Before the
DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, DC 20230

In the Matter of	)	
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Development of a National Spectrum Strategy	)	Docket No. 30308–0068
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COMMENTS OF V2X

V2X is pleased to present these comments to the National Telecommunications and Information Administration (NTIA) on the Development of a National Spectrum Strategy. V2X is a leading provider of critical mission solutions and support to the U.S. Government and to defense clients worldwide. Formed by the 2022 merger of Vectrus and Vertex to build on more than 120 combined years of successful mission support, V2X delivers a comprehensive suite of integrated solutions across the operations and logistics, aerospace, training and technology markets to national security, defense, civilian and international clients. V2X's 15,000 employees bring innovation to every point in the mission lifecycle, from preparation to operations to sustainment, as they tackle the most complex challenges with agility, grit, and dedication.

A Spectrum Pipeline to Ensure U.S. Leadership in Spectrum Based Technologies

What are projected future spectrum requirements of the services or missions of concern to you in the short (less than 3 years), medium (3-6 years) and long (7-10 years) term?

According to the International Telecommunications Union (ITU) 2022 statistics, 66% of the world's population has some access to the Internet, an increase from 50% in 2019, but still leaving 2.7 billion offline.[1] As connectivity grows and technology continues to advance, our digital footprint will increase, putting increasing demands on spectrum. While spectral efficiency continues to improve, this improvement is not keeping pace with the rate at which new devices are coming online and demand grows exponentially. With very little greenfield spectrum remaining, we must work quickly to identify opportunities to leverage an "all of the above" approach to maximize use of all frequencies and ensure access for all users.

Recent testing has shown great promise for dynamic spectrum access, resulting in increased throughput and improved connection. Spectrum agility benefits from maneuverability across spectrum bands without jamming friendly actors. As research develops, allowing for multi-band spectrum access, implementation could support future low probability of intercept/low probability of detection anti-jam waveforms and Mobile Ad hoc Networks (MANETs), as well as other technologies to aid mission requirements in the near term.

How much, if at all, should our strategy by informed by work being performed within recognized standards-setting bodies (e.g., 3GPP, IEEE), international agencies (e.g., ITU), and non- U.S. regulators or policymakers (e.g., the European Union)? What relationship (if any) should our strategy have to the work of these entities?

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[1] Statistics (itu.int)

Engaging with global regulators, such as the ITU and standards organizations like the Third Generation Partnership Project (3GPP), is critical for achieving the most effective use of spectrum. Doing so increases the opportunity to harmonize bands and mitigates potential interference issues, thereby improving connectivity and advancing innovative solutions and approaches.

Equally important is working with leading government research organizations such as the Institute of Telecommunication Sciences (ITS) at NTIA, the National Institute of Standards and Technology (NIST), the Defense Advanced Research Projects Agency (DARPA), and the Department of Defense (DoD) Office of the Under Secretary of Defense for Research and Engineering [OUSD(R&E)] to better understand the needs of their constituencies. For instance, the ongoing requirement for command and control and situational awareness via unmanned systems will continue to grow throughout the short, medium, and long term. These systems bring vital operational data from all echelons of the battlespace to the tactical commander. To maximize the utility of unmanned systems, bandwidth is needed to facilitate communications, data management and information dissemination in real-time. By understanding these technical requirements for emerging technologies and mission-critical federal operations, spectrum planning can be performed in a way that is responsive to the needs of users.

What spectrum bands should be studied for potential repurposing for the services or missions of interest or concern to you over the short, medium, and long term? For each band identified, what are some anticipated concerns?

In the short term, as industry urges policymakers to release spectrum in the 4.4 to 4.9 gigahertz (GHz) and the 7.125 to 8.4 GHz bands, we recommend a thorough evaluation of interference possibilities for legacy systems in adjacent bands spearheaded by NTIA with support from DoD, Academic and Industry partners.

Longer term, it is important that evaluations of future DoD spectrum dependent systems acquisitions should be considered as input criteria for sharing feasibility.

Are there spectrum access models (e.g., low-power unlicensed, dynamic sharing) that would either expedite the timeline or streamline the process for repurposing the band?

As NTIA looks to future bands, spectrum sharing should be utilized.

If the United States is to continue as the innovation leader of the world while supporting global defense capabilities, we must embrace advancements made in spectrum sharing. Additional funding for research and development, coupled with continued public/private partnerships, will only enhance the development and "buy-in" of sharing.

