

Mid-Band Spectrum Opportunities



Mid-band spectrum ranges from 2.5 GHz to 6 GHz. This band has good propagation and the ability to have greater capacity – through spectrum reuse or wider channels – adding a critical complement to the existing mobile spectrum ecosystem to be an essential component of future 5G networks.

2.5 GHz Educational Broadcast Service (EBS) Band

The EBS band consists of 114 MHz of spectrum between 2496-2690 (with the remaining 80 MHz in the band assigned to Broadband Radio Service (BRS)). Currently, eligibility to hold an EBS license is limited to:

- Accredited public and private educational institutions.
- Governmental organizations engaged in the formal education of enrolled students.
- Non-profit organizations whose purposes are educational and include providing educational and instructional television material to accredited institutions and governmental organizations.

EBS licensees provide an educational service that has generally been used for the transmission of instructional material to accredited education institutions. EBS allows educators to offer instructional services utilizing low-power broadband systems and high-speed internet access. **Importantly, licensees can lease their excess capacity to commercial providers and most have done so.** Eligible educational entities are required to retain at least 5% of the system's capacity for their educational mission and they must use each channel at least 20 hours per week for educational purposes.

The FCC has initiated a Rulemaking evaluating how best to incentivize more efficient and effective use of this spectrum by providing greater flexibility to current EBS licensees as well as providing new opportunities for additional entities to obtain unused EBS spectrum to facilitate improved access to wireless services, including 5G. They are also considering alternative approaches to include moving directly to an auction for some or all of the spectrum.

Given that a majority of EBS spectrum is no longer used for its original purpose – educational broadcast service – and is leased or unused, the most effective, timely, and efficient way to unleash this band's full potential is through appropriate market mechanisms - an auction for the non-licensed portions of the band (frequency and geography) and an incentive auction allowing incumbent licensees to transfer their spectrum rights in exchange for fair market compensation.

3.5 GHz Citizens Band Radio Service (CBRS) Band - 3550-3700 MHz

The FCC has developed a unique sharing arrangement in the CBRS band whereby there will be a three-tiered spectrum authorization framework to accommodate a variety of commercial uses on a shared basis with incumbent federal and non-federal users of the band. Access and operations will be managed by a spectrum access system (SAS). The three tiers are: **Incumbent Access, Priority Access, and General Authorized Access.**

- **Incumbent Access** users include authorized federal and grandfathered Fixed Satellite Service (FSS) users, primarily for U.S. Naval radar operations.

- The **Priority Access** tier consists of Priority Access Licenses (PALs) that will be assigned via an auction of 70 MHz, consisting of seven 10 MHz licenses within the 3550-3650 MHz portion of the band. PAL licenses will be issued on a county-level basis and will have a 10-year life with renewal expectancy.
- The **General Authorized Access** (GAA) tier is licensed-by-rule to permit open, flexible access to the band for the widest possible group of potential users. GAA users are permitted to use any portion of the band not assigned to a higher-tier user and may also operate opportunistically on unused Priority Access channels.

As noted, a SAS will manage access and operations in the band. The SAS is an automated radio spectrum coordinator tasked with protecting the higher-tier users from lower-tier users while optimizing the efficient use of the available spectrum. The SAS maintains a database of all CBRS radio base stations, including their tier status, geographical location, and other pertinent information to coordinate frequency, transmit power assignments, and monitor and protect the band from potential interference. It will take input from the Environmental Sensing Capability (ESC) informing it of incumbent naval radar activity and whether the frequencies can be used by PALs or GAA. This experimental three-tier operation is expected to become operational in 2019.

C-Band – Ranges from 4.0-8.0 GHz

The C-band is used for many satellite communications transmissions, WiFi, microwave backhaul, and some weather radar systems. Nearly all C-band communication satellites use the band of frequencies from 3.7 to 4.2 GHz for their downlinks (space to earth), and the band of frequencies from 5.925 to 6.425 GHz for their uplinks (earth to space), providing backhaul for data and video programming.

For satellite communications, the C-band offers better reliability for satellite systems relative to higher-frequency satellite bands, which are more susceptible to rain fade and adverse weather conditions. Rain fade is the primary problem at the higher frequencies as a consequence of precipitation and moisture in the air.

3.7-4.2 GHz Band

The FCC has an open proceeding evaluating reallocation of a portion of the 3.7-4.2 GHz Fixed Satellite Service (FSS) C-band for terrestrial mobile use. While there is some disagreement over whether repurposing should be done through an auction or secondary market transaction, most parties, including incumbent FSS providers, support a voluntary and market-driven repurposing of at least a portion of the band. Tapping into the C-band's potential in the mid-band range to facilitate the deployment of terrestrial 5G will yield tremendous economic and societal benefits for the American public. At the same time, it is critical that clear, transparent, and thoughtful processes and procedures are implemented in order to ensure incumbent C-band users are held harmless.

6 GHz Band

The 6 GHz band has extensive fixed microwave point-to-point use, both from commercial entities and public safety. The unlicensed community, think WiFi, is very interested in this band being used for unlicensed services due to its adjacency to the unlicensed 5 GHz bands. Similar to the 3.7-4.2 GHz band, the FCC should balance the need to protect both existing users and the proposed unlicensed use.