**Annex 10: Radio microphone applications including Assistive Listening Device (ALD), wireless audio and multimedia streaming systems**

**Scope of Annex**

This annex covers frequency bands and regulatory as well as informative parameters recommended for radio microphone applications (also referred to as wireless microphones or cordless microphones), Assistive Listening Devices (ALD) (also referred to as aids for the hearing impaired) and wireless audio and multimedia streaming systems.

It covers professional and consumer radio microphones, both hand-held and body-worn, in-ear monitoring devices and Assistive Listening Devices (ALD).

Radio microphones are small, low power (typically 50 mW or less) transmitters designed to be worn on the body, or hand held, for the transmission of sound. The receivers are tailored to specific uses and may range from small and portable to rack mounted modules as part of a multichannel system. ALDs are specific radio microphone applications which capture an acoustic signal that is transmitted by radio to the hearing aid receivers.

It also covers wireless audio and multimedia streaming systems used for audio/video transmissions and audio/video synchronisation signals including cordless loudspeakers; cordless headphones; Band II low power FM transmitters operating in the FM Broadcast band 87.5 MHz to 108 MHz are used for the provision of an RF link between a personal audio device, including mobile phone, and the in-car or home entertainment system etc.

Assistive Listening Systems (ALS) are for use by the hearing impaired in public spaces such as airports, railway stations, churches and theatres, where the transmitter is connected to the audio programme or public address system and the receiver is worn by hearing-impaired users, or integrated into users’ hearing aids.

Frequency band limits for radio microphones should be regarded as tuning ranges within which a device can be designated to operate. In most cases, Appendix 3 indicates those parts of the range that are not available in individual countries but this does not apply to the broadcasting bands at 174-216 MHz and 470-862 MHz where national geographical and licensing restrictions are likely to exist and the national administration should be contacted.

The sub-bands below are intended for the following applications:

* ALDs: sub-bands b), c1), c2), d), g),
* Radio microphones: sub-bands a), e), f1), f2), f3), f4), g),h1), h2), h3), j1), j2), j3),
* Wireless audio and multimedia streaming systems: sub-bands g), and j2),
* Band II low power FM transmitters: sub-band a1),
* ALS: sub-band i).

