



December 6, 2021

By ECFS

The Honorable Jessica Rosenworcel
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: **GN Docket No. 18-122**

Dear Chairwoman Rosenworcel:

On December 2, 2021, the Aerospace Industries Association (AIA), on behalf of a larger aviation coalition, sent the National Economic Council (NEC) the attached Aviation Safety Proposal for 5G Limits for discussion and consideration within the NEC's interagency group dedicated to developing a solution to the potential harmful interference from 3.7 GHz licensed operations. This proposal is in response to AT&T and Verizon's operational proposals presented to your office on November 21, 2021.¹

We appreciate the efforts on the part of the telecom industry in their offer for a path forward, but the subject proposals by Verizon and AT&T are inadequate and far too narrow to ensure the safety and economic vitality of the aviation industry. Our coalition's proposal builds on the telecom proposal and provides additional safeguards in, around, and on the approach to airports and heliports. Our proposal also aims to minimize the impact on both the telecom operations and our national aviation system.

We look forward to continuing to work with all stakeholders to find a win-win solution for both industries and for the flying public.

¹ Letter from AT&T Services, Inc. & Verizon, GN Docket No.18-122 (dated Nov 24, 2021) at <https://www.fcc.gov/ecfs/filing/11241848723664>.



Pursuant to Section 1.1206(b) of the Commission's rules, this letter is being filed electronically along with a copy of the Aviation Safety Proposal for 5G Power Limits as Attachment A.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "D. Silver", is positioned above the typed name and contact information.

By: _____

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Attachments

Aviation Safety Proposal

Aviation stakeholders reviewed the most recent proposal provided by AT&T and Verizon and upon assessing it per aviation safety methodology, found that the proposal was insufficient to protect safety of life aviation radio altimeter usage in and around airport and heliport areas and helicopter operations outside of heliport areas. Aviation stakeholders considered a range of possible base station locations in and around areas where airborne platforms are required to perform safely including glide paths that are less than 3 degrees. Upon evaluation, it was determined that none of the altimeters assessed are compatible with these potential base station locations. Pursuant to this determination, aviation compiled an alternate proposal that will preclude the need for an AMOC (Alternate Means of Compliance) and provide compatibility with relevant user category 1 (large air transport / cargo) platforms. This proposal addresses a subset of user category 2 (which includes all regional commuter jets and turboprop aircraft that feed the major airport hubs) and a subset of user category 3 aircraft/helicopters operations.

Enclosed below are the salient aspects of this alternate proposal:

1. Retain AT&T and Verizon proposal item A.2 [1] (-31 dBW/m²/MHz PFD limit on the runway surface).
2. Retain AT&T and Verizon proposal item A.5 [1] (-19 dBW/m²/MHz PFD limit for all other airport surfaces, both movement and non-movement areas), subject to aviation validation of high continuity at this level for all ground operations.
3. Replace AT&T and Verizon proposal items A.1[1], A.3[1], A.4[1], A.6[1], A.7[1], C.1[1], C.2[1], and C.3 [1] with the following:
 - a. At and above all aviation Protected surfaces (i.e. Part 77 surfaces in addition to surfaces that govern engine out conditions and on airport surface operations), the following Signal in Space (SiS) PFD limits as shown in Figure 1 (by frequency band) apply as a function of the local aircraft height above ground level:

