



SHORT RANGE RADIO COMMUNICATION DEVICES

Regulatory Framework For SRD



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PAKISTAN TELECOMMUNICATION AUTHORITY
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Contents

1	Introduction	2
1.1	Short Range Radio Communication Devices (SRD)	2
1.2	Ultra-wide-band systems (UWB)	3
2	Global Practices	3
2.1	FCC-USA	3
2.1.1	SRD	3
2.1.2	UWB	3
2.2	CEPT-European Union	4
2.2.1	SRD	4
2.2.2	UWB	4
2.3	SRDs in Asia Pacific Tele-community (APT)	5
2.4	ITU Technical and Operating Recommendations	5
2.4.1	ITU-R Report SM.2153-7	5
2.4.2	ITU- Recommendation SM.1896-1	5
2.4.3	ITU-Recommendation SM.1754	5
2.4.4	ITU- Recommendation SM 1755	5
2.4.5	ITU- Recommendation SM 1756	6
2.4.6	ITU- Recommendation SM.1757	6
3	Objective of SRD and UWB Framework	6
4	Proposed Regulatory framework for SRD and UWB	6
5	References	8
6	Annexures	9
6.1	Annex-I: Specific conditions for Short Range Devices (SRD)	9
6.2	Annex-II: Proposed spectrum for SRD (UWB) devices	11
7	Terms & Definitions	12
8	Feedback and Comments	13

1 Introduction

Pursuant to section 8.3 read with section 8.13 of Telecom policy 2015, MoIT, on recommendations of FAB and PTA, will prepare and publish a rolling spectrum strategy. As per the rolling strategy, amongst other action items, PTA, in consultation with FAB and after deliberation with stakeholders, will prepare a Framework for Un-Licensed Bands including SRDs that provides the industry a list of frequencies that are approved for SRDs. This will include the technical parameters and standards, types of applications approved and other operational restrictions.

1.1 Short Range Radio Communication Devices (SRD)

Short Range Radio Communication Devices (SRDs) is a term which applies to radio transmitters operating over short distance and at low power. Generally, these devices have little potential to cause interference to other radio equipment. They are usually exempted from licensing if operating within approved technical standards.

Short range devices are not considered a radio service under the ITU Radio Regulations. In some countries, spectrum bands are designated as "unlicensed spectrum bands" whilst in other countries, the short range devices are exempted from licensing under a class license. The level of power permissible and the types of applications are usually specified in published standards. Only equipment that meets the standards are permitted to be imported.

One cannot list all the applications of SRDs, because they provide many different services. Among their more popular applications are:

- Telecontrol for home- or other building-automation systems
- Wireless sensor systems
- Alarms
- Automotive, including remote keyless entry and remote car-starting
- Wireless speech and video

SRDs are used in many areas including remote control, RFID, wireless microphones, health monitoring devices and wireless LAN. Increasingly, manufacturers are working through the ITU and other standardization bodies to harmonize the frequency ranges and the technical standards. Bluetooth, ZigBee and Wi-Fi (802.11) are some examples of global standards that are widely used and the economies of scale have driven down the cost of hardware tremendously.

Today, wireless LAN has moved from IEEE 802.11b in 2.4GHz offering 11 Mbps to IEEE 802.11ac in 5GHz offering over 500 Mbps to 1 Gbps (using wider bandwidth and techniques such as MIMO and 256 QAM). The development of IEEE 802.11ay is underway, pushing wireless connectivity to 20Gbps by utilizing 60GHz spectrum. Wireless LAN is now widely deployed in offices and used in households for sharing the bandwidth with multiple users or devices. In large campuses, such as universities, wireless LAN can help students to get access anywhere within the campus.

With the growing demand for wireless LAN, there is a strong case for allowing wireless LAN to share the spectrum in the 5GHz band with existing users. However, there have been instances where wireless LAN can interfere existing systems. For example, in the US, wireless LAN was found to interfere with Terminal Doppler Weather Radars (5600- 5650 MHz) used around airports and the FCC had to impose a moratorium on new certifications and closed the band temporarily to mitigate the problem. Hence the conditions of use need to be carefully consulted with existing

users.

