Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Comments on Technological Advisory Council Spectrum Policy Recommendations	)	ET Docket No. 17-340
	)	

COMMENTS OF AVIATION SPECTRUM RESOURCES INC.

Aviation Spectrum Resources Inc. (ASRI) hereby files its views in response to the December 1, 2017, Public Notice of the Office of Engineering and Technology seeking comment on the spectrum policy recommendations of the Commission's Technological Advisory Council (TAC).[1]

I. EXECUTIVE SUMMARY

There are many similarities between the TAC's recommendations and the principles under which current aviation-developed systems operate: utilizing good engineering for transceiver design, the use of international standards, and a quantitative assessment for compatibility. Consideration needs to be given on how the Commission will make decisions based on these principles, as there may be unintended consequences for equipment used for international operations. While many of the TAC's ideas are useful to improve spectrum use and efficiency, it makes it very difficult to plan in a meaningful manner given future uncertainties. The special requirements for protecting aviation and safety-of-life services will require

[1] Public Notice, Office of Engineering and Technology Seeks Comment on Technological Advisory Council Spectrum Policy Recommendations, DA 17-1165, ET Docket No. 17-340 (OET rel. Dec. 1, 2017) ("*Public Notice*").

differentiated treatment when applying any principles, the Commission might adopt and implement in response to the TAC's recommendations, such as the use of harm claim thresholds.

II. INTRODUCTION

ASRI is the communications company of the United States civilian air transport industry and is owned by the airlines and other airspace users. As sponsor of the Aeronautical Frequency Committee (AFC), ASRI brings together expertise and opinions from across the aviation sector to promote the safe and efficient operation of commercial aviation radio communications systems in use within the United States.[2] Reliable access to spectrum plays an increasingly important role in the aviation industry to ensure efficient operations and the safety of passengers, cargo, and aircraft.

ASRI applauds OET issuing the *Public Notice* and seeking public input on effective spectrum management and interference mitigation principles with the aim of maximizing the value and compatible uses of radio frequency spectrum. The AFC previously filed comments on the TAC's proposed recommendations for improving receiver performance.[3] The *Public Notice* offers ASRI the opportunity to contribute complementary views of the aviation industry on reinforcing and, where appropriate, improving Commission policies concerning spectrum management.

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[2] AFC membership includes: Airlines for America (A4A), Alaska Airlines, American Airlines, Aircraft Owners and Pilots Association (AOPA), ARINC/Rockwell Collins IMS, Aviation Spectrum Resources, Inc. (ASRI), Boeing Corporation, Bristow Helicopters, Chevron, Delta Airlines, Era Helicopters, Federal Aviation Administration (FAA), Federal Express (FedEx), Frontier Airlines, Harris Corporation, Helicopter Association International (HAI), Helicopter Safety Advisory Conference (HSAC), International Air Transport Association (IATA), JetBlue Airways, National Air Transportation Association (NATA), PHI, Inc., Societe Internationale de Telecommunications Aeronautique (SITA), Southwest Airlines, United Airlines, United Parcel Service (UPS).

[3] Comments of the Aeronautical Frequency Committee, ET Docket No. 13-101 (filed July 22, 2013).

III. COMMENTS ON SPECTRUM MANAGEMENT PRINCIPLES

A. Principles #1-3: Interference Realities[4]

- Harmful interference is affected by the characteristics of both a transmitting service and a nearby receiving service in frequency, space or time;
- All [radio] services should plan for non-harmful interference from signals that are nearby in frequency, space or time, both now and for any changes that occur in the future;
- Even under ideal conditions, the electromagnetic environment is unpredictable. Operators should expect and plan for occasional service degradation or interruption. The Commission should not base its rules on exceptional events;

The Commission's spectrum management principles should consider the purposes for which radio spectrum is utilized, especially when used for safety-of-life and safety-of-property purposes, as aviation communications are. The aviation community currently works toward eliminating interfering signals and minimizing outages with either operational controls or through the regulatory framework. Addressing potential service degradation and performance issues should be considered in the engineering design phase of all radio systems. The majority of aviation developed systems, in order to meet airworthiness and regulator safety assessment, have a minimum performance requirement through international standards such as ICAO Standard and Recommended Practices (SARPS)[5] and RTCA Minimum Operational Performance Standards (MOPS).[6] To account for the many possible scenarios where service interruption can happen, the aviation industry defines possible aircraft operational scenarios where Communications, Navigation and Surveillance (CNS) may be degraded, and the likelihood of those scenarios. Planning for robust operation even in the face of such events is a core aspect of

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4 *See Public Notice* at 2, 3.

