

August 13, 2019

**Ex Parte**

Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington, DC 20554

Re: *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295; *Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz*, GN Docket No. 17-183

Dear Ms. Dortch:

On August 9, 2019, representatives from Broadcom Inc. and Qualcomm Incorporated met with representatives of the Office of Engineering and Technology. A complete list of participants is attached to this letter.

During the meeting, we discussed the attached presentation addressing European Union studies that demonstrate that Wi-Fi can share the 6 GHz band without causing harmful interference to fixed and satellite operations. Because these studies demonstrated successful coexistence, European regulators have begun drafting harmonized regulations that will enable RLANs for “free circulation and use” in the 5925-6425 MHz band.

We explained that Europe’s experience and the conservative assumptions that they used should give U.S. regulators confidence in opening the 6 GHz band to indoor low power unlicensed operations. The European investigations, which used a variety of methodologies, are similar to the RKF analysis under discussion in these proceedings—and underscore how conservative RKF’s assumptions were.<sup>1</sup> Additionally, we discussed simple provisions that can ensure that indoor devices remain indoors. These include prohibiting removable antennas, weather-proof casing, and battery-powered operations, as well as labeling the devices for indoor-only operation.

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<sup>1</sup> See RKF Engineering Services, *Frequency Sharing for Radio Local Area Networks in the 6 GHz Band* (Jan. 2018), as attached to Letter from Paul Margie, Counsel to Apple, Inc., Broadcom Inc., Facebook, Inc., Hewlett Packard Enterprise, and Microsoft Corporation, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 and GN Docket No. 17-183 (filed Jan. 26, 2018).

Ms. Marlene H. Dortch  
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Pursuant to the FCC's rules, I have filed a copy of this notice electronically in the above referenced docket. If you require any additional information, please contact the undersigned.

Sincerely,

A handwritten signature in black ink that reads "Austin Bonner". The signature is written in a cursive style with a long horizontal flourish extending to the right.

E. Austin Bonner  
*Counsel to Broadcom Inc.*

Enclosure

Cc: Meeting participants

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**MEETING ATTENDEES**

Bahman Badipour (OET)  
Michael Ha (OET)  
Jamison Prime (OET)  
Gregory Callaghan (OET)  
Barbara Pavon (OET)

Ira Keltz (OET)\*  
Chris Szymanski, Broadcom Inc.  
Tevfik Yucek, Qualcomm Incorporated\*  
E. Austin Bonner, Harris, Wiltshire & Grannis LLP

\* Participated telephonically.

# 6 GHz EU Update

August 9, 2019

# European Studies Demonstrate RLAN Compatibility in 6 GHz

- EU Investigations of RLAN compatibility in 6 GHz resulted in clear recognition that low power use cases are compatible with incumbent fixed and satellite operations
- Report 302 contains studies with different methodologies to arrive at this conclusion, similar to the complementary analyses in the current proceeding provided by the RKF Study for large-scale aggregate results and detailed study of specific ULS links
- RKF Study assumptions overall are more conservative than those used in Report 302
- CEPT now drafting harmonized technical conditions for low power unlicensed operations on the basis of Report 302 findings