1.2 Ultra-wide-band systems (UWB)

Ultra-Wide Band Technology (UWB) operates by spreading signals across a very large frequency band (above 500 MHz). UWB transmissions is usually low power and operate in frequency bands already allocated for other uses including exclusively licensed commercial bands. UWB regulations are commonly referred to as underlay regulations in a sense that they spread over a very large frequency range, which may overlap several frequency bands. UWB systems having technology for short-range radio communication, involving the intentional generation and transmission of radio-frequency energy that spreads over a very large frequency range (more than 500MHz or %20 bandwidth), which transmit generally lower than noise level.

2 Global Practices

2.1 FCC-USA

2.1.1 SRD

In USA, SRDs are known as low-power, non-licensed transmitters, or Part 15 transmitters. They are supposed to comply with the Rules in Part 15 of the FCC Rules. Part 15 transmitters use very little power, most of them less than 1 mW. They are non- licensed because their operators are not required to obtain a license from the FCC to use them. Although an operator does not have to obtain a license to use a Part 15 transmitter, the transmitter itself is required to have an FCC authorization before it can be legally imported into or marketed in the United States of America. This authorization requirement helps ensure that Part 15 transmitters comply with the Commission’s technical standards and, thus, are capable of being operated with little potential for causing interference to authorized radio communications. If a Part 15 transmitter does cause interference to authorized radio communications, even if the transmitter complies with all of the technical standards and equipment authorization requirements in the FCC rules, then its operator will be required to cease operation, at least until the interference problem is corrected. Part 15 transmitters receive no regulatory protection from interference.

Any Part 15 “Radio Frequency Devices” ’transmitter must be tested and authorized before it may be marketed. There are two ways to obtain authorization: Certification & Verification. The measurement procedures for determining compliance with the technical requirements for Part 15 devices are provided within the rules.

2.1.2 UWB

FCC believes that the combination of technical standards and operational restrictions will help to ensure that UWB devices can coexist and give adequate protection to other radio communication services. FCC established various technical standards and operating restrictions for 3 types of UWB devices: communications systems; imaging systems (including ground penetrating radars); and vehicular radar systems. The classification for each type of UWB devices is based on their potential to causing interference to the existing licensed users in the 3.1-10.6 GHz frequency band. Accordingly, emission limits are designed for each type of UWB devices to further mitigate

interference.

In December 2004, FCC released its Second Report and Order and a Second Memorandum Opinion & Order on UWB [2] to provide greater flexibility for the introduction of wide-bandwidth devices and systems which do not fall into the classification of UWB technology. Under the new rules, the peak power limits for wide bandwidth device emission is raised to the same level as UWB devices in the three frequency bands already made available for unlicensed operation, i.e 5925-7250 MHz, 16.2-17.2 GHz and 23.12-29 GHz in addition, the Commission amended its measurement procedures to permit frequency hopping, swept frequency, and gated systems operating in these bands to be measured in their normal operating mode.

2.2 CEPT-European Union

2.2.1 SRD

ETSI has developed harmonized European standards for the majority of SRDs. The equipment is tested for compliance with the technical parameters defined by ETSI and given CE marking accordingly. The CE marking indicates compliance with EU legislation and so enables the free movement of products within Europe. By CE marking a manufacturer declares that the product meets all the legal requirements for the CE marking, & product can be sold throughout the European Economic Area (EEA), 28 Member States of the EU & European Free Trade Association (EFTA) countries Iceland, Norway and Liechtenstein. The SRD labelling indicates that the equipment operates according to specific requirements as per R&TTE Directive, Article 12. ETSI has produced a series of standards for generic short-range devices. Each standard covers short range devices operating within a defined frequency range. These standards are each in two parts. Part 1 covers technical requirements, including those for specific applications. Part 2 is the Harmonized Standard, which identifies the necessary parameters to comply with the Radio Equipment Directive.

