

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
World Radiocommunication Conference)	IB Docket No. 16-185
Advisory Committee)	
)	

**COMMENTS OF RAYTHEON COMPANY
ON DRAFT RECOMMENDATION FOR AGENDA ITEM 9.1/ISSUE 9.1.5**

Raytheon Company (“Raytheon”), by its attorney, hereby responds to the October 29, 2017, *Public Notice* in this proceeding seeking comment on the Preliminary Views and Draft Proposals presented at October 30, 2017 Meeting of the World Radiocommunication Conference Advisory Committee.¹ In particular, Raytheon comments on the alternate views regarding Item 9.1, Issue 9.1.5, of the International Telecommunications Union (“ITU”) 2019 World Radiocommunication Conference (“WRC-19”) Agenda. As explained herein, Raytheon supports View B as striking an appropriate balance between the interests of existing and future unlicensed Wireless Access Systems (“WAS”), including Radio Local Area Networks (“RLANs”) operations, and primary licensed radar (radiolocation and radiodetermination) operations as they have progressed and continue to evolve in the 5250-5350 and 5470-5725 MHz bands.

Raytheon is a leading defense and aerospace company in the United States and worldwide with more than sixty thousand employees at numerous locations around the country and the globe. Among many other products and services, Raytheon designs and manufactures

¹ See FCC Public Notice DA 17-1059, IB Docket No. 16-185 (rel. Oct 29, 2017) (“Public Notice”); *see also id.*: Attachment A, Preliminary Views and Draft Proposals presented at October 30, 2017 Meeting of the World Radiocommunication Conference Advisory Committee (“Attachment A”), pp. 32-49 (presenting the alternate Views A and B).

meteorological, military, and civilian radar systems that operate in in various radar bands, including the 5 GHz band. Radars in these bands, manufactured by Raytheon and others, operate on variety of platforms and perform mission critical functions such as air and sea surveillance, tracking of space launch and aeronautical vehicles, and studies of ocean water cycles and weather.

Raytheon acknowledges and supports the efforts of administrations and regulators to stimulate the growth of and support the deployment of broadband services and applications, including in recent years through fostering unlicensed systems, such as RLANs operating under mobile services applications, capable of operating on a shared basis throughout much of the 5 GHz band. Raytheon has no wish to stand in the way of further development of RLAN services and applications nor impose undue burdens upon them. Raytheon recognizes that they, like radars, provide valuable services to this nation's welfare. Yet where RLANs and radar systems share spectrum, certain regulatory realities hold and should be accommodated in the ITU Radio Regulations and related documents.

Throughout the sub-bands of the 5 GHz band, including 5250-5350 and 5470-5725 MHz, RLAN and other unlicensed equipment have to share the spectrum with incumbent operations, including radar systems, on a non-interference basis. This is accomplished by using such techniques as Dynamic Frequency Selection ("DFS"), as recommended by ITU recommendations² and required by the Commission's rules.³

In Issue 9.1.5 of the WRC-19 Agenda, the issue is how best to address the technical and regulatory impacts of evolving radar systems and ITU Recommendations, including potential

² See Res. 229 (Rev. WRC-12); ITU-R M.1652-1.

³ Cite to FCC part 15 rules

references to Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in RR Nos. 5.447F and 5.450A of the Radio Regulations.⁴ These two Radio Regulations, which currently reference only Recommendation ITU-R M.1638-0, provide generally that mobile (i.e., WAS/RLAN) stations shall operate on a non-interference basis with regard to primary radiolocation and certain passive services in the 5250-5350 MHz band and with regard to primary radiodetermination services in the 5470-5725 MHz band. In the 2015 WRC (“WRC-15”) cycle, Recommendation ITU-R M.1638-0 was revised, such that several new radars types with different system characteristics are now covered by Recommendation ITU-R M.1638-1 and M.1849-1,⁵ raising the issue of whether and how this development should be reflected in RR Nos. 5.447F and 5.450A. The proponents of View A do not wish to see either of these two revisions referenced in the footnotes for fear that undue constraints will be imposed on RLANs in order to protect the primary radar services where no clear mitigation methods exist. Raytheon recognizes that in certain cases, i.e., for certain bi-static and fast frequency hopping radars, additional studies are underway to determine what mitigation techniques can be used to mitigate potential interference to them⁶

⁴ **RR No. 5.447F** In the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0. (WRC-03)

RR No. 5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. Radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0. (WRC-03)

⁵ There is no debate on this point. See *Attachment A* at 36 (Attachment to View A) and 43 (Attachment to View B)

