

# Spectrum For Next Generation Wireless: 5G and Wi-Fi

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**Note: The views expressed in this presentation are those of the author and may not necessarily represent views of the Federal Communications Commission**



## Topics

- The spectrum landscape, both licensed and unlicensed.
- Licensed:
  - High, mid and low bands.
- Unlicensed:
  - 6 GHz draft Report and Order, releasing 1.2 GHz of new spectrum for unlicensed use, April 2020
  - Repurposing 5.9 GHz, Fall 2020





## FCC 5G FAST Plan: Facilitate America's Superiority in 5G Technology: <https://www.fcc.gov/5G>

- Comprehensive strategy to allocate spectrum in high, mid and low-bands as well as unlicensed.
- **High-band (> 24 GHz):** small-cell, deployments using 5G mmWave. ~ 1 Gbps throughputs.
- **Mid-band (1 GHz – 6 GHz):** Balance coverage with throughput.
- **Low-band (< 1 GHz):** Wide area coverage, e.g. for IoT applications.
- **Unlicensed:** Enable expansion of Wi-Fi and deployment of 5G in unlicensed spectrum.



## High Band

- Completed auctions:
  - Jan. 2019: 800 MHz in 28 GHz.
  - May 2019: 750 MHz in 24 GHz
  - Mar. 2020: 3.4 GHz in upper 37 GHz, 39 GHz and 47 GHz.
- 4.95 GHz of spectrum allocated for mmWave 5G.
  - US leads the world in high-band licensed allocations.
- Aggressive roll out of mmWave 5G across the US, delivering Gbps speeds.



## Mid-Band

- 2.5 GHz (2496 MHz – 2690 MHz): single largest contiguous block of spectrum below 3 GHz
  - Currently allocated to Educational Broadcast Service (EBS) and Broadband Radio Service (BRS)
  - Anticipated auction: 2021
- C-Band Report and Order: [https://docs.fcc.gov/public/attachments/FCC-20-22A1\\_Rcd.pdf](https://docs.fcc.gov/public/attachments/FCC-20-22A1_Rcd.pdf)
  - Public auction of 280 MHz, 3.7 GHz – 3.98 GHz, starting Dec. 2020.
  - Satellite incumbents will be moved out of this band.
  - 200 MHz will continue to be reserved for satellite.
- CBRS (3.55 GHz – 3.65 GHz) auctions started July 23, 2020 for Priority Access Licenses (PAL)
- Potential sharing in 3.45 GHz – 3.55 GHz, NTIA report on spectrum sharing: [https://www.ntia.gov/files/ntia/publications/1-24-2020\\_ntia\\_tr-20-546.pdf](https://www.ntia.gov/files/ntia/publications/1-24-2020_ntia_tr-20-546.pdf)
  - Announcement on moving ahead with freeing up the band, Aug. 10, 2020: <https://docs.fcc.gov/public/attachments/DOC-366068A1.pdf>



## Low-Band

- 600 MHz: 70 MHz of licensed spectrum
- 900 MHz: repurposed to enable broadband using LTE and possibly 5G.

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## Unlicensed

- 5.925 GHz – 7.125 GHz: 1.2 GHz of spectrum for unlicensed use.
  - Will be shared with existing incumbents: 6 GHz fixed links and Broadcast Auxiliary Services (BAS)
  - Rules will permit low power indoor without AFC and higher power outdoor with AFC.
  - Envisaged use: Wi-Fi, 5G NR-U
- 5.85 GHz – 5.925 GHz: repurpose lower 45 MHz of DSRC band for unlicensed use
- 95 GHz: 21.2 GHz for unlicensed use



## Closing thoughts: Sustainable Spectrum Strategy

- Presidential Memorandum on Developing a Sustainable Spectrum Strategy For America's Future, Oct. 25, 2018 <https://www.whitehouse.gov/presidential-actions/presidential-memorandum-developing-sustainable-spectrum-strategy-americas-future/>
  - increase spectrum access for all users, including on a **shared** basis, through transparency of spectrum use and improved cooperation and collaboration between Federal and non-Federal spectrum stakeholders;
  - create **flexible models** for spectrum management, including standards, incentives, and enforcement mechanisms that promote efficient and effective spectrum use, including flexible-use spectrum licenses, while accounting for critical safety and security concerns;
  - use ongoing research, development, testing, and evaluation to develop advanced technologies, innovative spectrum-utilization methods, and **spectrum-sharing tools** and techniques that increase spectrum access, efficiency, and effectiveness;
  - build a secure, automated capability to facilitate assessments of spectrum use and expedite coordination of **shared access** among Federal and non-Federal spectrum stakeholders;

