



MINTZ




THE FCC AND THE FUTURE OF 5G

CLE Program

May 13, 2021

SPEAKERS



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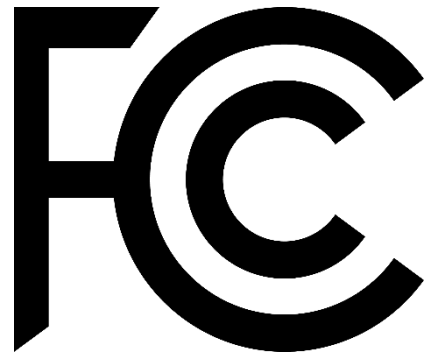



Danielle Pineres
*Vice President & Associate
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**NCTA – The Internet and
Television Association**


AGENDA

- 5G Policy and Legal Reforms
 - Overview of FCC
 - Case Studies
- Industry 5G Efforts
 - Wireless Activities and Priorities
 - Cable's 5G Role and Future
- Questions

5G Policy and Legal Reforms



The FCC and 5G

ACC NCR CLE May 13, 2021

Jessica Greffenius

Associate Chief, Mobility Division

Wireless Telecommunications Bureau



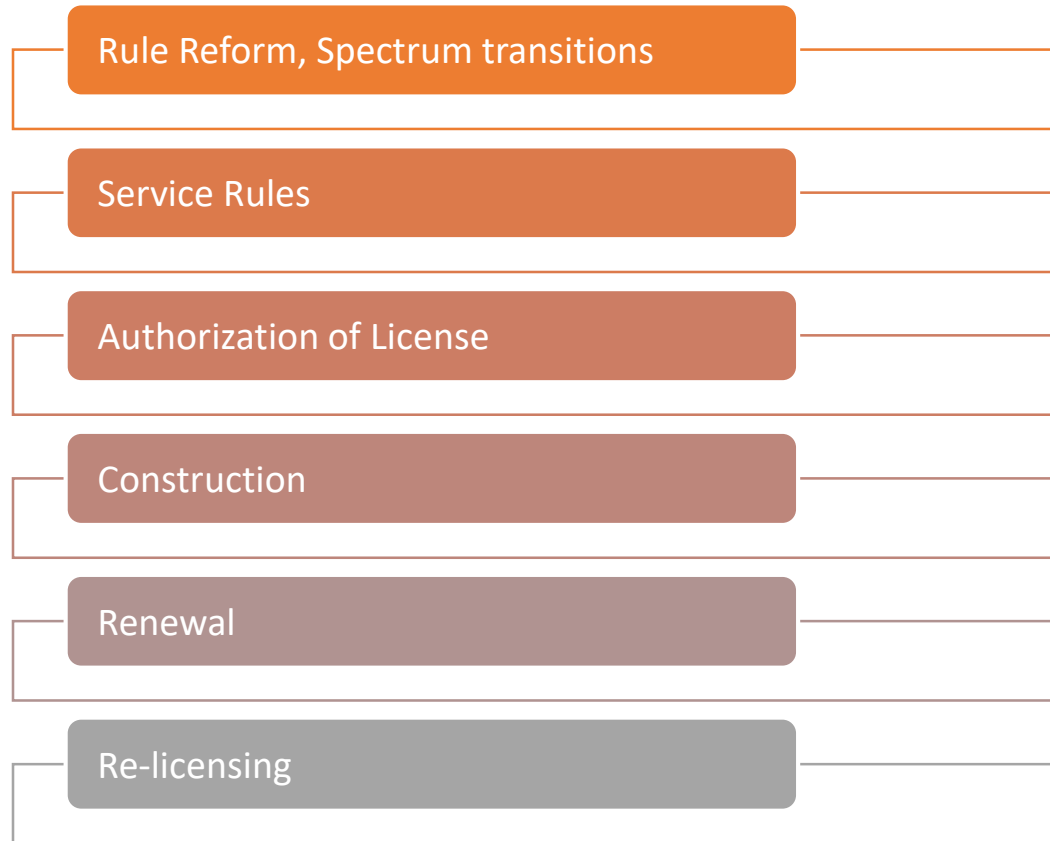
* This presentation and its contents are for informational purposes only; the Commission's rules in part 47 of the Code of Federal Regulations and the Commission's previous reports and orders adopting those rules represent the binding rules and determinations of the Commission.

Radio Spectrum

- Radio spectrum is the radio frequency (RF) portion of electromagnetic spectrum. In the United States, regulatory responsibility for radio spectrum is divided between the Federal Communications Commission and the National Telecommunications and Information Administration.
- The FCC administers spectrum for non-Federal use and the NTIA, which is an operating unit of the Department of Commerce, administers spectrum for federal use.
- The FCC's Wireless Telecommunications Bureau (WTB) develops and executes policies and procedures for fast, fair licensing of all wireless services, from fixed microwave links to amateur radio to mobile broadband services.
- WTB oversees nearly two million licenses.

Licensing and managing wireless spectrum

Lifecycle of a license



FCC develops policies and rules to facilitate rapid, widespread deployment of wireless communications services

- ✓ *Promote innovation and competition*
- ✓ *Technology neutral frameworks*
- ✓ *Efficient use of spectrum*
- ✓ *Spectrum sharing models*
- ✓ *Licensed and Unlicensed use*

The Five G's – A Chronology



5G – Rolling Out Now

Promises faster data rates and energy savings. Enhances existing networks and ushers in new uses like telemedicine and virtual reality.

4G – Streaming Video

Faster data downloads and uploads, support for data-intensive applications, gaming services, mobile TV, video conferencing, and other high-speed features.

3G – Internet and Video

Enabled full-feature mobile internet access and video calling, with faster data transmission speeds.

2G – Messaging

Replaced analog with a digital network. Enabled call and text encryption, text, and multimedia messaging.

1G – Wireless Calling

Eliminated the need for phone cords and copper wiring, enabling network calls on the go. Voice only. Poor battery life and voice quality.

Source: [fcc.gov/5G FAQs](https://www.fcc.gov/5G-FAQs)

5G Chronology

FCC SPECTRUM ACTIONS FOR NEXT-GEN WIRELESS

High-band:

[28 GHz](#) band auction (27.5 GHz – 28.35 GHz; 2 x 425) Completed January 2019

[24 GHz](#) band auction (24.25 – 24.45; 25.25 -25.75 GHz; 7 x100) Completed May 2019

[37 GHz, 39 GHz, and 47 GHz](#) auction (made available 3,400 megahertz of spectrum) Completed March 2020

Mid-band:

[3.5 GHz](#) auction completed August 2020 (7x10)

[3.7-3.98 GHz](#) “C-Band” auction completed February 2021 (14x20)

[3.45 – 3.55 GHz](#) auction targeted October 2021 (10x10)

[2.5 GHz](#) Rural Tribal Priority Window

Low-band:

[600 MHz](#) incentive auction completed March 2017, transition successfully reached July 13, 2020 deadline

[900 MHz](#) broadband license application window opens May 2021

Unlicensed:

Creating opportunities for Wi-Fi in the [5.9 GHz](#), [6 GHz](#), [57-71 GHz](#) and [above 95 GHz](#) bands.

