



November 3, 2021

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: *Ex Parte* Letter, *Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122

Dear Ms. Dortch:

For more than a year, CTIA has raised substantial concerns with the flawed analysis presented by representatives of the aviation industry that argue that 5G operations in the C-Band will cause harmful interference to radio altimeters that operate up to 500 megahertz away. Any reasoned review of aviation's analysis exposes significant faults, as CTIA has demonstrated.¹ Perhaps more tellingly, these claims ignore that 5G has been deployed in the C-Band across the globe without any evidence of harmful interference to altimeters, further underscoring why the aviation-sponsored study cannot be relied upon.

Nearly 40 countries have already adopted rules and deployed hundreds of thousands of 5G base stations in the C-Band at similar frequencies and similar power levels—and in some instances, at closer proximity to aviation operations—than 5G will be in the U.S. None of these countries has reported any harmful interference with aviation equipment from these commercial deployments, as the Federal Aviation Administration recently confirmed.² Just by way of example:

¹ See Letters from CTIA to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Aug. 26, 2020; Oct. 27, 2020; Oct. 30, 2020; Nov. 17, 2020; Dec. 7, 2020; Mar. 4, 2021; and Sept. 3, 2021).

² Special Airworthiness Information Bulletin, AIR-21-18 (dated Nov. 2, 2021) (“There have not yet been proven reports of harmful interference due to wireless broadband operations internationally, although this issue is continuing to be studied.”).



- **Japan.** Tens of thousands of 5G base stations have been deployed up to 4100 MHz—meaning there is just a 100-megahertz guard band between 5G operations and where radio altimeters operate. The U.S. will have *four times* the guard band with this year’s Phase 1 deployments (3700-3800 MHz), and *two times* the guard band following the full C-Band transition in 2023 (3700-3980 MHz). There are no mitigations below 4000 MHz (*i.e.*, no restrictions in the spectrum where U.S. 5G operations will be), and there have been no claims of interference.
- **Europe.** The 3400-3800 MHz band is harmonized for 5G, and 5G has been operating more than ten thousand base stations in more than 20 countries for up to three years at power levels substantially similar to U.S. C-Band 5G levels, without harmful interference claims—including in the band segment where Phase 1 5G operations will launch in the U.S. this year (3700-3800 MHz). Denmark, for instance, has achieved nationwide coverage up to 3800 MHz, with nearly 4,000 base stations transmitting at power levels within 1 dB of the U.S.
- **Australia.** Australia auctioned the 3475-3700 MHz band in 2020, and carriers are successfully operating more than 5,000 5G base stations today.³
- **South Korea.** More than one hundred thousand 5G sites have been deployed in the 3400-3700 MHz band for the past three years.⁴ There are no mitigations in place and no known reports of interference.

³ See, *infra*, page 5 for a discussion of why deployments below 3700 MHz are equally apt for comparison.

⁴ *Entering the 5G Era: Lessons from Korea*, Dr. Een-Kee Hong, et al, World Bank Group Korea Office, Innovation and Technology Note Series Number 5, at 4 (June 2021), <https://openknowledge.worldbank.org/bitstream/handle/10986/35780/Entering-the-5G-Era-Lessons-from-Korea.pdf?sequence=1&isAllowed=isAllowed=y>. As of March 2021, SK Telecom, KT, and LGU+ had built 149,038 base stations.



If RTCA's claims were correct, commercial 5G base stations deployed across the globe would not meet aviation's purported "safe" interference tolerance threshold. A least two hundred thousand 5G base stations are already operating today in at least a dozen countries with technical rules and proximity to radio altimeter operations that the RTCA Report would suggest should be seeing harmful interference, yet no known reports of interference exist. Put another way: the RTCA Report shows harmful interference on paper where no such interference exists in the real world. For example:

