FCC'S Actions to Ensure U.S. Leadership in 5G

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For Tactical and First Responder Networks
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Note: The views expressed in this presentation are those of the author and may not necessarily represent the views of the Federal Communications Commission

5G Is Transformational

- Key characteristics:
  - Much faster data speed – necessary for some applications (VR, AR)
  - Greater capacity - - necessary for expanding applications
  - Reduced latency - - enables near real-time interactions
  - Ultra-reliable communications – required for certain sectors
  - Multiple delivery platforms – fixed, mobile, satellite
- Ability to tailor service to the applications:
  - Network slicing
  - Software defined networking
- Supports massive growth for the Internet of Things

5G: New Use Cases for Verticals

New Wireless Connectivity Options for Every Industry & Sector

- Public Safety
- Transportation
- Healthcare
- Education
- Energy
- Media
- Smart Cities
- Agriculture
- Building & Home Automation
- And Many Others . . .

5G Public Safety & Tactical Use Cases

2.6 EMERGENCY, DISASTERS AND PUBLIC SAFETY

The use cases in this category require robust and reliable communications in case of natural disasters such as earthquakes, tsunamis, floods and hurricanes. The use cases may require accurate position location and quick communication exchanges between users and systems. Energy efficiency in user battery consumption and network communications are critical in these use cases. The public safety organizations require enhanced and secured communications with real-time video and the ability to send high-quality pictures.

https://www.5gamericas.org/wp-content/uploads/2019/07/5G_Americas_URLLLC_White_Paper_Final__updateJW.pdf

DoD 5G Findings

The Task Force deliberations resulted in the following six overarching findings.

Finding 1: 5G Bandwidth (BW) and services, low power implementations and low latency capabilities may enhance DoD current mission capabilities and have potential to create new mission capabilities.

- Multiple strategies for adopting 5G must be considered
- Insufficient 5G resources and testbed(s) capable of evaluating current and proposed standards, capabilities and technologies exist

https://dsb.cto.mil/reports/2010s/5G_Executive_Summary_2019.pdf?zoom_highlight=5G

FCC 5G FAST Plan

Facilitate America's Superiority in 5G Technology

https://www.fcc.gov/5G

Spectrum:

- ***High-band:*** Completed auctions of both the 28 GHz and 24 GHz bands - - a combined 1,550 megahertz of spectrum. This December 10, will launch an auction of the upper 37 GHz, 39 GHz, and 47 GHz band – a combined 3,400 megahertz of spectrum.

- ***Mid-band:*** Adopted flexible new rules for the 2.5 GHz band - intend to auction the unused portions of the band next year. Will auction 70 MHz of spectrum in the 3.5 GHz band next year. And working to free up additional airwaves for 5G in the 3.7-4.2 GHz band, commonly called the C-band.

- ***Low-band:*** Repurposing spectrum for mobile broadband in the 600 MHz band, which was long used for broadcast television.

- ***Unlicensed:*** Made over 21 gigahertz of spectrum available for use by unlicensed devices above 95 GHz; proposed 1,200 megahertz of potential spectrum for next-generation Wi-Fi at 6 GHz

FCC 5G FAST Plan

Facilitate America's Superiority in 5G Technology

https://www.fcc.gov/5G

- **Infrastructure Policy:**
  - Speeding Up the Deployment of small cells
  - Speeding up State and Local Review of Small Cells
- **Modernizing Outdated Regulations:**
  - Restoring Internet Freedom
  - One-touch make ready
  - Speeding the IP Transition
  - Business Data Services
  - Supply Chain Integrity

Citizen's Broadband Radio Service (3.5 GHz)

CBRS – A New Opportunity for Verticals

- Based on sophisticated spectrum access system
- Multi-stakeholder process developed details
- Widespread support – combines licensed and unlicensed models
- FCC has approved SAS's, Initial Commercial Deployments (ICDs) & Devices
- Opens the door to localized demand/applications

CBRS Alliance Initial Commercial Launch
Event September 18, 2019

See https://www.cbrsalliance.org/

A few examples of connectivity solutions described on web site:

OnGo Private LTE Deployment Guide

The universe of mobile communications just became larger. With Federal Communications Commission authorization of Citizen…

Private LTE

OnGo Case Study: Aristotle Unified Communications

Aristotle Unified Communications uses OnGo solutions to provide cost-affordable, reliable connectivity to rural areas that…

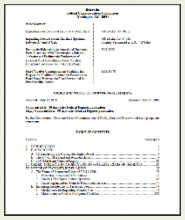
Rural Connectivity

OnGo Case Study: Dallas Love Field Airport

Dallas Love Field Airport uses OnGo solutions to provide high-performance, low-latency connectivity to its customers,…