3.45 GHz Band

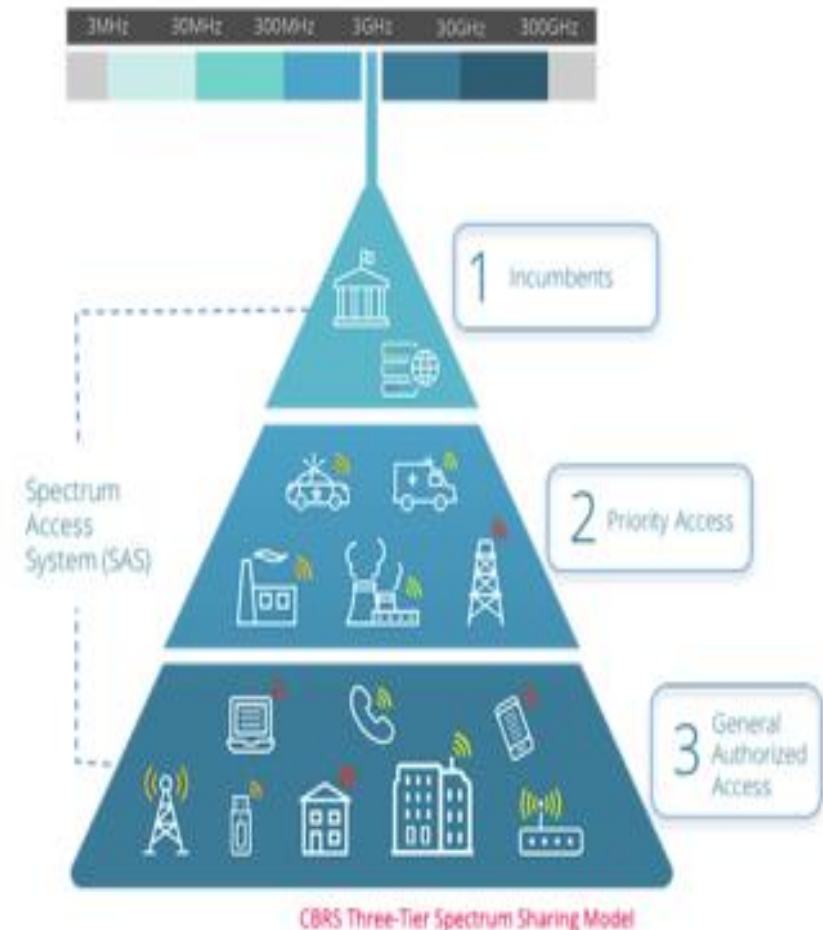
- 2018: Congress asked the FCC and NTIA to identify additional spectrum for wireless use and asked NTIA to evaluate whether commercial wireless services and federal incumbents could share spectrum between 3.1 and 3.55 GHz
- 2019: The FCC proposed to clear the 3.3-3.55 GHz of existing secondary, non-federal incumbents to prepare for future sharing between commercial wireless services and federal incumbents
- 2020: The FCC worked with the White House, DoD, and NTIA to begin the process of establishing coordination procedures and clearing to prepare the 3.45-3.55 GHz band for auction and commercial use
- October 2020: The FCC proposed service and technical rules for new 3.45 GHz Service and a coordination framework for areas in which federal use will continue
- Congress directed the FCC to begin a system of competitive bidding for the 3.45-3.55 GHz band by December 31, 2021

3.45 GHz Band: Status

- On March 17, 2021, the FCC adopted an [Order](#) that enabling flexible-use wireless operations in the 3.45-3.55 GHz band, including for 5G.
 - This included technical, licensing, and competitive bidding rules for such use, based on a mixture of rules previously adopted for other flexible-use bands.
 - Technical rules to ensure non-interference with the adjacent CBRS operations (3.5 GHz) and a licensing regime based on 10 megahertz channels licenses on a Partial Economic Area basis.
- Established a coordination mechanism to ensure commercial users and incumbent DoD operations can share the band in certain areas.
 - Periodic Use Areas and Cooperative Planning Areas
- Completed a process of transitioning incumbent secondary, non-federal users to below 3.0 GHz, including by providing for reimbursement of reasonable relocation expenses.
- The FCC has solicited comments on auction procedures and is continuing to work with NTIA and DOD to transition the band (Target October 2021).

CBRS: Dynamic Sharing

- Hybrid framework with dynamic, real-time adjustments
- Multiple Levels of Sharing
 - Incumbents
 - Priority Access
 - General Authorized Access (GAA)
 - At least 80 megahertz in any given county available for GAA
 - Can operate on any “unused” Priority Access License channels
 - Non-exclusive use
- Access managed by Spectrum Access System (SAS)
- Commercial deployments using GAA are underway
- Priority Access Licenses (PALs) issued in spring 2021
- Recent SAS and ESC authorizations



CBRS – PAL Auction

- Bidding started July 23, 2020, and concluded August 25, 2020
- Raised a total of \$4,543,232,339 in net bids (\$4,585,663,345 in gross bids), with 228 bidders winning a total of 20,625 licenses
- WTB announced that applications from winning bidders were accepted for filing in December 2020, January 2021, and March 2021
- WTB granted licenses in March and April 2021



C-Band (3.7-4.2 GHz)

- 500 megahertz of spectrum used by satellite companies to provide content to video and audio broadcasters, cable systems, and other content distributors.
- The FCC in February 2020 adopted an [Order](#) requiring incumbents to clear existing services from the lower 300 megahertz, making it available for flexible use wireless services.
 - Existing satellite operations will be repacked and move into the upper 200 MHz of the band (4.0–4.2 GHz).
- Incumbent operations will be reimbursed by new flexible-use licensees for their reasonable relocation costs, plus an accelerated relocation payment
 - All satellite operators opted into accelerated relocation; \$9.7 billion payment.
- New 3.7 GHz Service will offer flexible-use licensing with service and technical rules supporting widescale commercial wireless deployment

C-Band Auction (3.7 GHz Service)

- Bidding started December 8, 2020
- In February 2021, WTB announced the winning bidders and the final bid totals
- Net winning bids totaled \$81,114,481,921 and gross winning bids totaled \$81,168,677,645
- Twenty-one bidders won all 5,684 available licenses
- WTB accepted applications for licenses in April and is reviewing applications

5G Network Security

- The FCC is pursuing a proactive, three-pronged strategy to building a more secure, resilient, and next-generation communications supply chain for the 5G future.
 - Taking direct action to slow down untrusted vendors both at home and abroad
 - Moving fast to speed the way for trustworthy innovation
 - Collaborating across government, with industry, and with partner nations on a multifaceted, strategic approach to protect our networks from all threats

Open Radio Access Networks (Open RAN)

- The RAN is the portion of the wireless telecommunication system that connects user devices (e.g., mobile phones) with the core network that performs routing or delivery of content
- Open RAN is a technology approach featuring general disaggregation and virtualization of RAN functionality using open interface specifications between elements instead of proprietary specifications
- Open RAN can enable interoperability across multiple vendors and is based on community-developed standards
- On March 17, 2021, the FCC adopted a [Notice of Inquiry](#) seeking public input on:
 - The current status of Open RAN development and deployment
 - Whether and how the FCC might foster the success of these technologies
 - How to support competitiveness and new entrant access to this emerging market



Broadband Data Collection

- **March 2020, Broadband DATA Act:** Specified collection of broadband data
- **December 2020, Consolidated Appropriations Act:** Funding for implementation and administration of data collection
- **February 2021, Establishment of FCC Broadband Data Task Force:** Leads a cross-agency effort to collect detailed data and develop more precise maps about broadband availability

It is more apparent than ever that broadband is no longer nice to have. It's need to have. Yet we know that in some parts of this country finding a reliable connection to the online world is not easy. But exactly how many people face this problem? Where do they live? And what technology could work best to connect them? We need answers to these basic questions so we can close the gap between the digital haves and have nots.

– **Acting Chairwoman Jessica Rosenworcel**



QUESTIONS?



JESSICA.GREFFENIUS@FCC.GOV



Industry Efforts





Presentation to Association of Corporate Counsel

Kara Graves, Assistant Vice President, Regulatory Affairs

May 13, 2021

What is CTIA?

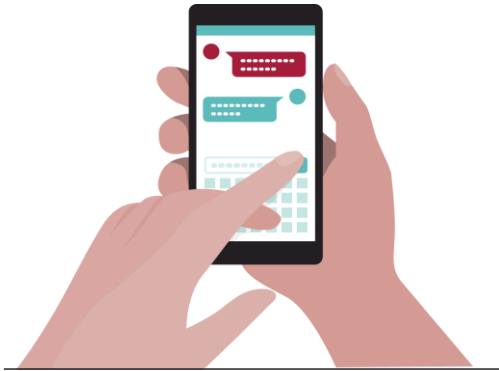
CTIA represents the U.S. wireless communications industry. From carriers and equipment manufacturers to mobile app developers and content creators, we bring together a dynamic group of companies that enable consumers to lead a 21st Century connected life.

Our Members Include:



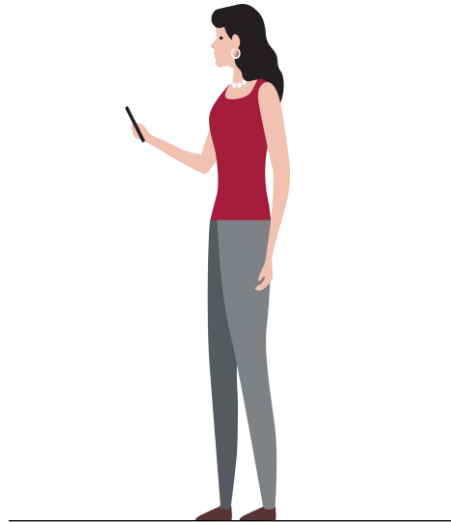
Americans Rely on Wireless

Your wireless phone has gone from a luxury 30 years ago to almost an extension of yourself.