## European Process Overview & Status

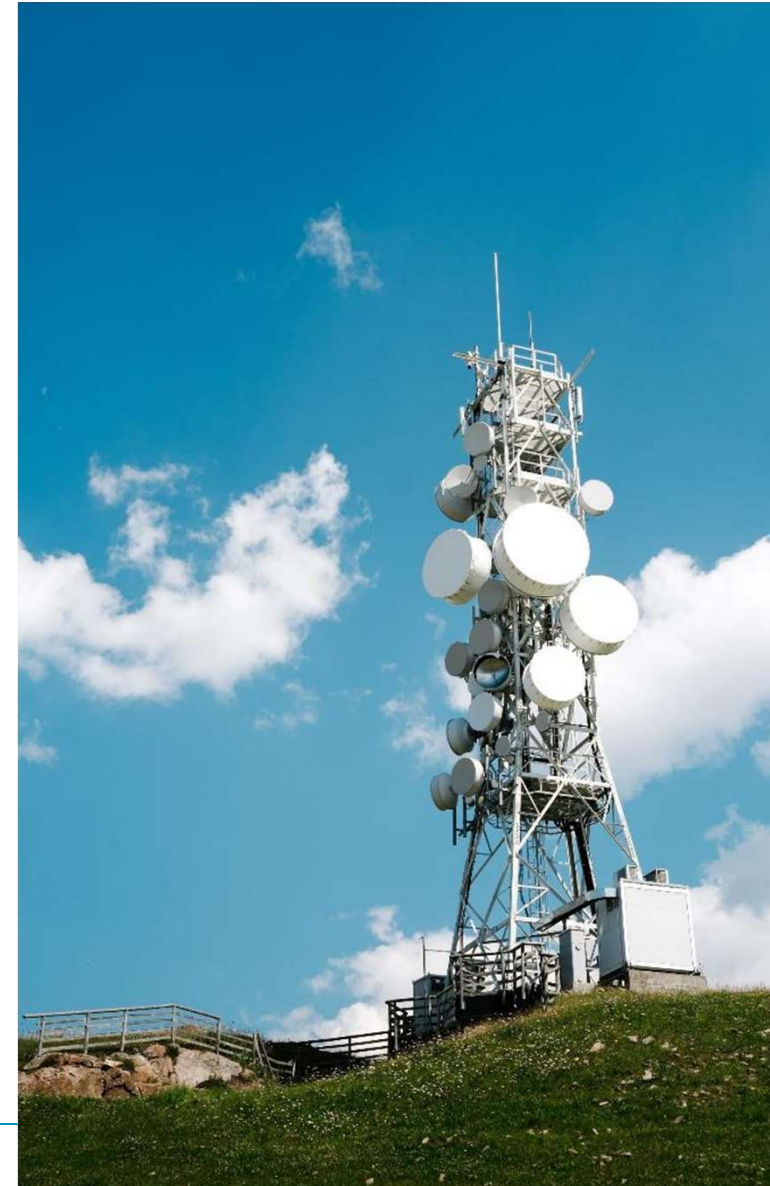
- In December 2017 the European Commission Issued a Mandate to the European Conference of Postal and Telecommunications (CEPT) to study the feasibility of enabling RLANs in the 5925-6425 MHz band
- In response, CEPT agreed to the following timeline
  - 11/18: Interim Report from CEPT to the Commission
  - 07/19: Draft Report A from CEPT to the Commission
  - 03/20: Final Report A from CEPT and Draft Report B to the Commission
  - 07/20: Final Report B from CEPT to the Commission
- To complete its deliverables, CEPT created an expert group to engage in technical studies (SE45), which fed its results into the expert group responsible for responding to the Commission's Mandate (FM57)
  - SE45 completed and published [ECC Report 302](#)
  - FM57 completed draft Report A (now called [draft CEPT Report 73](#) ), which has been sent out for public consultation
- During its July 2019 meetings, CEPT adopted a new work item for the development of an ECC Decision on a harmonized CEPT-wide regulation to enable RLANs for “free circulation and use” in the band ([FM57-04](#))

## 5925-6425 Sharing and Compatibility Study (Report 302)

- 186 page [ECC Report 302](#) studied the compatibility of RLAN systems with incumbent systems in the 5925 - 6425 MHz and adjacent bands
    - Meetings were well attended by FS, FSS, & ITS incumbents, RLAN industry, and various Administrations
    - Key parameters and assumptions agreed by all parties
  - Studies in Report 302 set the target interference protection criteria (IPC) for a given FS receiver as follows:
    - Long term IPC of less than -10 dB I/N for less than 20% of the time
    - Short term IPC of less than +19 dB I/N for less than 0.00045% of the time
  - Report concludes that RLAN sharing is feasible with FS and FSS operations
    - **FS:** Low power indoor operations is likely sufficient to enable sharing
    - **FSS:** Sharing is feasible when outdoor operations is limited to less than 5% of total RLAN use (2025 projections indicate that less than 2% of RLAN transmissions will take place outdoors)
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# Report 302 Demonstrates Sharing Between RLAN and FS is Feasible