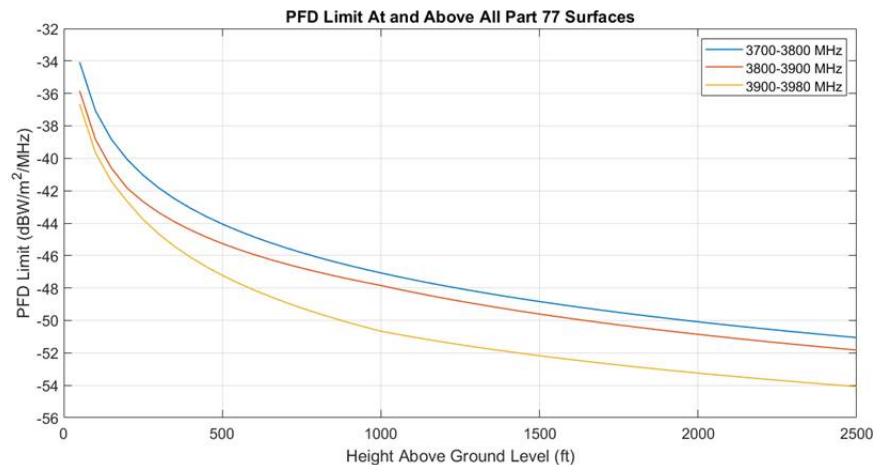


Figure 1: PFD Limit Curves (5G Fundamental Transmission)

- b. The SiS PFD must be limited to no greater than $-54 \text{ dBW/m}^2/\text{MHz}$ at altitudes that are 2500 feet and higher above ground level everywhere outside of the aviation Protected surfaces.
- c. In any given location, the applicable Protected surface will intersect the PFD limit curve at a corresponding height above ground. The portion of the PFD limit curve below the Protected surface is not applicable at that location, but the portion of the PFD limit curve where it intersects the protected surface, as well as at all heights above that intersection point, does apply at that location. Example of a Part 77 surface is seen in Figure 2.

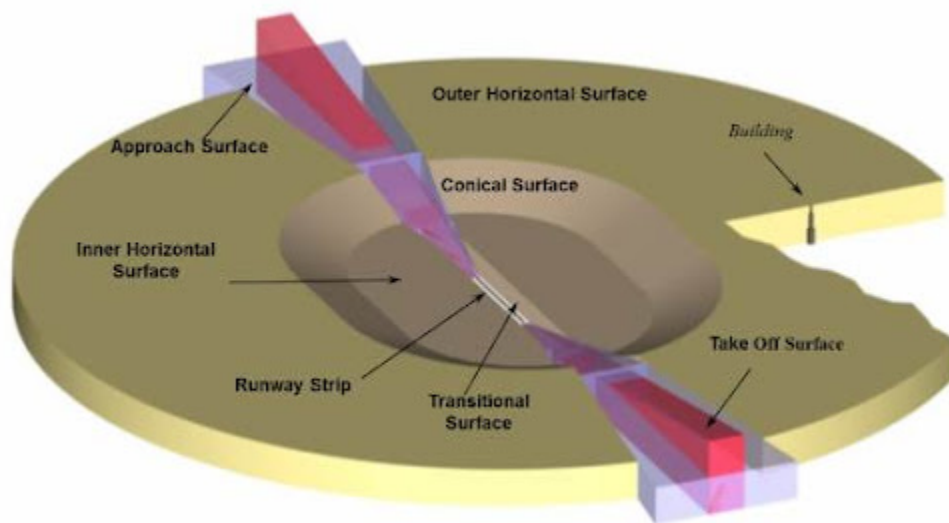


Figure 2: Example visual - part 77 surfaces

- d. In addition to FAR Part 77 surfaces, the United States Standards for Terminal Instrument Procedures (TERPS) [2] specific charted arrival and departure procedure paths and Air Traffic Control maneuvering areas must be protected to preclude airport diversions with corresponding economic and safety consequences.
 - i. On approach, aircraft descend below 2500 foot between the initial approach fix (IAF) and the final approach fix (FAF) typically around 8 to 10 nmi from the runway. From the initial approach fix (IAF) to the FAF the Required Obstacle Clearance (ROC) protection surface that must be protected for normal operations is 500' AGL. The ROC protection surface from the FAF inbound is 250' AGL.
 - ii. ATC radar vector aircraft to approach at altitudes from a 1000 foot minimum vectoring altitude (MVA) to above 2500 feet.
 - iii. Aircraft must be able to circle at 300' AGL and require protection at a 150 foot ROC out to 5.5 nmi radius from all runway ends for category E aircraft.