- a) EN 300 220 covers equipment operating in the frequency range 25 MHz to 1000 MHz.
- b) EN 300 330 covers radio equipment operating in the frequency range 9 kHz to 25 MHz (and inductive loop systems operating up to 30 MHz).
- c) EN 300 440 covers radio equipment operating in the frequency range 1 GHz to 40 GHz.

In addition, ETSI produces standards that specify essential requirements related to Electromagnetic Compatibility (EMC). For short range devices, the relevant ETSI EMC standards are:

- d) EN 301 489-1 (Common technical requirements for radio equipment) and
- e) EN 301 489-3 (Specific conditions for SRDs).

2.2.2 UWB

CEPT has defined the harmonized conditions for the use of generic UWB devices below 10.6 GHz. These devices comply with the regulatory framework for placing on the market, free movement and putting into service of radio equipment in these countries, which may be demonstrated by compliance with harmonized standards or equivalent technical specifications. These devices are exempt from individual licensing and operate on a non-interference, non-protected basis. However, the provisions are not applicable to flying models; outdoor installations and

infrastructure, including those with externally mounted antennas, and devices installed in road and rail vehicles, aircraft and other aviation. The UWB devices in these types of product are not exempt from individual licensing.

The European Commission has issued a standardization mandate for the production by ETSI of harmonized standards for Ultra Wide Band under the Radio Equipment Directive (RED), and a mandate to the European Conference of Postal and Telecommunications Administrations (CEPT) for harmonized frequency allocations under the Radio Spectrum Decision.

ETSI Standards EN 302 065 are the group of standards that define the technical operational parameters and limitations for use of the allowed bands for various applications

2.3 SRDs in Asia Pacific Tele-community (APT)

SRD in APT member countries are usually exempted from licensing if operating within approved technical standards/limits. Almost all the APT members following FCC part15 or EN standards. APT member countries have defined technical and operational parameters, extensively. The technical regulations covered include typical application types, authorized frequency bands, field strength and RF power limitations.

2.4 ITU Technical and Operating Recommendations

2.4.1 ITU-R Report SM.2153-7

On Technical and operating parameters and spectrum use for short- range radio communication devices”: This Report sets out common technical and nontechnical parameters for short-range radio communication devices (SRDs) and widely recognized approaches for managing their use on a national basis. It provides SRD definitions and short description of different applications using SRDs in addition to indicating typical technical characteristics/limitations including common frequency ranges; required radiated power or magnetic/electric field-strength values to allow for satisfactory operation.

2.4.2 ITU- Recommendation SM.1896-1

Provides frequency ranges for global or regional harmonization of short-range devices. This Recommendation contains frequency ranges to be used as recommended ranges for short-range devices (SRDs) applications requiring operation on a global or regional harmonized basis.

2.4.3 ITU-Recommendation SM.1754

Recommends measurement techniques for generating **UWB** signals with various modulation and randomization schemes. This document includes both frequency domain and time domain measurement techniques of the PSD of UWB transmissions for all UWB signal types;

2.4.4 ITU- Recommendation SM 1755

Recommends the general characteristics of UWB technology;

2.4.5 ITU- Recommendation SM 1756

Recommends the framework and provides guidance to administrations considering the introduction of devices using UWB technology; and

2.4.6 ITU- Recommendation SM.1757

Recommends methodologies which assess the impact of UWB devices on systems operating in the spectrum band concerned. It includes a summary of both theoretical analyses and measurement studies carried out in the laboratory and in the field.

In developing a national framework for UWB, ITU-R SM 1756 puts forward two possible implementations a generalized regulatory; and an application-dependent regulatory. For the generalized regulatory implementation, the administrations may consider imposing usage restrictions, technical limits and controls (i.e activity factors and UWB power spectral density), and mitigation techniques to address interference concerns. For application-dependent regulatory implementation, the approach is to restrict the use of certain UWB devices (i.e. imaging devices and automotive short- range radar) in certain premises and allow specific group of people to operate these devices.

