

Update on FCC Actions to Make Spectrum Available for 5G



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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

New Leadership Federal Communications Commission (FCC)



L to R: Commissioner Mignon Clyburn, Chairman Ajit Pai and
Commissioner Michael O'Rielly.

Themes from Presentation At Second 5G Global Event

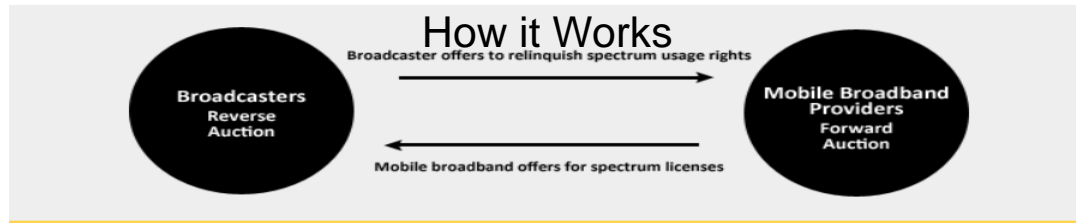
Proven formula:

- Make spectrum available
- Encourage and protect innovation-driving competition
- Stay out of the way of technological development and details of implementation

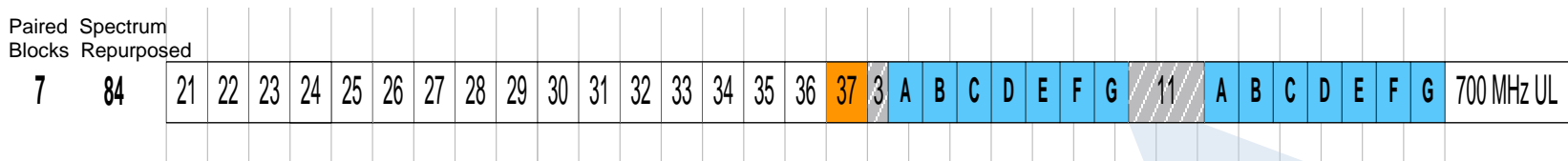
Spectrum:

- Flexibility: FCC will not designate the 5G band or bands
- Trifecta: Importance of low, mid and high band spectrum

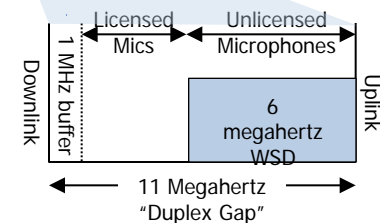
Spectrum Trifecta: Low Band TV Incentive Auction (600 MHz band)



