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System Reference document (SRdoc);
Wireless access systems including radio local area networks (WAS/RLANs) in the band 5 925 MHz to 6 725 MHz

Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document includes necessary information to support the co-operation under the MoU between ETSI and the Electronic Communications Committee (ECC) of the European Conference of Postal and Telecommunications Administrations (CEPT).

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

License exempt Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) represent the primary broadband wireless access technologies used for wireless internet access. With billions of devices already in operation, and the rapid growth expected to continue for the foreseeable future, and the demand for greater throughput to support Gigabit internet access and advanced wireless applications, the current spectrum allocations are insufficient to maintain an acceptable level of performance users are accustomed to. Based on these expected growth rates and currently limited available frequency bands, there is an essential need for additional license exempt spectrum for WAS/RLANs to accommodate the anticipated market growth.

The present document provides the justification for the need for additional license exempt spectrum for WAS/RLANs and also requests modifications to the regulatory rules of the 5 925 MHz to 6 725 MHz frequency range to enable the operation of WAS/RLANs in this band implementing advanced spectrum sharing techniques as appropriate.

1 Scope

The System Reference Document provides information on the intended applications, the technical parameters, mitigation techniques, the relation to the existing spectrum regulation and additional new radio spectrum requirements for Wireless access systems including radio local area networks (WAS/RLANs). The SRdoc contains information to support the CEPT activities resulting from Work Item SE45_1 (covering the band 5 925 MHz to 6 425 MHz). In addition, the present document contains a request for considering additional frequencies up to 6 725 MHz. The document includes the necessary information to support the co-operation between ETSI and the Electronic Communications Committee (ECC) of the European Conference of Post and Telecommunications Administrations (CEPT).

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.2] IEEE 802.11™-2016: "IEEE Standard for Information Technology - Telecommunications and information exchange between systems Local and metropolitan area networks - Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[i.3] ETSI TS 136 104 (V14.5.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 14.5.0 Release 14)".

[i.4] ETSI TS 136 101 (V14.5.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 14.5.0 Release 14)".

[i.5] ETSI TS 136 213 (V14.4.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (3GPP TS 36.213 version 14.4.0 Release 14)".

[i.6] ETSI EN 301 893 (V2.1.1): "5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.7] Wi-Fi Alliance Spectrum Needs Study conducted by Quotient Associates.

NOTE: Available at http://www.wi-fi.org/file/wi-fi-spectrum-needs-study.

[i.8] Qualcomm Study: "A Quantification of 5 GHz Unlicensed Band Spectrum Needs".

NOTE: Available at https://www.qualcomm.com/documents/quantification-5-ghz-unlicensed-band-spectrum-needs.

[i.9] ETSI EN 303 143 (V1.2.1): "Reconfigurable Radio Systems (RRS); System architecture for information exchange between different Geo-location Databases (GLDBs) enabling the operation of White Space Devices (WSDs)".

[i.10] ETSI EN 303 144 (V1.1.1): "Reconfigurable Radio Systems (RRS); Enabling the operation of Cognitive Radio System (CRS) dependent for their use of radio spectrum on information obtained from Geo-location Databases (GLDBs); Parameters and procedures for information exchange between different GLDBs".

[i.11] ETSI EN 303 145 (V1.2.1): "Reconfigurable Radio Systems (RRS); System Architecture and High Level Procedures for Coordinated and Uncoordinated Use of TV White Spaces".

[i.12] ETSI EN 303 387 (V1.1.1): "Reconfigurable Radio Systems (RRS); Signalling Protocols and information exchange for Coordinated use of TV White Spaces; Interface between Cognitive Radio System (CRS) and Spectrum Coordinator (SC)".

[i.13] ITU-R Radio Regulations, Articles, Edition of 2012.

NOTE: Available at http://search.itu.int/history/HistoryDigitalCollectionDocLibrary/1.41.48.en.101.pdf.

[i.14] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz (ECA TABLE)".

NOTE: Available at http://www.efis.dk/sitecontent.jsp?sitecontent=ecatable.

[i.15] Commission Decision 2007/344/EC of 16 May 2007 on harmonised availability of information regarding spectrum use within the Community".

[i.16] ECC Decision ECC/DEC/(01)03: "ECO Frequency Information System (EFIS)".

[i.17] ETSI TR 138 901: "5G; Study on channel model for frequencies from 0.5 to 100 GHz (3GPP TR 38.901)".

[i.18] ETSI TS 136 211 (V13.7.1): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation (3GPP TS 36.211 version 13.7.1 Release 13)".

[i.19] CEPT/ERC/REC 74-01: "Unwanted Emissions in the Spurious Domain".

[i.20] ECC Report 186: "Technical and operational requirements for the operation of white space devices under geo-location approach".

[i.21] ETSI EN 302 571: "Intelligent Transport Systems (ITS); Radiocommunications equipment operating in the 5 855 MHz to 5 925 MHz frequency band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.22] ECC Decision (17)06: "The harmonised use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)".

NOTE: Available at https://www.ecodocdb.dk/download/4f052b0b-2c6c/ECCDEC1706.pdf.

[i.23] ERC Recommendation 14-01:"Radio-frequency channel arrangements for high capacity analogue and digital radio-relay systems operating in the band 5925 to 6425 MHz".

[i.24] ERC Recommendation 14-02: "Radio-frequency channel arrangements for high, medium and low capacity digital fixed service systems operating in the band 6425 to 7125 MHz".

[i.25] ECC Recommendation 14(06): "Implementation of Fixed Service Point-to-Point narrow channels (3.5 MHz, 1.75 MHz, 0.5 MHz, 0.25 MHz, 0.025 MHz) in the guard bands and center gaps of the lower 6 GHz (5925 to 6425 MHz) and upper 6 GHz (6425 to 7125 MHz) bands".

NOTE: Available at https://www.ecodocdb.dk/download/4d550cd2-890c/REC1406.PDF.

[i.26] IEEE P802.11™ax: "IEEE Draft Standard for Information Technology -- Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks -- Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment Enhancements for High Efficiency WLAN".

[i.27] IEEE 802.11™ac: "IEEE 802.11ac-2013 - IEEE Standard for Information technology -- Telecommunications and information exchange between systems Local and metropolitan area networks -- Specific requirements -- Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications -- Amendment 4: Enhancements for Very High Throughput for Operation in Bands below 6 GHz".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in the Directive 2014/53/EU [i.1] and the following apply:

6 GHz RLAN bands: total frequency range that consists of the 5 925 MHz to 6 725 MHz frequency band

adaptive equipment: equipment operating in an adaptive mode

adaptive mode: mechanism by which equipment can adapt to its environment by identifying other transmissions present in the band

ad-hoc mode: operating mode in which an RLAN device establishes a temporary wireless connection with other RLAN devices without a controlling network infrastructure

antenna array: two or more antennas connected to a single device and operating simultaneously

antenna assembly: combination of the antenna (integral or dedicated), its coaxial cable and if applicable, its antenna connector and associated switching components

NOTE 1: This term (antenna assembly) refers to an antenna connected to one transmit chain.