2.22

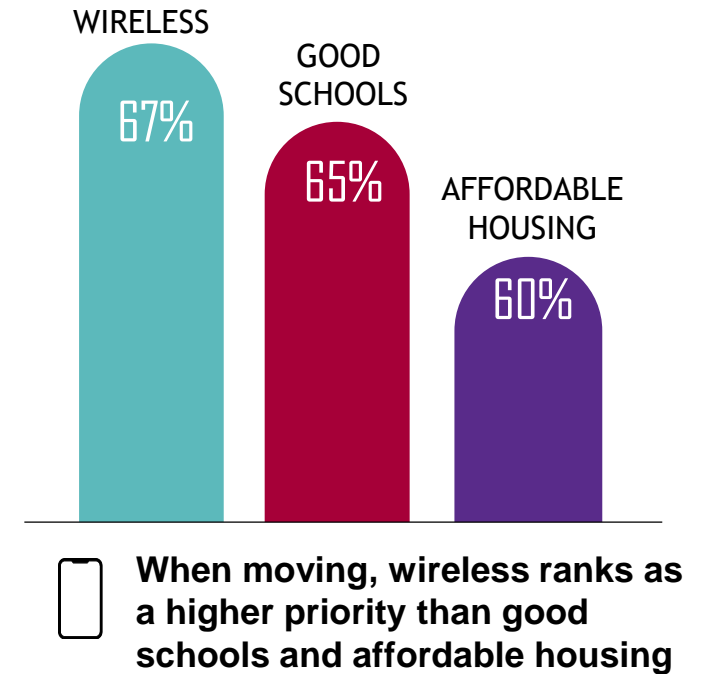
Average hours spent
per day



We check our phones
96 times a day



There are **1.3** wireless
devices per American now



Wireless Connects More Americans

Wireless is the primary broadband access for millions of Americans.

SMARTPHONE-ONLY HOUSEHOLDS



17%

OF BLACK HOUSEHOLDS



25%

OF HISPANIC HOUSEHOLDS



27%

OF LOW-INCOME HOUSEHOLDS
(less than \$30,000)

Supporting Exponential Wireless Data Growth

96x more

mobile data used by Americans
in 2019
than in 2010

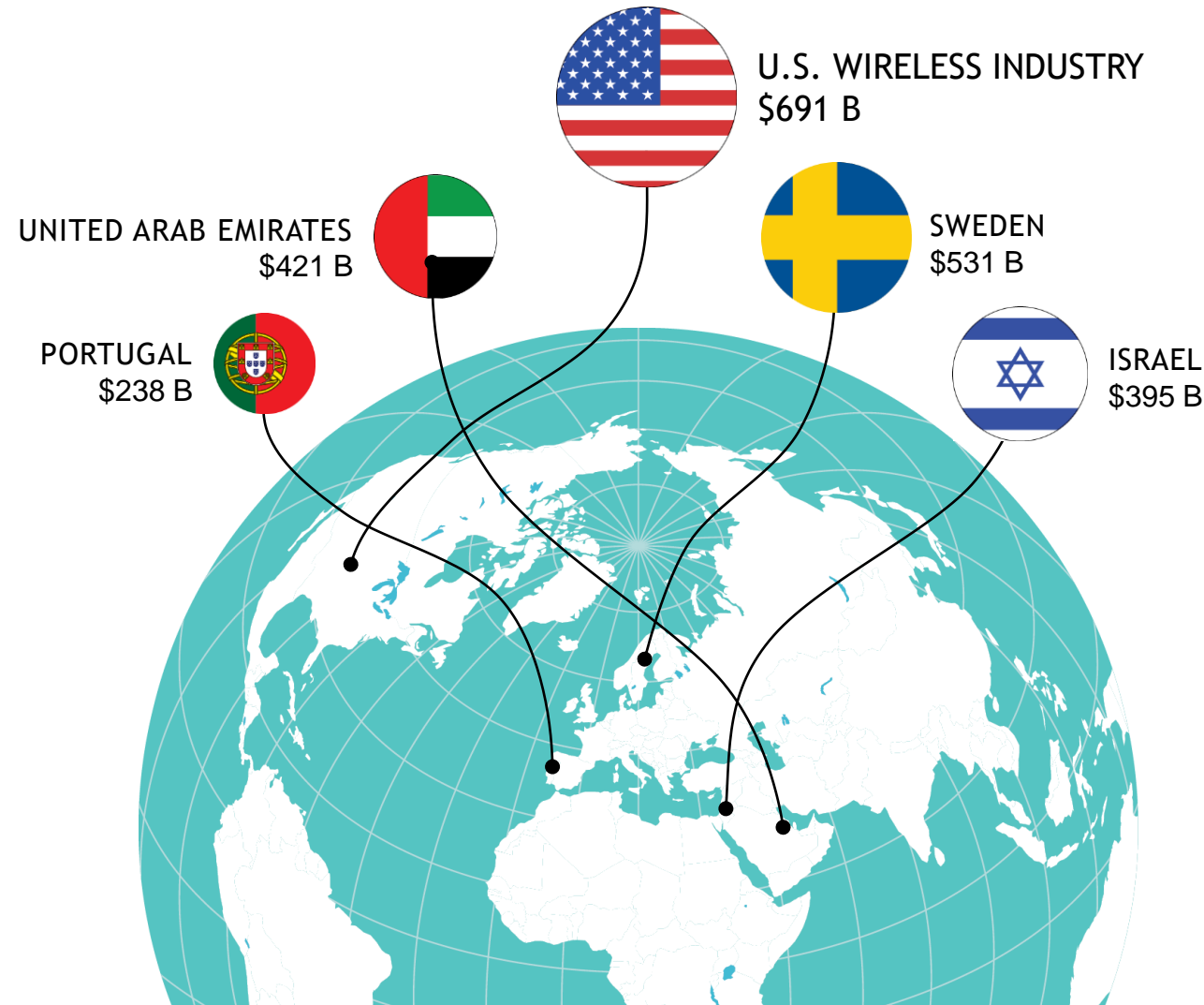
42x more

spectrally efficient
since 2010



Wireless Economic Impact Today

Wireless contributed nearly \$700B to the economy last year and supported almost 5M jobs—jobs that pay 50% more than average U.S. jobs.