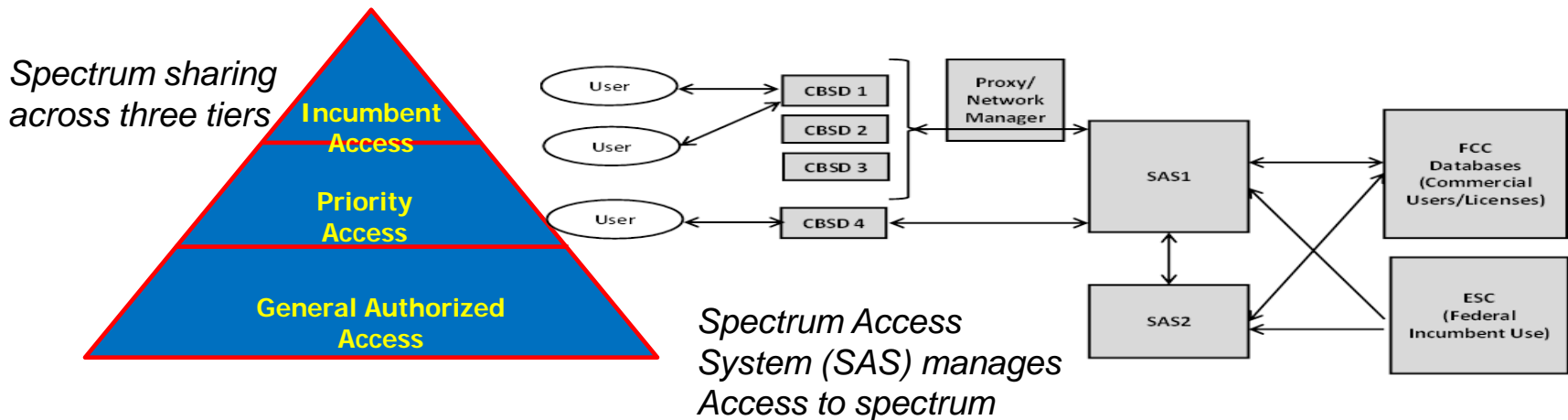
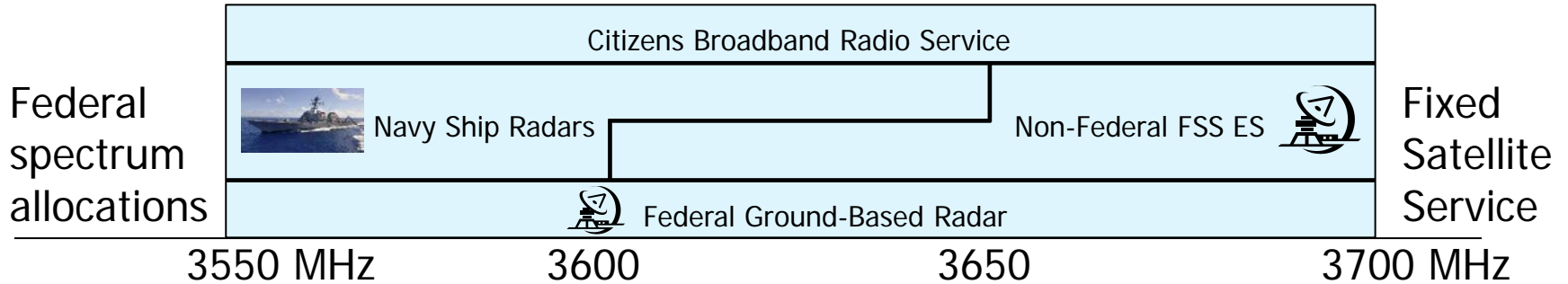
- Reverse Auction
 - Ended January 13, 2017 – Stage 4; 84 megahertz clearing target
 - Broadcaster clearing cost - ~ \$10 Billion
 - Broadcaster relocation funds – \$1.75 Billion
 - ~ \$12 Billion needed to cover costs



- Forward Auction
 - Concluded February 10, 2017
 - \$19.6 Billion in proceeds
- Auction closing and channel reassignment PN issued April 13, 2017; begins 39 month transition period



Spectrum Trifecta: Mid-band



- Approved first Spectrum Access Administrators
- Multi-stakeholder process developing implementation details
- Considering further rulemaking
- Mobile Now Act (**Pending**): Study 3100 – 3550 MHz & 3700 – 4200 MHz

Spectrum Trifecta: High-band Spectrum

□ Core Principles of FCC Approach

- Identify substantial spectrum in MMW bands for new services
- Protect incumbent services against interference
- Flexible use: Enable market to determine highest valued use
- Overlay auctions where no existing assignments
- Provide spectrum for both licensed and unlicensed use

□ Added 10.85 GHz of for mobile service

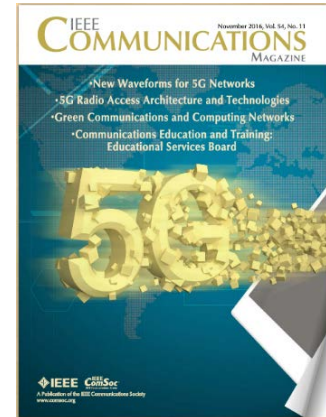
- Licensed: (3.85GHz): 27.5-28.35 GHz; 38.6-40 GHz; 37-38.6 GHz
- Unlicensed: (7GHz): 64-71 GHz

□ Upper Microwave Flexible Use Service (UMFUS)

- Licensing: Market based; Overlay Auctions; Areas; Band Plan, Term
- Technical rules
- Performance Requirements