NOTE 2: The gain of an antenna assembly G in dBi, does not include the additional gain that may result out of beamforming.

available channel: channel identified as available for immediate use as an *Operating Channel*

beamforming gain: additional (antenna) gain realized by using beamforming techniques in smart antenna systems

NOTE: Beamforming gain as used in the present document does not include the gain of the antenna assembly.

burst: period during which radio waves are intentionally transmitted, preceded and succeeded by periods during which no intentional transmission is made

channel: minimum amount of spectrum used by a single RLAN device

NOTE: An RLAN device is permitted to operate (transmit/receive) in one or more adjacent or non-adjacent channels simultaneously.

EXAMPLE: For the purpose of the present document, an IEEE 802.11™ [i.2] device operating in a 40 MHz mode may be considered as operating in 2 adjacent 20 MHz channels simultaneously.

channel plan: combination of the centre frequencies and for each of the centre frequencies, the declared nominal bandwidth(s)

clear channel assessment: mechanism used by an equipment to identify other transmissions in the channel

combined equipment: any combination of non-radio equipment that requires a plug-in radio device to offer full functionality

dedicated antenna: antenna external to the equipment, using an antenna connector with a cable or a wave-guide and which has been designed or developed for one or more specific types of equipment

NOTE: It is the combination of dedicated antenna and radio equipment that is expected to be compliant with the regulations.

energy detect: mechanism used by an adaptive system to determine the presence of another device operating on the channel based on detecting the signal level of that other device

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

host equipment: any equipment which has complete user functionality when not connected to the radio equipment part and to which the radio equipment part provides additional functionality and to which connection is necessary for the radio equipment part to offer functionality

integral antenna: antenna designed as a fixed part of the equipment (without the use of an external connector) which cannot be disconnected from the equipment by a user with the intent to connect another antenna

NOTE: An integral antenna may be fitted internally or externally. In the case where the antenna is external, a non-detachable cable or wave-guide can be used.

Listen Before Talk (LBT): mechanism by which an equipment applies clear channel assessment (CCA) before using the channel

manufacturer: company that has manufactured the equipment and who submits it for test

NOTE: Alternatively, the importer or any other person or entity that submits the equipment for test can be considered as the manufacturer for the purpose of the present document.

multi-radio equipment: radio, host or combined equipment using more than one radio transceiver

operating channel: *Available Channel* on which the RLAN has started transmissions

NOTE: An *Operating Channel* becomes again an *Available Channel* if the RLAN stopped all transmissions on that channel and no radar signal was detected by the *In-Service Monitoring*.

plug-in radio device: radio equipment module intended to be used with or within host, combined or multi-radio equipment, using their control functions and power supply

receive chain: receiver circuit with an associated antenna

NOTE: Two or more receive chains are combined in a smart antenna system.

RLAN devices: 6 GHz high performance wireless access systems (WAS) including RLAN equipment

simulated radar burst: series of periodic radio wave pulses for test purposes

smart antenna systems: equipment that combines multiple transmit and/or receive chains with a signal processing function to increase the throughput and/or to optimize its radiation and/or reception capabilities

NOTE: These are techniques such as spatial multiplexing, beamforming, cyclic delay diversity, MIMO, etc.

stand-alone radio equipment: equipment that is intended primarily as communications equipment and that is normally used on a stand-alone basis

sub-band: portion of the 6 GHz RLAN bands

NOTE: See definition for "6 GHz RLAN bands".

total occupied bandwidth: total of the Nominal Channel Bandwidths in case of simultaneous transmissions in adjacent or non-adjacent channels

NOTE: The Total Occupied Bandwidth may change with time/payload.

transmit chain: transmitter circuit with an associated antenna

NOTE: Two or more transmit chains are combined in a smart antenna system.

Transmit Power Control (TPC): technique in which the transmitter output power is controlled resulting in reduced interference to other systems

unavailable channel: channel which cannot be considered by the RLAN device for a certain period of time *(Non Occupancy Period)* after an incumbent signal was detected on that channel

unusable channel: channel from the declared channel plan which may be declared as permanently unavailable due to one or more incumbent detections on the channel

usable channel: any channel from the declared channel plan, which may be considered by the RLAN for possible use

3.2 Symbols

For the purposes of the present document, the following symbols apply:

A	Measured power output
AC	Alternating Current
T_{ch}	Number of active transmit chains
D	Measured power density
dBm	dB relative to 1 milliwatt
DC	Direct Current
E	Field strength
E_o	Reference field strength
f_c	Carrier frequency
G	Antenna gain
GHz	GigaHertz
Hz	Hertz
kHz	kiloHertz
MHz	MegaHertz
ms	millisecond
MS/s	Mega Samples per second
mW	milliWatt
n	Number of channels
P_H	Calculated e.i.r.p. at highest power level
P_L	Calculated e.i.r.p. at lowest power level
Pburst	RMS (mean) power over the transmission burst
PD	Calculated power density
P_d	Detection Probability
R	Distance
R_{ch}	Number of active receive chains
R_o	Reference distance
S0	Signal power
T0	Time instant
T1	Time instant
T2	Time instant
T3	Time instant
W	Radar pulse width
x	Observed duty cycle
Y	Beamforming (antenna) gain

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3rd Generation Partnership Project
AP	Acces Point
AR/VR	Augmented Reality/Virtual Reality
BS	Base Station
CBTC	Communications Based Train Control
CCA	Clear Channel Assessment
DFS	Dynamic Frequency Selection
DL	DownLink
e.i.r.p.	equivalent isotropically radiated power
EC	European Commission
ECO	European Communications Office
EFIS	ECO Frequency Information System
EIRP	Effective Isotropic Radiated Power
EN	European Norm
ERC	European Radio Committee
ESV	Earth Station on Vessel
EU	European Union
FM	Frequency Management
FS	Fixed Service
FSS	Fixed Satelitte Service
HD	High Definition
IEEE	Institute of Electrical and Electronic Engineers
ITS	Intelligent Transport Systems
LBT	Listen Before Talk
LTE-eLAA	Long Term Evolution-enhanced Licenced-Assisted Access
MFCN	Mobile Fixed Communications Network
MIMO	Multiple Input, Multiple Output
OFDM	Orthogonal Frequency-Division Multiplexing
OFDMA	Orthogonal Frequency-Division Multiple Access
PER	Packet Error Rate
RLAN	Radio Local Area Network
RMS	Root Mean Square
RR	Radio Regulations
SDL	Supplementary DownLink
SE	Spectrum Engineering
TC	Technical Committee
TPC	Transmit Power Control
UK	United Kingdom
UWB	Ultra WideBand
WAS	Wireless Access Systems
WGSE	Working Group Spectrum Engineering
WIA	Wireless Industrial Automation
WLAN	Wireless Local Area Network