Relocation of assets to another band is often incredibly time-consuming, costly, and can impact the utilization of that asset. For example, a new radio or sensor is needed to meet the new link range of the future band. New equipment may require new power levels to maintain link range, and, therefore, begin a cascade impact on the asset's size, weight, and power. Rather than force the relocation of incumbent uses in a band, at a significant expenditure of both time and money,

sharing spectrum allows for new uses to co-exist with an incumbent user, with far less impact on either entity.

Current technology advancements utilizing artificial intelligence (AI) and machine learning (ML) to make more efficient decisions related to spectrum management have proven successful in facilitating spectrum sharing. Expanding these and other technologies would help with repurposing different spectrum bands through sharing, particularly those with incumbent uses that are difficult or costly to relocate.

What factors should be considered in identifying spectrum for the pipeline?

As additional spectrum resources are identified, the Federal Communications Commission (FCC) and the NTIA must quickly assess, using all available data, whether a particular band is capable of being repurposed, or ideally, shared. The agencies need to embrace and support the use of advanced technologies, such as AI, to improve efficient usage of spectrum resources. Agencies should also hold users--both commercial and government--to a high standard with the expectations that as advancements come online, systems should be constantly assessed and updated, allowing for greater efficiencies in any given band.

The current bifurcated system of separate agencies assessing the engineering needs and capabilities of federal and commercial entities has created a mismatch of expectations. The NTIA and FCC should consider a mechanism, such as working with the National Spectrum Consortium (NSC), to prototype future bands. The NSC has an extensive track record as a

public/private partnership driving policy based on science and process. The needs of federal agencies should be identified and vetted well in advance, and to the extent possible, shared with commercial entities, giving industry sufficient lead planning time. The current lack of certainty and coordination is hampering both commercial and government users and adversely impacting deployments.

Should the Strategy prioritize for repurposing spectrum bands that are internationally harmonized and that can lead to economies of scale in network equipment and devices?

Commercial systems technology will likely continue to outpace lengthy DoD acquisition pipelines. Harmonizing with international spectrum bands would not only improve user equipment device availability but could prevent future DoD systems' need for transition due to Federal spectrum auction.

Spectrum access underpins cutting-edge technology that serves important national purposes and government missions. Are there changes the government should make to its current spectrum management processes to better promote important national goals in the short, medium, and long term without jeopardizing current government missions?

The current spectrum management coordination process is time-consuming and includes numerous "human-in-the-loop" (HITL) touchpoints. By streamlining and automating the process, spectrum requests can be assessed and settled nearly instantaneously.

Equipment Spectrum Certification tools and processes are dated and no longer appropriate when adopting and implementing the newest technologies like fifth generation (5G) and spectrum sharing methodologies like Citizens Broadband Radio Service (CBRS) for federal use. Hardware certification processes between FCC and NTIA should be modernized and synchronized to reduce the burden on commercial vendors collaborating with federal customers.

Better spectrum management systems will result in overall improved future allocation processes and outcomes for commercial and federal users, while protecting critical incumbent users.

For purposes of the Strategy, we propose to define "spectrum sharing" as optimized utilization of a band of spectrum by two or more users that includes shared use in frequency, time, and/or location domains, which can be static or dynamic. Is this how spectrum sharing would be defined?

V2X supports NTIA's definition of spectrum sharing, understanding that, with the advancements in technology, sharing arrangements may change over time.

What technologies, innovations or processes are currently available to facilitate spectrum sharing as it should be defined?

V2X is partnered with Naval Surface Warfare Center Dahlgren Division (NSWCDD) on several projects related to sharing spectrum in the 3.45 to 3.55 GHz America's Mid-Band Initiative Team (AMBIT) band. To understand impacts to Department of the Navy (DoN) systems, we

develop the DoN AMBIT Analysis Tool (DAAT). The DAAT assesses potential electromagnetic interference (EMI) to DoN radar systems currently operating in the AMBIT band by providing approval or denial of Coordination Requests (CR) for commercial wireless operations, as well as possible mitigation options.

Commercial vendors provide detailed, proprietary specifications and configurations of proposed commercial system installations for use in the DAAT's radio frequency (RF) propagation models to perform realistic interference analyses using validated and agreed upon methodologies. Use of generic data in models typically provides overly conservative, even worst-case results, unnecessarily impacting the commercial vendor and limiting economic and technological value of that portion of the spectrum.

What additional research and development may be required to advance potential new spectrum sharing models or regimes, who should conduct such research and development, and how should it be funded?

NTIA is right to focus on continued research and development of advanced technologies to help alleviate the constraints. As mentioned earlier, leveraging trusted partners like the NSC can provide a results-driven framework with ecosystem-wide concurrence. The NSC has more than 400 members that include a wide variety of companies from major spectrum stakeholders like mobile network operators (MNO) to venture-backed startups, commercial enterprises, and engineering services companies like V2X, as well as advisory members such as CTIA—the trade association for the commercial wireless industry.