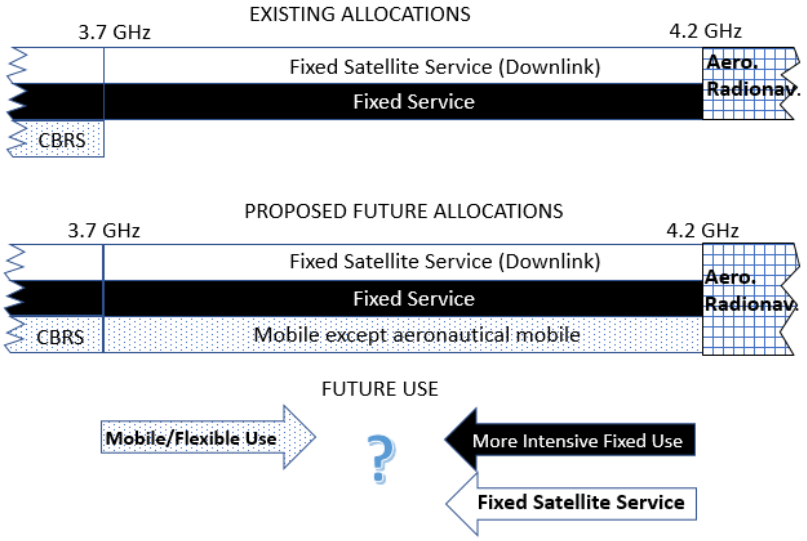
Deployment at an Airport

Proposal to Repurpose C-band Spectrum (3.7 – 4.2 GHz) For Wireless



https://www.fcc.gov/document/fcc-expands-flexible-use-mid-band-spectrum

- Notice of Proposed Rule Making
- Considers of C-band DL for wireless
- C-Band Alliance proposal (transition via market transactions)
- Commenters suggest alternatives
- Complex policy, legal, economic and technical issues
- Action expected later this year



Many Approaches Suggested:

- Market Mechanisms
- Auctions
- Combination of approaches
- Reallocation of X MHz
- Sharing of remaining satellite spectrum w/ fixed service

Proposal for Unlicensed at 6 GHz Based on Sharing

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183

NOTICE OF PROPOSED RULEMAKING

Adopted: October 23, 2018 **Released: October 24, 2018**

Comment Date: 60 days after Federal Register publication
Reply Comment Date: 90 days after Federal Register publication

By the Commission: Chairman Pai and Commissioners O'Rielly, Carr, and Rosenworcel issuing separate statements.

See https://www.fcc.gov/document/fcc-proposes-more-spectrum-unlicensed-use-0

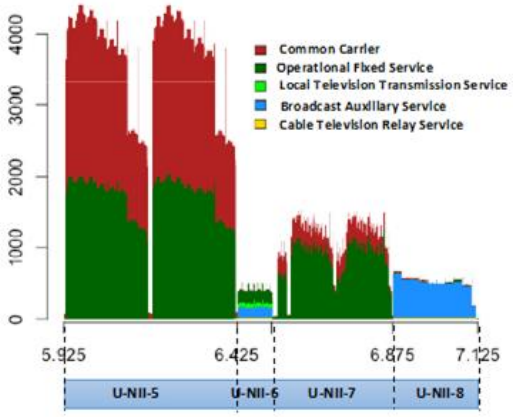


Figure 1. Assignment Density

Band (GHz)	Primary Allocations	Reference used in this NPRM[63]	Devices
5.925-6.425	Fixed Service FSS	U-NII-5	Standard-Power Access Point
6.425-6.525	Mobile Service FSS	U-NII-6	Low-Power Access Point
6.525-6.875	Fixed Service FSS	U-NII-7	Standard-Power Access Point
6.875-7.125	Fixed Service Mobile Service FSS[64]	U-NII-8	Low-Power Access Point

Proposed sharing with fixed service based on automated frequency coordination (for outdoor use)

Expanding Access to Upper Reaches of the Spectrum

- **FCC Spectrum Horizons proceeding**
- **Expanded access above 95 GHz**
  - **Order adopted March 15, 2019**
  - **Total of 21.2 GHz for unlicensed use**
    - 116-123 GHz, 174.8-182 GHz, 185-190 GHz and 244-246 GHz, bands
    - Similar to 60 GHz rules
    - Selected high absorption bands
  - **New type of experimental licenses > 95 GHz**
    - Longer license terms
    - Ability to sell devices

