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(06/2015)

User requirements for wireless microphones

BT Series
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Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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Series of ITU-R Recommendations

(Also available online at <http://www.itu.int/publ/R-REC/en>)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R BT.1871-1*

User requirements for wireless microphones

(Question ITU-R 121/6)

(2009-2010-2015)

Scope

This Recommendation deals with user requirements for wireless microphones. It contains typical system parameters and operational requirements for analogue and digital wireless microphones, which may be used by administrations and broadcasters when planning tuning ranges within the frequency bands allocated to broadcasting, fixed and mobile service.

The ITU Radiocommunication Assembly,

considering

- a) that separate applications exist for broadcast and non-broadcast application of wireless microphones;
- b) that separate applications exist for news, sports, drama, light entertainment, studio and non-studio programme production within broadcasting use of wireless microphones;
- c) that there is a requirement within a wireless microphone system to assign a range of selectable frequencies to each system to permit frequency management and mitigate interference;
- d) that wireless microphones are currently assigned frequencies in bands allocated to the mobile service in Region 3 and those allocated to the broadcasting service in Regions 1 and 2, and many administrations are undertaking the transition from analogue to digital terrestrial television broadcasting;
- e) that wireless microphone systems are used in many countries, and are deployed for television production in other countries by national broadcasting organizations;
- f) that many administrations use TV Bands IV and V, which are also allocated to the mobile service in Region 3, as tuning ranges for professional wireless microphones;
- g) that it is desirable to minimize the potential for interference in these systems, while minimizing frequency management resource requirements, mitigating interference and increasing global harmonization of the selectable frequencies,

recommends

- 1** that the description of the user requirements and key characteristics of analogue and digital wireless microphones in Annex 1 should be referred to by administrations seeking to operate these applications in the frequency bands indicated;
- 2** that the tuning ranges and licensing arrangements for analogue and digital wireless microphones in Annex 2 should be referred to by administrations and broadcasters seeking information.

* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in May 2011.

Annex 1

User requirements for wireless microphones

Table 1 provides the description of the user requirements and key characteristics of analogue and digital wireless microphones which should be referred to by administrations seeking to operate these applications.

TABLE 1
User requirements for radio/wireless microphones

Characteristics	Specification
Application	Voice (speech, song), music instruments
Transmitter	
Placement of a transmitter	Body worn or handheld
Power source	Battery
Transmitter RF-output power	10 to 100 mW
Transmitter audio input	Microphone level
Receiver	
Placement of a receiver	Fixed/camera mounted
Power source	a.c. mains/battery
Receiver audio output	Line level
Receiver type	Single or diversity
General	
Battery/power pack operation time	> 4-8 h
Audio frequency response	≤ 80 to ≥ 15.000 Hz
Audio mode	Mono
RF frequency ranges	TV Bands III/IV/V, 1.8 GHz
Signal-to-noise ratio (optimal/possible)	> 100/119 dB
Modulation	Analogue – FM wideband, Digital – Shift QPSK
RF peak deviation (AF = 1 kHz)	± 50 kHz
RF bandwidth	≤ 200 kHz
Number of useable wireless microphone channels per 8 MHz	> 12

Annex 2

Tuning ranges of wireless microphones

The tuning ranges of wireless microphones are intended to guide administrations and broadcasters seeking to operate analogue and digital wireless microphones and when considerations are made to frequency sharing with other services.

Table 2 provides frequency bands and licensing arrangements within some administrations.

TABLE 2

Frequency bands and licensing arrangements

Country	Frequency tuning range	Licensing arrangement(s)
Australia	VHF Band III – 174-230 MHz	Class license permits up to 3 mW e.i.r.p. (note an increase to 50 mW e.i.r.p. is under consideration) Australian standard AS/NZS 4268 ⁽¹⁾ on short-range devices specifies 0.1 μ W for spurious emission level into an adjacent channel.
	520-694 MHz ⁽³⁾	Up to 100 mW e.i.r.p. Some (much less commonly used) apparatus licensing for higher powered uses up to 250 mW e.i.r.p. (for digital systems) Australian standard AS/NZS 4268 ⁽¹⁾ on short-range devices specifies 0.1 μ W for spurious emission level into an adjacent channel.
	1 790-1 800 MHz ⁽³⁾	The maximum e.i.r.p. is 100 mW Expansion to 1 785-1 790 MHz is under consideration with the additional limitations that transmitters must not be operated on frequencies within 1 MHz of 1 785 MHz and transmitters using frequencies below 1 790 MHz must only be used indoors. These proposed limitations on 4 MHz of the proposed additional permitted operating frequency band are to provide for co-existence with adjacent services. Australian standard AS/NZS 4268 ⁽¹⁾ on short-range devices specifies 0.1 μ W for spurious emission level into an adjacent channel.