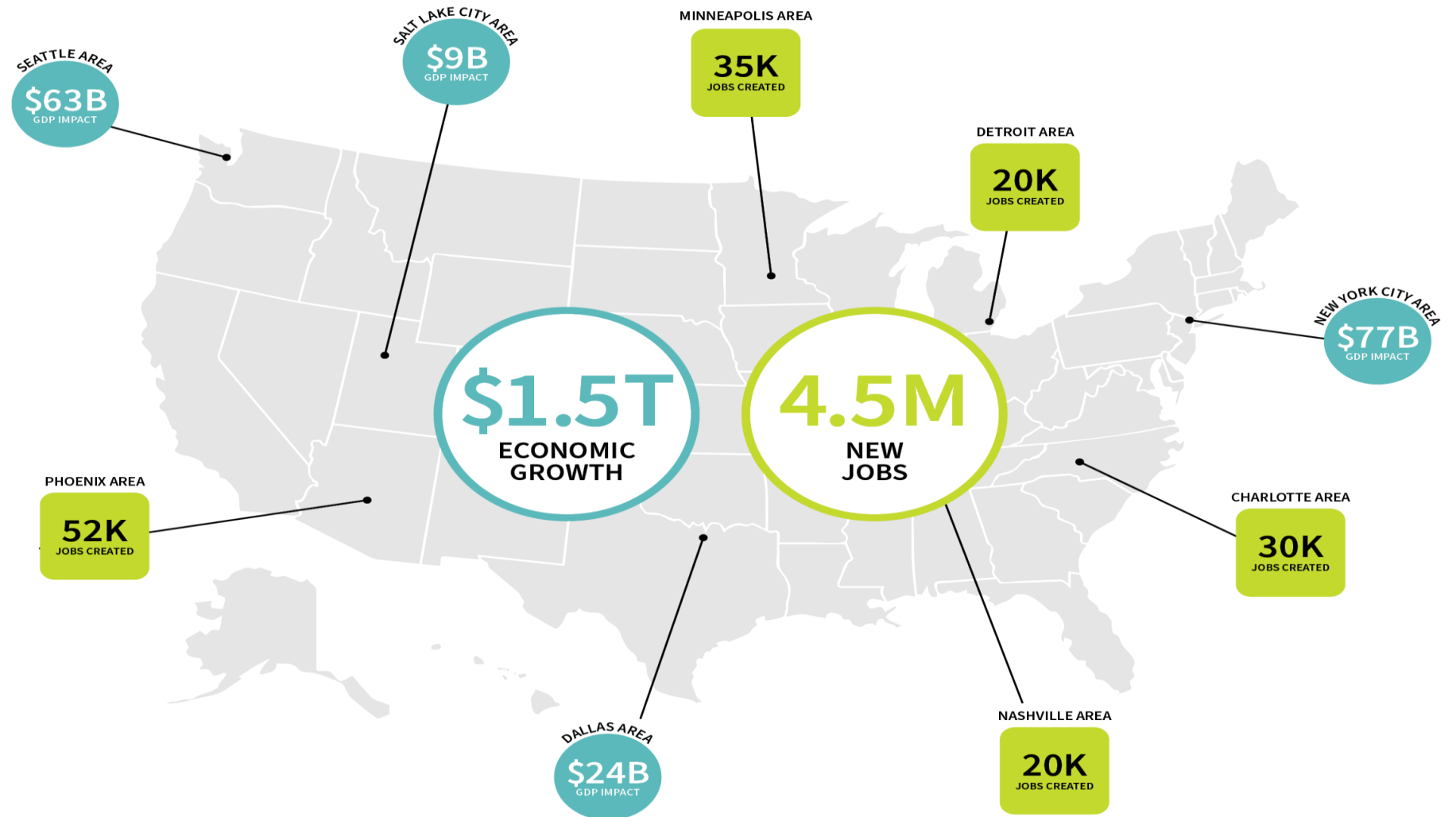


**SIZE OF THE U.S.
WIRELESS
INDUSTRY
COMPARED TO
NATIONAL GDPs**

5G Will Drive Record Job Creation and Growth

We know 5G will have a powerful economic effect because of our 4G experience, which drove innovation in the past decade fostering the app and sharing economies.

**THE 5G ECONOMY
WILL DRIVE OUR
ECONOMIC
RECOVERY THIS
DECADE (BCG)**



5G Characteristics

5G is the next generation of wireless. It's more than just an evolutionary step forward technologically. It's a revolutionary leap.



100x

FASTER

With 4G, it can take almost six minutes to download a full movie. That same movie can be downloaded in about 15 seconds with 5G.



100x

MORE DEVICES

5G will be able to connect up to 100 times more devices, including everything from baby monitors to cars, smartphones, drones, VR headsets and more.

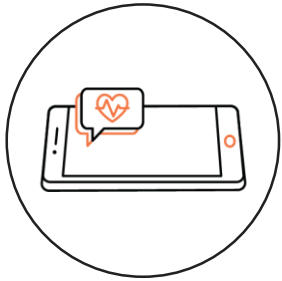


5x

MORE RESPONSIVE

5G's low latency (or quick reaction time) will make breakthroughs in real-time applications a reality.

5G Opportunity



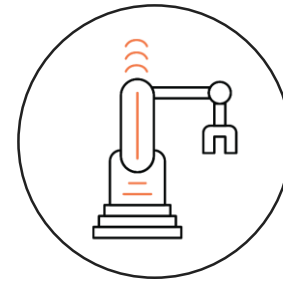
Healthcare

5G will reduce patient costs,
say **84%** of healthcare
executives



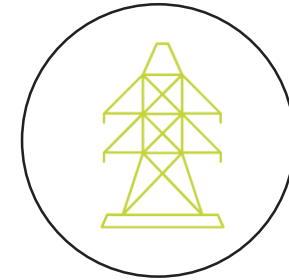
Transportation

81% of transportation
executives believe 5G will save
lives and improve roadway
safety



Manufacturing

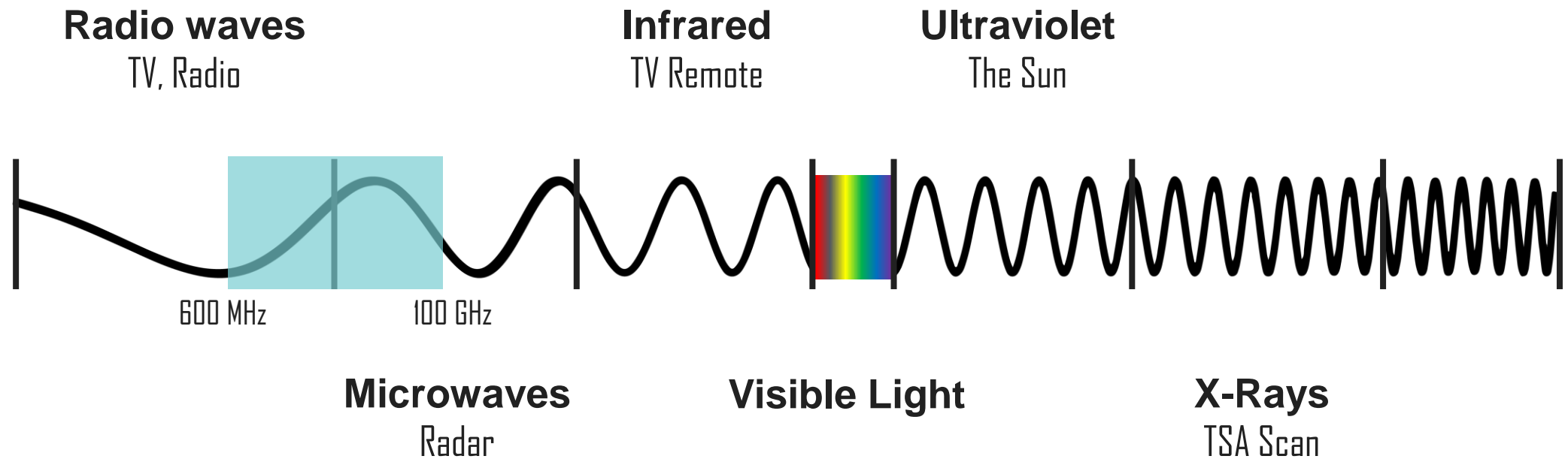
7 out of 10
manufacturing executives
believe 5G will improve
process efficiency



Energy

5G-power grids will
generate **\$1.8T** in
savings

What is Spectrum?

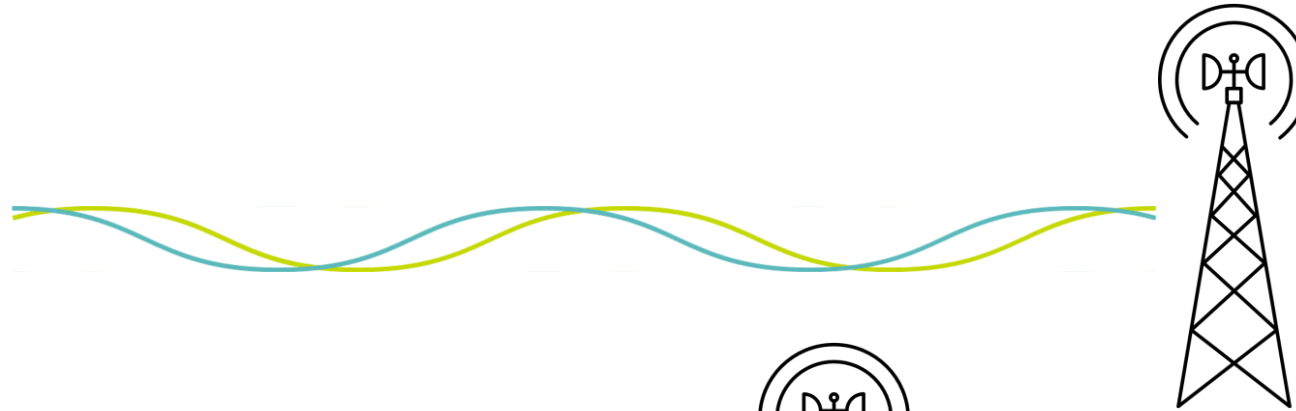


Wireless Needs a Mix of Spectrum Bands

Low-Band

Below 3 GHz

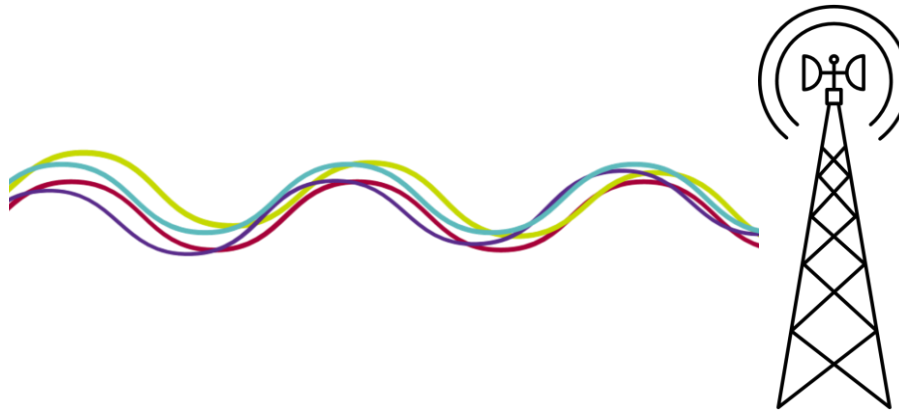
Travels long distance, but lower speeds/capacity



Mid-Band

3-8 GHz

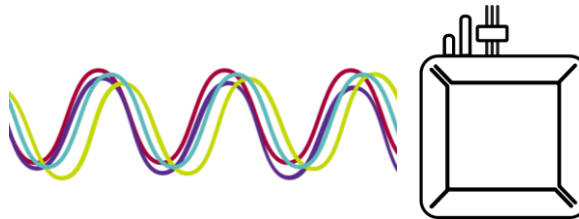
Mix of coverage and capacity



High-Band

Over 8 GHz

Travels short distance, but high speeds/capacity

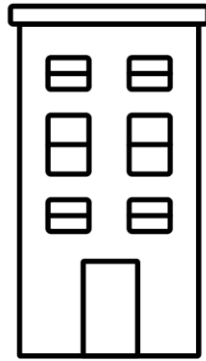


What Are the Rules?



