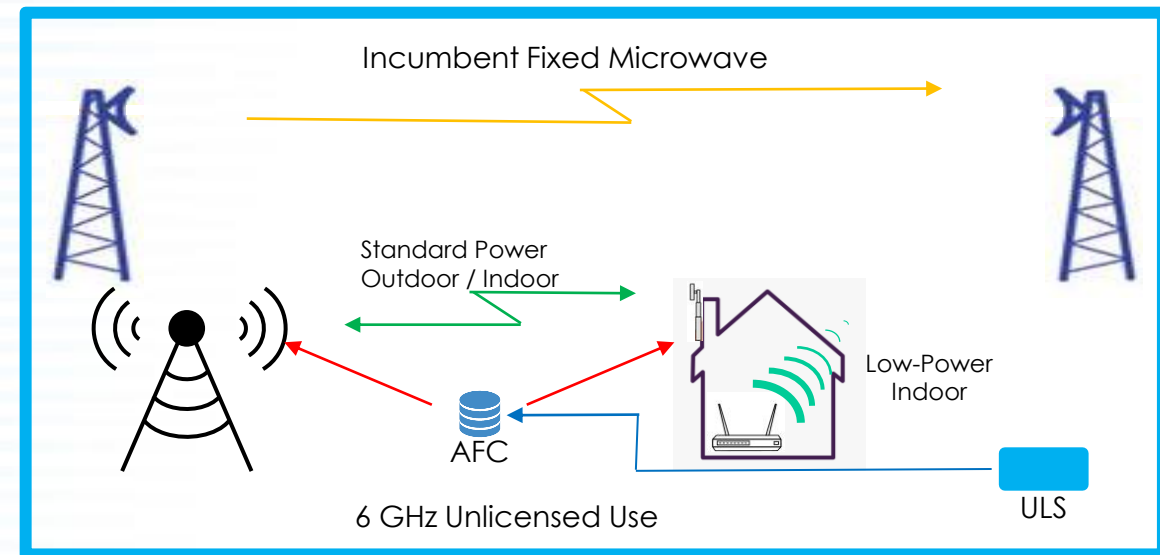
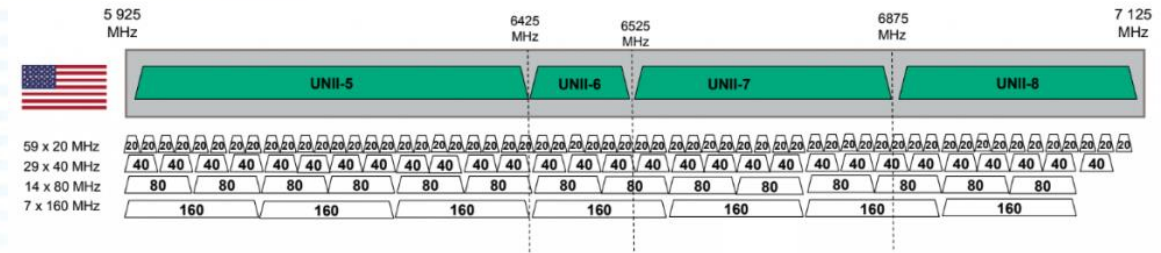




# 6 GHz

## Unlicensed Sharing with Fixed Microwave Links

- Report & Order adopted April 2020
- 1200 megahertz for unlicensed use in four sub-bands
  - Up to 7 160-megahertz wide channels
  - Standard access points in U-NII-5, 7 only
  - Low-power indoor access points across full band
  - Contention-based protocol required
- Unlicensed access to full band
  - Significant economic value of unlicensed operations
    - Only spectrum where new Wi-Fi 6 with larger channels/higher throughput can operate
    - Plans for Wi-Fi 7; even higher data rates
  - Other mid-band spectrum available (or soon to be available) for licensed operations
    - Continued effort to identify additional mid-band spectrum for flexible use

