

ITUWORKSHOPS

1st ITU Inter-regional Workshop on WRC-19 Preparation

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1st ITU INTER-REGIONAL WORKSHOP ON WRC-19 PREPARATION (Geneva, 21-22 November 2017)

Session 2 – Terrestrial WRC-19 agenda item 1.16

WAS/RLAN between 5 150 and 5 925 MHz

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90th Anniversary
CCIR - ITU-R Study Groups
(1927-2017)

Organized by:





Outline

- WRC-19 agenda item 1.16
- Resolution 239 (WRC-15)
- Background and motivation
- Organization of the work in WP 5A
- Status of studies
- Methods (work in progress)
- References



WRC-19 agenda item 1.16

- to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with [Resolution 239 \(WRC-15\)](#);
 - [Resolution 239 \(WRC 15\)](#) – Studies concerning Wireless Access Systems including radio local area networks in the frequency bands between 5 150 MHz and 5 925 MHz
- Responsible Group: **WP 5A**
- Contributing Groups: **WP 4A, WP 4C, WP 5B, WP 5C, WP 7C**
- Interested Groups: (WP 1B), (WP 3J), (WP 3K), (WP 3M), (WP 5D).



Resolution 239 (WRC-15)

(1 of 2)

Studies concerning Wireless Access Systems including radio local area networks in the frequency bands between 5 150 MHz and 5 925 MHz

resolves to invite WRC-19

to consider the results of the ITU-R studies and take appropriate actions,

invites ITU-R

to conduct and complete the following in time for WRC-19:

- a) to study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range;
- b) to conduct studies with a view to identify potential WAS/RLAN mitigation techniques to facilitate sharing with incumbent systems in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, while ensuring the protection of incumbent services including their current and planned use;
- c) to perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency band 5 150-5 350 MHz with the possibility of enabling outdoor WAS/RLAN operations including possible associated conditions;

(continues...)



Resolution 239 (WRC-15)

(2 of 2)

invites ITU-R (continued)

- d) to conduct further sharing and compatibility studies between WAS/RLAN applications and incumbent services addressing:
- i) whether any additional mitigation techniques in the frequency band 5 350-5 470 MHz beyond those analyzed in the studies referred to in recognizing a) would provide coexistence between WAS/RLAN systems and EESS (active) and SRS (active) systems;
 - ii) whether any mitigation techniques in the frequency band 5 350-5 470 MHz would provide compatibility between WAS/RLAN systems and radio determination systems;
 - iii) whether the results of studies under points i) and ii) would enable an allocation of the frequency band 5 350-5 470 MHz to the mobile service with a view to accommodating WAS/RLAN use;
- e) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 725-5 850 MHz with a view to enabling a mobile service allocation to accommodate WAS/RLAN use;
- f) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 850-5 925 MHz with a view to accommodating WAS/RLAN use under the existing primary mobile service allocation while not imposing any additional constraints on the existing services.



Background and Motivation

- **RR No. 5.446A** specifies that the use of the bands 5 150-5 350 MHz and 5 470-5 725 MHz by the stations in the mobile, except aeronautical mobile, service shall be in accordance with Resolution **229 (Rev.WRC-12)**, which resolves that the use of these bands by the mobile service will be for the implementation of WAS, including RLANs.
- Since WRC-03, the demand for mobile broadband applications especially for WAS/RLANs has been growing rapidly. Resolution **239 (WRC-15)** states “that the results of ITU-R studies indicate that the minimum spectrum need for WAS/RLAN in the 5 GHz frequency range in the year 2018 is estimated at 880 MHz; this figure includes 455-580 MHz already utilized by non-IMT mobile broadband applications operating within the 5 GHz range resulting in 300-425 MHz additional spectrum being required.”
- WRC-15 examined the possibility of additional global allocations to the mobile service for terrestrial mobile broadband applications, including in the 5 GHz range, to facilitate contiguous spectrum for WAS/RLAN, thereby enabling the use of wider channel bandwidths to support higher data throughput. The compatibility studies performed by ITU-R in preparation for WRC-15 indicated that when assuming the use of WAS/RLAN mitigation measures limited to the regulatory provisions of Resolution **229 (Rev.WRC-12)**, sharing between WAS/RLAN and the EESS (active) systems in the frequency band 5 350 to 5 470 MHz may not be feasible, as well as being insufficient to ensure protection of certain radar types in this frequency band. For these cases, sharing may only be feasible if additional WAS/RLAN mitigation measures are implemented. However, no agreement was reached on the applicability of any additional WAS/RLAN mitigation techniques. No studies were agreed for the frequency band 5 725-5 850 MHz. As such, WRC-15 concluded no change (NOC) for these frequency bands and established a WRC-19 agenda item to continue the work.



