Spectrum Proceedings & Part 15 Waivers

Bahman Badipour
Technical Rules Branch, Chief
Policy and Rules Division
Office of Engineering and Technology

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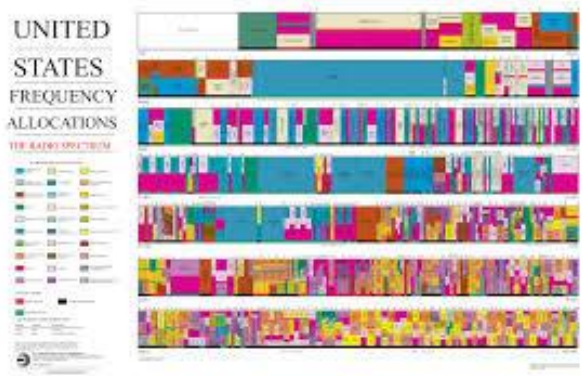
Note: The views expressed in this presentation are those of the author and may not necessarily represent the views of the Federal Communications Commission.

Spectrum Developments

- **OET has day-to-day responsibilities for Frequency Allocations and Equipment Authorization (Part 2), Experimental (Part 5), Unlicensed Device (Part 15) and Industrial, Scientific, and Medical Equipment (ISM) (Part 18).**
  - The Policy and Rules Division is directly responsible for conducting proceedings that modify the rules and procedures, including spectrum availability, related to these areas.

- **Implementing new services or providing additional spectrum for existing services typically require modifications to the Table of Frequency Allocations.**
  - The Policy and Rules Division conducts proceedings to implement new allocations and closely collaborates with other bureaus that are responsible for individual service rules.



FCC 5G Plan Underway

The FCC is taking action to make additional spectrum available for 5G services.

- **High-band**: Concluded 5G spectrum auction for the 28 GHz & 24 GHz bands. Auction for the upper 37/39/47 GHz bands is complete and we are in the process of issuing the licenses.
- **Mid-band**: Repurposing activities to make a large contiguous block of mid-band spectrum available for commercial use, 3.45-3.55 GHz band and neighboring 3.5 GHz and 3.7 GHz bands could offer 530 megahertz of mid-band spectrum for flexible use.
- **Low-band**: The FCC is acting to improve use of low-band spectrum with targeted changes to the 600 MHz, 800 MHz, and 900 MHz bands.
- **Unlicensed**: The agency is creating new opportunities for the next generation of Wi-Fi in the 5.9 GHz and 6 GHz and above 95 GHz band.
- **More to come**

3.45-3.55 GHz Band

GN Docket No. 19-348

- **3.45-3.55 GHz band currently allocated for Federal Radiolocation Service**
- **Second Report and Order adopted March 17, 2021**
- **Summary of 2nd R&O:**
  - Reallocate 100 megahertz of spectrum in the 3.45 GHz band for non-federal flexible use wireless services
  - Establish a framework for the 3.45 GHz band that will enable robust commercial use by an array of service providers, while also ensuring that federal incumbents are still protected from harmful interference where and when they require continued access to the band
    - Protection provided within designated cooperative planning areas and periodic use areas
  - Technical rules
    - Power level consistent with other flexible use bands
    - Two-step emission mask; similar to CBRS
  - Collectively, the 3.45 GHz band, the neighboring 3.5 GHz and 3.7 GHz bands represent 530 megahertz of contiguous mid-band spectrum for 5G
  - On January 4, 2022, Auction 110 concluded raising a total of $22,418,284,236 in net bids with 23 bidders winning a total of 4,041 licenses.(see AU Docket No. 20-25).

3.55-3.7 GHz Band (CBRS Band)

GN Docket No. 12-354 (3.5 GHz), 15-319 (SAS/ESC), Docket 17-258 (October 2018 R&O)

- **Three Reports and Orders adopted in 2015, 2016 and 2018**
- **Sharing 150 MHz in 3550-3700 MHz for flexible use between new mobile broadband, incumbent DoD Radar, and Commercial FSS.**
- **Summary of the band:**
  - In 2020 Commission released a Public Notice and certified Amdocs, CommScope, Federated Wireless, Google, and Sony as SAS Administrators in the 3.5 GHz band.
  - In March 2021, the Commission released a public notice and certified Key Bridge as the newest SAS administrators. Currently there are six certified SAS admins operate in the country.
  - Currently ITS is testing the second wave of SAS administrator applicants. These are RED Technologies, and Nokia.
  - CBRS equipment certification: more than one-hundred CBSDs (Category A and B) from more than 50 different manufacturers have been approved by the FCC lab.
  - Auction 105 concluded raising a total of $4.58B.