- Specify a reduced limit for aggregate spurious PFD at and above the aviation Protected surfaces in the 4200-4400 MHz frequency band as a function of aircraft altitude above ground level (as seen in Figure 3).

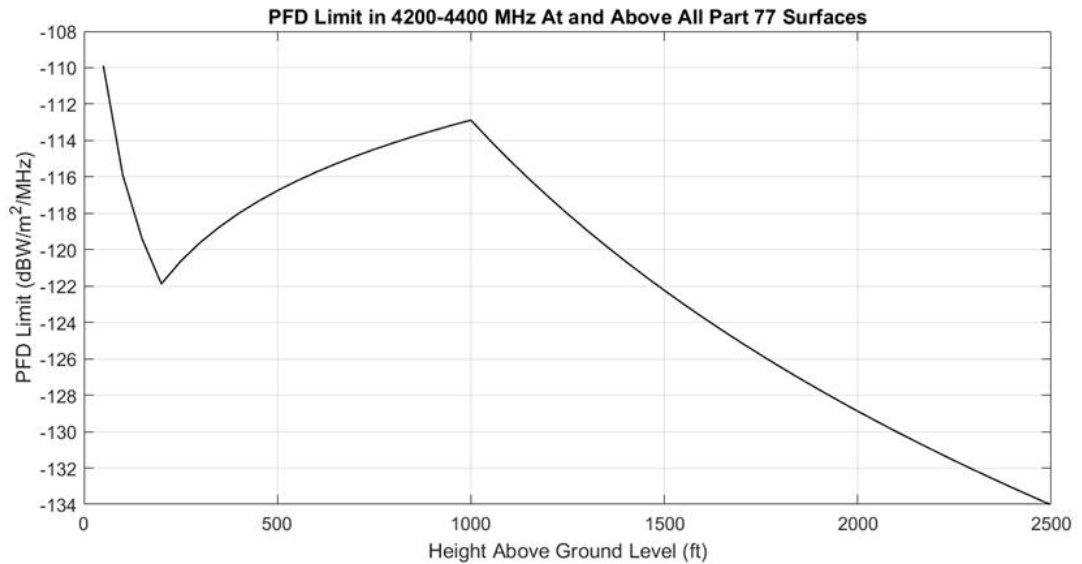


Figure 3: PFD Limit Curve (5G Spurious Emissions into 4.2 - 4.4 GHz)

- The current AT&T and Verizon proposal [1] must be updated to address helicopter operations outside Part 77 surface areas given the number of helicopters impacted and time scale needed to modify and recertify radio altimeters and antenna for installations on helicopters. In support of this, an angle-dependent EIRP limit shall be applicable to all base stations regardless of their proximity to protected surfaces. This would be similar in concept to C.1[1] and C.2[1] from the AT&T and Verizon proposal. However, we would need to modify that to restrict the full EIRP to below the horizon, instead of allowing it up to 11 degrees above the horizon as in the FCC proposal. As an example, the curve in figure 4 shifts the FCC proposal downward by 15 degrees, so that the full EIRP is allowed up to -4 degrees elevation, and above this it rolls off to 48 dBm/MHz at and above 75 degrees elevation