4 Comments on the System Reference Document

4.1 Comments from ETSI members

4.1.1 Comments from Ericsson Telefonaktiebolaget LM

On clause 7.3 (Information on relevant standards):

The second sentence of the paragraph: *"Once new spectrum in the 6 GHz range has been made available, ETSI EN 301 893 will be revised to include these new frequency band(s)."* should be removed."

4.1.2 Comments from Ministère Economie et Finances

Source: Ministère de l'Economie et des Finances (France)

(For further information contact Ms. Andrianilana Rakotondradalo (andrianilana.rakotondradalo@anfr.fr)

"The following statements intend to provide relevant information regarding the complexity of the feasibility study on WAS/RLAN 6 GHz:

- *Further to a request from some administrations to study WAS/RLANs in 6 GHz band, CEPT has decided about the feasibility study limited to 5925-6425 MHz, taking in particular into consideration the need to migrate the existing L bands fixed links in the frequency band above 6.4 GHz and the need to avoid uncertainty in such migration of the fixed links and therefore in the refarming of the L-band.*

- *In fact, CEPT has just adopted harmonized framework for mobile SDL (supplemental downlink) in frequency bands 1427-1452 MHz / 1492-1518 MHz[1] in addition to the already harmonized framework at ECC and EC levels. The European Commission is also expecting the final response from CEPT to its EC mandate "1427-1452 MHz / 1492-1518 MHz" in order to launch the drafting of the Commission implementing Decision amending the current EU Decision 2015/750. Consequently, the current narrow band fixed service usage in the L-band are already planned to be refarmed within the 6 GHz band in order to release the frequency bands 1427-1452 MHz and 1492-1518 MHz.*

- *In addition, the frequency band 6 GHz is extensively used by medium/high capacity, long distance fixed terrestrial links (point-to-point) for backhauling of some mobile broadband networks[2]. Some Member States have also authorised urban rail systems (such as CBTC) in this band. The band 6425-6725 MHz is also the so-called "extended C band" for uplink transmissions (Earth-to-Space).*

- *The current EU policy and initiatives are actively engaged in order to support investment on wireless connectivity.*

- *For each compatibility and sharing scenario in the 5925-6425 MHz band, the risk of interference, the deployment assumptions of all applications and consequential restrictions in WAS/RLAN deployment should be identified, as well as all requirements for implementing sharing scenario. Furthermore, relevant sharing solutions for possible usage of WAS/RLAN systems in the 5925-6425 MHz band, have to be defined and developed. They may imply operational developments supporting implementation of the sharing framework such as geolocation and databases. However, an innovative sharing solution supported by geolocation and databases increases the complexity and needs time before practical implementation in particular due to the need to validate and to implement solutions for the databases concept.*

- *Finally, taking into account the current interference situation in the 5 GHz band (as meteorological radars are still subject to interferences from RLAN 5 GHz) which is still subject to debate, and the current usage in that band supporting development of mobile broadband with security requirements, there is a need to ensure the proof of concept of any sharing solutions between WAS/RLAN and the other systems in 5925-6425 MHz band. Such proof of concept shall be limited to 5925-6425 MHz in line with the scope of CEPT feasibility study.*

Note 1: *See ECC Decision (17)06 "The harmonised use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)" approved on 17th of November 2017.*

Note 2: *See ERC Recommendation 14-01 "Radio-frequency channel arrangements for high capacity analogue and digital radio-relay systems operating in the band 5925 to 6425 MHz" and ERC Recommendation 14-02 "Radio-frequency channel arrangements for high, medium and low capacity digital fixed service systems operating in the band 6425 to 7125 MHz"."*

4.1.3 Comments from Norwegian Communications Authority (Nkom)

Taking into the consideration that:

1) *The Radio Spectrum Committee at its 62nd meeting (6th-7th December 2017) decided to change the frequency range in their mandate to CEPT to study feasibility and identify harmonized technical conditions for WAS/RLAN from 5925-7125 MHz to 5925-6425 MHz.*

2) *CEPT/ECC has assigned WGSE (SE45) to study the technical feasibility of the introduction of low power WAS/RLAN in the band 5925-6425 MHz under a non-protected basis and ensuring certainty of continued operation, development and protection of existing services (FS, FSS) taking into account RR 5.440 and 5.458.*

3) *CEPT/ECC has adopted a ECC Decision (17)06 on "The harmonized use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)" and ECC Recommendation 14(06) on refarming of Fixed Service Point-to-Point and in the guard bands and center gaps of the lower 6 GHz (5925 to 6425 MHz) and upper 6 GHz (6425 to 7125 MHz) bands.*

4) *CEPT/ECC has adopted Recommendation 14-01 for high capacity radio-relay systems operating in the band 5925 -6425 MHz and Recommendation 14-02 for high, medium and low capacity digital fixed service systems operating in the band 6425 - 7125 MHz. Today, a large number of fixed radio links in 6 GHz are in use, and more than 1600 in Norway. This band is the very well suited for long-range radio relay systems and it is also widely used offshore. High capacity radio relay has no feasible alternative for certain topographies, like Norway. Radio relay systems are affected by very low input signals, which means that also a distant interferer would be detected by a receiver of a radio relay. Even a short-term interference could quickly result in reduced availability of fixed services, which under normal circumstances are operational 99.995 % of the time. Aggregated noise of a short-term low interfering signals from a multiple RLAN/WAS would add to the total noise level. High capacity radio relay system in 6425 - 7125 MHz are often used in backbone transmission network. Interference of a such trunk-system would lead to traffic outages in large areas. The mitigation techniques described in 7.2.4 of the present document is unlikely to give sufficient protection of fixed service links in 6 GHz.*

5) *The interference situation on meteorological radars in the 5 GHz band is lasting for several years already and is currently again the subject to joint ECC/ADCO action. As study of the interference cases shows, the requirements for DFS, as described in EN 301 893, are not followed by all RLAN/WAS manufacturers. There is a need to prevent further worsening of the spectrum by RLAN/WAS not following the obligatory mitigation techniques.*
At the same time, opening of the new band for the same applications could also cause "moving" of the current 5 GHz RLAN/WAS users to the 5 925 - 6 725 MHz frequencies where no radar detection is required. This would be even more probable if Article 5 of RED (2014/53/EU) is activated for RLAN/WAS in 5GHz. With this a much higher penetration and outdoor use then predicted by this document § 7.2.2 Table 1 can be expected, while leaving unused 5GHz part of spectra. This would bring even more uncertainty in use of existing and refarming of the fixed links of the L band.