□ Considering add'l 15.8 GHz + above 95 GHz

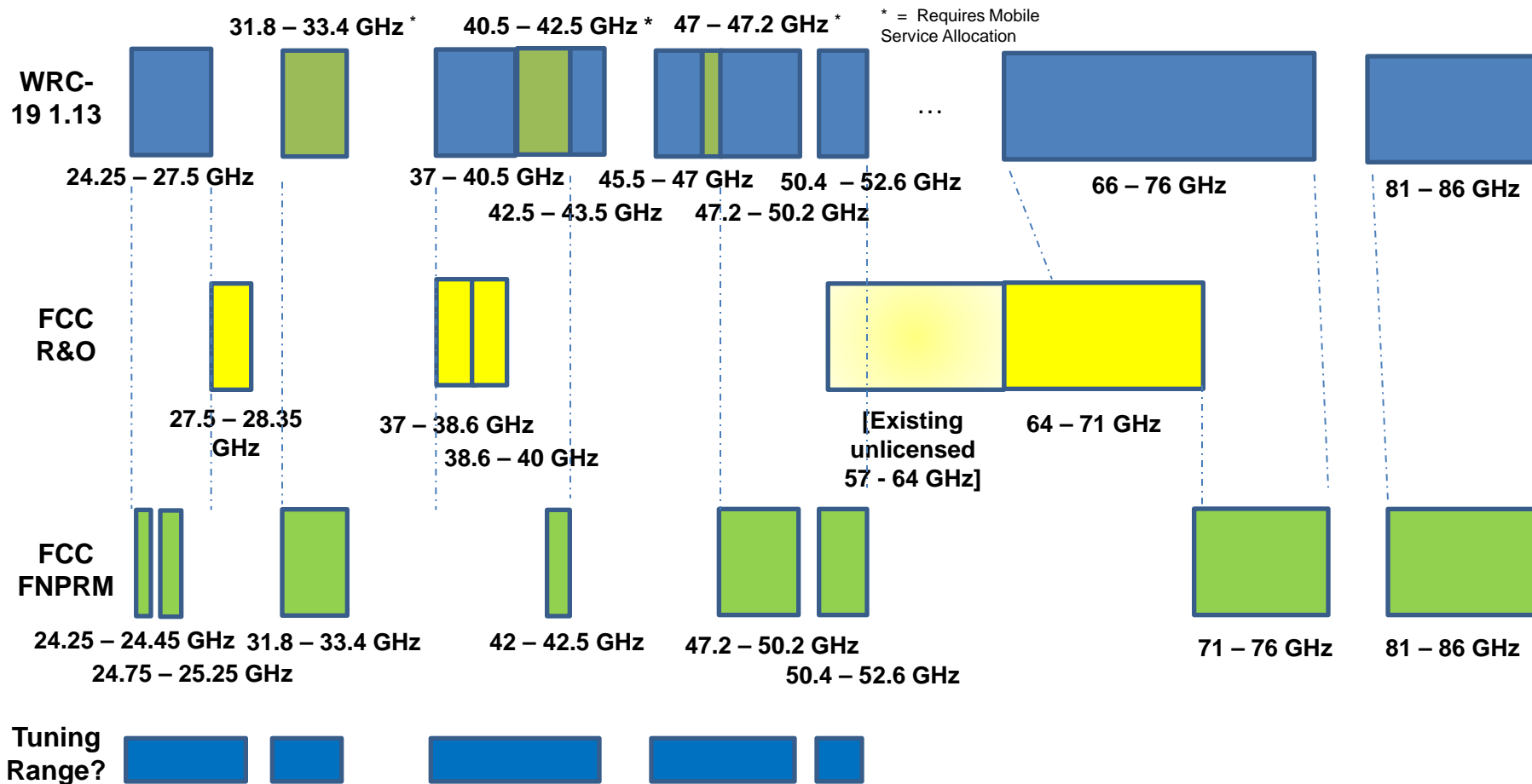
- 24.25-24.45 GHz; 24.75-25.25 GHz; 31.8-33.4 GHz; 42-42.5 GHz; 47.2-50.2 GHz; 71-76 GHz; 81-86 GHz; bands above 95 GHz