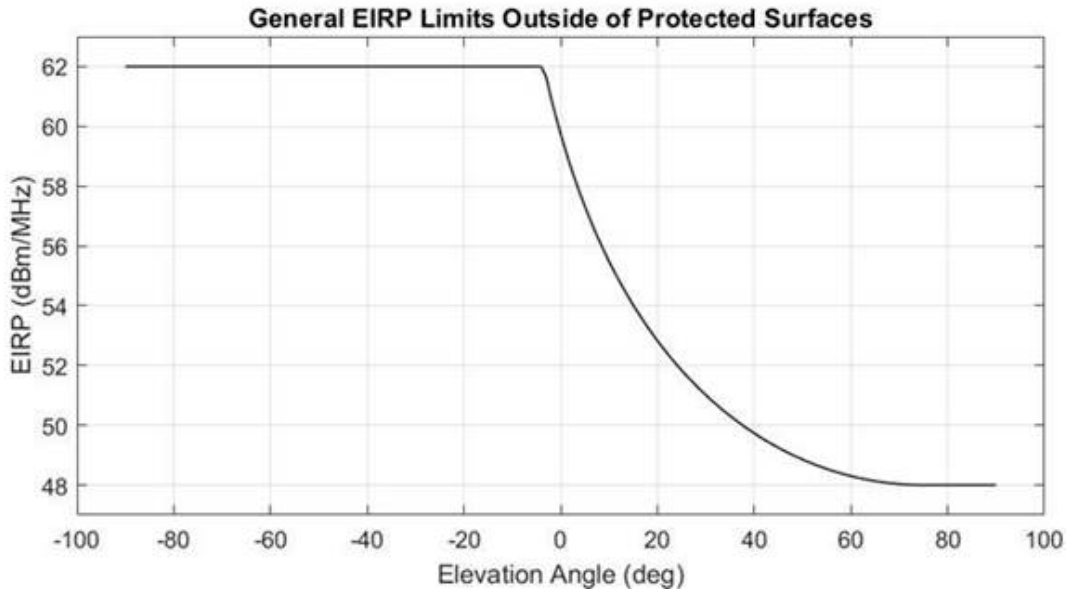


Figure 4: EIRP Limits outside protected surfaces

It is to be noted that every base station would have to comply with the PFD limit curves (Figures 1 and 3) that is at and above all Protected surfaces in the vicinity of that base station. The limiting case for angle-dependent EIRP, for example, may not be at the intersection of the PFD limit curve and the Protected surface – it can occur at much higher AGL altitudes above the Protected surface so both the limit curve at the Protected surface and at high altitudes must be assessed to determine the controlling case. Further, a given base station location may affect multiple Protected surfaces in different azimuth directions, but this can also allow design space to be preserved for 5G rollout in other azimuth directions. For example, a base station located on the edge of a Protected surface area could radiate with much higher power levels in directions away from the airport and Protected surfaces. This approach precludes unnecessarily prohibiting base stations from installations close to a Protected surface.

An airport by airport assessment of Protected surfaces will be beneficial to 5G C-band deployment since a single uniform proposal for mitigations will be unnecessarily restrictive for 5G. An airport by airport assessment affords the ability to protect both existing flight procedures as well as allows for future flight procedure designs and planned runway additions/modifications.

The PFD limit approach espoused above affords flexibility and design space for the 5G rollout. This PFD limit could be used to derive elevation angle dependent EIRP limits for base stations as a function of both base station height and base station location relative to one or more Protected surfaces. Additional relevant bounds on antenna pointing and antenna patterns (limiting upward side lobe level) prevent unacceptable emissions at or above the aviation Protected surfaces.

Further discussions are needed with the 5G Telecom stakeholders to help assess the statistical likelihood of the failure of base station hardware or software and/or incorrect configuration of a base station such that the base stations performance might exceed the proposal limits and impact radio altimeter performance due to unplanned/ uncontrolled transmissions/ emissions. Power and frequency monitoring (continuous and/or at scheduled intervals could greatly reduce the likelihood of non-conformances if deployed.

The FCC limitation to “Public Use” airports excludes over all DoD, U.S. Coast Guard and many federal, state and local airports. As a minimum, the designation of airport applicability needs to be revised to all “Publicly Owned” airports since like heliports, many “publicly Owned” aircraft are designated “Private Use”.

REFERENCES

- [1] AT&T and Verizon mitigation proposal , “ Draft Operating Conditions.23Nov2021.pdf”
- [2] FAA Order 8260.3E *United States Standards for Terminal Instrument Procedures (TERPS)*