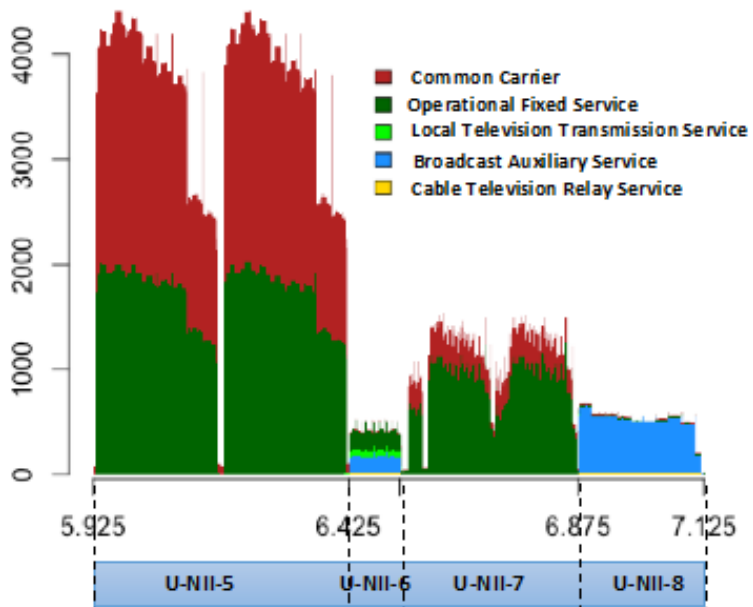




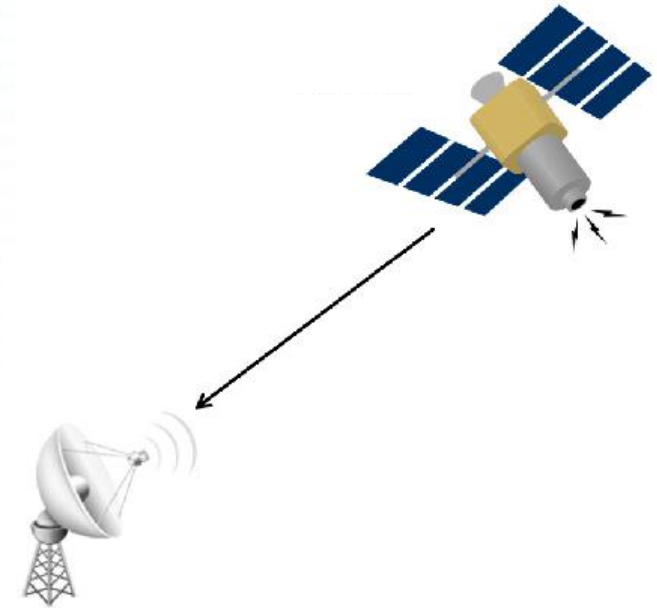
# 6 GHz Band Incumbents

47,695 unique call signs

FCC Assignments per Megahertz



Microwave links (including public safety, utilities, cellular backhaul),  
Broadcast Auxiliary Services



Fixed Satellite Service  
1,517 Downlinks  
21 Uplinks



# Why 1200 MHz For Unlicensed Devices?

- Balanced approach to spectrum
  - Commission recently made / is pursuing licensed spectrum available for mid-band
    - 530 MHz available for mobile broadband (3.45-3.55 GHz, 3.55-3.7 GHz, 3.7-3.98 GHz)
    - 3.1-3.45 GHz currently under study
- Economic Impact
  - Consumer Technology Association – permitting unlicensed use would add over \$95.8 billion to the economy (retail hardware sales)
  - The Economic Value of Wi-Fi: A Global View (2018 and 2023)
    - 2025 forecast predicts 6 GHz band addition will add additional \$200B in economic value to U.S.; value will continue to grow over time
    - Job creation by 2025 will reach 720,000
    - [https://www.wi-fi.org/download.php?file=/sites/default/files/private/The Economic Value of Wi-Fi-A Global View 2021-2025 202109.pdf](https://www.wi-fi.org/download.php?file=/sites/default/files/private/The_Economic_Value_of_Wi-Fi-A_Global_View_2021-2025_202109.pdf)
- Most data traffic already carrier over Wi-Fi
  - Carriers rely on Wi-Fi to keep their networks from capacity overload
- Future-proof for Wi-Fi 7
  - Three 320-megahertz channels available vs. only one in lower 500 megahertz



# Technical & Operational Rules

Device Class	Operating Bands	Maximum EIRP	Maximum EIRP Power Spectral Density
Standard-Power Access Point (AFC Controlled)	U-NII-5 (5.925-6.425 GHz) U-NII-7 (6.525-6.875 GHz)	36 dBm	23 dBm/MHz
Client Connected to Standard-Power Access Point		30 dBm	17 dBm/MHz
Low-Power Access Point (indoor only)	U-NII-5 (5.925-6.425 GHz) U-NII-6 (6.425-6.525 GHz) U-NII-7 (6.525-6.875 GHz) U-NII-8 (6.875-7.125 GHz)	30 dBm	5 dBm/MHz
Client Connected to Low-Power Access Point		24 dBm	-1 dBm/MHz

Maximum EIRP is based on a 320-megahertz wide channel; power density limits EIRP for other channel bandwidths

**Standard-Power Access Point** is limited to U-NII-5 & 7 (avoids operation in bands with mobile services), can operate outdoors and must be under the control of an Automated Frequency Coordination system (i.e., database)

**Low-Power Indoor Access Point** can operate throughout entire 1200 megahertz, but is limited to indoor usage (takes advantage of building attenuation to enable co-existence)

Rules permit additional devices to enable mesh networking





# Technical & Operational Rules (cont'd)

- Standard-Power Access Points
  - Must limit power to 21 dBm above 30-degree antenna elevation angle
  - Operation is prohibited on oil platforms, cars, trains, boats, and aircraft
- Low-Power Indoor Access Points
  - Operation permitted on large aircraft flying above 10,000 feet
  - Must implement a contention-based protocol
- All Access Points
  - Prohibited to communicate with unmanned aerial systems

Commission requested that industry stakeholders create multi-stakeholder group to address issues of common interest:

- AFC standards, testing, development
- Process for interference detection and mitigation



# 6 GHz – Ongoing Work

- AFC approvals
  - 13 interested entities; proposals currently under review
  - Testing procedures still being worked out
- AFC Waiver request to use building entry loss for indoor standard power devices
- Petitions for Reconsideration
  - Issues involve testing mandates for LPI, spectrum set-aside for licensed use, allowing higher power standard power access point
- Further Notice of Proposed Rulemaking
  - Very low power operations
  - Increase power for LPI
  - Mobile standard power access points
  - Higher power limits and antenna directivity for standard access points



# Ongoing Work (Cont'd)

- Public Notice
  - Sought comment on allowing client-to-client communications
- Petition for Rulemaking and Stay Request
  - Revise LPI rules – proponents hid extent of beacon signaling in wi-fi
  - Reimburse incumbents for cost of interference monitoring and mitigation
  - Conduct field testing to ensure AFC protects operations
  - Cease certifying equipment
- Rule interpretations
  - Indoor vs outdoor use
- Outside FCC
  - Multistakeholder group/Winnforum/Wi-Fi Alliance/Others working on technical standards for access points and AFC as well as testing AFC protocols