



FCC Perspective on Paving the Way for 6G and Beyond

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Update on 6G R&D Efforts

- **Largely industry-driven**
- **Public-private partnerships**

Examples of U.S. government initiatives:

- National Science Foundation (NSF):
 - Resilient and Intelligent Next-Generation Systems (RINGS)
 - Platforms for Advanced Wireless Research (PAWR)
 - Spectrum Innovation Initiative (SII)
 - *For additional information, see generally:*
<https://www.nsf.gov/cise/advancedwireless/>.

Strategic Collaboration Toward 6G

Examples include:

- **U.S.-Japan Competitiveness and Resilience (CoRe) Partnership** (April 2021): Will “strengthen competitiveness in the digital field by investing in research, development, testing, and deployment of secure networks and advanced ICT including 5G and next-generation mobile networks (‘6G’ or ‘Beyond 5G’),” with a joint commitment of US\$4.5 billion.
- **U.S.-Korea Leaders’ Summit** (May 2021): “We commit to forging new ties on [...] emerging technologies, including 5G and 6G technology... [...] President Biden and President Moon commit to work together to develop open, transparent, and efficient 5G and 6G network architectures using Open-RAN technology.”
- **U.S.-UK science & technology partnership agreement** (June 2021): Announced plans to develop a detailed agreement, to include a provision on the development of 6G technology.
- **Quad Leaders’ Summit** (Sept. 2021): “In partnership with industry, we are advancing the deployment of secure, open, and transparent 5G and beyond-5G networks, and working with a range of partners to foster innovation and promote trustworthy vendors and approaches such as Open-RAN.”

Industry & Multistakeholder Engagement



ATIS Next G Alliance: <https://nextgalliance.org/>

6G@UT: <http://6g-ut.org/>

FCC Technology Advisory Council: <https://www.fcc.gov/general/technological-advisory-council>

“What we need now is new thinking, broader consensus, and more early focus than we had for 5G. We need a process for prioritizing and executing on spectrum objectives and for developing strategies to align the ends, ways, and means for 6G [...] that brings together government, business, the non-profit sector, and the rest of civil society and the public to chart a new course. That way, we can pursue policymaking that works and ensure our continued wireless leadership far into the future.”

FCC Chairwoman Jessica Rosenworcel

Experimental Licenses & Innovation Zones

The FCC adopted rules in 2013 creating the opportunity for expanded experimentation through Program Experimental Licenses and Innovation Zones.

- **Program Experimental License:** Qualified institutions may conduct testing for multiple non-related experiments under a single authorization within a defined geographic area under control of the licensee and where the licensee has institutional processes to manage and oversee experiments.
- **Innovation Zones:** Take this concept a step further by effectively providing an extension of a Program Experimental License's authorized area of operation. Such licensees are permitted to operate within an Innovation Zone, under the parameters set for that zone, without having to modify their licenses to cover the new location.
 - **Sept. 2019: First two Innovation Zones (New York City and Salt Lake City)**
 - **Aug. 2021: Additional two Innovation Zones (Boston and Raleigh):**
<https://www.fcc.gov/document/fcc-established-two-new-innovation-zones-boston-and-raleigh>

FCC Regulatory Philosophy

- Light-touch regulatory approach – goal: facilitate an enabling environment in which market-driven, industry-led innovation can thrive.
- Key elements:
 - Flexible, technology-neutral rules that provide regulatory certainty
 - Fact-based, data-driven decisions
 - Active stakeholder participation through an open, transparent & collaborative process
- A light touch approach does *not* mean a lack of government action where needed.
 - When no rational business incentives exist in the market, it is the FCC's responsibility to step in to encourage and incentivize investment and deployment.
 - Example: universal service.

FCC Strategic Goals

Pursue a “100%” broadband policy

Promote diversity, equity, inclusion, and accessibility

Empower consumers

Enhance public safety and national security

Advance America’s global competitiveness

Foster operational excellence



The FCC is focusing on five principles for delivering 5G that is fast, secure, resilient, and available everywhere:

- 1) Ensuring sufficient spectrum**
- 2) Expanding the reach of fiber facilities**
- 3) Equipment diversity**
- 4) Building security and resiliency in our supply chains**
- 5) Working with friends and allies on the global stage on setting the technology standards of the future**

Spectrum in the United States for 5G Use (and Beyond):