5 International Convention on Civil Aviation, Annex 10.

6 Founded as the Radio Technical Commission for Aeronautics, RTCA works in response to requests from the Federal Aviation Administration (FAA) to develop comprehensive, industry-vetted and endorsed recommendations for the Federal government on issues ranging from technical performance standards to operational concepts for air transportation.

aviation safety planning to account for all known scenarios. Concerns would be raised if a studied operational scenario used for standards or planning should be deemed an exceptional event. More clarity is needed on what constitutes an exceptional event and the determination criteria for such exceptional events.

B. Principles 4-6: Service Responsibilities[7]

- Receivers are responsible for mitigating interference outside their assigned channels;
- Systems are expected to use techniques at all layers of the stack to mitigate degradation from interference;
- Transmitters are responsible for minimizing the amount of their transmitted energy that appears outside their assigned frequencies and licensed areas;

In general, ASRI agrees that users of the spectrum and manufacturers of RF equipment, should utilize good engineering practices to minimize RF spectrum "footprints," including through the design of more robust receivers. However, an obligation to mitigate the impact of other users has limits.

First, technical standards themselves often cannot anticipate and prevent interference from subsequent operational changes by other users, such as mobile devices moving into the proximity of existing systems or radios being misused. This is often the case in aviation spectrum when assessing interference from changes to other radio communication services in adjacent or the same frequency bands, even when the performance of all systems is known through relevant standards.

[7] *See Public Notice* at 2, 3-4.

Second, there are inherent uncertainties when considering to what degree RF equipment can be designed to accommodate potential future events.[8] This depends on the performance characteristics of the system being designed: Is this a cellular system, highly directive microwave transmission, radar systems, wireless power transfer for commercial vehicles, etc.? Designing for the worst case will add substantial cost to equipment, without any guarantee that such additional engineering, development, and expense would have a payback for the manufacturer or end user. Before considering the adoption of any regulations, the Commission needs to recognize the additional costs to receiver design and manufacture to maximize protection from interference, as there is balance between cost of equipment and performance.

Finally, if new rules are implemented to make radio systems more compatible with other spectrum uses, who should shoulder the responsibility and cost? Incumbent users will not likely be incentivized to move or accept new interference levels, without a form of commitment from the proponents of services that seek to implement new limits. There are also questions when existing users operate equipment that cannot be modified to meet the new standards. What rights under the new rules should the incumbent systems have to claim protection or grandfathered status despite not meeting the new standards?

C. Principle #7: Disclosure of Standards, Guidelines, and Characteristics[9] –

The TAC recommends that Commission licensees "disclose the relevant standards, guidelines and operating characteristics of their systems to the Commission if they expect protection from harmful interference." The majority of aviation systems are already regulated

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8 *See* Section: Determining Interference Limits, "Basic Principles for Assessing Compatibility of New Spectrum Allocations", FCC Technological Advisory Council, December 11, 2015.

9 *See Public Notice* at 2, 4.

through adherence to standards such as the ICAO's SARPS or RTCA MOPS, which publicly provide a range of transmitter and receiver parameters for usage and testing to ensure operation in an aviation environment.[10] These standards have been the basis for many aviation systems being considered in the Commission's proceeding, providing an extensive amount of data for any interference assessment. ICAO even publishes Doc 9718 as an international policy document on aviation spectrum management and the principles that should be implemented. The ICAO standards and RTCA MOPS are developed over many years by an international multi-stakeholder community, creating standards that are applicable for the 20+ year life cycle for aircraft flying internationally. Should the Commission deviate from international standards which aviation employs, it will affect the global movement of people and goods our national economy heavily relies on.