**Regulatory parameters**

| **Frequency Band** | **Power / Magnetic Field** | **Spectrum access and mitigation requirements** | **Modulation/ maximum occupied bandwidth** | **ECC/ERC Deliverable** | **Notes** |
| --- | --- | --- | --- | --- | --- |
| **a** | 29.7-47.0 MHz | 10 mW e.r.p. | No requirement | ≤ 50 kHz |  | Radio microphones.On a tuning range basis.Individual licence may be required |
| **a1** | 87.5-108.0 MHz | 50 nW e.r.p. | No requirement | 200 kHz |  | Band II low power FM transmitters |
| **b** | 169.4-174.0 MHz | 10 mW e.r.p. | No requirement | ≤ 50 kHz |  | Assistive Listening Device (ALD).On a tuning range basis |
| **c1** | 169.400-169.475 MHz | 500 mW e.r.p. | No requirement | ≤ 50 kHz | ECC/DEC/(05)02 | Assistive Listening Device (ALD). |
| **c2** | 169.4875-169.5875 MHz | 500 mW e.r.p. | No requirement | ≤ 50 kHz | ECC/DEC/(05)02 | Assistive Listening Device (ALD). |
| **d** | 173.965-216 MHz | 10 mW e.r.p. | Notes 1 and 2 | ≤ 50 kHz | ECC Report 230 | Assistive Listening Device (ALD).On a tuning range basis.Individual licence may be required |
| **e** | 174-216 MHz | 50 mW e.r.p. | No requirement | Not specified |  | Radio microphones.On a tuning range basis.Individual licence may be required |
| **f1** | 470-786 MHz | 50 mW e.r.p. | No requirement | Not specified |  | Radio microphones.On a tuning range basis.Individual licence may be required  |
| **f2** | 786-789 MHz | 12 mW e.r.p. | No requirement | Not specified |  | Radio microphones.On a tuning range basis.Individual licence may be required.See technical conditions for PMSE (including radio microphones) in Annex 3 of Decision ECC/DEC/(09)03 section 3.1 |
| **f3** | 823-826 MHz | 20 mW e.i.r.p./100 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones.Individual licence may be required.100 mW restricted to body worn equipment.See technical conditions for PMSE (including radio microphones) in Annex 3 of Decision ECC/DEC/(09)03 section 3.1 |
| **f4** | 826-832 MHz | 100 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones.Individual licence may be required.See technical conditions for PMSE(including radio microphones) in Annex 3 of Decision ECC/DEC/(09)03 section 3.1 |
| **g** | 863-865 MHz | 10 mW e.r.p. | No requirement | Not specified |  | Radio microphones, wireless audio and multimedia streaming devices. The frequency band is also identified in annex 1 |
| **h1** | 1350-1400 MHz | 20 mW e.i.r.p./50 mW e.i.r.p. | No requirement/ SSP (see notes column) | Not specified |  | Radio microphones.Individual licence may be required.50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1350-1400 MHz band |
| **h2** | 1492-1518 MHz | 50 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones.On a tuning range basis.Individual licence required.Restricted to indoor use |
| **h3** | 1518-1525 MHz | 50 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones.On a tuning range basis.Individual licence required.Restricted to indoor use |
| **i** | 1656.5-1660.5 MHz | 2 mW/600 kHz e.i.r.p | No requirement | Not specified |  | Assistive Listening Systems.Individual licence may be required |
| **j1** | 1785-1795 MHz | 20 mW e.i.r.p./50 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones.Individual licence may be required.50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band |
| **j2** | 1795-1800 MHz | 20 mW e.i.r.p./50 mW e.i.r.p. | No requirement | Not specified |  | Radio microphones, wireless audio and multimedia streaming devices.Individual licence may be required.50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band |
| **j3** | 1800-1804.8 MHz | 20 mW e.i.r.p./50 mW e.i.r.p. | No requirement | No specified |  | Radio microphones.Individual licence may be required.50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band |

Note 1: a threshold of 35 dBµV/m is required to ensure the protection of a DAB receiver located at 1.5m from the ALD device, subject to DAB signal strength measurements taken around the ALD operating site.

Note 2: the ALD device should operate under all circumstances at least 300 kHz away from the channel edge of an occupied DAB channel.

**Additional Information**

**Harmonised Standards**

EN 300 422 all sub-bands except a1)

EN 301 357 sub-bands a1), g) and j2)

Systems using ETSI EN 301 357 should be designed so that when not in use there should be no transmission of an RF carrier, where indicated in the frequency issues.

**Technical parameters also referred to in the harmonised standard**

No information

**Frequency Issues**

Sub-band a1):

The user interface of SRD shall permit as a minimum the selection of any and all possible frequencies within the 88.1 MHz to 107.9 MHz and as a maximum 87.6 MHz to 107.9 MHz. When audio signals are not present, apparatus must employ a transmission time out facility. Pilot tones that ensure continuity of transmission are not permitted.

Sub-band d):

ECC Report 230 provides information on ALD frequency issues in the frequency band 174-216 MHz including an example for an on-site measurement procedure. It should be noted that ALD applications may need to move in frequency if changes in the use of the broadcast radio service take place.

Sub-bands f1) and f2): ECC/DEC/(15)01 identifies the band 703-733 MHz/758-788 MHz for the introduction of mobile/fixed communication networks (MFCN). Some national administrations which have not introduced mobile/fixed communication networks (MFCN) in accordance with Decision ECC/DEC/(15)01 may authorise larger parts or the whole of the band 694-790 MHz to be used by radio microphones.

Sub-bands f2), f3), f4): Some national administrations which have not introduced mobile/fixed communication networks (MFCN) in accordance with Decision ECC/DEC/(09)03 may authorise larger parts or the whole of the band 786-862 MHz to be used by radio microphones.

Sub-band h2): this frequency band is identified for the introduction of mobile/fixed communication networks supplemental downlink (MFCN SDL) in ECC Decision (17)06. National administrations may authorise radio microphones in the band as long as they will not have introduced mobile/fixed communication networks (MFCN).