6) *License exempted spectrum available for RLAN/WAS in Norway are 85.5 MHz in 2.4GHz-band and 555MHz in 5GHz-bands. There are no known reports on RLAN/WAS traffic congestions.*
There is no sustained justification in § 6 and § 8 of this document of why the frequency bands already available for RLAN would not be sufficient. This document in §8 Justification of Spectrum Request refers to Qualcomm's report [i.8] "A quantification of 5 GHz unlicensed band spectrum needs" which concludes that a 1280 MHz of license free spectrum for future 1Gbit/s throughput is needed. This conclusion is made with assumption of 100% coverage (1 AP per room) in dense residential settings and dense enterprise deployments, with the maximum of 4 MIMO-antenna system and the WLAN backhauling. In the configuration with 60 GHz last hop, according to this Qualcomm report, only 480 MHz of 5 GHz spectrum is required. Under Configuration with 4 APs per apartment with 5 GHz WLAN backhaul between APs, stations requires 800 MHz of spectrum.

At the same time, justification for new spectra neither considered other options for connectivity like smartphones, M2M nor wired PCs traffic that are used in dense residential and enterprise deployments, but presumed the total data traffic is to be routed through RLAN!

We do not accept the justification given in this document for a need for more spectra, nor why the extension of 500 MHz would not be sufficient."

4.1.4 Comments from 3db Access AG

"Purpose of SRdoc is to allow SE to identify the worst case scenarios for compatibility studies with incumbent services.

Details have to be provided on:

- *Use case scenarios (Home, Car, Phone (Hotspot, Wifi direct), Public, Industrial, etc.)*
- *Market penetration of RLAN*

- *Density estimation of RLAN*
- *Activity factor, usage. E.g. Ton time*
- *Wireless parameters: modulation, data rates, etc.*

In Europe, WiFi is allowed in 5180 - 5825 MHz (>600 MHz). All allocations need to be documented."

5 Executive summary

The present document provides justification for additional new license exempt spectrum for Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) highlighting the importance of the 5 925 MHz to 6 725 MHz frequency range and proposes modifications to regulatory rules for 5 925 MHz to 6 725 MHz frequency range, for consideration with the aim of helping market growth of license-exempt WAS/RLANs devices. The continued Wi-Fi market expansion, additional throughput demand of wireless applications, and the addition of license exempt LTE-eLAA technologies are placing unsustainable demand on the existing spectrum available for WAS/RLAN thus creating the momentum and justification to secure access to additional new license exempt spectrum.

The present document presents market data and predictions for the continued growth of the Wi-Fi industry, and for the projected rollout of LTE-eLAA, MulteFire and 5G New Radio (5GNR).

The IEEE P802.11ax [i.26] project (to become IEEE 802.11™ax standard) and the LTE-eLAA standards (relevant specifications for the present document can be found in [i.3], [i.4] and [i.5]) are example technologies for WAS/RLANs that allows for a wide-range of high efficiency wireless broadband through the use of OFDMA and other enhancements for efficient spectrum utilization and coexistence. The present document describes their salient technical characteristics and features such as transmitter power control, detect and avoid, listen-before-talk and receiver blocking performance.

Based on market data and technical requirements for deployment of future licence exempt technologies, a suitable regulatory framework is required to gain access to additional new license exempt spectrum for Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) in the 5 925 MHz to 6 725 MHz frequency range.

The present document suggests regulatory change to support WAS/RLANs in the 5 925 MHz to 6 725 MHz frequency range. Based on the current limitations in the regulations for the 5 925 MHz to 6 725 MHz frequency range, the present document requests that ideally the following proposed changes to the regulations are considered for implementation enabling WAS/RLANs access to the 5 925 MHz to 6 725 MHz frequency range:

1) European Common Allocation implement Radio Regulations Region 1 Allocation allowing MOBILE, [i.14].

2) ETSI would like the CEPT to consider developing an appropriate ECC decision that would harmonise the usage of 6 GHz band by WLAN/RLANs across the CEPT member states. In addition, we would like the EC to develop an appropriate Commission Decision that would harmonise the 6 GHz band within the EU for use by WLAN/RLANs.

These proposed regulatory amendments are necessary for WAS/RLANs license exempt technologies to access the 5 925 MHz to 6 725 MHz frequency range under the least restrictive regulations conditions. Benefits of these changes include higher spectrum efficiency and fairer approaches to spectrum access/utilization.

6 Market Information

The primary methods for internet access at home, schools, businesses and public spaces use is licence exempt spectrum, with Wi-Fi systems carrying the vast majority of this wireless access traffic.

Wireless data traffic is projected to continue to grow dramatically during the 2018 - 2025 timeframe (http://www.cisco.com/c/en/us/solutions/service-provider/visual-networking-index-vni/index.html?stickynav=1). At the same time the licence exempt spectrum is expected to experience significant increase in utilization demand and congestion.

In addition, demand for usage of licence exempt spectrum is expected to experience increased demand due to new technologies utilizing LTE based technologies such as eLAA and MulteFire in the near future, with migration to 5GNR in the 2025 timeframe.

New and high growth application areas such as 4k/8k HD video, AR/VR, gaming and low latency industrial applications, combined with the significant increase of the number of Mobile Broadband wireless devices in homes, schools, businesses and public spaces, are expected to be significant drivers of additional traffic.

UK based Quotient Associates conducted projected traffic patterns based analysis and concluded that in Europe there will be a Wi-Fi spectrum shortfall of between 345 MHz and 753 MHz in 2020 and between 655 MHz and 1 713 MHz in 2025 [i.7].

An analysis conducted by Qualcomm on spectrum requirements to enable 1 Gbit/s coverage in dense deployment scenarios for IEEE 802.11™ax technology networks concluded that a total amount of around 1 280 MHz of licence exempt spectrum will be required around the 5 GHz band [i.8].