3 Objective of SRD and UWB Framework

The objective of this framework is to provide the industry a liberal regulatory regime and a list of frequencies that are allowed for SRD and UWB bands in Pakistan. This will include the technical parameters and standards, types of applications approved and other operational restrictions. SRD and UWB regulations and requirements are subject to periodic review and new frequency bands may be opened up for specific and non-specific SRDs/UWB.

4 Proposed Regulatory framework for SRD and UWB

Short range radio communication devices shall be License-Exempt, Type Approval Required subject to compliance with limits as specified in Annex-I & II

- i. Under the Telecom Act 1996 (section 29), no terminal equipment can be directly or indirectly connected with public switched network unless it has been type approved by PTA. Type approval granted by PTA (Pakistan Telecommunication Authority) signifies that particular telecommunication equipment is approved for general sale and is suitable to connect with a specific public telecommunication network.
- ii. The common spectrum allocation, for individual applications and the general operating conditions as well as the specific conditions for Short Range Devices, are given in Annex-I & II. However, applicant shall also follow Type Approval regulations for initiating/processing of applications and compliance with other general conditions and requirements.
- iii. All SRD devices including UWB devices, as mentioned in Annex-I & II, shall be type approved by PTA in accordance with relevant ITU-R Spectrum management

- recommendations and/or other international relevant standards (FCC-eCFR, EN standards, EMC, IEC etc.)
- iv. Approved laboratories may be in countries other than Pakistan. Subject to type approval based on international norms and testing by one of the approved set of laboratories, the Authority may recognize the test reports issued by world-renowned laboratories duly accredited by the accreditation council within the originating country.
 - v. The SRDs shall be allowed only on “Secondary, Non-interference, Non Protection” basis.
 - vi. SRD operation shall not cause interference with other authorized radio communication services, and be able to tolerate any interference caused by other radio-communication services, electrical or electronic equipment.
 - vii. The SRDs shall not be constructed with any external or readily accessible control which permits the adjustment of its operation in a manner that is inconsistent with the specifications given in Annex I & II.
 - viii. If any SRD is found, or reported to interfere with any primary service, the device operation must be stopped immediately.
 - ix. While issuing NOC for SRDs operational in frequency band marked with asterisk (*), protection of primary services operational in adjacent frequency bands shall be ensured. Moreover, if the power levels exceed the limits, for that purpose, such applications may be forwarded to FAB for evaluation and upon FAB’s concurrence device may be type approved.
 - x. UWB applications like ground and walls penetration radar (GPR and WPR), Walls Imaging Radar, Radio Monitoring devices and Medical shooting devices which are meant for specific organizations only and have the capability to cause harmful interference in case of wide spread deployments will be considered on case to case basis.

5 References

- 1) ITU-R Report SM.2153-7 “Technical and operating parameters and spectrum use for short-range radio communication devices”, June, 2019.
- 2) ERC Recommendation (70)03 “Use of short range devices”, 7 June .2019.
- 3) APT Report No. APT/AWG/REP-07 (Rev.6) “Survey on operation of Short-Range Devices (SRDs)”, September, 2018.
- 4) ITU-R Recommendation SM.1756 “Framework for introduction of devices using Ultra wideband technology”.
- 5) ITU-R Recommendation SM.1755 “Characteristics of UWB technology”.
- 6) APT REPORT No. APT/AWF/REP-1 ” ULTRA WIDE BAND (UWB): 2007”.
- 7) ETSI TR 103 181-3 Worldwide UWB regulations between 3.1 and 10.6 GHz.

