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May 9, 2016

**SUBMITTED ELECTRONICALLY VIA ECFS**

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, NW  
Washington, DC 20554

Re: **Notice of *Ex Parte* Presentation**

**GN Docket No. 14-177, Use of Spectrum Bands Above 24 GHz for Mobile Radio Services**

Dear Ms. Dortch:

On May 5, 2016, John Hunter, Senior Director, Engineering and Technology Policy, T-Mobile US, Inc., Russell Fox of Mintz Levin and I met with the following members of the Commission's staff regarding the above-referenced proceeding:

Julius Knapp (OET)  
John Wilkins (WTB)  
Brian Regan (WTB)  
Chris Helzer (WTB)  
Matthew Pearl (WTB)  
Blaise Scinto (WTB)  
Simon Banyai (WTB)  
Michael Ha (OET)

We distributed and discussed the attached presentation. We described the rapid pace of development of 5G technology and the importance of having access to sufficient millimeter wave spectrum both to serve the needs of consumers and to help bolster US leadership and competitiveness. We noted that T-Mobile expects that the initial use cases for millimeter wave 5G technology will be for small-cell applications in urban and suburban areas. We anticipate that we will use the technology to fill-in coverage gaps, to provide additional capacity where required and to meet new application requirements, including for the Internet of Things. We urged the Commission to provide a competitive framework by preventing excess aggregation of millimeter wave spectrum. Research into the substitutability of various bands is ongoing and will be a factor in developing a suitable high-band screen. We informed the Commission that T-Mobile is actively involved with other industry participants in efforts to better evaluate how and

to what extent millimeter wave spectrum can be shared between terrestrial operations and satellite systems. We observed that this work is just beginning and requires further efforts, but that there is significant industry focus on trying to provide solutions. We expressed optimism regarding cooperation with federal users of millimeter wave spectrum, citing both past and ongoing work with those entities in the AWS-3 relocation process.

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter and the associated presentation is being filed for inclusion in the above-referenced docket and sent to each member of the Commission's staff with whom we met. Please direct any questions regarding this filing to the undersigned.

Respectfully submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey  
Vice President, Government Affairs  
Technology and Engineering Policy

Attachment

cc: (via e-mail, with attachment, to all Commission staff noted above)



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# Millimeter Wave Spectrum – Advancing 5G Leadership

May 5<sup>th</sup>, 2016

# Millimeter-Wave Bands pave the way for 5G

- 5G will**
  - Use high band spectrum bands initially.
  - Evolve over time, and interwork with LTE as it develops.
  - Enable new use cases and improve existing use cases.
- Exclusively licensed, large bandwidth spectrum will be critical to the 5G ecosystem**
  - Work to maximize contiguous bands in order to better offer larger channel BW
- Competitive playing field in mmWaves needed**
  - Competition drives innovation and is necessary for a healthy and globally competitive 5G ecosystem
  - Sufficient spectrum available for terrestrial services is a critical component

## 5G Key Themes



## 5G Spectrum Options

Bands	28GHz	37GHz	39GHz	70GHz
Bandwidth	850MHz	1600MHz	1400MHz	7GHz

T-Mobile conducting 5G testing in accordance with STA



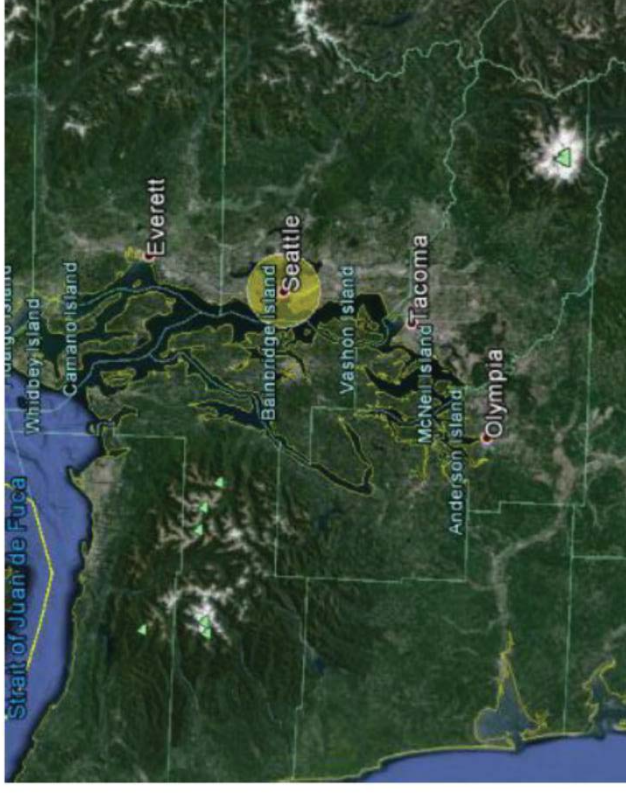
## Creating a Competitive Framework

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- Mobile terrestrial use should be permitted in the existing 28 GHz LMDS and 37/39 GHz bands on an exclusive, licensed basis
  - Mobile use should be extended to existing licensees
  - Larger license areas, such as PEAs, more accurately reflect business and service requirements and reduce complexity compared to counties
  - Band structure should accommodate technical flexibility and competition
    - Multiple licenses per band
    - Licenses should be proportionate to the amount of spectrum
      - 28 GHz – 200 MHz minimum
      - 37/39 GHz – combined to create a 3 gigahertz band with larger license block sizes
  - Ten year license terms provide certainty required for investment
  - Traditional construction-based performance requirements not appropriate given developing technology and use cases
    - Fee based approach would disincentive warehousing - with fee reduced or eliminated based on use
  - Allow pre-auction swap at 39 GHz to optimize contiguous spectrum
  - Guard against excessive aggregation of spectrum through a high-band spectrum screen

