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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 16 to Document 90-E** |
|  | **7 October 2019** |
|  | **Original: English** |
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| Zimbabwe (Republic of) | |
| Proposals for the work of the conference | |
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| Agenda item 1.16 | |

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)**;

Background

RLANs have proven to be a success in conjunction with other fixed and mobile networks at providing affordable and ubiquitous broadband wireless access to the Internet. Introduced by some administrations in the 2.4 GHz band and subsequently expanded into some of the 5 GHz frequency bands, RLANs, specifically Wi-Fi devices, now carry approximately half of all global Internet Protocol (IP) traffic. 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”. In particular, Resolution **239 (WRC-15)** looks at studying possible RLAN operations in the frequency bands from 5 150-5 925 MHz.

According to the latest statistics, more than 50% of all global IP traffic will be delivered over Wi‑Fi, and forecasts suggest that with the introduction of 5G and gigabit wireless technologies, the demand will continue to grow rapidly in the coming years. In spite of the growing demand, however, the spectrum available globally for RLAN access has remained unchanged since World Radiocommunication Conference 2003 (WRC-03). This lack of adequate spectrum threatens to degrade RLAN performance and limit connectivity for consumers worldwide. This problem is particularly acute for RLAN outdoor deployments. Studies were mainly focused on whether sharing between WAS/RLANs and the mobile-satellite service (MSS) feeder links, aeronautical radionavigation service (ARNS) and the aeronautical mobile telemetry (AMT) is possible or not if outdoor operations of WAS/RLANs in this band are allowed.

The 5 150-5 250 MHz band offers unique advantages in addressing the growing need for RLAN outdoor access. One study from an administration which presently allows RLANs to operate in 5 150-5 250 MHz 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 (i.e. a total 36 dBm e.i.r.p., with emissions at elevations above 30 degrees restricted to 21 dBm (125.893 mW) or less) showed that RLANs could protect the non-GSO MSS feeder links when typical deployment characteristics were taken into account. These rules are intended to prevent harmful interference to MSS Earth-to-space communications by limiting the aggregate noise received by the satellite. Some studies confirm that RLAN operations outdoors in the band 5 150-5 250 MHz will not cause harmful interference to other operations in the band.

Outdoor RLAN use enables internet service providers (ISPs) to provide affordable internet service in rural and under-served areas. Instead of using a cable to deliver the last mile, ISPs (both wired and wireless)are now employing fixed wireless connections to the home. These outdoor RLAN access points are relatively inexpensive to deploy compared to wired fiber and should be something that is very favourable for promoting connectivity; especially in developing countries.

The up to a maximum 1 W conducted power provision would be more advantageous to Africa as greater coverage areas are of essence, particularly in suburban and rural areas. It is to be noted that there is flexibility afforded to the national authority by permitting conducted power levels up to this up to a maximum 1 W conducted power level. This means the regulator can determine which appropriate power levels can be allowed for RLANs in the band in order to protect existing services.

The frequency band 5 150-5 250 MHz is allocated to various services as contained in the Radio Regulations (RR) Table of Frequency Allocations including associated footnotes thereto:

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| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 5 150-5 250 FIXED-SATELLITE (Earth-to-space) 5.447A  MOBILE except aeronautical mobile 5.446A 5.446B  AERONAUTICAL RADIONAVIGATION  5.446 5.446C 5.447 5.447B 5.447C | | |

Zimbabwe Proposal

Zimbabwe supports the revision of Resolution **229 (Rev.WRC-12)** in order to enable outdoor WAS/RLAN operations including possible associated conditions for new maximum e.i.r.p. limits with an associated e.i.r.p elevation mask which addresses the protection of incumbent services. Accordingly Zimbabwe proposes ***Method A2* of the CPM Report which entails a revision of Resolution 229 (Rev.WRC-12) to enable outdoor RLAN operations in the band 5 150**-**5 250 MHz, including possible associated conditions for new e.i.r.p. limits.**

MOD ZWE/90A16/1#49951

RESOLUTION 229 (Rev.WRC‑19)

Use of the bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz   
by the mobile service for the implementation of wireless access systems   
including radio local area networks

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that WRC‑03 allocated the bands 5 150-5 350 MHz and 5 470-5 725 MHz on a primary basis to the mobile service for the implementation of wireless access systems (WAS), including radio local area networks (RLANs);

*b)* that WRC‑03 decided to make an additional primary allocation for the Earth exploration-satellite service (EESS) (active) in the band 5 460-5 570 MHz and space research service (SRS) (active) in the band 5 350-5 570 MHz;

