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DAVINA SASHKIN
PETER TANNENWALD
JAMES U. TROUP
KATHLEEN VICTORY
HOWARD M. WEISS

* NOT ADMITTED IN VIRGINIA

1300 NORTH 17th STREET, 11th FLOOR
ARLINGTON, VIRGINIA 22209

OFFICE: (703) 812-0400
FAX: (703) 812-0486
www.fhhlaw.com
www.commlawblog.com

RETIRED MEMBERS
VINCENT J. CURTIS, JR.
RICHARD HILDRETH
GEORGE PETRUTSAS
JAMES P. RILEY

OF COUNSEL
THOMAS J. DOUGHERTY, JR.
ROBERT M. GURSS*
KATHRYN A. KLEIMAN
MITCHELL LAZARUS
TONY S. LEE
ROBERT J. SCHILL
LAURA A. STEFANI*
ROBERT M. WINTERINGHAM

LAURA STEFANI
(703) 812-0450
STEFANI@FHHLAW.COM

May 22, 2015

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: GN Docket Nos. 12-268 and 14-166 and ET Docket No. 14-165
***Ex Parte* Filing of Sennheiser Electronic Corporation**

Dear Ms. Dortch:

With regard to the above-captioned proceedings, Joe Ciaudelli, Director of Spectrum Affairs, Sennheiser Electronic Corporation ("Sennheiser"), and the undersigned, counsel for Sennheiser, participated in the following meetings with Federal Communications Commission ("FCC" or "Commission") staff:

- May 20, 2015: Separate meetings with Priscilla Delgado Argeris, Legal Advisor to Commissioner Rosenworcel; Renee Gregory, Legal Advisor to Chairman Wheeler; and Erin McGrath, Legal Advisor to Commissioner O'Reilly.

- May 21, 2015: Separate meetings with Brendan Carr, Legal Advisor to Commissioner Pai, and Louis Peraertz, Legal Advisor to Commissioner Clyburn.

The participants discussed the points Sennheiser has made in the above-captioned dockets with regard to the future of wireless microphone use in the U.S., as detailed in the attached presentation. In particular, Sennheiser:

- Disabused the myth that wireless microphone technology is not cutting edge or spectrally efficient;
- Emphasized the importance of wireless microphones to one of our country's most vital industries, content creation;
- Highlighted the differences between wireless microphone and WSD technology, differences which allow wireless microphones to be good spectrum neighbors to incoming 600 MHz licensees and to not require control by a database;
- Made clear that two UHF channels sans white space devices is a need not a want; and
- Noted that the definition of "commencement of service" should be unambiguous, reasonable and practicable.

Please direct any questions to the undersigned.

Respectfully submitted,

Laura A. Stefani
Counsel for Sennheiser Electronic Corp.

Attachment

cc: Renee Gregory
Louis Peraertz
Priscilla Delgado Argeris
Brendan Carr
Erin McGrath
Gary Epstein
Howard Symons
David Goldman
Julius Knapp
Paul Murray
Ira Keltz
Hugh Van Tuyl
Chad Breckinridge
John Schauble
Stephanie Minnock
AJ Glusman
Stephen Buenzow
Chris Helzer
Simon Banyai

Proposal for Future Wireless Microphone Operation in The United States – A Balanced Approach

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Sennheiser at a Glance

The leading manufacturer of high-end professional wireless microphones (including more than 90% of what is used on Broadway)

- Founded in 1945
- Three U.S. Facilities:
  - Old Lyme, CT
    - Sales & Marketing (140 employees)
  - Albuquerque, NM
    - Factory (140 employees, $60M annual sales)
  - San Francisco, CA
    - Advanced R&D

First wireless microphone introduced in 1957

Today's technology

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Cutting Edge Technology

- Sennheiser has a long history of innovation
- Newest models have even higher spectral efficiency
- New semi-professional products operate outside of UHF
- Digital is not inherently more spectrally efficient than analog:
  - Digital does allow for compression and can increase spectral efficiency, assuming clean spectrum (low noise floor), but at the cost of latency, audio quality, or both
  - Market forces, not mandatory technical requirements, should be the driving force in the technology applied

