Final Report and Recommendations

Identifying Key Characteristics of Bands for Commercial Deployments and Applications Subcommittee

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Overview

- Subcommittee was presented with 5 questions.
- Answers for each question were generated in the report that has been provided to the CSMAC.
- Four recommendations have been drafted based on the responses to the NTIA questions.

Question 1

- From a commercial industry perspective, what are the key characteristics it considers in evaluating the desirability of a particular frequency band as a candidate for licensed (exclusive or shared) and unlicensed spectrum?
- **Response**: The key factors when industry looks to evaluate particular spectrum bands are divided into several categories: (1) propagation and coverage; (2) capacity; (3) contiguity; (4) international harmonization (scale); and (5) incumbency issues. In general, no single spectrum band will meet every requirement for a particular use, given the diversity of industry requirements and use cases. Relative priority for each of these characteristics is likely to vary based on industry and use case.

Question 2

- What are the technical and operational impacts of contiguous versus non-contiguous spectrum to satisfy commercial requirements?
- **Response**: The subcommittee addressed this question for the IEEE 802.11 family (Wi-Fi, et al), 4G LTE (and 5G to the extent known), and commercial satellite systems.
- In general, there are several themes that are consistent across technologies:
  - Systems using contiguous spectrum can be designed to use more channels than two separate tranches of spectrum of the same total size.
  - Larger channels provide benefits that smaller channels do not, for example, larger channels produce lower power spectral density or improve geolocation
  - Engineering complexity is substantially reduced with contiguous spectrum.
  - Broad channels enable the use of technologies that increase data throughput rates.
  - While it is possible to aggregate spectrum from different bands, aggregation comes at a cost to performance.

Question 3

- When industry describes its need for low-, medium-, and high-band spectrum, what should we understand to be the definitions for those broad frequency ranges and the rationale for selecting the boundaries between each?
- **Response**: Definitions for frequency ranges are dynamic and subject to change based on use cases and technology evolution. The subcommittee provided details (in the current environment) that helped to define the characteristics of low, mid, and high band spectrum.

Question 4

- To what extent does the channel bandwidth needed for any given deployment vary depending on whether the deployment is low, medium or high band spectrum?
- **Response**: The channel bandwidth needed for a given deployment (set of intended applications) does not vary depending on whether the deployment is in low, medium or high band spectrum. Instead, channel bandwidth is normally determined based on spectrum availability and economics. Those factors in turn drive the set of intended applications that can be supported in the available channel bandwidth.

Question 5

- What commonalities or compatibilities between federal and commercial applications could be exploited to maximize the potential for sharing between federal and non-federal users? These might include, for example, applications that could coexist (technically and/or operationally) or common technologies.
- **Response**: The potential compatibility for a wireless system to share spectrum depends on several factors including the following:
  - The technical capacity for wireless technologies to share spectrum and coexist
  - Technical support for cohabitation of spectrum including certified support systems
  - Feasibility of upgrading incumbent systems to support spectrum sharing
  - Support for operational de-confliction
  - Trust between operators / users

Recommendations

- **Recommendation 1:** The subcommittee recommends that NTIA give consideration to the following key characteristics when reviewing potential new spectrum bands for reallocation or use by the commercial industry: (1) propagation and coverage; (2) capacity; (3) contiguity; (4) international harmonization (scale); and (5) incumbency issues. The subcommittee would note that relative priority for each of these characteristics is likely to vary based on industry and use case.
- **Recommendation 2:** The subcommittee recommends that NTIA make every effort to focus its efforts to identify opportunities for either repurposing or sharing of federal spectrum on bands that are contiguous to existing commercial spectrum uses.
- **Recommendation 3:** The subcommittee recommends that NTIA not attempt to rigidly define low, mid, and high band spectrum bands as this metric is dynamic and ever changing.
- **Recommendation 4:** The subcommittee recommends that NTIA consider directing CSMAC to develop a methodology (rubric) to identify federal bands for potential commercial-federal sharing.