3.7-4.2 GHz Band (C-Band)

GN Docket No. 18-122

- **Report and Order adopted February 28, 2020**
- **Repurposed lower 300 megahertz from fixed satellite service and fixed service to flexible use for mobile broadband**
- **Summary of changes:**
  - Add mobile allocation to 3.7-4.0 GHz band.
  - Transition 280 megahertz, plus a 20-megahertz guard band, from incumbent use to flexible-use through public auction.
    - 3.7-3.8 GHz transition in 46 of top 50 markets – December 2021
    - All spectrum across entire U.S. – December 2023
  - Require FSS operations to relocate to 4.0-4.2 GHz band.
  - Provide incumbent FSS and FS licensees with reimbursement of reasonable relocation costs, paid by flexible-use licensees.
  - Adopt service and technical rules for flexible-use licensees in the 280 megahertz of spectrum designated for transition to flexible-use.
  - On February 17, 2021, Auction 107 concluded raising a total of $81,114,481,921 in net bids with 21 bidders winning a total of 5,684 licenses.(see AU Docket No. 20-25).
- **Petitions for Reconsideration remain pending**

12 GHz Band

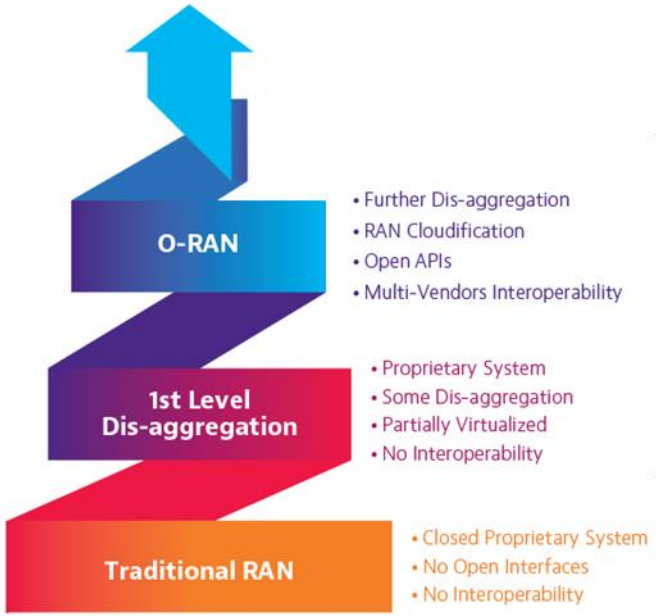
WT Docket No. 20-443

- **12 GHz band is 500 megahertz of mid-band spectrum between 12.2-12.7**
- **Currently licensed to two DBS operators but NGSO and MVDDS services can operate on a non-harmful interference basis**
- **NPRM adopted January 15, 2021 seeks comment on:**
  - Whether it is possible to add mobile service throughout the 12 GHz band without causing harmful interference to incumbent licensees
  - Whether there are technical parameters that would allow additional terrestrial shared used of the band, methods for assigning flexible use rights in the band, and potential sharing mechanisms for the band if coexistence among the incumbent services and new flexible use service is technically feasible
  - Whether the public interest benefits of maintaining the current allocations and framework for the band outweigh the potential benefits of accommodating new services in the band
  - Comments extended to May 7, 2021 and reply comments extended to July 7, 2021.

Open Radio Access Network (ORAN) Notice of Inquiry

GN Docket No. 21-63

- **NOI on the opportunities and potential challenges presented by open and virtualized radio access networks (adopted March 17, 2021)**
- **FCC seeks comment on:**
  - The current status of Open RAN development and deployment in networks in the US and abroad
  - What steps should be taken by the FCC, federal partners, industry, academia, and others to accelerate the timeline for Open RAN standards development
  - Challenges or other considerations related to the deployment, security, reliability, integration, and testing of systems based on Open RAN specifications
  - The costs and benefits associated with Open RAN development and deployment
  - Comments April 28, 2021, and reply comments May 28, 2021
- **FCC ORAN showcase (July 14-15, 2021)**
  - The showcase provides vendors an opportunity to provide information about their interoperable, open interface, standards-based 5G network equipment and services ready for purchase and installation by January 1, 2022. (see https://www.fcc.gov/news-events/events/2021/07/open-ran-solutions-showcase-day-1)