To enable required throughputs and network capacities, the wireless industry is moving towards the use of wider bandwidth channels. For example newest generation IEEE 802.11™ac [i.27] and IEEE 802.11™ax [i.26] standards based systems widely use 80 MHz and 160 MHz wide channel bandwidths and system bandwidth of a single 3GPP 5GNR carrier could be up to 100 MHz. Of note here is that in the EU there are currently only five non-overlapping 80 MHz channels, and two 160 MHz channels.

Availability of a sufficient amount of licence exempt spectrum is a necessary requirement to meet the European Commission's objectives for Connectivity for a European Gigabit Society.

7 Technical Information

7.1 Detailed technical description:

It is expected that WAS/RLANs used in 5 925 MHz to 6 725 MHz frequency range will function as extension to wired LANs utilizing radio as the connectivity media. The range for majority of these systems are expected to be on the order of tens of meters while there can be point-to-point links which provide larger operating range. However, these point-to-point links are likely to be comparatively smaller in number.

7.2 Technical parameters and implications on spectrum

7.2.1 Status of technical parameters

7.2.1.1 Current ITU and European Common Allocations

See clause 9.

7.2.1.2 Sharing and compatibility studies already available

None found.

7.2.1.3 Sharing and compatibility issues still to be considered

- In band:
    - RLAN and FS
    - RLAN and FSS (Space Stations/ESV)
    - RLAN and UWB
    - RLAN and Radiodetermination
- Adjacent band:
    - RLAN and ITS [i.21]

- RLAN and UWB
- RLAN and non-specific SRDs
- RLAN and WIA

7.2.2 Transmitter parameters

7.2.2.1 Transmitter Output Power/Radiated Power

RLAN devices used in different applications will have different power levels. Most devices are expected to use e.i.r.p. levels lower than the maximum limit for various reasons such as power consumption and transmit power control. Devices that serve as base stations may transmit at the higher power level than the devices that serve as mobile stations.

Base station transmit power is typically fixed. Table 1 has the percentages of the indoor devices that transmit at a certain maximum power levels.

Table 1: WAS (including RLANs) power distribution for indoor (98 %)

Weighted EIRP Distribution (mW): Indoor								
Indoor Use Case	**Weight**	**1 000**	**250**	**100**	**50**	**13**	**1**	**Total**
Indoor Client	26,32 %	0,00 %	0,00 %	1,82 %	12,03 %	12,47 %	0,00 %	26,32 %
Indoor Enterprise AP	2,63 %	0,00 %	1,06 %	0,90 %	0,58 %	0,09 %	0,01 %	2,63 %
Indoor Consumer AP	66,31 %	0,00 %	7,90 %	2,76 %	11,20 %	38,94 %	5,51 %	66,31 %
Indoor High Performance Gaming Router	4,74 %	0,71 %	0,20 %	0,73 %	1,97 %	0,97 %	0,16 %	4,74 %
Sub-Total	100,00 %	0,71 %	9,15 %	6,21 %	25,79 %	52,47 %	5,68 %	100,00 %

Table 2 has the percentages of the outdoor devices that transmit at a certain maximum power levels.

Table 2: WAS (including RLANs) power distribution for outdoor (2 %)

Weighted EIRP Distribution (mW): Outdoor								
Outdoor Use Case	**Weight**	**1 000**	**250**	**100**	**50**	**13**	**1**	**Total**
Outdoor High Power AP	20 %	2,99 %	0,83 %	3,05 %	8,37 %	4,10 %	0,66 %	20,00 %
Outdoor Low Power AP	30 %	0,25 %	3,41 %	1,33 %	5,73 %	16,87 %	2,41 %	30,00 %
Outdoor Client	50 %	0,00 %	0,00 %	3,46 %	22,85 %	23,68 %	0,00 %	50,00 %
Sub-Total	100,00 %	3,24 %	4,24 %	7,84 %	36,95 %	44,65 %	3,07 %	100 %

This results in weighted average EIRPs for indoor RLANs of 17,48 dBm, outdoor RLANs of 17,53 dBm, and combined indoor/outdoor of 17,48 dBm are used in the simulations.

7.2.2.2 Antenna Characteristics

For majority of the indoor deployments for RLAN use, the RLAN antenna can be modelled as omni-directional antenna with 0 dB gain for both mobile stations and the base stations. Access points/BS can be equipped with directional antennas; the antenna gain can be assumed to be 6 dBi typically, which also implies a certain discrimination in the vertical plane.

Table 3 provides the characteristics of a typical antenna for 5 150 MHz to 5 250 MHz. A similar antenna performance is assumed for outdoor operation in the 6 GHz band.

Table 3: Typical antenna performance

Antenna Parameter	Value
Vertical 3 dB bandwidth	30 degrees
Horizontal 3 dB beam width	90 degrees
Suppression at 30 deg elevation	At least 15 dB
Front-to-back-ratio	-20 dB

Antenna height depends on regions where users are located and can be modelled as following for different deployment zones.

Table 4: Typical antenna heights by region

		Building Construction Type Probability									
		Urban Indoor			Suburban Indoor			Rural Indoo			All Outdoor
Building Story	Height (m)	Corporate	Public	Home	Corporate*	Public	Home	Corporate	Public	Home	
1	1,5	69,0 %	69,0 %	60,0 %	69,0 %	69,0 %	60,0 %	70,0 %	70,0 %	70,0 %	95,0 %
2	4,5	21,0 %	21,0 %	30,0 %	21,0 %	21,0 %	30,0 %	25,0 %	25,0 %	25,0 %	2,0 %
3	7,5	7,0 %	7,0 %	7,0 %	7,0 %	7,0 %	5,0 %	5,0 %	5,0 %	5,0 %	2,0 %
4	10,5	0,7 %	0.7%	0,7 %	0,7 %	0,7 %	5,0 %	0,0 %	0,0 %	0,0 %	0,50 %
5	13,5	0,58 %	0,58 %	0,58 %	0,58 %	0,58 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
6	16,5	0,50 %	0,50 %	0,50 %	0,50 %	0,50 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
7	19,5	0,43 %	0,43 %	0,43 %	0,43 %	0,43 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
8	22,5	0,35 %	0,35 %	0,35 %	0,35 %	0,35 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
9	25,5	0,28 %	0,28 %	0,28 %	0,28 %	0,28 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
10	28,5	0,2 %	0,2 %	0,2 %	0,2 %	0,2 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
Total		100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

For outdoor deployments, the base station device height is typically 4,5 m for urban, suburban and rural deployment zones. For outdoor deployments, omni directional model for a base station device is not adequate. A commonly used reference model for the outdoor 3D antenna element pattern is given in ETSI TR 138 901 [i.17], Table 7.3-1.

When deployed at the base station, the antenna techniques are seen as an effective method to limit the interference in a given direction.