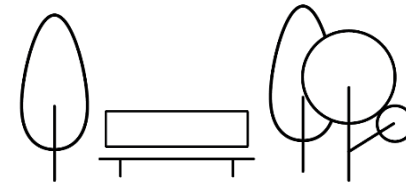
Licensed

Licensed spectrum comes with certain rights and obligations under numerous FCC service rules.



Shared Spectrum

Spectrum sharing among commercial users and federal/non-federal users is increasingly common as our frequencies become more crowded.



Unlicensed

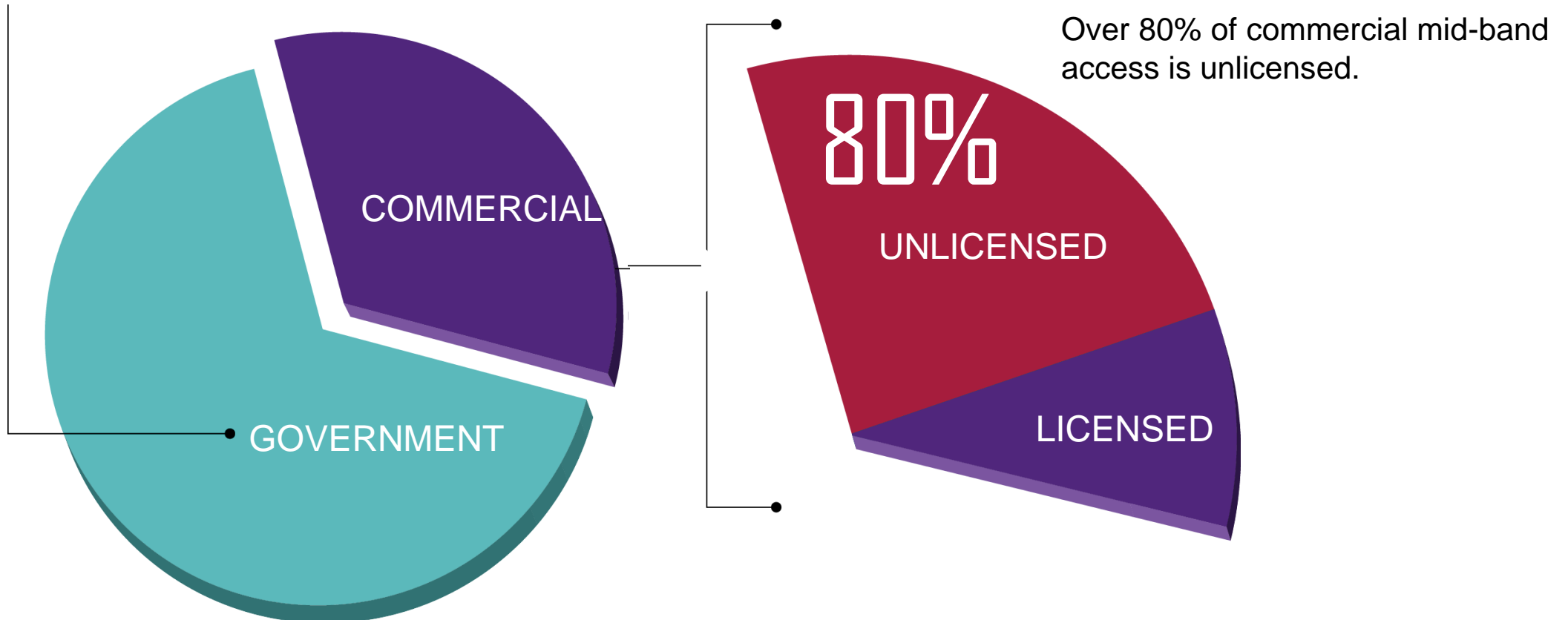
Unlicensed spectrum requires good neighbor management and occurs under Part 15 of the FCC's rules.

Seeking a Balanced Spectrum Policy

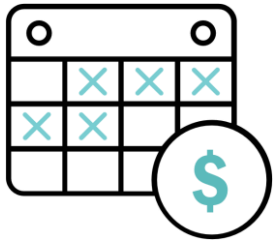
Despite recent auctions, licensed spectrum access significantly trails government use as well as unlicensed access.

2/3

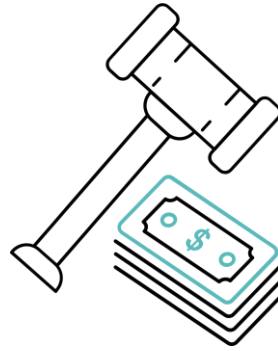
Federal government controls two-thirds of mid-band spectrum (3-8 GHz).