High-band:	<p><u>24 GHz</u> band (24.25-24.45 GHz; 25.25-25.75 GHz)</p> <p><u>28 GHz</u> band (27.5-28.35 GHz)</p> <p><u>Upper 37 GHz</u> (37.6-38.6 GHz), <u>39 GHz</u> (38.6-40 GHz), and <u>47 GHz</u> (47.2-48.2 GHz) bands</p> <p>Exploring the <u>26 GHz</u> (25.25-27.5 GHz), <u>42 GHz</u> (42-42.5 GHz), and <u>50 GHz</u> (50.4-52.6 GHz) bands</p>
Mid-band:	<p><u>2.5 GHz</u> band (auction planning in progress)</p> <p><u>3.45-3.55 GHz</u> band (auction began Oct. 5, 2021)</p> <p><u>3.5 GHz</u> band</p> <p><u>3.7-3.98 GHz</u> band</p>
Low-band:	<p><u>600 MHz</u> band</p> <p><u>800 MHz</u> band</p> <p><u>900 MHz</u> band</p>
Unlicensed:	<p>Creating opportunities for Wi-Fi in the <u>6 GHz</u>, <u>61-71 GHz</u> and <u>above 95 GHz</u> bands</p>

Promoting Innovation in Unlicensed Spectrum

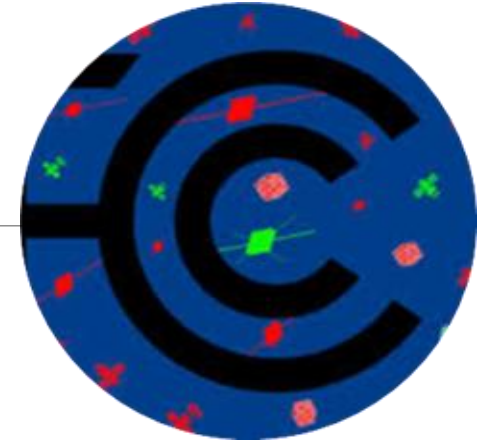
Because unlicensed spectrum will be important for 5G, the FCC is creating new opportunities for the next generation of Wi-Fi (**6 GHz**, **57-71 GHz**, and **above 95 GHz**).

- *Example:* In April 2020, the FCC adopted rules that made 1,200 megahertz of spectrum in the 6 GHz band (5.925–7.125 GHz) available for unlicensed use.



Image source: Cisco

Facilitating Space-Based Services



Provided a balanced approach vis-à-vis high-band spectrum:

- Preserved the 48.2-50.2 GHz and 40-42 GHz bands for next generation satellite use.
- Ensured flexibility in the FCC's earth station siting rules for the 28 GHz and 39 GHz bands.
- Permitted individually licensed FSS earth stations in the 50.4-51.4 GHz band.

Facilitated innovation and investment in satellite-based services, *e.g.*, took action to streamline space station and earth station rules, easing the path for the rollout of new services.

Licensed GSO high-throughput satellites to provided new high-speed broadband options for consumers.

NGSO FSS systems:

- To date, the Commission has approved ten applications, that are currently active, to launch NGSO satellite constellations using the Ku-, Ka-, and/or V-bands.
- Licensed systems range from two satellites to more than 4,000 satellites in different orbits.
- Launch, deployment, and testing of the first operational satellites has already begun.

Expanding Connectivity

FCC universal service programs:

- 1) **High-cost** (*e.g.*, Rural Digital Opportunity Fund): Subsidizes voice & broadband in high-cost areas
- 2) **E-Rate**: Reduces cost of broadband for K-12 schools & libraries
- 3) **Lifeline**: Reduces cost of voice & broadband for low-income consumers
- 4) **Rural Health Care**: Reduces cost of broadband for rural healthcare providers

Other FCC broadband programs:

- Emergency Broadband Benefit: <https://www.fcc.gov/emergency-broadband-benefit-program>
- Emergency Connectivity Fund: <https://www.fcc.gov/emergency-connectivity-fund>
- COVID-19 Telehealth Program: <https://www.fcc.gov/covid-19-telehealth-program>

Open RAN and Supply Chain Integrity

Open Standard Radio Access Networks (Open RAN): software-centric approach drives innovation, supply-chain diversity and increased security.

In Feb. 2021, the FCC adopted a **Notice of Inquiry (NOI) on Open RAN.**

Open RAN Showcase (July 14-15, 2021):

- <https://www.fcc.gov/news-events/events/2021/07/open-ran-solutions-showcase-day-1>
- <https://www.fcc.gov/news-events/events/2021/07/open-ran-solutions-showcase-day-2>



Building a more secure, resilient, and next-generation communications supply chain for the future by:

- 1) Slowing down untrusted vendors
- 2) Speeding up trustworthy innovation
- 3) Collaborating with government, industry, and partner nations

See generally: <https://www.fcc.gov/supplychain>