D. Principle #8 –Interference Limits[11]

Ideally, interference limits give the receiver designer a "picture" of the current spectrum environment in which equipment must operate. However, should new services be allocated in the same band or nearby in frequency which may affect incumbent system by changing the set interference limit, the incumbent's equipment may have to be re-engineered to meet its required performance levels. Equipment in the field cannot be instantaneously replaced nor can certain equipment be changed out rapidly in a cost-effective manner if it has been engineered to have a long usable life. Therefore, sufficient transition periods may be required for adjustments to the new limits. Manufacturers naturally will design equipment to accommodate operation in the

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[10] ICAO, RTCA standards, and the European equivalent from EuroCAE are developed on an international basis for worldwide adoption. Most equipment also uses relevant engineering standardizes by Airlines Electronic Engineering Committee (AEEC) to ensure compatibility between aviation systems.

[11] *See Public Notice* at 3, 4.

current RF environment and cannot, and should not be expected to, anticipate what may or may not happen in the future.

Without mandating receiver performance specifications, selectively articulating interference limits and applying them would be one of the more difficult tasks the Commission could undertake. The process by which the Commission would decide on such limits would not only be difficult, but subject to challenge that limits are being incorrectly drawn. The Commission should carefully consider the risk of an incorrect limit being applied to a safety-of-life system. While increasing the public benefit and utilization of spectrum is important, it should not come at the cost of a decrease in safety.

E. Principle #9 – Quantitative Analysis of Interactions between Services[12]

ASRI strongly believes that quantitative analysis should always be part of any procedure determining service compatibility. As with any scientific or technical study, it needs to be effectively peer reviewed so that one party's analysis, which may be understandably, inadvertently, or otherwise biased, does not drive the process. In addition, the Commission should enforce the use of transparency and reproducibility in any compatibility studies it may rely upon, ensuring that there is always an adequate opportunity for interested parties to receive the analyses in an unredacted form (pursuant to protective orders, if necessary). If one party uses software to assess compatibility with another service or other users, the code or software file should be available to the other services operators or users to examine. These measures would not only improve transparency in the studies, it would help affected parties and the Commission to come to a better understanding of how their systems would interact.

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12 *See Public Notice* at 3, 4-5.

Economic factors also need to be considered when the introduction of new services or uses is being considered such as equipment lifecycle and cost of replacement. Allocations where the equipment is replaced or updated in a shorter timeframe are better suited to handle changes in the interference environment and adapt quickly. For commercial aircraft, economic lifespans of aircraft can range from 20 to 30 years. Should new equipment need to be installed, it will need to be retrofitted to airframe and potentially lengthy transitions will be required. Such retrofits are generally very expensive for the owner/operator and will also be disruptive: changes will take the aircraft out of service, causing operators to forego valuable revenue and operational availability.

IV. USE OF HARM CLAIM THRESHOLDS

Not all frequency bands are sufficient for harm claim thresholds, as this is especially the case for bands supporting services related to aviation and safety-of-life[13], as it would be very difficult for aviation users to implement anything different than existing international standards. The Commission should carefully consider where to apply harm claim threshold analysis. Where such analysis is appropriate, it should be done in a manner that fairly allocates costs to the various users of the spectrum while maximizing public benefit.

[13] *See* J. Pierre De Vries, "HARM CLAIM THRESHOLDS: FACILITATING MORE INTENSIVE SPECTRUM USE THROUGH MORE EXPLICIT INTERFERENCE PROTECTION RIGHTS", 12 J. on Telecomm. and High Tech. L. 55 (2014).

V. CONCLUSION

ASRI appreciates this opportunity to provide comments on the TAC's spectrum policy recommendations. While in general ASRI supports the intent to provide incentives for more robust equipment and system design, special consideration is required where safety-of-life is involved, as in many aviation scenarios. Furthermore, deviations from international standards can have a severe impact to different industries and the economy, especially those like aviation which regularly cross international borders.

Respectfully submitted,

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