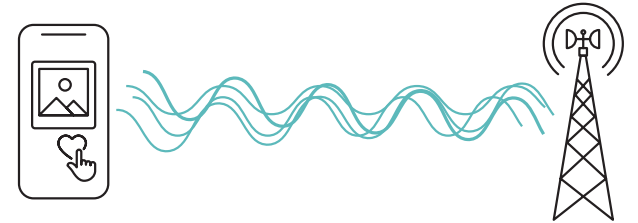
FCC Spectrum Agenda



C-Band Transition



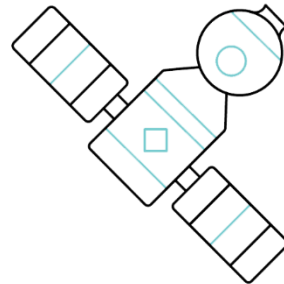
3.45 GHz Auction



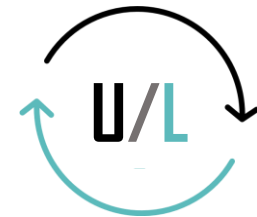
Lower 3 GHz Spectrum



International Preparations



Satellite Issues



Unlicensed Spectrum

Mid-Band Spectrum Critical for 5G Leadership



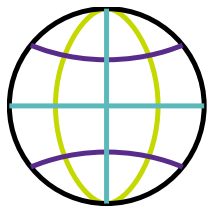
Essential Input For 5G

"Goldilocks" of spectrum—good capacity and propagation



Significant Economic Impact

Expected to create 1.3 million jobs

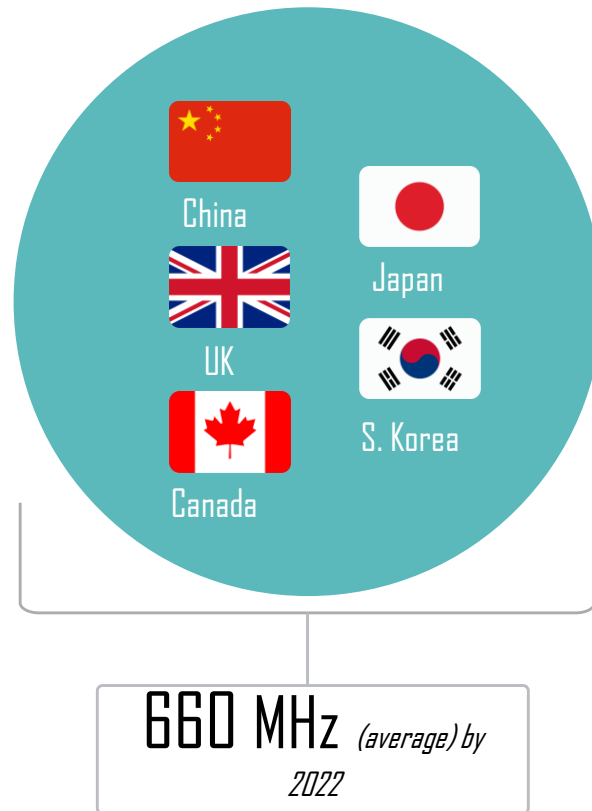


A Global Priority

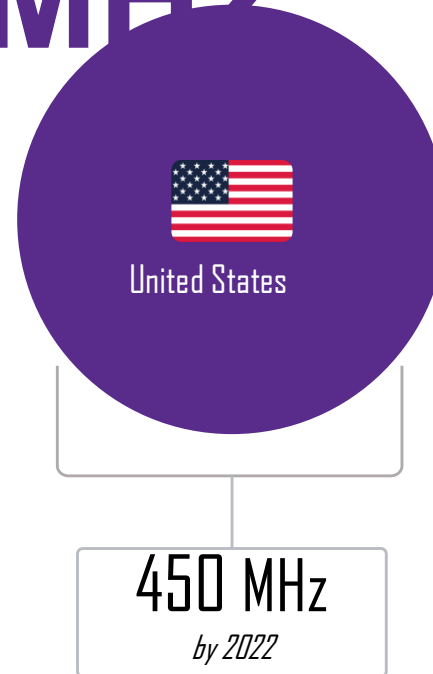
24 other nations auctioned mid-band spectrum in 2020

Mid-Band Challenge

By end of 2022, 5 countries will have nearly 1.5x the amount of mid-band as the U.S.

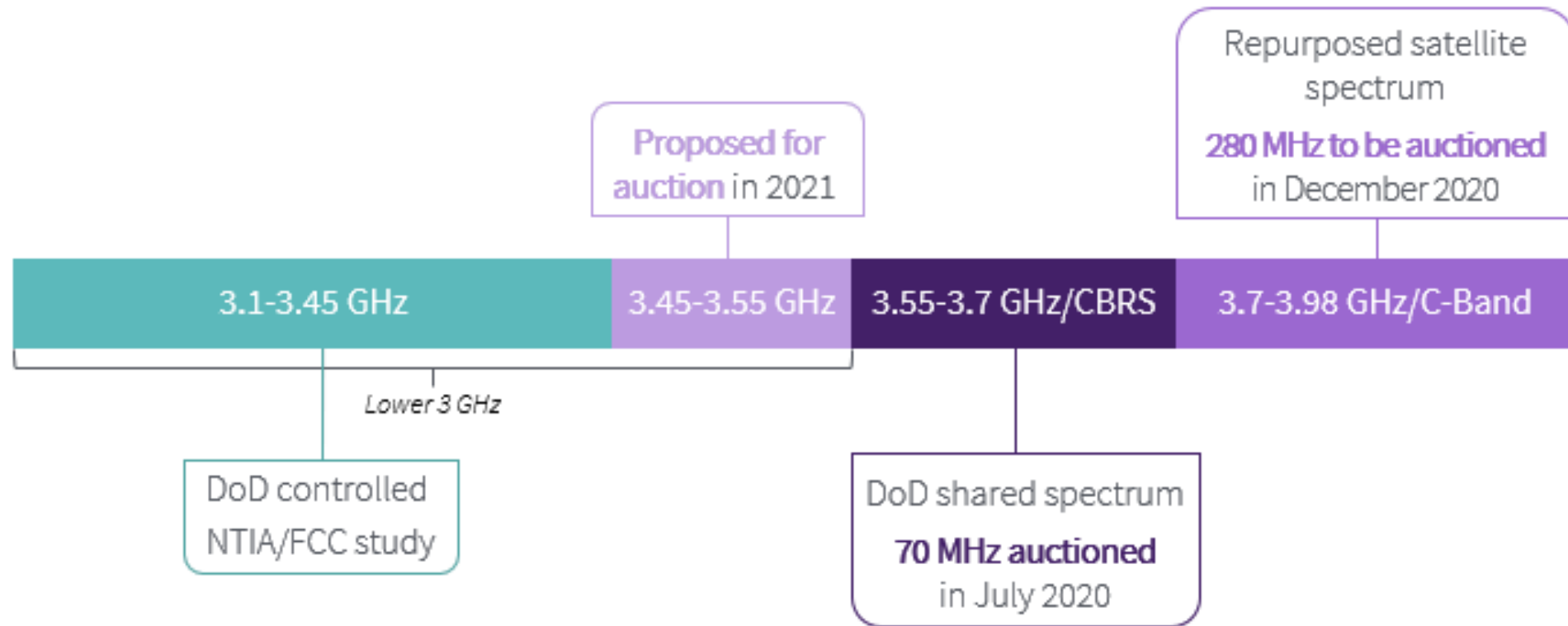


210
MHz



*the amount of mid-band the
U.S. needs to close the deficit*

The 3 GHz Band



2021 FCC Issues

Pandemic Response

Emergency Broadband Benefit (\$3B)

Telehealth (\$250M)

Economy

Spectrum

Infrastructure Deployment

Digital Equity

Mapping

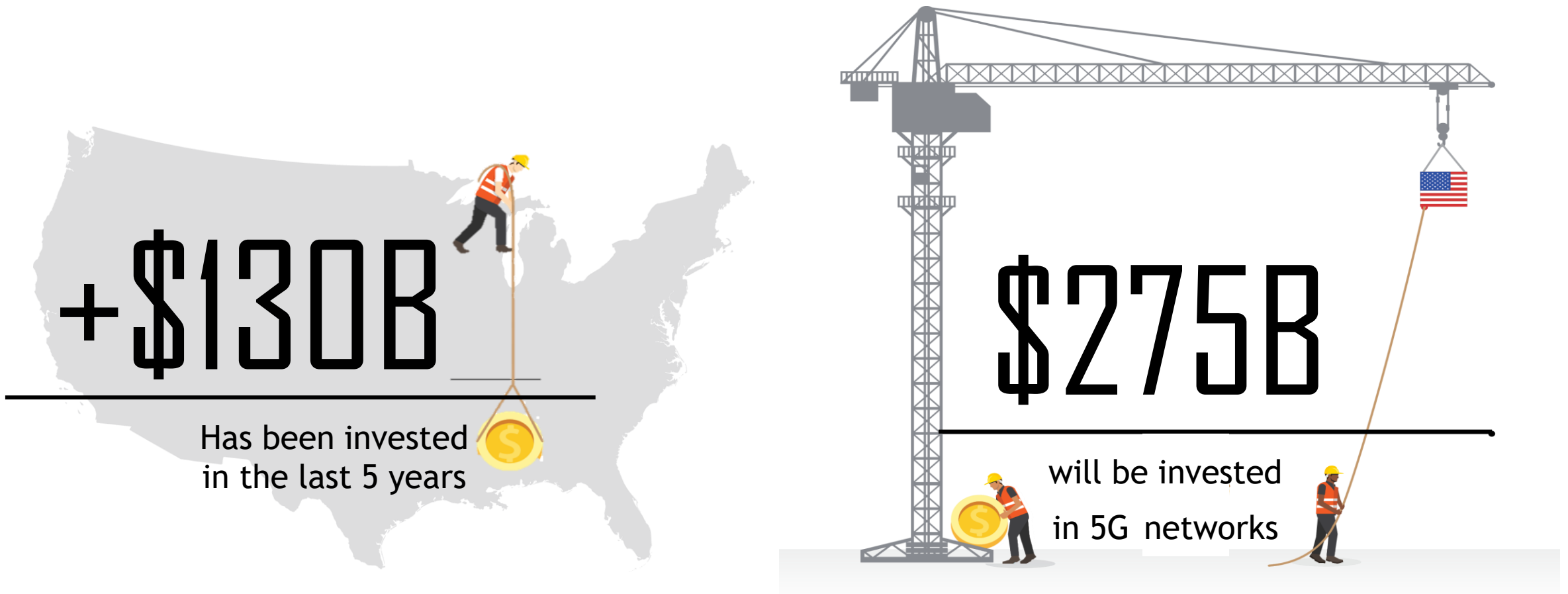
Homework Gap

Low Income

Emergency Connectivity Fund (\$7B)

Wireless Invests in Tomorrow's Infrastructure

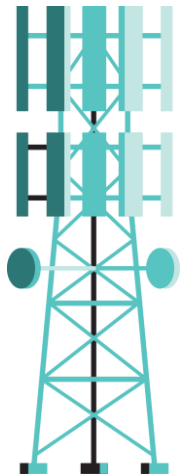
The wireless industry invested \$29B last year alone in private capital towards our 5G future, bringing 5G connectivity from NYC to Cedar Rapids.