Work in WP 5A

(1 of 2)

- Work being conducted in WG5A-4 chaired by Mr. KRAEMER Michael, Germany
- The main activities are:
 - Development of draft CPM text for agenda item 1.16:
 - Draft CPM text: [Annex 10](#) to [Doc. 5A/650](#)
 - Work plan: [Annex 11](#) to [Doc. 5A/650](#)
 - Development of 7 draft new ITU-R Reports and one study:
 - Working document towards a preliminary draft new Report ITU-R M.[RLAN MITIGATION] - Study of proposed additional mitigation techniques to facilitate sharing between RLAN systems and incumbent services: [Annex 25](#) to [Doc. 5A/469](#)
 - Working document towards a preliminary draft new Report ITU-R M.[RLAN REQ-PAR] - Technical characteristics and operational requirements of WAS/RLAN in the 5 GHz frequency range: [Annex 21](#) to [Doc. 5A/650](#)
 - Working document towards a preliminary draft new Report ITU-R M.[AGGREGATE RLAN MEASUREMENTS] - Use of aggregate RLAN measurements from airborne and terrestrial platforms to support studies under WRC-19 agenda item 1.16: [Annex 22](#) to [Doc. 5A/650](#)

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Work in WP 5A

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continued ...

- Working document towards a preliminary draft new Report ITU-R M.[RLAN SHARING 5150-5250 MHz] - Sharing and compatibility studies of WAS/RLAN in the 5 150-5 250 MHz frequency range: [Annex 23](#) to [Doc. 5A/650](#)
- Working document towards a preliminary draft new Report ITU-R M.[RLAN SHARING 5 250-5 350 MHz] - Sharing and compatibility studies of WAS/RLAN in the 5 250-5 350 MHz frequency range: [Annex 24](#) to [Doc. 5A/650](#)
- Working document towards a preliminary draft new Report ITU-R M.[RLAN SHARING 5 350-5 470 MHz] - Sharing and compatibility studies of WAS/RLAN in the 5 350-5 470 MHz frequency range: [Annex 25](#) to [Doc. 5A/650](#)
- Working document towards a preliminary draft new Report ITU-R M.[RLAN SHARING 5 725-5 850 MHz] - Sharing and compatibility studies of WAS/RLAN in the 5 725-5 850 MHz frequency range: [Annex 26](#) to [Doc. 5A/650](#)
- Elements of sharing and compatibility studies of WAS/RLAN in the 5 850-5 925 MHz frequency range: [Annex 27](#) to [Doc. 5A/650](#)