6 Annexures

6.1 Annex-I: Specific conditions for Short Range Devices (SRD), Subject to approval by FAB.

S.No	Frequency Band	Allowed Power	Max Range	Applications	Applicable Standards	Remarks
1	9-59.750 KHz	66db μ A/m@10m	10 m	induction loop system SRDs	EN 300 330	only loop coil external antennas may be employed
2	59.75-60.250 KHz	42db μ A/m@10m	10m	induction loop system SRDs	EN 300 330	only loop coil external antennas may be employed
3	60.25-70.000 KHz	66db μ A/m@10m	10m	induction loop system SRDs	EN 300 330	only loop coil external antennas may be employed
4	70-119 KHz	42db μ A/m@10m	10 m	induction loop system SRDs	EN 300 330	only loop coil external antennas may be employed
5	119-135 KHz	66db μ A/m@10m	10 m	induction loop system SRDs/RFID	EN 300 330	only loop coil external antennas may be employed
6	13.553-13.567 MHz	42 db μ A/m@10m, 100mW e.r.p	10 m	Induction loop system, Radio detection, alarm system	FCC Part 15 §15.225 (a) and ANSI C63.10-2013; or EN 302 291 -1	EN 300 330 for Non-specific SRD
7	26.957-27.283 MHz	42db μ A/m@10m, 10mW e.i.r.p	10m	telemetry	FCC Part 15 §15.227 and ANSI C63.10-2013; or EN 300 220-1, EN 300 220-2	-
8	40.66-40.700 MHz	10 mW e.i.r.p	10m	Telemetry, Telecommand SRDs	FCC Part 15 §15.231 (Periodic operation in 40.66-40.7 MHz) and ANSI C63.10-2013 or EN 300 220	-
9	180-200 MHz	\leq 112db μ A/m@10m	indoor only	Wireless microphone, Hearing/Audio assistance aids	EN 300 422 EN 300 220-1	-

10	433.05-434.79 MHz	100mW e.i.r.p	100m	Radio Telemetry, Telecomand, Alarms' and data system	FCC Part 15 §15.240 (433.5 – 434.5 MHz) and ANSI C63.10-2013 or EN 300 220-1 , EN 300 220-2	-
11	920-925 MHz*	≤ 200 mW e.i.r.p	10m	Radio Telemetry, Telecomand, RFID systems	FCC Part 15 §15.249 and ANSI C63.10-2013 or EN 300 220-1 or EN 302 208	-
12	2.40-2.5 GHz	≤ 100mW e.i.r.p	100m	Wireless video transmitters ,WLans	FCC Part 15 §15.249 and ANSI C63.10-2013; or EN 300 440 or EN 300 328	For wideband modulations other than FHSS, the maximum e.i.r.p. density is limited to 10 mW/MHz
13	5.150-5.350 GHz	≤ 200 mW e.i.r.p	100m	WLans and broadband access	FCC Part15 §15.407 (1)5.15-5.25GHz (2)5.25-5.35 GHz or EN 301 893	WLAN operating in 5.250 – 5.350 GHz under this provision shall employ Dynamic Frequency Selection (DFS) mechanism and implement Transmit Power Control (TPC).
14	5.470-5.725 GHz	≤ 200 mW e.i.r.p	100m	WLans and broadband access	FCC Part15 §15.407 (2) 5.47-5.725 GHz or EN 301 893	WLAN operating under this provision shall employ Dynamic Frequency Selection (DFS)
15	5.725-5.875 GHz	≤ 1W e.i.r.p		WLans and broadband access	EN 300 440	
16	10.5-10.55 GHz	≤ 117 db μV/m@3m	indoor only	Wireless video transmitters & other SRDs	EN 300 440	Radar gun devices not allowed under this provision
17	24.00-24.25GHz	≤ 100 mW e.i.r.p	50m	Wireless video transmitters & other SRDs	EN 302 858 EN 300 440	

18	76.00-77.00 GHz	≤ 23.5 dBm e.i.r.p	50m	Automatic cruise control and collision warning system for vehicles	EN 301 091	
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6.2 Annex-II: Proposed spectrum for SRD (UWB) devices, Subject to approval by FAB.