TABLE 2 (continued)

Country	Frequency tuning range	Licensing arrangement(s)
Japan	40.68 MHz, 42.89 MHz	Maximum antenna input power: 10 mW (for analogue systems)
	44.87 MHz, 47.27 MHz	
	470-714 MHz ⁽⁶⁾⁽⁷⁾	Maximum antenna input power: 10 mW (for analogue system) 50 mW (for digital system)
	779.125-787.875 MHz ⁽⁵⁾	Maximum antenna input power: 10 mW (for analogue systems)
	797.125-805.875 MHz ⁽⁵⁾	
	770.250-778.750 MHz ⁽⁵⁾	Maximum antenna input power: 50 mW Tolerance of antenna input power: -50% to +50%
	778.875-797.125 MHz ⁽⁵⁾	Minimum operational channel spacing: 500 kHz for 128 ksymbol/s Maximum occupied bandwidth: 288 kHz
	797.250-805.750 MHz ⁽⁵⁾	Maximum number of simultaneous operable channels at 9 MHz bandwidth: 18 ch (for digital systems)
1 240-1 252 MHz 1 253-1 260 MHz ⁽⁷⁾	Maximum antenna input power: 50 mW (for analogue/digital systems)	
France ⁽²⁾	32.8 MHz, 36.4 MHz, 39.2 MHz	1 mW e.r.p. and BW 200 kHz (for analogue systems)
	169.4-169.6 MHz	500 mW e.r.p. and BW up to 50 kHz (for analogue systems)
	175.5-178.5 MHz	10 mW e.r.p. and BW up to 200 kHz (for analogue systems)
	183.5-186.5 MHz	10 mW e.r.p. and BW up to 200 kHz (for analogue systems)
	470-830 MHz ⁽³⁾	⁽²⁾ Limited to media professional uses
	863-865 MHz	SAB ⁽⁸⁾ (see Decisions ART ⁽⁹⁾ Nos. 99-781, 99-782 and 00-20) (for analogue systems)
	1 785-1 800 MHz ⁽⁴⁾	10 mW (for analogue systems) 20 mW e.r.p. (see Recommendation ERC/REC/70-03 (Annex 10) ⁽⁴⁾ Microphones)
Korea	72.610-73.910 MHz, 74.000-74.800 MHz, 75.620-75.790 MHz	10 mW e.r.p. and BW up to 60 kHz
	173.020-173.280 MHz, 217.250-220.110 MHz, 223.000-225.000 MHz	10 mW e.r.p. and BW up to 200 kHz
	470-698 MHz	250 mW e.r.p. and BW up to 200 kHz (for SAB/SAP and licensed only)
	925.000-937.500 MHz	10 mW e.r.p. and BW up to 200 kHz

TABLE 2 (end)

Country	Frequency tuning range	Licensing arrangement(s)
Canada ⁽¹⁰⁾	26.10-26.48 MHz 88-107.5 MHz	1W e.r.p. and BW up to 200 kHz
	450-451 MHz 455-456 MHz	1W e.r.p. and BW up to 200 kHz, only for auxiliary-to-broadcast use
	54-72 MHz 76-88 MHz 174-216 MHz	Maximum antenna input power: 50 mW BW up to 200 kHz
	150-174 MHz	Maximum antenna input power: 50 mW BW up to 54 kHz
	470-608 MHz 614-698 MHz	Maximum antenna input power: 50 mW BW up to 200 kHz
Germany	32.475-38.125 MHz	10/50 mW e.r.p. ⁽¹¹⁾⁽¹²⁾
	174-230 MHz	50 mW e.r.p., BW up to 200 kHz, channel raster 25 kHz ⁽¹²⁾
	470-608 MHz, 614-703 MHz, 733-823 MHz	50 mW e.r.p., BW up to 200 kHz, channel raster 25 kHz ⁽¹²⁾
	790-814 MHz, 838-862 MHz	50 mW e.r.p., BW up to 200 kHz, channel raster 25 kHz ⁽¹¹⁾⁽¹³⁾
	823-832 MHz	82/100 mW e.i.r.p. ⁽¹¹⁾
	863-865 MHz	10 mW e.r.p., BW up to 200 / 300 kHz ⁽¹¹⁾
	1 452-1 492 MHz	50 mW e.i.r.p ⁽¹²⁾
	1 492-1 518 MHz	50 mW e.i.r.p, indoor only ⁽¹²⁾
1 785-1 805 MHz	82 mW e.i.r.p. ⁽¹¹⁾	

(1) AS/NZS 4268:2012 Radio equipment and systems: Short-range devices – Limits and methods of measurement.

(2) More detailed information can be found in:
http://www.anfr.fr/fileadmin/mediatheque/documents/tnrbf/DR-02_13_Annexe_7_AFP_.pdf and
<http://www.arcep.fr/>.

Analogue and digital radio microphones comply with ETSI Standard EN 300 422 and frequencies allowed for analogue systems can be reused by digital systems.

(3) While the UHF tuning range in the current Radiocommunications (Low Interference Potential Devices) Class License 2000 is 520-820 MHz, this class license is being reviewed.

(4) <http://www.erodocdb.dk/Docs/doc98/official/pdf/REC7003E.PDF>

(5) More detailed information can be found in the latest version of ARIB STD RCR STD-22.

(6) The frequency range 470-710 MHz is used for Digital Terrestrial Television Broadcasting as a primary service and for wireless microphones as a secondary service. The channel arrangement and locations of wireless microphones are regulated by the Administration.

(7) More detailed information can be found in the latest version of ARIB Standard STD-T112.

(8) Services Ancillary to Broadcasting.

- ⁽⁹⁾ Autorité de Régulations des Télécommunications.
- ⁽¹⁰⁾ More detailed information can be found in RSS-123:
<https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10154.html#s52>
- ⁽¹¹⁾ More detailed information can be found in <http://www.bundesnetzagentur.de/allgemeinzuteilungen> →
“Mikrofone”
- ⁽¹²⁾ More detailed information can be found in <http://www.bundesnetzagentur.de/drahtlosemikrofone> →
“Funkmikrofone (Drahtlose Mikrofone)”
- ⁽¹³⁾ General license Vfg. 91/2005 will expire 31.12.2015
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