Allocation of Spectrum for Non-Federal Space Launch Operations

ET Docket No. 13-115

- **Report and Order and Further Notice of Proposed Rulemaking adopted on April 22, 2021 Commission meeting**

- **Summary of Order**
  - Added a secondary non-Federal Space Operation allocation to the 2200-2290 MHz band through use of an Allocation Table footnote (limited to pre-launch testing and space launch operations in four 5MHz sub-bands)

- **Summary of FNPRM**
  - Seeks comment on:
    - Adopting primary non-Federal allocations in the 420-430 MHz, 2025-2110 MHz, and 5650-5925 MHz bands for use during commercial space launches
    - Adding a non-Federal Mobile allocation to the 2200-2290 MHz band and upgrading the non-Federal Space Operation allocation from secondary to primary
    - Propose service rules for commercial space launch operations in all these frequency bands.
  - Seek additional comment on proposals in a 2013 NPRM to provide Federal agencies access to commercial satellites in the C-band, Ku-band, and Ka-band
  - Comments extended to August 11, 2021 and reply extended to September 10, 2021.

5.9 GHz Band

ET Docket No. 19-138

- **5.9 GHz band (5.850-5.925 GHz) formerly reserved for Intelligent Transportation Systems**
- **Summary of R&O (November 18, 2020):**
  - Repurpose lower 45 megahertz of the band (5.850-5.895 GHz) for unlicensed operations.
    - Only indoor operations currently permitted pending conclusion of the FNPRM.
  - ITS services cease operation in the lower 45 megahertz of the band no later than July 5, 2022.
  - Require transition from DSRC- to C-V2X-based technology as the standard for safety-related transportation and vehicular communications in the upper 30 megahertz of the band (5.895-5.925 GHz).
    - DSRC operations will be permitted to continue pending outcome of the FNPRM.
- **Further Notice of Proposed Rulemaking**
  - Seek to establish power and emission limits and other technical rules to allow full-power outdoor unlicensed operations in the lower 45 MHz of the band, subject to protection of federal radiolocation systems. .
  - Seek to address transitioning all ITS operations in the upper 30 MHz of the band to C-V2X-based technology, including timeline for implementation and codification of technical parameters for operation.
  - Seek comment on consideration of allocating additional spectrum for ITS applications in the future.
- **Two Public Notices released on August 6, 2021**
  - DA 21-963 lifts the filing freeze previously imposed on the acceptance and processing of new and expanded use applications related to part 90 services operating in certain portions of the 5.9 GHz band.
  - DA 21-962 provides guidance to ITS licensees seeking waivers of the Commission's rules to operate roadside units with C-V2X-based technology in the upper 30 megahertz (5.895-5.925 GHz) portion of the 5.9 GHz band pending adoption of final rules.

6 GHz Unlicensed
ET Docket 18-295

- **R&O and FNPRM (April 23, 2020) expanded unlicensed device rules in 1200 megahertz of spectrum:**
  - In the 5.925-6.425 GHz and 6.525-6.875 GHz bands, access points can transmit indoors and outdoors under control of an automated frequency coordination (AFC) system at full power, consistent with levels permitted in 5 GHz band (i.e., 30 dBm conducted power into a 6 dBi antenna).
  - In the 5.925-7.125 GHz band, access points can operate at lower power without an AFC system, restricted to indoor use only.
    - Restricted to maximum 5 dBm/MHz PSD
    - Maximum EIRP limited to 30 dBm
    - Devices must be supplied power from a wired connection, have an integrated antenna, may not be battery powered, and not have a weatherized enclosure
- **Proposed to permit very low power operation (indoors and outdoors) across entire 6 GHz band**
  - Also seeks comment on permitting higher power for non-AFC controlled indoor access points.
- **PN DA 21-7 (January 11, 2021) seeks comment on whether the Commission should permit 6 GHz U-NII client devices to directly communicate when they are under the control of or have received an enabling signal from a low-power indoor access point.**

6 GHz Band
Automated Frequency Coordination Systems
Public Notice ET Docket 21-352

- **AFC Public Notice (PN) adopted on September 27, 2021.**
- **PN invites proposals from parties interested in operating an AFC system in accordance with the 6 GHz Report and Order.**
- **PN describes the information that must be provided with proposals to operate an AFC system, and describes the procedures for designating AFC system operators.**
  - OET received 14 proposals by the November 30, 2021 due date. Comments on these proposals were due by December 21, 2021.
  - OET is in the process of reviewing all proposals submitted by November 30, 2021 concurrently and with equal priority. Proposals submitted after this date will be considered by OET, but they may not be considered concurrently with proposals submitted by the due date.
  - For proposal received after November 30, 2021, OET will issue a public notice announcing receipt of the proposal and establishing a period for the public to review and comment on the proposal.
  - OET will conditionally approve as many proposals as are found to satisfy all AFC system requirements.