Helping Wireless Build Far and Fast

It is critical federal, state and local policymakers continue to promote and incent deployments with zoning and siting rules that provide certainty

GOOD PROGRESS



3x

We built more cell sites last year than in three prior years combined

RISK OF FALLING BEHIND

\$25B



Every 6 month delay in 5G deployment means missing out on \$25B in benefits (BCG)

ctiaTM

The logo features the lowercase text "ctia" in a white, sans-serif font. A small trademark symbol (TM) is positioned to the upper right of the letter "a". Directly beneath the text, there is a horizontal row of seven solid white dots. The entire logo is centered on a solid teal background.

Cable's 5G Future

DANIELLE PIÑERES

VICE PRESIDENT & ASSOCIATE GENERAL COUNSEL

May 13, 2021



Cable's 5G Story

FROM WI-FI TO IOT AND 5G

CABLE WI-FI OPERATIONS

- Wi-Fi is how cable customers experience broadband—Wi-Fi speeds must keep up with the wired Gigabit (and eventually 10G) speeds delivered to the home
- Cable also offers other services—home security, low-power, wide-area IoT networks, and fixed wireless—that rely on unlicensed spectrum



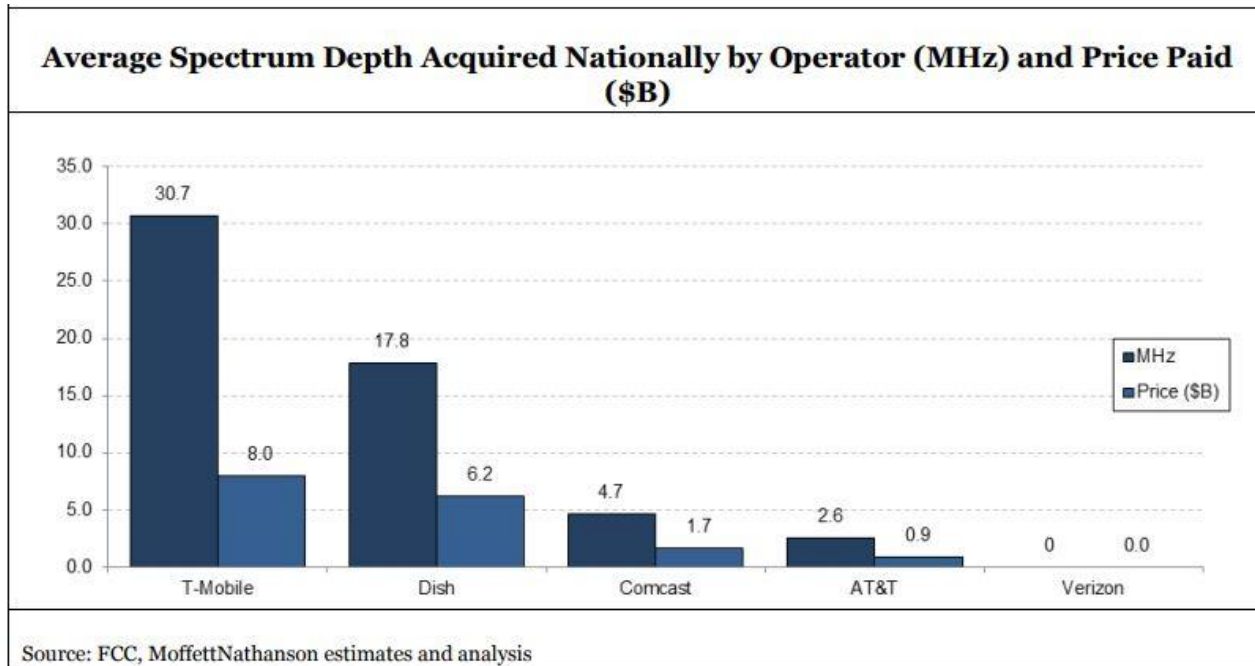
CABLE IN THE MOBILE SPACE

- Three of the four largest operators have Mobile Virtual Network Operator (MVNO) arrangements
 - Comcast launched Xfinity Mobile in 2Q 2017 and now has 3.1 million total lines
 - Partnering with Verizon
 - Charter launched Spectrum Mobile at the end of June 2018 and now has nearly 2.7 million lines
 - Also partnering with Verizon
 - Altice has an MVNO deal with T-Mobile, launched Altice Mobile in summer 2019, and now has 174k lines

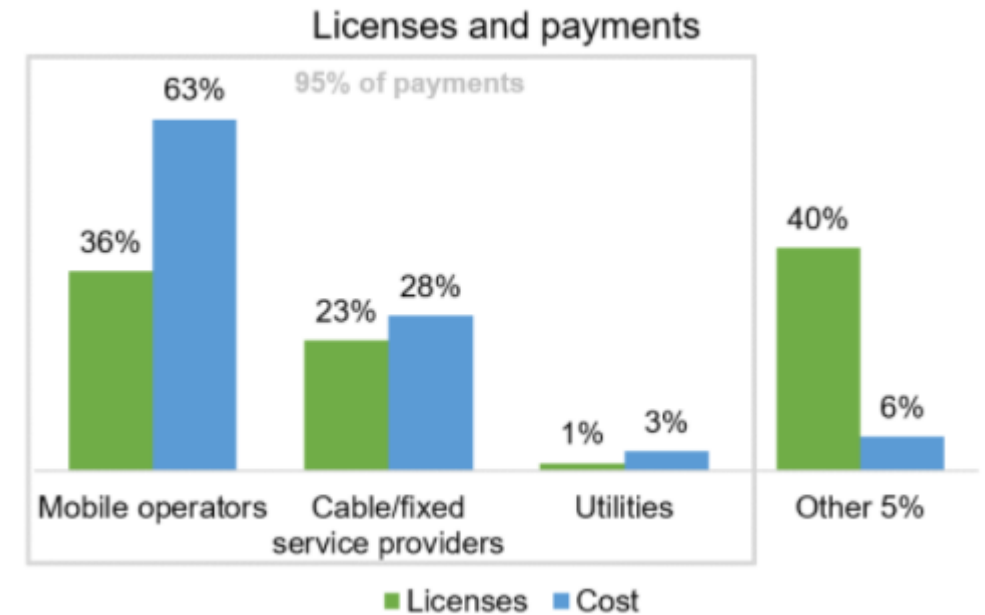


CABLE IN THE WIRELESS SPACE

600 MHz Auction Participation



3.5 GHz CBRS Auction Participation



Source: Senza Fili, <https://senzafili.com/cbrs-pals-everybody-wins/>

5G WILL BE HETEROGENEOUS

- 5G will combine different spectrum bands that are licensed, unlicensed, and dynamically shared to give consumers the services they need where they need them
- Unlicensed spectrum will play an important role in next-generation networking, both for Wi-Fi as a stand-alone technology and to support 5G



- [illegible]

