A Survey of Policy Issues in Spectrum Sharing in the 12 GHz Band

PI: Dr. Eric Burger, Virginia Tech
Research Assistant: Erika Heeren-Moon, Virginia Tech

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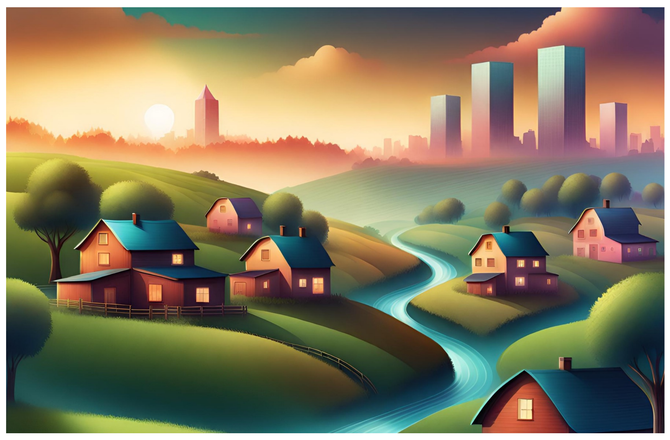
Introduction

- This paper reviews the recent history and discourse associated with spectrum sharing in the 12 GHz band. Then, opportunities for future policy research are presented.
- The research process included a review of the January 2021 FCC NPRM 20-443 seeking comment on how best to maximize efficient use of 500 megahertz of mid-band spectrum between 12.2 – 12.7 GHz, also known as the 12 GHz band and all comments filed and posted to the FCC's ECFS system between December 2020 through May 2023. At the time of review, there were approximately 95,000 comments posted to the ECFS system related to the NPRM.
- The focus of this article is to provide context to the socioeconomic issues that were identified and regulatory compliance opportunities.

Why 12GHz?

- Propagation characteristics that vary with the context, such as the weather. If a policy could be developed that honored the dynamic nature of the band, then sharing might be possible.
- Well-suited for next-gen wireless broadband due to the combination of favorable propagation characteristics (compared to higher bands) and the opportunity for additional channel re-use (compared to lower bands).

- Inter-device connectivity is a unique aspect of 5G and other mobile terrestrial services, unavailable to NGSO or DBS services.
- Incumbent considerations such as existing and future jobs created by the commercial providers of these services require stability in the band or an appropriate alternative.



Key Issues Identified

- **Will Harmful Interference Occur?**
- **If Harmful Interference is Likely to Occur, Which Service Should Prevail on the Band?**

Dynamic Policy Framework

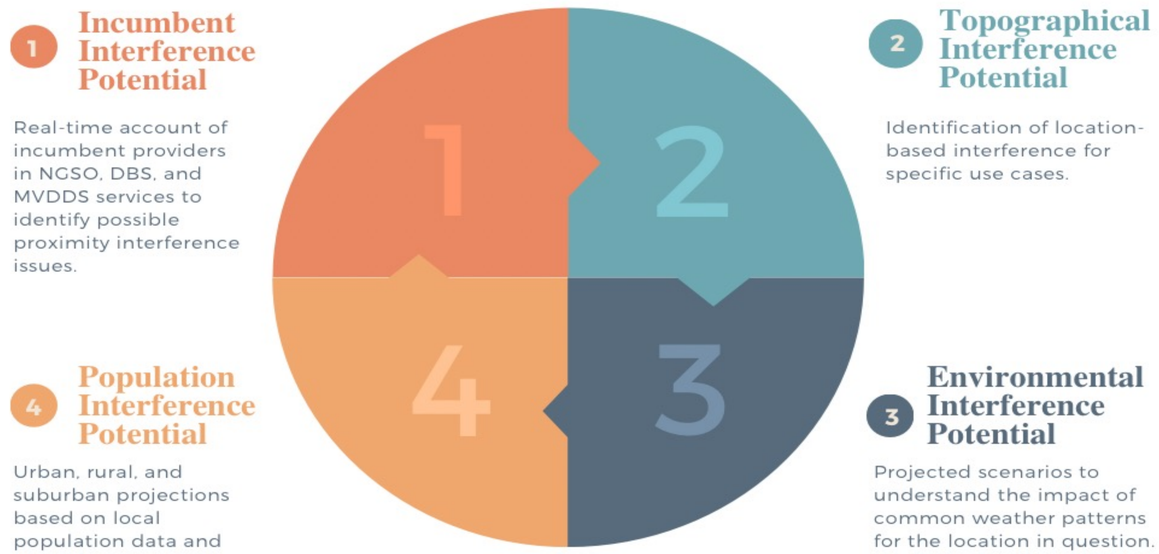


Figure 1

Where Do We Go From Here? Future Research Direction

- **A Reliable and Accurate Method for Testing for Interference**
  - A tool – or a collection of tools – that can be used to accurately determine interference potential on a case-by-case scenario would allow policymakers to better understand individual scenarios.
  - As of now, there are proposed tools that meet one or two of the items in Figure 1 separately. However, for policy decisions, a collection of tools that funnels data in each of these categories into a digestible analysis framework to identify the best use on a scoring system would reduce blind spots in spectrum sharing and allocation decisions.
- **Equity in Socioeconomic Factors**
  - In addition to technical and environmental issues, additional considerations come into play in the long and short term of spectrum allocation policy. Specifically, how can the FCC weigh ongoing access in rural, suburban, and urban communities? There is substantial discussion of job creation, but where are the jobs being created, and which local economies benefit? Does the allocation of a specific band of spectrum truly fit the best public use overall? A deeper demographic and service distribution analysis will be required to explore this topic further.

Research Progress & Publications

Z. Hassan, E. Heeren-Moon, J. Sabzehali, V. Shah, C. Dietrich, J. Reed, E. Burger, "Spectrum sharing of the 12 GHz band with two-way terrestrial 5G mobile services: Motivations, challenges, and research roadmap," in IEEE Communications Magazine, vol. 61, no. 7, pp 53-59, July 2023, DOI: 10.1109/MCOM.007.2200699.

T-s.R. Niloy, S. Kuma., A. Hore, Z. Hassan, C. Dietrich, E. Burger, J. Reed, V. Shah, "ASCENT: A Context-Aware Spectrum Coexistence Design and Implementation Toolset for Policymakers in Satellite Bands," IEEE Intl. Symposium on Dynamic Spectrum Access Networks (DySPAN). Washington, DC. May 2024.

T-s.R. Niloy, Z. Hassan, N. Stephenson, V. Shah, "Interference analysis of coexisting 5G networks and NGSO FSS receivers in the 12 GHz band," in IEEE Wireless Communication Letters, vol. 12, no. 9, pp 1528-1532, Sept. 2023, DOI 10.1109/LWC.2023.3281769.

Paper Presentation at DySPAN: Tuesday, May 14 at 4:30PM