60 GHz Short-Range Radars NPRM

ET Docket No. 21-264

- **NPRM adopted July 13, 2021**
- **NPRM is modeled after previously granted waivers for Google's gesture control device and to a number of parties for applications including hot car sensors.**
- **Proposed changes:**
  - Expanding the permissible uses for short-range radars in the 57 to 64 GHz band while promoting coexistence with other unlicensed users and not interfering with licensed and authorized users in the band.
  - Allowing unlicensed field disturbance sensors like radar devices to operate in mobile environments at a higher power level than authorized today.
  - Seeks comments on the use of sensing technology such as Listen-Before-Talk to allow transmission at the same power level as other unlicensed devices in this band.
  - Comments were due by September 20, 2021 and reply comments were due on or before October 18, 2021.
  - Received 25 comments mostly in favor of the proposed changes.

White Spaces

ET Docket No. 20-36

- **Report and Order and Further Notice of Proposed Rulemaking adopted October 27, 2020**
- **Report and Order:**
  - Increases maximum fixed device power from 10 watts to 16 watts EIRP in "less congested" areas (where at least half of TV channels are unused).
  - Increases HAAT limit for fixed devices from 250 meters to 500 meters in "less congested" areas, subject to a coordination procedure with TV broadcasters.
  - Eliminates limit on antenna height above ground in most cases.
  - Allows higher power mobile operations in "less congested" areas within defined "geo-fenced" areas.
  - Establishes new rules for narrowband IoT devices.
- **Further Notice of Proposed Rulemaking:**
  - Seeks comment on whether to permit the use of terrain-based propagation models for determining available TV channels.
  - Comments were due by March 29, 2021 and reply comments by April 26, 2021.

White Spaces

ET Docket No. 14-165, 20-36 and 04-186

- **Second Order on Reconsideration, Further Notice of Proposed Rulemaking, and Order adopted January 25, 2022**
- **Second Order on Reconsideration:**
  - Eliminates "push notification" requirement for white space devices and databases that was adopted in 2015 to help protect licensed wireless microphones.
  - Requires fixed and personal portable white space devices (except narrowband) to re-check database once per hour rather than once daily.
  - Devices certified beginning November 2, 2022 must comply with hourly re-check requirement.
- **Further Notice of Proposed Rulemaking:**
  - Seeks comment on whether to decrease the database re-check interval for mobile and narrowband white space devices from once daily to once per hour.
- **Order**
  - Denies NAB petition for reconsideration of OET's 2018 designation of Nominet UK as a white space database administrator.

Wireless Microphones

ET Docket No. 21-115

- **Wireless Multi-Channel Audio System (WMAS) is an emerging technology that can enable more wireless microphones to operate per megahertz of spectrum**
- **Notice of Proposed Rulemaking on WMAS adopted April 22, 2021**
  - Proposes to:
    - Allow WMAS under Part 74 (licensed) in the UHF and VHF TV bands, 600 MHz duplex gap, and the 900 MHz, 1.4 GHz and 7 GHz bands
    - Allow WMAS to use a channel size of up to 6 megahertz
    - Require WMAS to operate with at least 3 audio channels per megahertz
    - Update Part 15 and Part 74 rules to require conventional wireless microphones to comply with emission mask and spurious emission limits in latest ETSI wireless microphone standard (2017 instead of 2011)
  - Seeks comment on whether to allow WMAS under Part 15 (unlicensed) in the TV bands and in the 600 MHz guard band and duplex gap
  - Comments were due by August 2, 2021 and reply comments by August 30, 2021.

Part 15 Waivers

- A radio frequency device that operates in accordance with the Part 15 unlicensed rules may not be marketed unless it has completed the appropriate equipment authorization process - certification for most intentional radiators.

- Certification will only be granted for a device that has demonstrated compliance with all applicable Commission rules.