Status of studies

- Currently, within the 5 GHz range, RLAN devices utilize the following frequency bands: 5 150 - 5 250 MHz, 5 250 - 5 350 MHz, 5 470 - 5 725 MHz and 5 725 - 5 850 MHz (in some countries). Pursuant to Resolution 229 (Rev.WRC-12), operation in the 5 150 - 5 250 MHz frequency band is limited to indoor use [with a maximum e.i.r.p. of 200 mW (23 dBm),] while dynamic frequency selection rules apply in the 5 250 - 5 350 MHz and 5 470 - 5 725 MHz frequency bands.
- In the past several years, given the growth of and reliance on RLANs as a means to connect to the Internet, some administrations have studied the possibility of relaxing the conditions imposed by Resolution 229. The results of these proceedings have allowed administrations to authorize RLANs to operate at up to 1 Watt conducted power and a power spectral density (PSD) of 17 dBm/MHz with an allowance for a 6 dBi antenna gain, and to permit outdoor operation with the constraint that antenna elevation angles in excess of 30 degrees from the horizon must not exceed 125 mW (21 dBm) e.i.r.p., to minimize the likelihood of harmful interference to the operating MSS system.
- It is noted that while higher conducted power may be allowed by some administrations, ITU-R studies have concluded the average e.i.r.p. (19 dBm) transmitted by RLANs is significantly below these limits, minimizing interference while permitting operational flexibility in situations where greater power is required. This is in keeping with Resolution 239 (WRC-15), considering (c), of which notes that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access.



Methods (work in progress)

- **Method A:** No change
- **Method B:** Make an allocation to the mobile service to be used by RLANs under the MS on a primary basis (either by a new allocation or the upgrade of an existing secondary allocation) with a view to facilitate the development of terrestrial mobile broadband applications.
 - **Method B1** – Table of Frequency Allocations (ToA) - Make an allocation to under the MS on a primary basis in the Table of Frequency Allocations for use by WAS including RLANs.
 - **Method B2** – Footnote (FN) - Make an allocation to the MS for use by RLANs on a primary basis in a footnote.
- **Method C:** To identify different technical conditions for RLANs under an existing MS allocation either in a new or existing footnote. This Method can be applied individually if there is already a primary mobile allocation or in conjunction with Method B.
- Methods and options that may be applicable to the potential candidate frequency bands, taking into account existing frequency allocations contained in Article 5 of the RR:

Number / Bands (MHz)	Applicable Methods and Options* (shown in <i>italics</i>)				
	Method A	Method B-ToA	Method B-FN	Method C	Section
1 / 5 150-5 250	A	Under Review	Under Review	C	2/1.16/5.1
2 / 5 250 -5 350	A	Not Proposed	Not Proposed	Not Proposed	2/1.16/5.2
3 / 5 350-5 470	A	Not Proposed	Not Proposed	Not Proposed	2/1.16/5.3
4 / 5 725-5 850	A	Under Review	Under Review	Under Review	2/1.16/5.4
5 / 5 850-5 925	A	Not Proposed	Not Proposed	Not Proposed	2/1.16/5.5

- **In summary:** NOC in all bands under consideration, except for 5 150 –5 250 MHz and 5 725 – 5 850 MHz that are still under study.



References

- [Recommendation ITU-R M.1450-5](#) – “Characteristics of broadband radio local area networks ”
- [Recommendation ITU-R M.1454-0](#) – “E.i.r.p. density limit and operational restrictions for RLANS or other wireless access transmitters in order to ensure the protection of feeder links of non-geostationary systems in the mobile-satellite service in the frequency band 5 150-5 250 MHz”
- [Recommendation ITU-R M.1652-1](#) – “Dynamic frequency selection in wireless access systems including radio local area networks for the purpose of protecting the radiodetermination service in the 5 GHz band”
(Note - This version of the Recommendation is incorporated by reference in the Radio Regulations)
- [Recommendation ITU-R M.1653-0](#) – “Operational and deployment requirements for wireless access systems including radio local area networks in the mobile service to facilitate sharing between these systems and systems in the Earth exploration-satellite service (active) and the space research service (active) in the band 5 470-5 570 MHz within the 5 460 5 725 MHz range”
- [Recommendation ITU-R M.1739-0](#) – “Protection criteria for wireless access systems, including radio local area networks, operating in the mobile service in accordance with Resolution 229 (WRC-03) in the bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz”