

January 22, 2019

National Telecommunications and Information Administration
United States Department of Commerce
1401 Constitution Avenue, NW, Room 4725
Washington, DC 20230
Attention: John Alden

RE: Comment, Docket No. 181130999-8999-01, *Developing a Sustainable Spectrum Strategy for America's Future*

Dear Mr. Alden:

Introduction

The City of New York (the “City”), through its Department of Information Technology and Telecommunications (“DoITT”), respectfully submits these comments in response to the request from the National Telecommunications and Information Administration (“NTIA”) for public comment on Developing a Sustainable Spectrum Strategy for America’s Future (the “Request”). The City understands that the NTIA oversees federal spectrum use and thus, local spectrum use may not relate to your study. But the City submits the following observations and information to the extent that NTIA’s questions are a general inquiry, as a subject matter expert.

New York City, with its canyons, density and 24/7 environment presents one of the most challenging environments for spectrum use in the country. We understand the value of spectrum efficiency for powerful economic development, and the importance of spectrum-dependent technologies and tools to ensure we remain one of the safest and innovative cities in the world. But even as we make important strides in enhancing spectrum utilization and management, even as spectrum-dependent technologies enrich our lives and protect us, this extraordinary resource also presents challenges. We see it in the lack of protection in spectrum auctions for public television service. We see it in the coordination, or lack thereof, of shared access to certain frequency bands. We see it in the lack of reasonable spectrum alternatives for public safety T-Band incumbents.¹ For this reason, the City is encouraged that NTIA seeks public comments to improve its understanding of how spectrum utilization and management can flourish at the federal level in our rapidly changing country, and to ensure residents in cities like New York remain connected and that we are all protected and thriving.

¹ See, e.g., The City of New York, *Comment On Options for 470-512 MHz (T-Band) Spectrum* (May 13, 2013), on file with author (stating that “requiring public safety to vacate T-Band prematurely will cause immeasurable harm to public safety communications and is not in the public’s best interest”).

In light of the forgoing, the City encourages NTIA to consider the recommendations set forth below in response to certain questions posed in the Request. These recommendations describe both policy and practical considerations that could directly or indirectly benefit the City, and promote effective spectrum utilization throughout the country.

Recommendations

- *In what ways could the predictability of spectrum access for all users be improved?*

The City understands the importance of promoting predictability of spectrum access for all users, which is evident by our efforts to maintain access to T-Band spectrum for our public safety networks. To avoid the substantial damaging effects of requiring government agencies to relocate their wireless public safety systems from T-Band spectrum, the City recommends that NTIA support legislation terminating the T-Band auction and relocation mandate directed by Congress. This consequential piece of legislation would preserve public safety users' access to and substantial investments in T-Band spectrum, and solidify these users' capacity to plan for the future and update infrastructure necessary to continue mission critical voice communications.

Moreover, the City recommends the implementation of dynamic spectrum allocations and encourages smart networks that maintain these attributes: Channel Quality Indicators ("CQI), a control plane or control channel, significantly wider channels for data networks, narrower or mandated TDMA/TDD channels for voice only networks, software defined radios, carrier aggregation, and bonding of adjacent licensed channels. For example, dynamic spectrum allocations, when properly managed, allow for a greater number of users to access the same spectrum on a time sharing, priority access basis, thus increasing overall spectrum utilization and enhancing spectrum efficiency. Smart networks, in which a network controller or scheduler actively monitors the radio channel in real time, can increase the percentage of successful transmissions and reduce the number of transmit collisions and subsequent re-transmissions in shared radio channels.

- *To what extent would the introduction of automation facilitate assessments of spectrum use and expedite the coordination of shared access, especially among Federal and non-Federal spectrum stakeholders?*

Comprehensive radio frequency coordination would minimize frequency saturation which causes signal interference and degradation, risking the effectiveness of the City's various wireless public safety networks. Automatic Frequency Coordination ("AFC") spectrum access systems, if properly implemented and maintained can enhance spectrum efficiency by permitting licensees to share spectrum allocations, and potentially by permitting licensed and unlicensed access to the same spectrum. Recent proposals from the Federal Communications Commission ("FCC") have involved automated frequency sharing with rules, managers, and systems specific to a particular

spectrum band.² Establishing a nationwide frequency coordinator to manage operations in shared bands would promote efficiency and expanded access, as well as predictable, low-cost frequency sharing.

- *What is the practical extent of applying standards, incentives, and enforcement mechanisms to promote efficient and effective spectrum use?*

An effective policy and regulatory framework which outlines equitable standards, incentives, and sufficient enforcement mechanisms is essential for full spectrum participation. However, this framework should prioritize and support—not displace or disrupt—initiatives that use spectrum to provide public services that benefit City residents and local small businesses, including initiatives related to upgrades to wireless public safety networks and systems, free public Wi-Fi expansion, and the advancement of Internet of Things (“IoT”) technology in public spaces.