S.No	Frequency range in GHz	Maximum mean power (e.i.r.p.) spectral density	Maximum Peak power (e.i.r.p) defined in 50 MHz)
1	$f \leq 1.6$	- 90 dBm/MHz	-50 dBm
2	$1.6 < f \leq 2.7$	- 85 dBm/MHz	-45 dBm
3	$2.7 < f < 3.1$	- 70 dBm/MHz	-36 dBm
4	$3.1 < f \leq 3.4$	-70 dBm/MHz Or - 41.3 dBm/MHz using LDC ⁽¹⁾ or DAA ⁽²⁾	- 36 dBm or 0 dBm
5	$3.4 < f \leq 3.8$	-70 dBm/MHz or - 41.3 dBm/MHz using LDC(1) or DAA ¹² ,	-40dBm or 0 dBm
6	$3.8 < f \leq 4.8$	- 70 dBm/MHz Or - 41.3 dBm/MHz using LDC ⁽¹⁾ or DAA ⁽²⁾	-30 dBm or 0 dBm
7	$4.8 < f \leq 6$	-70 dBm/MHz	-30 dBm
8	$6 < f \leq 8.5$	-41.3 dBm/MHz	0dBm
9	$8.5 < f \leq 9$	-65 dBm/MHz or - 41.3 dBm/MHz using DAA ⁽²⁾	-25 dBm or 0dBm
10	$9 < f \leq 10.6$	-65 dBm/MHz	-25 dBm
11	$f > 10.6$	-85 dBm/MHz	-45 dBm

1. Within the band 3.1 GHz to 4.8 GHz. The Low duty cycle mitigation technique and its limits are defined in ETSI Standard EN 302 065-1
2. Within the band 3.1 GHz to 4.8 GHz and 8.5 GHz to 9 GHz. The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-1

7 Terms & Definitions

- 1) **Automatic cruise control and collision warning system** - A short range radar system is a movement and position detection device which is used to give a warning of collision by identifying the delay between a transmitted pulse and a return pulse.
- 2) **Induction loop communication system** - A system in which the radio frequency energy is conducted or guided along wires or in cables (e.g. Induction loop paging) and the field radiated by wire or cable is limited, giving a typical range between cable and receiving equipment of 30 meters. Induction loop communication systems may be used in a building or limited area of a factory site which is under the control of the system user.
- 3) **Radio detection system** - A movement detection device which is used to give warning of intrusion by activating an alarm or sending a coded signal to a receiving device to identify the source of emission (e.g. field disturbance sensor).
- 4) **Radio alarm system** - An alarm system which uses radio signals to generate or indicate an alarm condition or to set or unset the system (e.g. short range fire detection & alarm system, anti-theft alarm device).
- 5) **Radio microphone** - A microphone that uses a radio link to convey speech or music to a remote receiver.
- 6) **Telemetry** - The use of telecommunication for automatically indicating or recording measurements at a distance from the measuring instrument.
- 7) **Telecommand** - The use of telecommunication for the transmission of signals to initiate, modify or terminate functions of equipment at a distance (e.g. radio control of models, automatic garage door openers, etc.).
- 8) **Wireless LAN** - A wireless data communication (e.g. wireless LAN) is a radio-communication system used for transmission of data between computers installed within a building.
- 9) **Wireless Video Transmitter** - It is mainly to be used for controlling or monitoring purposes.
- 10) **Ground penetrating radar** - (GPR) is defined as a field disturbance sensor that is designed to operate only when in contact with, or within one meter of, the ground for the purpose of detecting or obtaining the images of buried objects or determining the physical properties within the ground. The energy from the GPR is intentionally directed down into the ground for this purpose.
- 11) **Wall imaging system** - is a field disturbance sensor that is designed to detect the location of objects contained within a "wall" or to determine the physical properties within the "wall." The "wall" is a concrete structure, the side of a bridge, the wall of a mine or another physical structure that is dense enough and thick enough to absorb the majority of the signal

transmitted by the imaging system. This category of equipment does not include products such as "stud locators" that are designed to locate objects behind gypsum, plaster or similar walls that are not capable of absorbing the transmitted signal.

8 Feedback and Comments

Comments, suggestions and views from the industry and the general public, may be submitted through following channels.

- Postal address: Director Strategy and Development, PTA HQs, F-5/1, Islamabad.
- Email address: ehsan@pta.gov.pk

This consultation will be opened for a period of four (04) weeks, and will close by 12 noon on 9th August, 2021.

PTA assures that stakeholders' comments would be duly analyzed and considered, if deemed appropriate, while finalizing the SRD Regulatory Framework.