- Three Studies (A, B, and C) were performed to determine RLAN compatibility with FS
  - **Study A** is an MCL Analysis that identified the most critical sharing scenarios
  - **Study B** evaluated the probability of the critical scenarios identified in study A via statistical Monte-Carlo Analysis for links in UK and The Netherlands and found that short and long term IPC [was met for indoor RLANs operating up to 200 mW e.i.r.p](#)
  - **Study C** Analysed two sets of complementary simulations based on three existing FS receivers in France that are located in high density locations and found that indoor-only RLAN usage has limited risk and additional restrictions may need to be applied in order to ensure indoor only use





## Report 302 Demonstrates Sharing Between RLAN and FSS is Feasible

- Two studies (A & B) assuming representative set of FSS satellites assess aggregate interference from RLAN into FSS receivers in space
  - **Study A** employed a Monte-Carlo methodology for the “Mid scenario” and found FSS satellites had 8.5 dB more margin than the -10 dB I/N protection criterion
  - **Study B** delivered a static analysis based on “Low, Mid and High scenarios” and found that sharing was feasible except when more than 5% of the RLANs were located outdoor



# Comparing Key Report 302 and RKF Assumptions Demonstrates that the RKF Report was Conservative

	Report 302 (Medium Scenario)	RKF
Projected 2025 Population	768,589,000 People	347,000,000
Instantaneously Transmitting Devices	Low: 820,521; Mid: 1,317,034; High: 2,057,866	394,958
Ratio of Instantly Transmitting Devices Per Person	Low: 0.106%; Mid: 0.171%; High: 0.268%	0.114%
Propagation Model (Terrestrial Paths)		
Urban and Suburban (<1 KM)	Winner II (3 meter exclusion)	Winner II (30 m exclusion)
Urban and Suburban (>1KM)	ITU-R P.452 + Terrain + P.2108	ITM/SRTM +P.2108
Rural	ITU-R P.452 + Terrain	ITU-R P.452 + Terrain
Building Entry Loss (P.2109)	30% Energy Efficient / 70% Traditional	20% Energy Efficient / 80% Traditional
FS Assumptions		
Antenna	Actual Antenna Patterns	F.1245
Polarization Mismatch	3 dB Average	0 dB
Feeder Loss	2 dB	0 dB
Target Modulation	64 QAM, 128 QAM	Actual Listed

## Draft Report A (Report 73) is Clear that Sharing is Feasible between Low Power Indoor RLANs and Existing Services

- [Draft CEPT Report 73](#) (Report A) anticipates “compatibility and coexistence between WAS/RLAN and existing services within and adjacent to the band 5925-6425 MHz be technically feasible under certain conditions”
  - Sharing between FS and RLAN is considered feasible with appropriate technical conditions and regulatory models
    - High-power indoor and outdoor operations may require solutions such as database for coordination (e.g., 1 W)
    - Low-power indoor (e.g., 200-250 mW) and very low power portable devices are expected to coexist with FS
  - Sharing between FSS and RLAN is considered feasible with limitations on higher power outdoor usage
- It indicates that additional complementary studies on short term protection criterion for low power indoor, and on very low power portable operations may be required to complete the harmonized technical conditions that will be outlined in Report B

## Confidence in Technical Studies and Proposed Regulatory Framework Paves the way for Accelerated CEPT-Wide Harmonized Regulation

- CEPT began working on an ECC Decision (FM57-04), which will contain the harmonized technical conditions for a CEPT-wide regulation to enable RLANs on a “free circulation and use” basis in 5925 - 6425 MHz.
  - Technical conditions will take into account the results of ECC Report 302 and CEPT Reports A and B in the response to the EC mandate (FM57-01).
- The target date of this work item is in line with the schedule of the mandate (final approval of CEPT Report B in July 2020).
- This decision was triggered by Germany, Estonia, Switzerland, Liechtenstein, Sweden, United Kingdom, Czech Republic, France, Lithuania, Ireland, and The Netherlands

## Conclusion: Europe is headed down the path to enable Low Power Indoor and Very Low Power Portable RLAN Operations

- Significant multi-stakeholder studies make it clear that indoor low power RLAN operations can coexist with FS and FSS deployments
  - Precise power levels, and operating conditions necessary to reduce incidental outdoor use are currently being studied
- Very low power portable RLANs that can be used indoor and outdoor are also expected to coexist
  - Precise power levels still being studied
- Higher power and outdoor devices are expected to require frequency coordination
  - Additional studies are recommended

Thank You