- If a specific rule cannot be complied with, the responsible party may submit a request for waiver.

Waiver Process

- **A request must demonstrate that there is good cause to waive the specific rule requirement.**
  - If the staff determines that the request warrants further consideration, it typically will release a public notice establishing a period for public comment.
- **The request will be granted or denied based upon review of the entire record.**
  - When appropriate, grants may include special conditions intended to ensure that underlying purpose of the waived rule continues to be satisfied.
- **Parties are expected to provide a copy of the granted waiver when submitting the application for certification.**

Recent Waiver Grants and Filings

- **Information about waiver filings and decisional documents may be found on the Commission's website**

  - The OET website includes headline links related to all Office activities : **www.fcc.gov/engineering-technology**

  - Commission and OET-level decisions may be found in the EDOCS system: **www.fcc.gov/edocs**

  - Petitions and related comment may be found in the ECFS system: **www.fcc.gov/ecfs**

  - Decisions are references by FCC/DA #; Most proceedings may be found by Docket No.; Text/title search also available

- **Recent waiver requests have reflected a variety of emerging technologies. Some examples include…**

Motion Sensing Devices

Waiver Granted April 14, 2021, DA 21-407

Permits automotive in-cabin radar use at higher power than permitted by Section 15.255

Single Order addresses six similar waiver requests:

- **Vayyar Imaging (DA 21-407)**
- **Valeo North America (DA 21-407)**
- **Tesla (DA 21-407)**
- **IEE Sensing (DA 21-407)**
- **Infineon Technologies America (DA 21-407)**
- **Brose North America (DA 21-407)**

Previous action – Dec. 2018 waiver to Google (DA 18-1308) for its Soli device that senses gestures rather than touch. Required waiver of power requirements for devices operating in the 57-71 GHz band (15.255). Waiver granted Dec. 2018.

Motion Sensing Devices Continued

Waiver Granted July 9th, 2021 permits radar use at higher power than permitted by Section 15.255

Six separate Order addressing six waiver requests:

- **Grant condition restricted to the interior of new passenger motor vehicles for the primary purpose of in-cabin monitoring functions**
  - **Faurecia Clarion Electronics North America (DA 21-811)**
  - **Texas Instruments Incorporated (DA 21-812)**
  - **Acconeer AB (DA 21-814)**
  - **Huyndai Mobis Co., Ltd.(DA 21-816)**

- **Grant condition restricted to in-home health-related monitoring and medical imaging applications**
  - **Vayyar Imaging Ltd. (DA 21-815)**

- **Grant condition restricted to a radar sensor**
  - **Amazon.com Services LLC (DA 21-813)**

These Orders include additional condition on radar off-time between two successive radar pulses that is less than 2 ms shall be considered "on time" for purposes of computing the duty cycle.

Detection/Screening

- **Rohde & Schwarz (DA 20-1025)** Security scanner system in the 70-80 GHz band designed to detect the presence of concealed metallic and non-metallic threats carried in or underneath the clothing of persons. Waivers of Sections 15.205 (restricted bands) and 15.209 (field strength limits) granted Sep. 2020.

- **Liberty Defense (DA 22-133)** seeks waivers of rules related to measurements, ultra-wideband (UWB) operations and certain user restrictions (15.31, 15.503, 15.511 and 15.521) for its HEXWAVE weapons/threat detection system. Waiver granted February 9, 2022.

Ground Penetrating Radar (GPR), mapping, measuring & other uses

- **Zebra Technologies (DA 21-1294)** positioning system in the 7125-8500 MHz band for applications such as tracking players in sports venues. Waiver of Section 15.519(a)(1) (The 10 second receiver acknowledgement requirement) granted October 19, 2021.
- **DA 21-1294 waiver conditions include:**
  - Zebra shall ensure that the UWB bandwidth of the Dart system is fully contained within the 7125-7900 MHz frequency band.
  - The width of the individual transmission pulses from a DART device shall not exceed 2.5 nanoseconds.
  - The total number of transmission pulses from an individual Dart device in any one second shall not exceed 4600.
  - The maximum number of active Dart tags in a designated sports venue shall not exceed 600.
  - The locations where the Dart system is permitted to operate outdoors only under the conditions of this waiver order, are limited to NFL game venues, NFL practice venues, one Senior Bowl venue, and college sports venues as specified in Zebra's ex-parte filed September 27, 2021.

