422 EN 301 489-9 EN 60950	CEPT/ERC/ REC 70-03	Fixed/Mobile
40.65-40.7 MHz	Wireless Microphones	100mW erp. 100% duty cycle No channel spacing	EN 300 422 EN 301 489-9 EN 60950	CEPT/ERC/ REC 70-03	Low power ISM band 40.66-40.77 MHz, Low power cordless phones
40.66-40.7 MHz	Non Specific SRDs	10mW erp No restriction on duty cycle; No channel spacing	EN 300 220-1 EN 301 489-1, 3 EN 60950	CEPT/ERC/ REC 70-03	ISM band 40.66-40.77 MHz, Low power cordless phones, wireless microphones
53-54 MHz	Wireless Microphone	50 mW erp for class 1 equipment 100mW e.i.r.p. 100% duty cycle No channel spacing	EN 300 422 EN 301 489-1, 9 EN 60950	CEPT/ERC/ REC 70-03	Low power cordless telephony Reserved for T-DAB
402-405 MHz	Medical Implants	25 $\mu$ W erp No duty cycle restriction for devices with LBT. Otherwise $\leq$ 1%. 25 KHz Channel spacing.	EN 301 839 EN 301 489-1,3 EN 60950 EN 300 220-1	ITU-R RS. 1346 CEPT/ERC/ REC 70-03	Meteorological Satellite Services Meteorological aids
402-406	Doppler shift movement detectors, wireless microphones, Vehicle alarm systems	10 mW erp. No channel spacing 100% duty cycle	EN 300 422 EN 300 220-1 EN 301 489-1, 3 EN 60950		Meteorological Satellite Services Meteorological aids
433.05-434.79 MHz	Non-specific SRD	1 mW erp No channel spacing. 100% duty cycle. 10 mW erp 100% duty cycle Up to 25 KHz	EN 300 220-1 EN 301 489-1, 3 EN 60950 ISO/IEC – 18047-7	CEPT/ERC/ REC 70-03	Fixed Amateur Land Mobile



Column A	Column B	Column C	Column D	Column E	Column F
Frequency Bands	Type of Device	Maximum Radiated Power or Field Strength Limits & Channel Spacing	Relevant Standard	Additional Requirements	Kenya TOFA Remarks
		Channel spacing.			
446-446.1 MHz includes the following 8 channels. 446.00625; 446.01875; 446.03125; 446.04375; 446.05625; 446.08125; 446.09125; 446.09375	Public Mobile Radio (PMR)	500mW erp 12.5 kHz channel spacing	EN 300 296-2 EN 301 489-5 EN 60950		Amateur Land Mobile Low power private radio (PMR 446)
863-865 MHz	Wireless Audio Systems	10 mW erp 100% duty cycle No channel spacing	EN 301 357 EN 301 489-9 EN 60950	CEPT/ERC/REC 70-03	Low Power Devices
863-865 MHz	Wireless Microphone	10 mW erp 100% duty cycle No channel spacing	EN 300 422 EN 301 489-9 EN 60950	CEPT/ERC/REC 70-03	Low Power Devices
865.0-865.6 MHz ,865.6-867.6 MHz & 867.6-868.0 MHz	Radio frequency identification (RFID)	100 mW erp. 200 kHz channel spacing No restriction on duty cycle.	EN 300 320 EN 301 489-1,3 EN 60950		Low Power Devices RFID
868 - 868.6 MHz	Non-specific SRD	25mW erp ≤1% duty cycle or LBT+AFA	EN 300 220 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03 (01) O4	Low Power Devices
868.6-868.7 MHz	Alarms	10mW erp ≤1% duty cycle 25kHz channel spacing	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03	SRD
868.7-869.2 MHz	Non-specific SRD	25mW erp ≤1% duty cycle or LBT+AFA	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03	SRD
869.25-869.3 MHz	Alarms	10mW erp ≤0.1% duty cycle 25kHz channel	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03	SRD

Column A	Column B	Column C	Column D	Column E	Column F
Frequency Bands	Type of Device	Maximum Radiated Power or Field Strength Limits & Channel Spacing	Relevant Standard	Additional Requirements	Kenya TOFA Remarks
		spacing			
869.4-869.65 MHz	Non-specific SRD	500mW erp ≤10% duty cycle or LBT+AFA	EN 300 220 EN 301 489-1,3 EN 60950		SRD
869.65-869.7 MHz	Alarms	25mW erp ≤10% duty cycle 25kHz channel spacing	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/ REC 70-03	SRD
869.7- 870 MHz	Non-specific SRD	5mW erp No Requirement 25mW erp ≤10% duty cycle or LBT+AFA	EN 300 220 EN 301 489-1,3 EN 60950		SRD
2400 - 2483.5 MHz	Non-specific SRD	10mW eirp No duty cycle restriction No channel spacing	EN300 328-2 EN 300 440 EN 301 489-1,3 EN 60950	CEPT/ERC/ REC 70-03	WAS such as Wi-Fi on non-interference, non-protected basis
2400-2483.5 MHz	Wideband Wireless Systems. WAS/RLANs	100mW eirp No duty cycle No channel spacing	EN 300 328 EN 301 489-1,17 EN 60950	CEPT/ERC/ REC 70-03	Adequate spectrum sharing mechanism (e.g. Listen-before-Talk, Detect-And-Avoid) shall be implemented by the equipment
5150-5350 MHz	Wireless Access Systems/Radio Local Access Network (WAS & RLAN) indoor use only.	200mW EIRP Dynamic Frequency Selection(DFS) & Transmitter Power control(TPC) Modulation schemes obligatory	EN 300 836-1 EN 301 893 EN 301 489-1,17 EN 60950	ITU-R M.1625 Rec. ITU-R M.1450-4, Resolution 229 (Rev.WRC-12)	WAS- indoor use 200mW max EIRP density of 10mW/MHz in any 1 MHz (=0.25mW/25 kHz in any 25 kHz band), must employ TPC at least 3dB and DFS.

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<b>Frequency Bands</b>	<b>Type of Device</b>	<b>Maximum Radiated Power or Field Strength Limits &amp; Channel Spacing</b>	<b>Relevant Standard</b>	<b>Additional Requirements</b>	<b>Kenya TOFA Remarks</b>
5470-5725 MHz	Wireless Access Systems/Radio Local Access Network indoor and outdoor use	1W EIRP Dynamic Frequency Selection (DFS) & Transmitter Power control (TPC) Modulation schemes obligatory	EN 300 836-1 EN 301 489-1, 17 EN 301 893 EN 301 489-1,17 EN 60950	ITU-R M.1625 Rec. ITU-R M.1450-4, Resolution 229 (Rev.WRC-12)	Max transmitter power of 250mW <sup>3</sup> with Max mean EIRP of 1W and a Max mean EIRP density of 50mW/MHz in any 1MHz band
5725-5875 MHz	Non-specific SRD	25mW EIRP No duty cycle restriction No channel spacing	EN 300 400 EN 301 489-1, 3 EN 60950	CEPT/ERC/REC 70-03	
24.00-24.25 GHz	Non-specific SRD	100mW EIRP No duty cycle restriction No channel spacing	EN 300 440 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03	Amateur User licence required Radiolocation ISM
76-77 GHz	RTTT radar	55dBm peak No duty cycle restriction No channel spacing	EN 301 091 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03	Radio Astronomy short range automotive radar (76-77 GHz)