Overview of New Bands

	28 GHz	37 GHz	39 GHz	64-71 GHz
<i>Frequency</i>	27.5-28.35 GHz	37-38.6 GHz	38.6-40 GHz	64-71 GHz
<i>Bandwidth</i>	850 MHz	1600 MHz	1400 MHz	7000 MHz
<i>Terrestrial Allocation</i>	Licensed for fixed operations, with about 75% of the population covered by existing licenses; remaining licenses in inventory	Yes (no current use)	Licensed for fixed operations, with about 50% of the population covered by existing licenses; the remaining licenses are in inventory.	Yes (no current use)
<i>Federal Allocation</i>	No	Radio Astronomy / Space Research in 37-38 GHz @ 3 sites; Federal Fixed/Mobile in 37-38.6 GHz @ 14 locations	Fixed Satellite Service / Mobile Satellite Service in 39.5-40 (military use only)	Earth Exploration Satellite Fixed/Mobile/Satellite
<i>Satellite Allocation</i>	Yes	Yes (no current use)	Yes (no current use)	Yes (no current use)
<i>Licensing Scheme</i>	Licensed	Licensed	Licensed	Unlicensed

Opportunities for International Harmonization



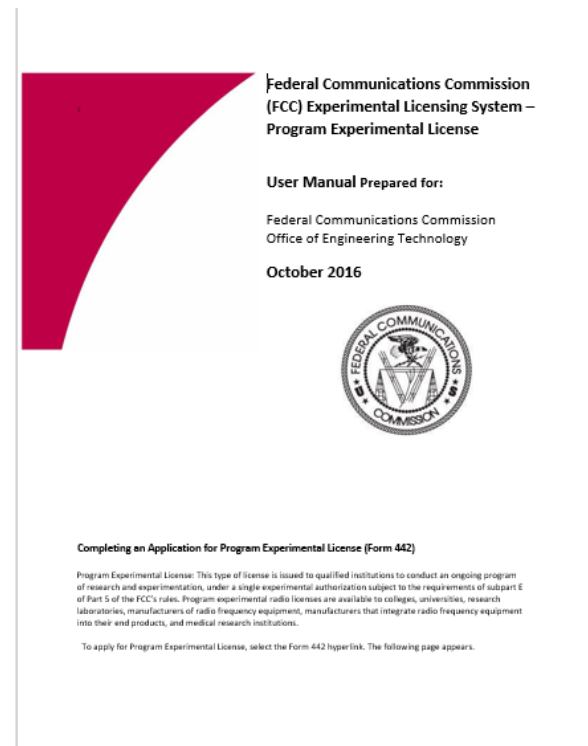
Further Developments

- Petitions for Reconsideration:
 - Generally strong support for FCC actions
 - Revisions requested for:
 - 28 GHz: Greater flexibility for earth station deployments
 - 37 GHz: Sharing with federal systems
 - 39 GHz: Adjust sharing criteria regarding terrestrial power limits and satellite pfd limits
 - Many other details
- Much industry activity: market transactions
- Continued industry testing, R&D, trial deployments

Expansion of Experimental Licensing Program (ET Docket No. 10-236)

Now Open for Business:

- ❑ **Greater flexibility to conduct research and development** by flexibility to adapt experiments within a broad range of parameters
- ❑ **Program experimental license:** Allows colleges, research laboratories, health care institutions, and manufacturers that have demonstrated experience in RF technology to conduct ongoing series of research experiments and tests
- ❑ **Clarifies, simplifies, and expands rules for market trials** - allows greater number of devices to enter U.S. for testing and evaluation purposes



National Science Foundation Advanced Wireless Research Initiative



- **Three intertwined components:**
 - Establishing **platforms for advanced wireless research** enabled by a new industry consortium and engagement of public and private partners;
 - Supporting **fundamental research enabling advanced wireless technologies**; and
 - Catalyzing **academic, industry, and community leaders** to work together to prototype innovative wireless approaches to address societal challenges.
- **Platforms for Advanced Wireless Research (PAWR)**
 - Research platforms the size of a small U.S. city – experimentation at scale
 - Public/private partnership, funding from NSF & industry consortium
 - PAWR Project Office led by US Ignite, Inc and Northeastern University
 - Builds upon FCC action on *Spectrum Frontiers*
- For details see <https://nsf.gov/cise/advancedwireless/>

Next Steps

- ❑ Address petitions for reconsideration later this year
- ❑ Determine which additional bands to make available among 24.25-24.45 GHz; 24.75-25.25 GHz; 31.8-33.4 GHz; 42-42.5 GHz; 47.2-50.2 GHz; 71-76 GHz; 81-86 GHz; and, bands above 95 GHz
- ❑ Continue support for R&D through new experimental program licenses
- ❑ Continue work looking towards WRC-19

Questions?