Much of the spectrum above 95 GHz is allocated for passive services

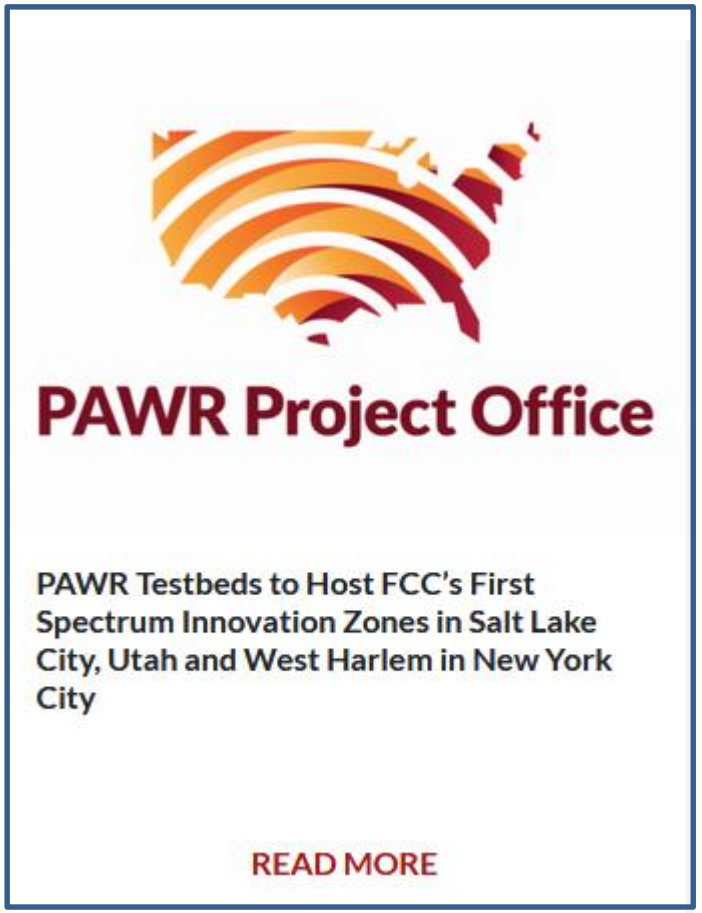
Achieve Fiber Capacity

Innovation

See https://www.fcc.gov/document/fcc-opens-spectrum-horizons-new-services-technologies-0

Innovation Zones

- On 9/18/19 FCC announced the first Innovation Zones for Program Experimental Licenses See https://docs.fcc.gov/public/attachments/DA-19-923A1.pdf
- New York City and Salt Lake City
- Process is in place to protect against harmful interference
- Platforms for Advanced Wireless Research (PAWR) - funded by the National Science Foundation sponsored and a consortium or 30 companies - - supports 5G R&D

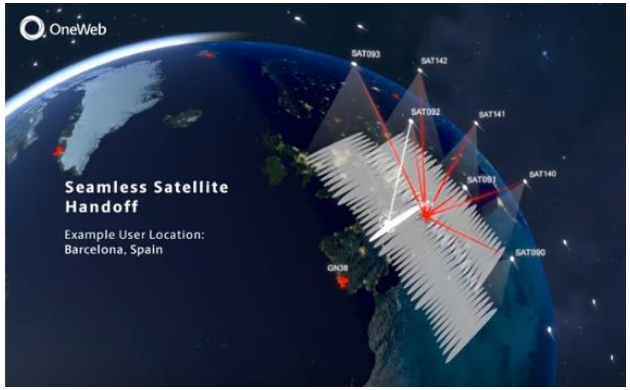


See https://advancedwireless.org/

Broadband Via Satellite

- FCC has licensed multiple LEO satellite systems - will offer broadband connectivity
- Satellites are anticipated to play a significant role in delivering 5G, IoT and other broadband services
- President Trump signed the Space Policy Directive-2 (SPD-2) on May 24, 2018 promoting spectrum support for commercial space sector

Example: SpaceX Starlink



Example: OneWeb

700 MHz Public Safety Broadband Spectrum - FirstNet

- Most public safety bands are not suitable for broadband
- The Middle Class Tax Relief and Job Creation Act of 2012 created the First Responder Network Authority, or FirstNet
- FirstNet is an independent authority within the U.S. Department of Commerce, tasked with ensuring the establishment of a nationwide interoperable public safety broadband network - See https://www.firstnet.gov/
- The 700 MHz band is allocated for public safety broadband

World Radio Conference 2019 (WRC-19)

- International Telecommunication Union (ITU)World Radio Conferences (WRCs) review and, if necessary, revise the international Radio Regulations (RR), the international treaty governing the use of the radio-frequency spectrum.

- WRC-19 will be held in Sharm el-Sheikh, Egypt, October 28 to November 22, 2019

- Will consider spectrum to identified for 5G, among many other topics on the agenda

- Will identify spectrum to be studied for the next WRC

PRESIDENTIAL MEMORANDA

Presidential Memorandum on Developing a Sustainable Spectrum Strategy for America's Future INFRASTRUCTURE & TECHNOLOGY

Issued on: October 25, 2018

- Within 180 days agencies report anticipated future spectrum requirements
- The Director of the Office of Science and Technology Policy (OSTP) shall report on emerging technologies and their expected impact on non-Federal spectrum demand https://www.whitehouse.gov/wp-content/uploads/2019/05/Emerging-Technologies-and-Impact-on-Non-Federal-Spectrum-Demand-Report-May-2019.pdf
- The Director of OSTP shall report on recommendations for research and development priorities that advance spectrum access and efficiency https://www.whitehouse.gov/wp-content/uploads/2019/05/Research-and-Development-Priorities-for-American-Leadership-in-Wireless-Communications-Report-May-2019.pdf
- Within 270 days submit a long-term National Spectrum Strategy that includes legislative, regulatory, or other policy recommendations
- The Chief Technology Officer and the Director of the National Economic Council, or their designees, shall co-chair a Spectrum Strategy Task Force

Thank You!