⁶ The View A proponents cite to remarks of the former NTIA Administrator and CEPT Reports 57 and 64, for the conclusion “there is no viable regulatory solution that RLAN devices can implement to comply with the requirement to protect these new radar systems.” See *Attachment A* at 34 n. 18. However, these sources do not address the bands in question in Issue 9.1.5: 5250-5350 and 5470-5725 MHz. Rather, these sources were looking at 5350-5470 MHz and/or 5725-5925 MHz. In addition, the current versions of ITU-R Doc. 5A/298 Annexes 24 and 27 cited by the View A proponents -- now Annexes 26 and 29 to Document 5A/469-E of the Working Party 5A Chairman’s report (12 June 2017) – also focus on bands other than 5250-5350 MHz and 5470-5725 MHz, namely 5150-5350, 5350-5470, 5725-5850, and 5850-5925 MHz.

beyond whatever measure of protection is provided by existing mitigation measures identified in ITU-R M.1652-1, which is referenced in Res. 229 and thereby indirectly incorporated into RR 5.446A.⁷

Recognizing the concerns of the View A proponents, Raytheon submits View B is nonetheless the correct approach because it does not impose on RLAN operations any burdens for which there are not already recognized mitigation techniques, which meets the stated objectives of View A. As primary users of the 5250-5350 and 5470-5725 MHz bands, radars are entitled to protection. For those radars covered by Recommendation ITU-R M.1849-1, that protection is ensured by including references in RR 5.447F and 5.450A to the Recommendation, as provided for in View B. This places no additional constraints to RLAN/WAS mobile operations, and the proponents of View A do not suggest otherwise in their proposal.⁸ Without these new references offered by View B, there could be the unwarranted inference that RLAN and other unlicensed systems operating in the bands do not owe these radar systems protection, despite the presence of adequate and established mitigation techniques.

And, in any event compatibility studies concerning the 5250-5350 and 5470-5725 MHz bands are still ongoing which makes any conclusions regarding availability of regulatory solutions premature.

⁷ “5.446A 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).” Neither View A nor B seek change to RR 5.446A, which makes Resolution 229 (Rec. WRC-12) mandatory, and references Recommendation ITU-R M.1652-1 which makes DFS a mandatory mitigation technique, albeit, as noted above, that method does not provide full protection to all radars covered by Recommendation ITU-R M.1638-1. The Report of the Conference Preparatory Meeting to WRC-15, §1/1.1/4.1.11.2, provides that “no conclusions can be drawn at this time” whether additional RLAN mitigation techniques may mitigate interference to the new radar types and notes that further studies to enable sharing are being undertaken.

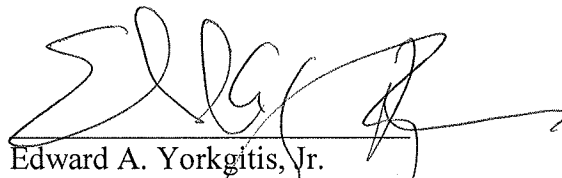
⁸ The View A proponents recognize “that both ITU-R M.1638-0 and M.1849-1 Recommendations require essentially the same protection requirements” but then go on to assert “that a new reference to ITU-R M.1849-1 is redundant and unnecessary.” *Attachment A* at 38. The necessity of including the reference to ITU-R M.1849 arises because some radar systems that had been covered by ITU-R M.1638-0 are now covered by ITU-R M.1849. Because the protections are similar, as the View A proponents note, no new burdens are or can be created by including the reference to ITU-R M.1849-1, and the additional clarity fully warrants its inclusion.

At the same time, by revising Resolution 764, and including a non-mandatory reference to Recommendation ITU-R M.1638-1 in the Resolution and RR Nos. 5.447F and 5.450A, View B paves the way for protection for the additional radars added by ITU-R M.1638-1 without increasing the burdens on RLAN/WAS systems. Raytheon supports the continuation of ITU-R studies to develop adequate mitigation measures for RLAN/WAS mobile systems that would enable compatible operation with radar systems covered by ITU-R M.1638-1 that are not protected by methods in ITU-R M.1652-1, such as bi-static and fast frequency hopping radar systems. Because the View B proposed changes both to RR 5.447F and 5.450A and to Resolution 764, in the form of ITU-R 1.638-1 references, make unequivocal that the effect of the references would be non-mandatory, there is no additional burden as the View A proponents contest.⁹

For the foregoing reasons, Raytheon supports View B in *Attachment A* as the appropriate U.S. position on Issue 9.1.5.

Respectfully submitted,

RAYTHEON COMPANY

A handwritten signature in black ink, appearing to read 'E. Yorkgitis, Jr.', is written over a horizontal line.

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⁹ See *Attachment A* at 37 (raising alleged concerns that “the technical and regulatory impacts of requiring the mobile service to protect new radars types such as bi-static radars would impose undue constraints on RLAN operation in the 5250-5350 MHz and 5470-5725 MHz frequency ranges”).