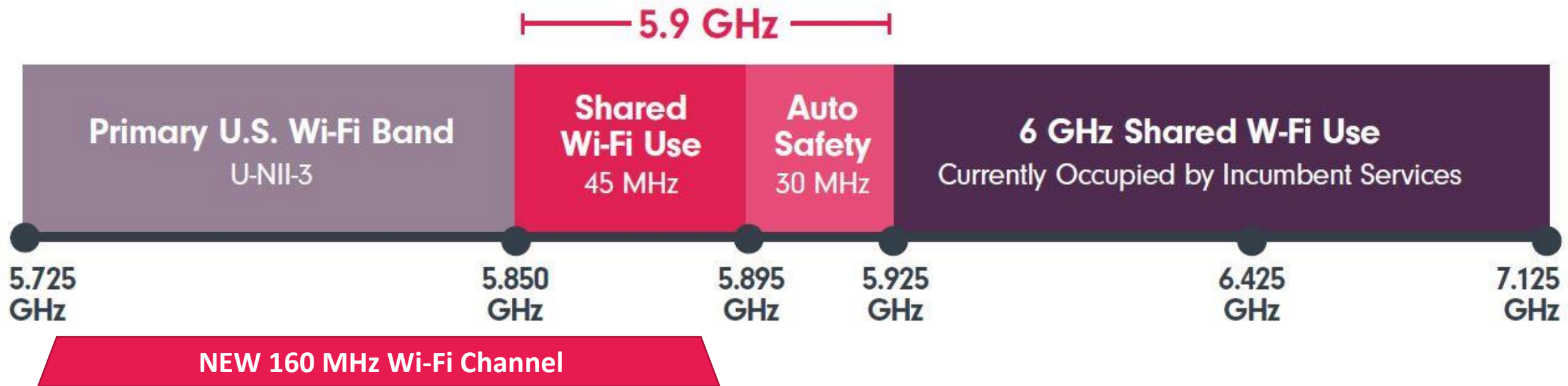
Impact of FCC Spectrum Decisions

2020 UPDATE AND NEXT STEPS

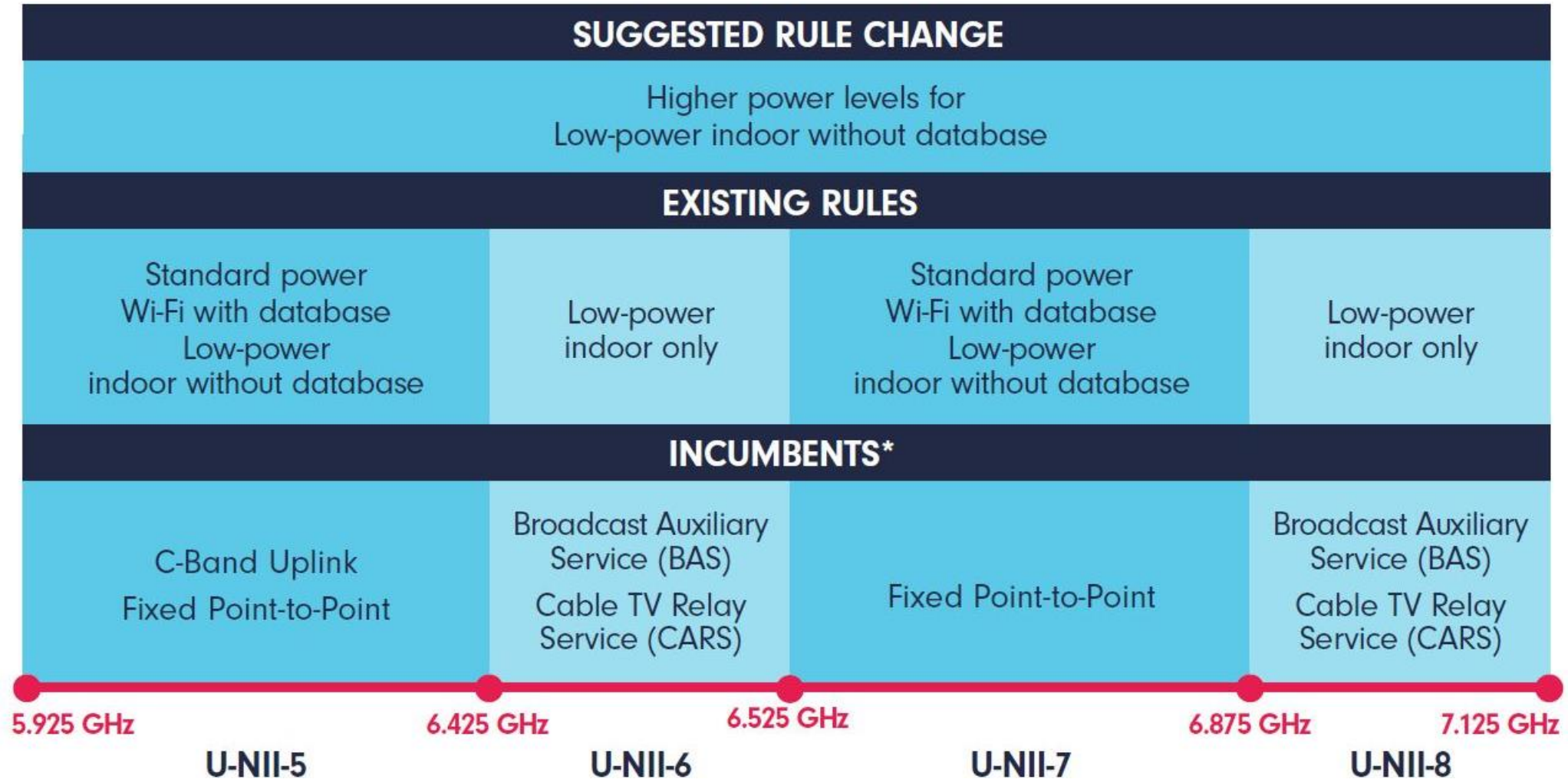
WHAT'S NEXT FOR WI-FI POLICY?

- Last year, on a bipartisan basis, the FCC made two important decisions for Wi-Fi:
 - Opened 1200 MHz of spectrum to shared unlicensed access in the **6 GHz band**
 - Designated the lower 45 MHz of the **5.9 GHz band** for indoor Wi-Fi use
- These additional unlicensed spectrum resources are critical to deploying the **160 MHz Wi-Fi 6 channels** that will enable multi-gigabit Wi-Fi speeds
 - 5.9 GHz spectrum can bring a contiguous 160 MHz Wi-Fi channel online in existing devices
 - 6 GHz spectrum can double Wi-Fi speeds and cut latency in half compared to Wi-Fi 5
- Still pending are decisions that would improve the bands for Wi-Fi
 - 6 GHz low power indoor Wi-Fi power increase that would **improve coverage by 45-75% and throughput by 113-170% on average**
 - Outdoor access to the 5.9 GHz band to foster a **robust device ecosystem**

5.9 GHZ BAND



6 GHZ BAND

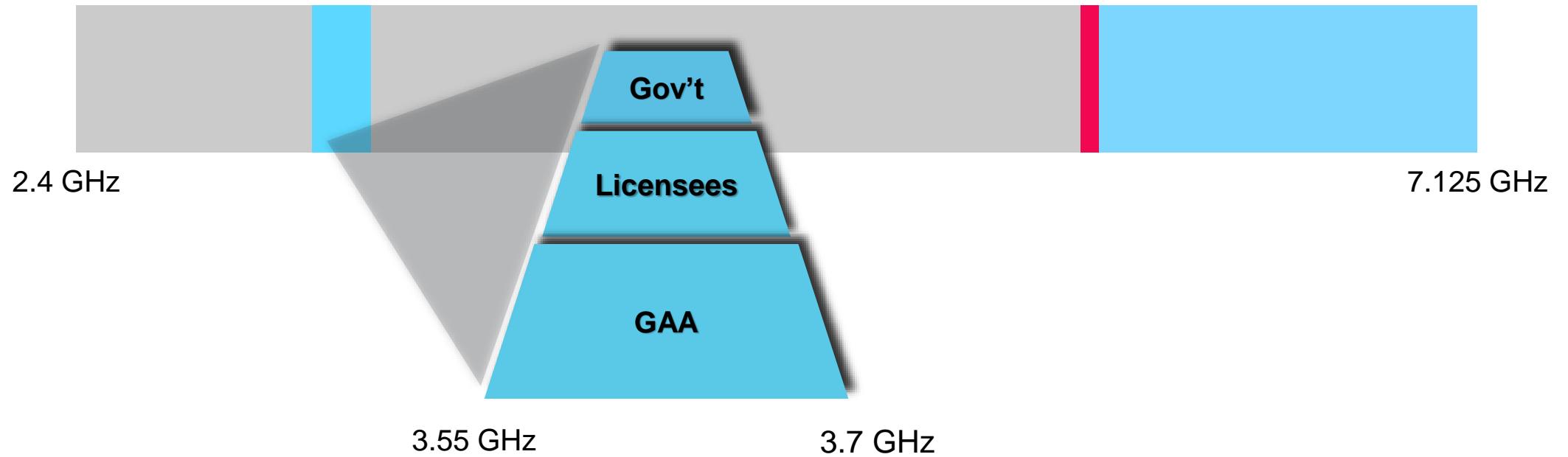


*Additional existing services not listed also share the band.

3.5 GHZ IMPACT AND NEXT STEPS

- In July 2020, the FCC auctioned the 3.5 GHz band
- The auction attracted a record 271 qualified applicants, 228 of which placed winning bids for licenses
 - Not only traditional players, but also cable, WISPs, utilities, tribes, equipment manufacturers, and others
- What makes this band unique?
 - Shared spectrum model
 - Small county-sized licenses
- FCC likely to look next at 3.1-3.45 GHz

3.5 GHZ CBRS BAND



THANK YOU





QUESTIONS?

KEY TAKEAWAYS

1. 5G is Here
2. Spectrum is Key
3. Other Important Resources
4. Federal Funding Can Help
5. Ongoing Compliance



THANK YOU

Angela Kung
Member | Mintz

Jessica Greffenius
*Associate Chief, Mobility Division, Wireless
Telecommunications Bureau | FCC*

Kara Graves
Assistant Vice President, Regulatory Affairs | CTIA

Danielle Piñeres
Vice President & Associate General Counsel | NCTA