The NSC spearheads collaboration with federal agencies to create industry groups that explore sharing solutions. V2X is a member of the NSC and participates in the Partnering to Advance Trusted and Holistic Spectrum Solutions (PATHSS) Working Group. Currently, PATHSS is rapidly developing potential spectrum sharing courses of action (COA) to make more mid-band spectrum available for commercial 5G.

Have previous efforts to facilitate sharing, whether statically or dynamically, proven successful in promoting more intensive spectrum use while protecting incumbents? Please provide ideas or techniques for how to identify the potential for and protect against interference that incumbents in adjacent bands may experience when repurposing spectrum.

Incentivizing sharing could lead to the use of advanced technologies that mitigate interference while creating a more collaborative ecosystem that encourages new entrants. For instance, local access licensing (LAL) is currently available in the United Kingdom and under consideration in several countries worldwide. This manual spectrum-sharing approach could be automated for faster coordination of the band. LAL is being used in areas where the incumbent is fixed and coordination is first come, first serve for band use. LAL could be applied in the United States in more remote areas where interference risks with incumbents are very low. LAL in remote areas would also reduce the need for a spectrum access system (SAS). By utilizing LAL, the CBRS model could potentially be expanded into the 3.1 to 3.4 GHz band after prototyping and study by government and an industry group.

What technical and policy-focused activities can the U.S. Government implement that will foster trust among spectrum stakeholders and help drive consensus among all parties regarding spectrum allocation decisions?

Similar to previous comments, the FCC and NTIA should collaborate with industry partners and federal users at the beginning of the spectrum allocation process. The National Spectrum Strategy should consider implementing policy to require pre-auction coordination with future licensees to identify critical information about incumbent DoD systems that may be co-located in high priority metropolitan markets. Coordination with future licensees is critical to sharing success. Early-stage interference modeling should include stakeholders' participation alongside the government, giving those affected the opportunities to adjudicate and mitigate findings at the outset and not after decisions have been made. Better coordination allows for greater opportunities for successful outcomes.

What policies should the National Spectrum Strategy identify to enable development of new and innovative uses of spectrum?

Congress and the administration should jointly focus on policies that involve the early collaboration of impacted stakeholders and industry partners to study sharing methodologies for future spectrum sharing. A good example of this collaborative effort is the NSC PATHSS Working Group and the 3.1 to 3.45 GHz Emerging Mid-Band Radar Spectrum Sharing (EMBRSS) band auction. By involving all stakeholders early in the process, the development of new spectrum use concepts would be more likely to reflect the various equities in every stage of

the effort. Additionally, by investing research funding in technologies like AI, the spectrum agencies will help advance their use cases, ultimately increasing adoption and creating more opportunities for sharing arrangements.

What role, if any, should the government play in promoting research into, investment in, and development of technological advancements in spectrum management, spectrum-dependent technologies, and infrastructure?
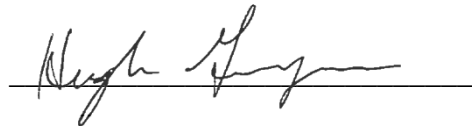
The government should promote the education and mentorship of Government spectrum management principles and methodologies. Spectrum management is looked at and handled differently among federal and non-federal entities. The government should provide industry and academia better insight and visibility into the current federal process and where it would like to see it evolve. This will help drive and focus industry and academia resources on solutions that would be consistent with or at least cognizant of federal efforts, avoiding some of the conflicts that we see today. The government should sponsor events such as Project Convergence, the Army's effort to promote interoperability with military branches and other allies, allowing vendors with spectrum management/sharing technologies to demonstrate their capabilities. This can lead to greater adoption of technological advancements by federal users and agencies.

What role, if any, should the government play in participating in standards development, supporting the use of network architectures, and promoting tools such as artificial intelligence and machine learning for spectrum coordination or interference protections?

The recent growth and maturity of AI/ML warrants re-examining its use for spectrum sharing. V2X is currently developing ML signal classification capabilities for the Navy that provides Own Force Monitoring (OFM) for emission control (EMCON) and interference detection. V2X recommends that AI/ML spectrum sharing efforts continue to be explored and investigated through industry and government collaboration with government-funded prototyping and industry bringing forward the latest innovations.

Closing

We appreciate the opportunity to respond to this request for comment and look forward to continuing our working relationship with NTIA and the U.S. Government to advance innovation and success.

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V2X