- *How might investment in RDT&E improve spectrum-sharing tools and techniques?*

The City recognizes the critical role advanced technology plays in ensuring public safety and national security. Investment in research, development, test, and evaluation (“RDT&E”) can improve spectrum utilization, and launch mutually-beneficial public and private partnerships through funded research projects. The City invites meaningful research partnerships; given we maintain one of the most appropriate environments for RDT&E of advanced wireless technologies. For instance, a consortium of local New York City-metropolitan universities—including Columbia University, New York University, and Rutgers University—is set to receive \$22.5 million in funding through the National Science Foundation Platforms for Advanced Wireless Research initiative to build a wireless testbed in Upper Manhattan.

Through the partnerships with academic researchers and industry stakeholders, the testbed, entitled COSMOS³, will serve as a real-world research hub for new wireless technologies and applications in one of the most populated urban environments in the world. These kinds of testbeds are necessary to ensure the appropriate scientific and technical knowledge is developed to advance new products to the market that work in many environments, including environments like New York City that require consideration of factors unique to densely populated and urban areas.

² See, e.g., *Notice of Proposed Rulemaking in the Matter of Promoting Investment in the 3550-3700 MHz Band*, Federal Communication Commission, GN Docket No. 17-258 (adopted Oct. 24, 2017) (discussing Spectrum Access Systems (SAS)); and *Proposed Rule in the Matter of Unlicensed Use of the 6 GHz Band*, Federal Communications Commission, 83 FR 64506, ET Docket No. 18-295, GN Docket No. 17-183 (published Dec. 17, 2018) (discussing automated frequency control (AFC)).

³ Press Release, Columbia University School of Engineering, NSF Announces New York City as Testbed for New Wave of Mobile Technology (Apr. 10, 2018), <https://engineering.columbia.edu/news/nsf-cosmos-testbed>; see also, COSMOS, <http://cosmos-lab.org/>.

- *How could a spectrum management paradigm be structured such that it satisfies the needs of commercial interests while preserving the spectrum access necessary to satisfy the mission requirements and operations of Federal entities?*

Public safety use of spectrum is paramount, and sometimes sharing is not possible or advisable. The City also recognizes, however, that unlicensed and shared spectrum uses are essential to the City's economic development and to close the digital divide. Where spectrum does not involve or prioritize public safety uses, it is imperative that spectrum management arrangements designed to assist commercial interests encourage competition and consider the unique needs of new commercial entrants to the market, especially those entrants whose business models promote enhanced wireless services and technology for federal- and local-based projects. Besides federal support for such arrangements, where possible, NTIA should consider other practical arrangements including, without limitation:

Location Aware Devices

Location aware radio devices exploit the spatial domain, by enabling spectrum re-use at closer intervals, mitigating inter-system interference and improving overall spectrum efficiency. Requiring radio devices to report their location to a centralized AFC database prior to activation would allow policies to be implemented that more granularly regulate the radio channel based on known transmitter locations, permitting a greater number of users to occupy the same spectrum concurrently.

Tiered Priority Access

Tiered Priority access allows for spectrum to be shared based on location, time and user priority. If properly managed by a scheduler or radio network controller, tiered priority access will allow for disparate user groups to share spectrum channels without interference, by granting priority access to primary licensed users while permitting secondary users access to the spectrum when primary licensed users are inactive. The traditional method for spectrum allocation is based upon static spectrum allocations. This method does not take modern broadband technologies into account, which exploits not only the frequency domain, but the time and the spatial domains as well. Modern broadband technology utilizing dynamic allocation of spectrum resources governed by an intelligent controller enforcing tiered priority access rules maximizes spectrum efficiency.

Flexible Use of Spectrum

The potential for flexible spectrum allocations allowing federal and non-federal non-first responder licensees to share a common frequency band should be studied. This measure could lower device costs, enhance interoperability and improve spectrum efficiency as the practice of bonding channels from multiple bands to achieve limited interoperability (channel patching), would no longer be required or desired.

- *What are the likely future needs of spectrum users, both terrestrially and for space-based applications, within the next 15 years? In particular, are present allocations of spectrum sufficient to provide next generation services like Fifth Generation (5G) cellular services and emerging space-based applications? For commenters who assert that existing allocations are insufficient, NTIA is interested in understanding better the amount of spectrum presently available to provide particular services (or similar services) and estimated of the amount of additional spectrum in each frequency band that commenter believes is needed.*

To accommodate the future needs of all stakeholders, we recommend NTIA, with other federal regulators and policy makers, support research and development to determine the feasibility of static spectrum allocations and the possibility of dynamic allocation of spectrum based upon location and priority. This spectrum framework would centralize an AFC database to avoid interference between licensees and implement a Tiered Priority Access system to manage co-channel usage among spectrum users operating in the same proximity.

Conclusion

The City encourages NTIA's efforts to galvanize ideas to develop a sustainable spectrum strategy for the future, and to improve spectrum utilization methods, and spectrum-sharing tools and techniques. Having said that, the federal government must prioritize the protection of public safety networks in the development and deployment of a new spectrum strategy, as well as ensure adequate spectrum allocations for critical local public services. The City looks forward to working with NTIA and various other public or private stakeholders and subject matter experts to develop an effective and equitable spectrum strategy, and continuing our support as we bring the concerns of localities to the forefront.

Respectfully submitted,

THE CITY OF NEW YORK