Ground Penetrating Radar (GPR), mapping, measuring & other uses

- **Robert Bosch (DA 22-8**) A frequency hopping UWB system in the 1.8 GHz and 5.7 GHz band for drywall scanning and stud finding function. Waiver of section 15.503(d) (fractional bandwidth equal to or greater than 0.20 or a UWB bandwidth equal to or greater than 500 MHz), 15.503(h), (definition for a wall imaging system), and Section 15.521(d)(compliance measurements shall be made with the pulse train gated on) granted January 4, 2022.

- **Wavesense now GPR (Open ET Docket No.19-241)** driver-assistance technology, which relies on UWB GPR to enable active lanekeeping in challenging environmental conditions; seeks waivers of certain operational and Federal coordination requirements (15.509 and 15.525)

- **GSSI (Open ET Docket 19-155)** request for waivers of the UWB rules to market up to 2000 evaluation kits for an UWB GPR intended to enable self-driving cars to read features of the roadbed beneath the pavement. (15.31, 15.503, and 15.509)

Ground Penetrating Radar (GPR), mapping, measuring & industrial uses

- **Proceq** (**Open ET Docket 20-127**) request for waivers of the UWB rules to test the safety, durability and sustainability of materials used in industrial settings. The request seeks to modify previously granted waiver to extend the operating frequency range from 200-6000 MHz to 30 MHz-8000 MHz.

- **Leica (Open ET Docket No. 19-350)** radar modules operating in the 60-64 GHz frequency band used on UAVs for hazard detection while in flight. Seeks waiver of the prohibition on-board aircraft in Section 15.255(b)(2). Waiver granted Jul. 2018.

Railroad Safety

- **Metrom (DA 20-1186)** Waiver of the UWB rules for their AURA system designed to prevent collisions between trains, over-speed derailments, unauthorized train movement in work zones, and to minimize human error. (15.519(a), and 15.519(c)) granted Oct. 2020.

- **Piper (DA 20-1349)** Waiver of the UWB rules for their Enhanced Transit Location System (ETLS) designed to provide position information of trains, prevent train-to-train collisions and identifying unauthorized train movements in work zones. (15.519(a)(2) and 15.250(c)-(d)) granted Nov. 2020.

U-NII Bands

- **Hydroid now Kongsberg Seatex AS (Open ET Docket No. ET 19-240)** seeks a waiver to use directional gains in excess of 6 dBi, without reducing transmitter power, for two-way communications between vessels, and between shore points at fixed locations and vessels. (15.407(a)(3)).

- **Radwin LTD. (DA 20-1088)** Waiver to permit the operation of its JET point-to-multipoint, beamforming fixed wireless base stations in the 5.15-5.25 GHz and 5.725-5.85 GHz bands with EIRP of up to 48 dBm (12 dB above the limit prescribed by the Commission's rules). The waiver will permit its customers to provide better high-speed broadband service to subscribers so that they can stay connected and access essential services during the COVID-19 pandemic. Waiver granted Jul. 2020; extension granted Sep. 2020 (15.407(a)).

Medical devices

- **Zoll Medical /Kyma Medical Tech (DA 16-1009 mod. By DA 19-742)** – uCor medical device to monitor congestive heart failure. Required waivers of Sections 15.31, 15.503, 15.513, and 15.521 for bandwidth, measurement, and frequency range. Waiver granted Sep. 2016 and modified Aug. 2019.

- **Sensible Medical Innovations, LTD (DA 19-937)** - ReDS System designed to measure lung fluid measurements in congestive heart failure patients. Required waivers of Sections 15.31, 15.503, 15.513, 15.521, and 15.525 related to bandwidth, frequency range, measurements and coordination. Waiver granted Sep. 2019.

- **MIT (DA 20-445)** – WiTrack system passively monitors mobility, breathing, and other physiological signals in patients without body-worn sensors. Requests Waivers of Sections 15.503, 15.31, and 15.521 related to UWB operations and measurements. Waiver granted Apr. 2020.

Medical devices Continued

- **GE Healthcare (GEHC) (DA 20-489)** To keep up with the demand created by COVID-19, GEHC requests limited waivers of the Commission's radio-frequency (RF) device equipment requirements to allow specific medical devices to be marketed, operated, and imported prior to such equipment receiving an equipment authorization grant. GEHC request waiver of certain provisions of title 47 of the Code of Federal Regulations (CFR) in part 2, part 15, part 18, and part 95. Waiver granted May 11, 2020.

Questions ?

Thank you!