- **Japan.** The RTCA Report claims that 5G would exceed the "safe" levels for the worst radio altimeter device by up to 48 dB in the U.S.⁵ If the 14 dB power difference between the U.S. (62.15 dBm/MHz) and Japan (48 dBm/MHz) is accounted for, the existing 5G base stations deployed and operating in Japan would be exceeding RTCA's "safe" level for the worst altimeter by 34 dB. Yet no interference has been reported.
- **Europe.** CEPT Report 67 addressed technical rules applicable to the 3400-3800 MHz band, establishing a non-mandatory upper bound equivalent to 61 dBm/MHz (as compared to 62.15 dBm/MHz in the U.S.).⁶ RTCA's claimed exceedance of the "safe" level by 48 dB was reached assuming a 5G base station EIRP of 60 dBm/MHz.⁷ Thus, the RTCA Report implied that the "safe" base station EIRP would be 15 dBm/MHz, which is nearly 40,000 times less than what is permitted in Europe. At a national level, as just a few examples, the "safe" threshold purported in the RTCA Report would be exceeded by 46 dB in Spain, where thousands of 5G base stations have been deployed; the UK, where thousands of 5G base stations have been deployed; France, where at least 40 percent of the population is served; and Romania, where at least 10 percent of the population is served. The "safe" threshold would also be exceeded by 33 dB in Switzerland, where more than 90 percent of the

⁵ See RTCA Report at 87.

⁶See *Review of the harmonised technical conditions applicable to the 3.4-3.8 GHz ('3.6 GHz') frequency band*, CEPT Report 67 to the European Commission (July 6, 2018), <https://docdb.cept.org/download/118> ("CEPT Report 67"). See *id.* at 2. Individual countries may set different power limits—for instance, the UK and Spain operate at 58 dBm/MHz. To put the operating power levels in perspective, if the power level already deployed in thousands of base stations in these and other countries were equated to a skyscraper height of 1,000 feet, aviation's claims are equivalent to requiring the building height to be no more than 0.5 inches.

⁷ RTCA Report, Figure 10-16 at 67, and Table 6-4 at 21.



population is served, and by 28 dB in Finland, where more than 60 percent of the population is served. Yet no interference has been reported.

- **Australia.** The 5G base station power level in Australia is 56 dBm/MHz.⁸ If RTCA’s claims were correct, Australia would be exceeding the “safe” level by 44 dB. Yet no interference has been reported.
- **South Korea.** The base station EIRP is at least 49 dBm/MHz.⁹ If the RTCA Report were correct, South Korea’s deployments would exceed RTCA’s “safe” levels by 35 dB. Yet no interference has been reported.
- **United States.** Citizens Broadband Radio Service (“CBRS”) operations—with more than a hundred thousand active units¹⁰—would exceed RTCA’s claimed “safe” threshold by 21 dB.¹¹ Yet no interference has been reported.

These successful deployments, which are operating despite the aviation community’s claims that harmful interference would be occurring, underscore why the RTCA Report cannot be relied upon.

Live flight testing confirms that C-Band 5G operations coexist today with radio altimeter operations. Given the substantial discrepancies in what is purported in the RTCA Report as compared to the successful operation of 5G in dozens of countries today, it is no surprise that live flight testing has also confirmed the ability of wireless to coexist with radio altimeter operations.

⁸ 5G base station power level confirmed with Australian wireless operators and equipment manufacturers.

⁹ See Korea Broadcasting and Communications Agency Research institution: The Korean Electromagnetic Society, *Comparative test and OTA measurement procedure proposal study to enhance inspection field applicability of 5G spatial radiation power measurement (Final Report)*, at 42, Table 3-1 (Aug. 28, 2020), <https://www.kca.kr/fileDownload.do?action=fileDown&mode=&boardId=REPORT&seq=5636200&fileSn=1> (describing over-the-air testing verification of 5G power levels and stating the total conducted power of 47 dBm/100 MHz into a 22.5 dBi antenna gain). for a total power of 69 dBm/100 MHz, or 49 dBm/MHz).

¹⁰ See, e.g., Iyad Tarazi, *Let The PAL Journey Begin*, FEDERATED WIRELESS (Apr. 19, 2021), <https://www.federatedwireless.com/let-the-pal-journey-begin/>.

¹¹ As noted above, the worst exceedance reported by RTCA for Category 2 altimeters was 48 dB. In the RTCA Report, 5G EIRP was studied as 80 dBm across 100 megahertz, whereas the EIRP for 40 megahertz of Priority Access License channels would be 53 dBm across 40 megahertz. The delta between the 5G operations modeled by RTCA and CBRS is 27 dB—which would exceed RTCA’s claimed “safe” threshold for Category 3 devices by 21 dB.