*c)* that WRC‑03 decided to upgrade the radiolocation service to a primary status in the 5 350-5 650 MHz band;

*d)* that the band 5 150-5 250 MHz is allocated worldwide on a primary basis to the fixed‑satellite service (FSS) (Earth-to-space), this allocation being limited to feeder links of non‑geostationary-satellite systems in the mobile-satellite service (No. **5.447A**);

*e)* that the band 5 150-5 250 MHz is also allocated to the mobile service, on a primary basis, in some countries (No. **5.447**) subject to agreement obtained under No. **9.21**;

*f)* that the band 5 250-5 460 MHz is allocated to the EESS (active) and the band 5 250-5 350 MHz to the SRS (active) on a primary basis;

*g)* that the band 5 250-5 725 MHz is allocated on a primary basis to the radiodetermination service;

*h)* that there is a need to protect the existing primary services in the 5 150-5 350 MHz and 5 470-5 725 MHz bands;

*i)* that results of studies in ITU‑R indicate that sharing in the band 5 150-5 250 MHz between WAS, including RLANs, and the FSS is feasible under specified conditions;

*j)* that studies have shown that sharing between the radiodetermination and mobile services in the bands 5 250-5 350 MHz and 5 470-5 725 MHz is only possible with the application of mitigation techniques such as dynamic frequency selection;

*k)* that there is a need to specify an appropriate e.i.r.p. limit and, where necessary, operational restrictions for WAS, including RLANs, in the mobile service in the bands 5 250-5 350 MHz and 5 470-5 570 MHz in order to protect systems in the EESS (active) and SRS (active);

*l)* that the deployment density of WAS, including RLANs, will depend on a number of factors including intrasystem interference and the availability of other competing technologies and services;

*m)* that the means to measure or calculate the aggregate pfd level at FSS satellite receivers specified in Recommendation ITU‑R S.1426 are currently under study;

*n)* that certain parameters contained in Recommendation ITU‑R M.1454 related to the calculation of the number of RLANs tolerable by FSS satellite receivers operating in the band 5 150-5 250 MHz require further study;

*o)* that an aggregate pfd level has been developed in Recommendation ITU‑R S.1426 for the protection of FSS satellite receivers in the 5 150-5 250 MHz band,

further considering

*a)* that the interference from a single WAS, including RLANs, complying with the operational restrictions under *resolves*2 will not on its own cause any unacceptable interference to FSS receivers on board satellites in the band 5 150-5 250 MHz;

*b)* that such FSS satellite receivers may experience an unacceptable effect due to the aggregate interference from these WAS, including RLANs, especially in the case of a prolific growth in the number of these systems;

*c)* that the aggregate effect on FSS satellite receivers will be due to the global deployment of WAS, including RLANs, and it may not be possible for administrations to determine the location of the source of the interference and the number of WAS, including RLANs, in operation simultaneously,

noting

*a)* that, prior to WRC‑03, a number of administrations have developed regulations to permit indoor and outdoor WAS, including RLANs, to operate in the various bands under consideration in this Resolution;

*b)* that, in response to Resolution **229 (WRC‑03)[[1]](#footnote-1)\***, ITU‑R developed Report ITU‑R M.2115, which provides testing procedures for implementation of dynamic frequency selection,

recognizing

*a)* that in the band 5 600-5 650 MHz, ground-based meteorological radars are extensively deployed and support critical national weather services, according to footnote No. **5.452**;

*b)* that the performance and interference criteria of spaceborne active sensors in the EESS (active) are given in Recommendation ITU‑R RS.1166;

*c)* that a mitigation technique to protect radiodetermination systems is given in Recommendation ITU‑R M.1652;

*d)* that Recommendation ITU‑R RS.1632 identifies a suitable set of constraints for WAS, including RLANs, in order to protect the EESS (active) in the 5 250-5 350 MHz band;

*e)* that Recommendation ITU‑R M.1653 identifies the conditions for sharing between WAS, including RLANs, and the EESS (active) in the 5 470-5 570 MHz band;

*f)* that the stations in the mobile service should also be designed to provide, on average, a near-uniform spread of the loading of the spectrum used by stations across the band or bands in use to improve sharing with satellite services;

*g)* that WAS, including RLANs, provide complementary broadband solutions;

*h)* that there is a need for administrations to ensure that WAS, including RLANs, meet the required mitigation techniques, for example, through equipment or standards compliance procedures,

resolves

1 that the use of these bands by the mobile service is for the implementation of WAS, including RLANs, as described in the most recent version of Recommendation ITU‑R M.1450;