NOTE: This use case is particularly relevant for the equipment compliant with the Rel 13 LTE LAA standard [i.18], since the standard supports downlink only transmission direction and conduct all uplink transmissions on a separate licensed band, thus limiting the impact to the primary users of the band.

7.2.2.3 Operating Frequency

Work onoing within IEEE 802.11 shows that the *Nominal Centre Frequencies* (fc) for a *Nominal Channel Bandwidth* of 20 MHz are defined by the following formula, where g = channel number:

$$fc_n = 5\,945 + (g \times 20) \text{ MHz}, \quad \text{where } 0 \leq g \leq 38$$

Equipment is envisaged to use simultaneous transmissions on more than one *Operating Channel* with a *Nominal Channel Bandwidth* of 20 MHz.

Figure 1 shows the IEEE 802.11 [i.2] channel arrangement adopted for the 6 GHz band.

Equipment compliant with the existing LTE-LAA standard could support wider channel bandwidth via carrier aggregation up to 32 carriers (including at least one anchor carrier in a licensed band). Such configurations, among other things, will be potentially used in the coming 3GPP 5G New Radio standard, too.

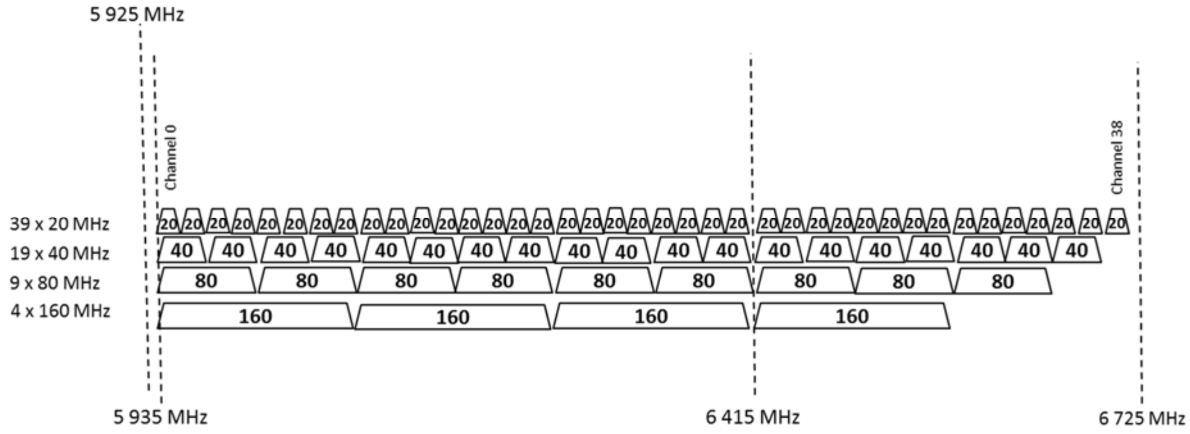

Figure 1: IEEE 802.11 [i.2] channel arrangement adopted for the 6 GHz band

NOTE: TC ITS has requested that the band plan provide a 20 MHz guard band at 5 925 MHz, instead of the 10 MHz shown here.

7.2.2.4 Bandwidth

The 6 GHz band will be greenfield operation for most RLAN system and is expected to be used for high data-rate applications. Correspondingly, the expected deployment of 80 MHz and 160 MHz devices while lower bandwidth operation, such as 20 MHz and 40 MHz might also be used. Table 5 shows a prediction for channel bandwidth used in 6 GHz band.

Table 5: Bandwidth distribution

Channel bandwidth	20 MHz	40 MHz	80 MHz	160 MHz
RLAN Device Percentage	10 %	10 %	50 %	30 %

7.2.2.5 Unwanted emissions

7.2.2.5.1 Transmitter unwanted emissions in the 6 GHz bands

It is expected that RLANs operating in the 6 GHz band will use modulations similar to the ones currently used in 5 GHz band, i.e. OFDM. Hence, spectral emissions would follow similar pattern. For sharing studies, the spectral mask given in figure 2 can be used.

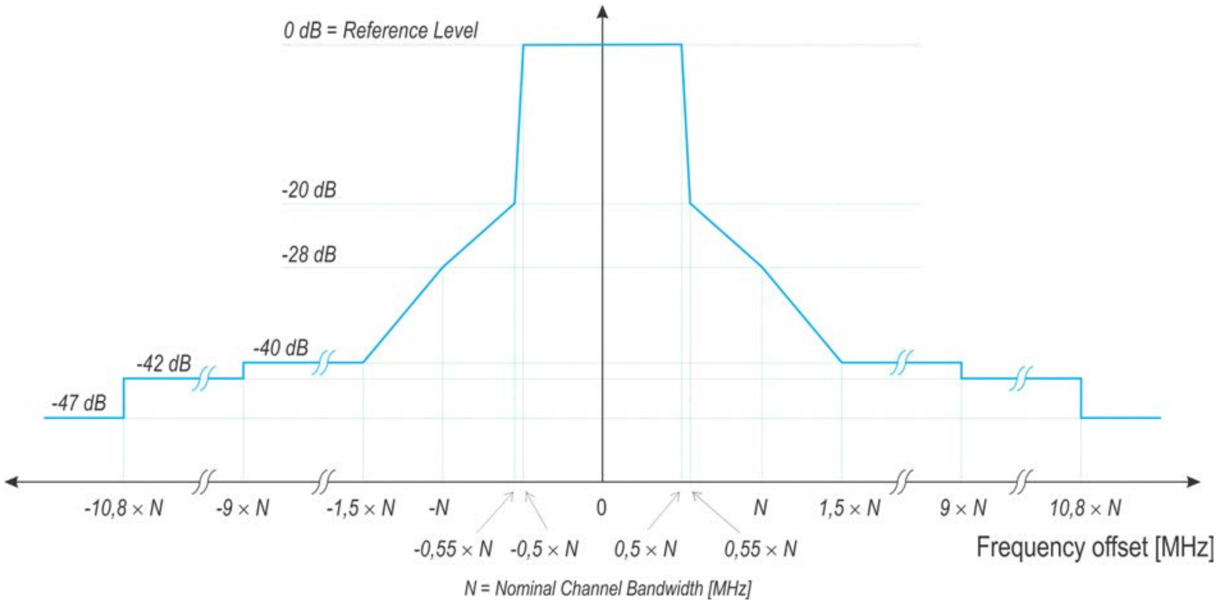

Figure 2: Transmit spectral power mask

Smart antenna system (devices with multiple transmit chains) parameters will be similar to those already defined for the 5 GHz band in ETSI EN 301 893 [i.6].