# Further Development of Sharing Proposals Necessary

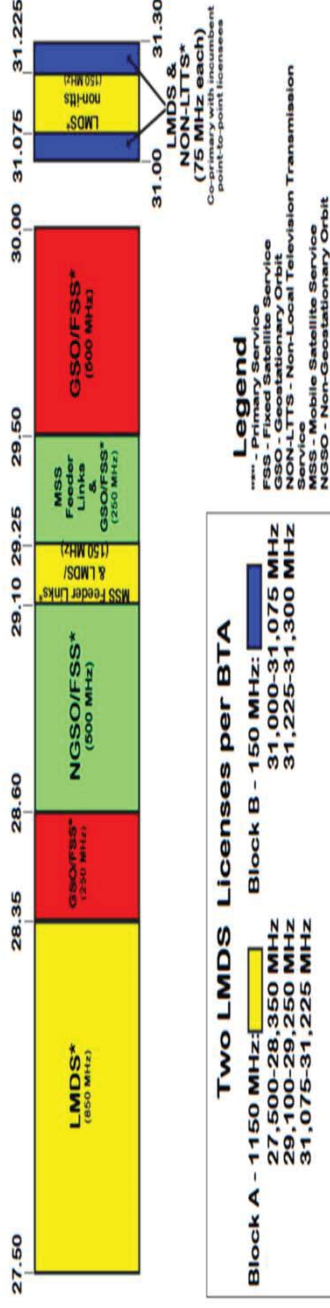
- ❑ High level framework lacks details necessary to fully evaluate impact
  - ❑ Vague coordination requirements and requirement to accommodate future satellite operations is unworkable in auctioned spectrum
- ❑ Number and size of “urban-core” areas is arbitrary:
  - ❑ No relationship to potential licensed areas or to economic areas
  - ❑ The zones are too limited and fail to provide the certainly necessary for terrestrial deployment
  - ❑ At a minimum, top 200 PEAs should be excluded from additional satellite use.
- ❑ Technical working groups are underway to establish IPC for both 5G to FSS and FSS to 5G



Market	Lon	Lat	Coord Radius (mi)
Seattle	-122.327	47.6056	7

Source: AT&T/EchoStar proposal

# FSS Operations in the 28 GHz Band

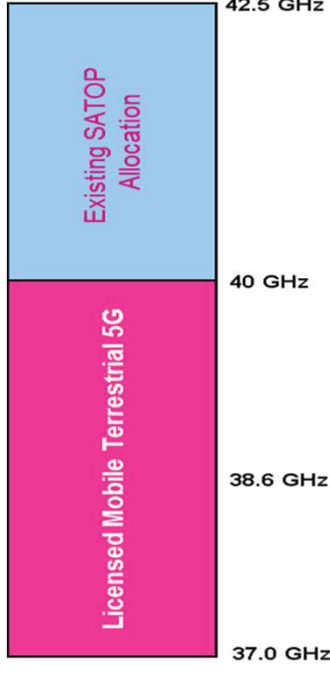


- FSS retains secondary status, but existing earth stations shall be grandfathered
  - Coordination zones to be established in accordance with the FSS class of service with IPC limits to dictate the size of the protection zones.
  - SAS not necessary to protect fixed locations
- Flexible UMFU licensees allow deployment of additional FSS earth stations
  - Market-based approach
  - Little competition for licenses in markets not attractive for terrestrial deployment.
- Additional FSS operations on secondary basis may be feasible but requires further evaluation and testing
- UMFU Licensees shall deploy their networks in accordance with their business objectives and FCC build-out requirements.
  - PFD limits to protect space station operations are not appropriate or necessary.



## The 39 GHz (extended) Band

- ❑ The 37 and 39 GHz bands should be combined to create a contiguous 3 GHz licensed block
  - ❑ The proposed hybrid should be rejected.
    - ❑ Outdoor-only licenses are not economically viable, will reduce the value of the spectrum and limit service offerings
    - ❑ Deployment and enforcement will be extremely complicated and costly with no apparent benefit over a fully licensed approach



- ❑ Emphasis on the band should remain on terrestrial operations
  - ❑ Lack of existing satellite operations provides opportunity for 5G advancement
  - ❑ Globally harmonized band
  - ❑ Current rules limit gateway deployment and satellite PFD
  - ❑ FSS allocation exists in adjacent band
- ❑ Further analysis is necessary to determine the viability of broader opportunistic satellite use
  - ❑ Any such use must ensure that the satellite downlink doesn't interfere with terrestrial operation
  - ❑ Any change in PFD permitted would have to ensure coexistence with terrestrial operations



# 64-71 GHz Band

- ❑ An equitable balance between Unlicensed and Licensed spectrum is necessary.
  - ❑ 66-71 GHz identified for study for mobile operations by WRC-15 for 5G services
  - ❑ 66-71 GHz should be for licensed operations
  - ❑ 64-66 GHz can be added to existing unlicensed band at 57-64 GHz, creating a 9 GHz block