2 that in the band 5 150-5 250 MHz, stations in the mobile service shall be restricted to a maximum conducted output of 1 W provided the maximum antenna gain does not exceed 6 dBi (i.e. a total maximum mean e.i.r.p. of 36 dBm)[[2]](#footnote-2)1, and, in addition, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band, and, for the outdoor operation of stations in the mobile service the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon shall not exceed 125 mW (21 dBm), and finally, for WAS/RLAN transmitters operating in the 5 150-5 250 MHz band, all unwanted emissions outside of the 5 150-5 350 MHz band shall not exceed an e.i.r.p. of −27 dBm/MHz;

3 that in the band 5 250-5 350 MHz, stations in the mobile service shall be limited to a maximum mean e.i.r.p. of 200 mW and a maximum mean e.i.r.p. density of 10 mW/MHz in any 1 MHz band. Administrations are requested to take appropriate measures that will result in the predominant number of stations in the mobile service being operated in an indoor environment. Furthermore, stations in the mobile service that are permitted to be used either indoors or outdoors may operate up to a maximum mean e.i.r.p. of 1 W and a maximum mean e.i.r.p. density of 50 mW/MHz in any 1 MHz band, and, when operating above a mean e.i.r.p. of 200 mW, these stations shall comply with the following e.i.r.p. elevation angle mask where θ is the angle above the local horizontal plane (of the Earth):

−13 dB(W/MHz) for 0° ≤ θ < 8°

−13 − 0.716(θ − 8) dB(W/MHz) for 8° ≤ θ < 40°

−35.9 − 1.22(θ − 40) dB(W/MHz) for 40° ≤ θ ≤ 45°

−42 dB(W/MHz) for 45° < θ;

4 that administrations may exercise some flexibility in adopting other mitigation techniques, provided that they develop national regulations to meet their obligations to achieve an equivalent level of protection to the EESS (active) and the SRS (active) based on their system characteristics and interference criteria as stated in Recommendation ITU‑R RS.1632;

5 that in the band 5 470-5 725 MHz, stations in the mobile service shall be restricted to a maximum transmitter power of 250 mW[[3]](#footnote-4)2 with a maximum mean e.i.r.p. of 1 W and a maximum mean e.i.r.p. density of 50 mW/MHz in any 1 MHz band;

6 that in the bands 5 250-5 350 MHz and 5 470-5 725 MHz, systems in the mobile service shall either employ transmitter power control to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or, if transmitter power control is not in use, then the maximum mean e.i.r.p. shall be reduced by 3 dB;

7 that, in the bands 5 250-5 350 MHz and 5 470-5 725 MHz, the mitigation measures found in Annex 1 to Recommendation ITU‑R M.1652‑1 shall be implemented by systems in the mobile service to ensure compatible operation with radiodetermination systems,

invites administrations

to consider appropriate measures when allowing the operation of stations in the mobile service using the e.i.r.p. elevation angle mask referred in *resolves*3 above, to ensure the equipment is operated in compliance with this mask,

invites ITU‑R

1 to continue studies on mitigation techniques to provide protection of EESS from stations in the mobile service;

2 to continue studies on suitable test methods and procedures for the implementation of dynamic frequency selection, taking into account practical experience.

**Reasons:** The band 5 150-5 250 MHz is widely harmonized spectrum for RLANs in the 5 GHz range that is not subject to the dynamic frequency selection constraint. Zimbabwe supports the use of outdoor RLAN because some studies confirm that RLAN operations outdoors in the band 5 150-5 250 MHz will not cause harmful interference to other operations in the band. The results of these studies are complimented by real practice of operational experience with some countries allowing RLAN operations outdoors in the 5 150-5 250 MHz with appropriate constraints, e.g. maximum number of outdoor RLANs. Allowing RLAN access to outdoor use in the band 5 150-5 250 MHz with appropriate mitigation and technical rules would address the growing demand for continuous and ubiquitous connectivity.

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1. \* *Note by the Secretariat:* This Resolution was revised by WRC‑12. [↑](#footnote-ref-1)
2. 1 In the context of this Resolution, “mean e.i.r.p.” refers to the e.i.r.p. during the transmission burst which corresponds to the highest power, if power control is implemented. [↑](#footnote-ref-2)
3. 2 Administrations with existing regulations prior to WRC‑03 may exercise some flexibility in determining transmitter power limits. [↑](#footnote-ref-4)