For transmitter unwanted emissions within the 6 GHz bands, simultaneous transmissions in adjacent channels may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels used simultaneously.

For simultaneous transmissions in multiple non-adjacent channels, the overall transmit spectral power mask is constructed in the following manner. First, a mask as provided in figure 2 is applied to each of the channels. Then, for each frequency point, the highest value from the spectral masks of all the channels assessed should be taken as the overall spectral mask requirement at that frequency.

7.2.2.5.2 Transmitter unwanted emissions outside the 6 GHz bands

The level of transmitter unwanted emissions outside the 6 GHz RLAN bands will comply with the ERC Recommendation 74-01 [i.19].

7.2.3 Receiver parameters

Receiver parameters will be similar to those already defined for the 5 GHz band in ETSI EN 301 893 [i.6].

7.2.4 Interference mitigation techniques

Critical to incumbent protection are the techniques used to access the spectrum. This may be variations on tested and proven methods, used as is or in combination, or may be entirely new methods. Some examples are:

- Transmit Power Control (TPC): reduce transmit power to prevent harmful interference to incumbents.
- Geolocation Database approach: use of location data to prevent harmful interference to incumbents [i.9], [i.10], [i.11], [i.12] and [i.20].
- Antenna Characteristics of the base station devices: reduction of skyward transmissions to reduce aggregate interference.
- Indoor operation: limitation to indoor operation to utilize Building Entry Loss.
- Massive MIMO: Antenna techniques such as Massive MIMO, which could be a very useful interference mitigation technique for outdoor deployments with DL only operation.

7.3 Information on relevant standards

ETSI EN 301 893(V2.1.1) [i.6] is the current version of the harmonised standard covering WAS/RLANs operating in the current 5 GHz frequency bands. Once new spectrum in the 6 GHz range has been made available, ETSI EN 301 893 [i.6] will be revised to include these new frequency band(s).

8 Justification of Spectrum Request

The main purpose of the present document is to present consideration for WAS/RLAN usage in the 5 925 MHz to 6 725 MHz frequency band. The target outcome is to request changes to the appropriate regulations, pending the results of coexistence and compatibility studies and analysis, to make the spectrum amenable for the deployment of WAS/RLANs.

As shown in clause 6, wireless data traffic is projected to continue to grow significantly during the 2018 - 2025 timeframe (http://www.cisco.com/c/en/us/solutions/service-provider/visual-networking-index-vni/index.html?stickynav=1). At the same time the license exempt spectrum is expected to experience significant increase in utilization demand. In addition, spectrum needs studies conducted by Quotient Associates and Qualcomm indicate serious spectrum shortfalls for RLANs in the next three to ten years.

The Wi-Fi Alliance Spectrum Needs Study, projects traffic pattern below 6 GHz and concluded that in Europe there will be a Wi-Fi spectrum shortfall of between 345 MHz and 753 MHz in 2020 and between 655 MHz and 1 713 MHz in 2025 [i.7].

The analysis conducted by Qualcomm on spectrum requirements to enable 1 Gbit/s coverage in dense deployment scenarios for IEEE 802.11ax™ technology networks concluded that a total amount of around 1 280 MHz of license exempt spectrum will be required around the 5 GHz band [i.8].

Availability of a sufficient amount of license exempt spectrum is a necessary requirement to meet the European Commission's objectives for Connectivity for a European Gigabit Society.

9 Regulations

9.1 International and European Allocations and their limitations

9.1.1 International Allocations

The ITU (Region 1) frequency allocation 5 925 MHz to 6 700 MHz is allocated to FIXED, FIXED SATELLITE (EARTH-TO-SPACE) and MOBILE. See table 6.

The ITU (Region 1) frequency allocation 6 700 MHz to 7 075 MHz is allocated to FIXED, FIXED SATELLITE (EARTH-TO-SPACE) (SPACE-TO-EARTH) and MOBILE. See table 6.

Table 6: 5 925 MHz to 7 075 MHz ITU (Region 1) Allocation

Frequency band	Allocations
5925 MHz - 6700 MHz (5.149) (5.440) (5.458)	FIXED-SATELLITE (EARTH-TO-SPACE) (5.457A) (5.457B) MOBILE (5.457C) FIXED (5.457)
6700 MHz - 7075 MHz (5.458) (5.458A) (5.458B)	FIXED MOBILE FIXED-SATELLITE (EARTH-TO-SPACE) (SPACE-TO-EARTH) (5.441)

9.1.2 European Allocations

The European Common Allocation for 5 925 MHz to 6 700 MHz is allocated to FIXED, FIXED SATELLITE (EARTH-TO-SPACE) and on a secondary basis to Earth Exploration-Satellite (passive). Note that there is no MOBILE allocation which is a departure from the ITU (Region 1) frequency allocation. See table 7.

The European Common Allocation for 6 700 MHz to 7 075 MHz is allocated to FIXED, FIXED SATELLITE (EARTH-TO-SPACE) (SPACE-TO-EARTH) and on a secondary basis to Earth Exploration-Satellite (passive). Note that there is no MOBILE allocation which is a departure from the ITU (Region 1) frequency allocation. See table 7.

Table 7: Spectrum use in Europe in the frequency band 5 925 MHz to 6 700 MHz (from ERC Report 25 [i.14])

5925 MHz - 6700 MHz

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RR Region 1 Allocation and RR footnotes applicable to CEPT	*European Common Allocation and ECA Footnotes*	*ECC/ERC harmonisation measure*	*Applications*	*Standard*	*Notes*
FIXED 5.457 FIXED-SATELLITE (EARTH-TO-SPACE) 5.457A 5.457B MOBILE 5.457C 5.149 5.440 5.458	FIXED FIXED-SATELLITE (EARTH-TO-SPACE) Earth Exploration-Satellite (passive) 5.149 5.440 5.458		-		
		ECC/DEC/(05)09	ESV	EN 301 447	Within the band 5925-6425 MHz
		ECC/DEC/(05)09	FSS Earth stations	EN 301 443	Priority for civil networks
		ECC/REC/(14)06 ERC/REC 14-01 ERC/REC 14-02	Fixed	EN 302 217	Point-to-point
			Passive sensors (satellite)		For sea surface temperature, sea surface wind speed and soil moisture measurements
		ECC/DEC/(11)02 ERC/REC 70-03	Radiodetermination applications	EN 302 372 EN 302 729	Within the band 4500-7000 MHz for TLPR application and 6000-8500 MHz for LPR applications
		ECC/DEC/(06)04 ECC/DEC/(12)03	UWB applications	EN 302 065	Generic UWB as well as UWB on-board aircraft regulation within the band 6.0- 8.5 GHz