In France, for instance, the French military (ANFR) conducted a test with a helicopter and an active 5G base station and concluded that “the emission of 5G NR base station had no impact on the operational behavior of the radio altimeter.”¹² The Norwegian Communications Authority also conducted tests this summer with an active 5G base station on several different aircraft approaching Bergen-Flesland Airport in the 3700-3800 MHz band (the same band where Phase I spectrum is to be launched first in the United States), which “showed no abnormalities on the radio altimeters during the test.”¹³

Successful deployments domestically and internationally below 3700 MHz are relevant to the discussion of aviation’s claims. The RTCA Report suggests that radio altimeters are already subject to harmful interference today from operations below 3700 MHz, making domestic and international deployments below this frequency range equally apt for comparison. Although the RTCA Report did not evaluate altimeter performance below 3700 MHz, the receiver overload for the worst-performing radio altimeter in AVSI’s test set becomes *more* susceptible with *greater* frequency separation from C-Band deployments, which is not normal.¹⁴ If RTCA’s claims were true, the altimeter driving these results would be just as susceptible to 5G signals below 3700 MHz—where wireless services have been deployed for more than a decade. The aviation community has failed to explain the unexpected behavior of this radio altimeter, which drives RTCA’s conclusions in Category 2 and Category 3 devices.

If the RTCA Report were to be believed, then altimeters would be subject to interference from deployed systems that operate below 3700 MHz. For instance, the SPN-43 federal air traffic control radar systems have operated for decades just below 3700 MHz, emitting *10,000 times more power than C-Band 5G deployments*. Based on the aviation industry’s study, the SPN-43 radar

¹² *Outcome from preliminary trial on one type of radioaltimeter fitted on helicopter*, ECC PT1(21)(192) (issued Sept. 6, 2021), https://www.cept.org/Documents/ecc-pt1/65970/ecc-pt1-21-192_france-radioaltimeter.

¹³ *Results of the preliminary test of compatibility between MFCN operating in 3400-3800 MHz and Radio Altimeters (RA) operating in 4200-4400 MHz*, ECC PT1(21)(184) (issued Aug. 2, 2021), https://www.cept.org/Documents/ecc-pt1/65941/ecc-pt1-21-184_norway-results-of-the-preliminary-test-of-compatibility-between-mfcn-operating-in-3400-3800-mhz-and-radio-altimeters-operating-in-4200-4400-mhz.

¹⁴ For example, AVSI reported that the worst performing radio altimeter suffered greater interference from the 5G signal at 3750 MHz than the signal at 3850 MHz.



would cause interference to radio altimeter operations—with the dramatically higher power level more than making up for the slightly greater separation between the bands. And, as noted above, even CBRS operations would exceed RTCA’s claimed “safe” threshold. Yet no interference claims have been made by the aviation community for either of these operations.

* * *

C-Band spectrum presents the most immediate and critical opportunity to help propel 5G deployment in the United States and enable our country to reap the resulting benefits of innovation, enhanced consumer welfare, and economic growth. CTIA’s members are making substantial investments to implement C-Band operations starting this year, and every six-month delay in deployment could cost our country \$25 billion in economic benefits from these next-generation deployments.¹⁵

Given the lack of real-world evidence of interference in the nearly 40 countries where hundreds of thousands of 5G base stations have been deployed, CTIA urges the Commission to ensure C-Band 5G deployments remain on track in the U.S. to serve our broader economy, businesses, and consumers.

Pursuant to Section 1.1206(b) of the Commission’s rules, a copy of this letter is being electronically submitted into the record of this proceeding. Please do not hesitate to contact the undersigned with any questions.

Sincerely,

/s/ Kara Graves

Kara Graves

Assistant Vice President, Regulatory Affairs

Doug Hyslop

Vice President, Technology and Spectrum Planning

¹⁵ *5G Promises Massive Job and GDP Growth in the US*, BOSTON CONSULTING GROUP, at 10 (Feb. 2021), https://api.ctia.org/wp-content/uploads/2021/01/5G-Promises-Massive-Job-and-GDP-Growth-in-the-US_Feb-2021.pdf.