6700 MHz - 7075 MHz

RR Region 1 Allocation and RR footnotes applicable to CEPT	*European Common Allocation and ECA Footnotes*	*ECC/ERC harmonisation measure*	*Applications*	*Standard*	*Notes*
FIXED FIXED-SATELLITE (EARTH-TO-SPACE) (SPACE-TO-EARTH) 5.441 MOBILE 5.458 5.458A 5.458B	FIXED FIXED-SATELLITE (EARTH-TO-SPACE) (SPACE-TO-EARTH) 5.441 Earth Exploration-Satellite (passive) 5.458 5.458A 5.458B		FSS Earth stations	EN 301 443	Within the band 6725-7025 MHz. Priority for civil networks
			Feeder links		Feeder links for MSS. Within the band 6925-7075 MHz
		ECC/REC/(14)06 ERC/REC 14-02	Fixed	EN 302 217	Point-to-point
			Passive sensors (satellite)		For sea surface temperature, sea surface wind speed and soil moisture measurements
		ECC/DEC/(11)02 ERC/REC 70-03	Radiodetermination applications	EN 302 372 EN 302 729	Within the band 4500-7000 MHz for TLPR application. Within the band 6000-8500 MHz for LPR applications
		ECC/DEC/(06)04 ECC/DEC/(12)03	UWB applications	EN 302 065	Generic UWB as well as on-board aircraft regulation within the band 6.0-8.5 GHz

9.1.3 Limitations of Spectrum Regulations for WAS/RLANs

The European Common Allocation as detailed in ERC Report 25 [i.14] and in the ECO Frequency Information System http://www.efis.dk/ (fulfilling EC Decision 2007/344/EC [i.15] on the harmonised availability of information regarding spectrum use in Europe and the ECC Decision ECC/DEC/(01)03 [i.16] on EFIS) has not implemented the MOBILE allocation as detailed in the ITU (Region 1) frequency allocation for the 5 925 MHz to 6 700 MHz and 6 700 MHz to 7 075 MHz bands.

While there are no international regulatory impediments at an ITU (Region 1) level for MOBILE allocation there is indeed a constraint at a European level on MOBILE allocation for both the 5 925 MHz to 6 700 MHz and 6 700 MHz to 7 075 MHz bands.

The lack of a MOBILE allocation at a European level is introducing regulatory impediments to the implementation of WAS/RLANs in 5 925 MHz to 6 725 MHz frequency range.

Constraints on the MOBILE allocation are similar to 5 925 MHz to 6 700 MHz band, except that pursuant to ITU Radio Regulations No. 5.458B [i.13], the space-to-Earth allocation to the fixed-satellite service in the band 6 700 MHz to 7 075 MHz is limited to feeder links for non-geostationary satellite systems of the mobile-satellite service and is subject to coordination under No. 9.11A [i.13]. For the WAS/RLAN systems operating under the MOBILE allocation, this requirement entails a coordination zone in the vicinity of the non-geostationary, mobile-satellite receiving Earth stations of which there is a limited number deployed in Europe.

9.2 Proposed regulation

9.2.1 Detailed Changes to Regulatory Text

Based on the current limitations in the regulations for the 5 925 MHz to 6 725 MHz frequency range, the present document requests that the following proposed changes to the regulations are implemented enabling WAS/RLANs access to the 5 925 MHz to 6 725 MHz frequency range:

1) European Common Allocation implement Radio Regulations Region 1 Allocation allowing MOBILE, [i.14].

2) ETSI would like the CEPT to consider developing an appropriate ECC decision that would harmonise the usage of 6 GHz band by WLAN/RLANs across the CEPT member states. In addition, we would like the EC to develop an appropriate Commission Decision that would harmonise the 6 GHz band within the EU for use by WLAN/RLANs.

These proposed regulatory amendments are necessary for WAS/RLANs license exempt technologies to access the 5 925 MHz to 6 725 MHz frequency range under the least restrictive regulations conditions.

9.3 Technology Coexistence and Spectrum Sharing Considerations

None.

10 Conclusions

The present document presents justification on the need for additional new license exempt spectrum for Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) in the 5 925 MHz to 6 725 MHz frequency range to support future growth, particularly of WAS/RLANs with greater utilization and efficiency of this spectrum. One study concluded that in Europe there will be a WAS/RLAN spectrum shortfall of between 345 MHz and 753 MHz in 2020 and between 655 MHz and 1 713 MHz in 2025 [i.7]. Another study on spectrum requirements to enable 1 Gbit/s coverage in dense deployment scenarios concluded that a total amount of around 1 280 MHz of license exempt spectrum will be required around the 5 GHz band [i.8].

The present document presents some pertinent technical characteristics of WAS/RLAN systems as well as an example of spectrum access techniques that can be considered for sharing the band with incumbent users. Coexistence with other WAS/RLANs and interference to other radio systems in the spectrum are always concerns when new spectrum designations are considered, hence those impacts should be analysed and quantified during compatibility studies based on system parameter inputs from the present document.

While there are no international regulatory impediments at an ITU (Region 1) level for MOBILE allocation there is indeed a constraint at a European level since there is no MOBILE allocation for both the 5 925 MHz to 6 700 MHz and 6 700 MHz to 7 075 MHz bands. The lack of a MOBILE allocation at a European level is introducing regulatory impediments to the implementation of WAS/RLANs in 5 925 MHz to 6 725 MHz frequency range.

The present document suggests regulatory change to support WAS/RLANs in the 5 925 MHz to 6 725 MHz frequency range. Based on the current limitations in the regulations for the 5 925 MHz to 6 725 MHz frequency range, the present document requests that ideally the following proposed changes to the regulations are considered for implementation enabling WAS/RLANs access to the 5 925 MHz to 6 725 MHz frequency range:

1) European Common Allocation implement Radio Regulations Region 1 Allocation allowing MOBILE, [i.14].

2) ETSI would like the CEPT to consider developing an appropriate ECC decision that would harmonise the usage of 6 GHz band by WLAN/RLANs across the CEPT member states. In addition, we would like the EC to develop an appropriate Commission Decision that would harmonise the 6 GHz band within the EU for use by WLAN/RLANs.

These proposed regulatory amendments are necessary for WAS/RLANs license exempt technologies to access the 5 925 MHz to 6 725 MHz frequency range under the least restrictive regulations conditions. Benefits of these changes include higher spectrum efficiency and fairer approaches to spectrum access/utilization.

History

Document history		
V1.1.1	October 2018	Publication