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Economics of Content Creation

- Incentive Auction proceeding focuses on content **distribution** via broadband
- Spectrum is also essential for content **creation**
- U.S. produced news and entertainment is the best in the world:
  - Nearly $1 Trillion to the economy = ~ 6.5% of the national GDP
  - 3-to-1 export to import ratio, the highest, by far, of any American made product or service
- Demand for content and wireless microphones is growing; FCCs spectrum allocation is shrinking

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Three Classes of Microphone Operators

Class A: Power users (licensed professionals)

- Priority over White Space Devices
- Up to 350 MHz spectrum (mega-events)
- Up to 250 mW power (though generally 50 mW)

Class B: Civic and commercial productions

- Often professional (Baltimore Symphony, Steppenwolf Theater)
- Requires UHF and unlicensed spectrum
- May not qualify for Part 74 licensing under current requirements
- Registration of events for interference protection needed

Class C: Hobbyists

- Transitioning out of UHF to unlicensed bands

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Wireless Microphones are Different from WSD

- **Good Spectrum Neighbors**
  - Must be completely free from drop-outs or other interruptions
    - Operators seek clear frequencies!
- **Real time devices**
  - Must have negligible latency (sound delay)
    - <4 ms for microphones . . . a cell phone typically has >100 ms latency
- **Extremely low out-of-band emissions**
- **Long history of peaceful co-existence with licensed users (TV, PLMR, Studio Transition Links)**

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Millions Watching - No Second Chance

- Some hyper-critical applications require UHF that does not rely on the proper operation of the database system and not in the guard bands

Taylor Swift's
Time Square
Performance
News Year's Eve

Historic Events

The Today Show > Six Million Viewers Daily

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Two Blocks of Clean UHF Needed for Critical Applications

- Hyper-critical wireless microphone applications require UHF due to wave propagation and need for “clean” (low noise) spectrum
- News events are spontaneous and the location can change quickly; white space database systems cannot address
- Sharing with WSD is dependent on the complete proper operation of the database system and *all* WSDs
- The guard bands and duplex gap will have limited reliability for wireless microphone operation because of high noise (due to out-of-band emissions from the uplink and downlink blocks)

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Spectrum for Wireless Microphones

Television Bands

- **Two blocks - not available to WSD - for hyper-critical use**
  - Channel 37 (WMTS Coalition indicated support)
  - “Naturally occurring” UHF white space channel
- **Remaining unlicensed channels - shared with WSD**
  - Guard bands - at 50 mW
  - Duplex gap - upper 6 MHz per current FCC proposal, at 50 mW
  - Other white space TV channels (no portable WSD in Chs. 4-20)

Additional Bands

- 941-960 MHz (All Part 74 licensees)
- 1435-1525 MHz (All Part 74 licensees)
- Other bands for less critical links (2020-2025 MHz)

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Microphones Should Not Be Subjected to Database Control

- Microphones already fulfill the Spectrum Act, without database control
- Methods of avoiding interference routinely used today:
  - Manual checks
  - Scan functions
  - Spectrum analysis software
  - Outboard spectrum analyzers
- Wireless microphones cannot tolerate WSD database interruptions
- Wireless microphones generally operate indoors where geolocation is a challenge (*see* 3.5 GHz Order)
- Unlicensed wireless microphones have co-existed without issue; there is no reason to now require database control

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Smooth 600 MHz Transition

- The 39 month transition period is useful only with a meaningful definition of Commencement of Service
- Existing wireless microphones should be grandfathered to operate on the post-transition UHF frequencies, and not be junked
- Technical and operational rules should be determined, and access to new allocations set, before conducting the Incentive Auction
- Wireless microphone owners should be compensated for equipment purchased during the 700 MHz reallocation
  - During the 700 MHz proceeding, the Commission's press release directed wireless operators to use UHF below 700 MHz
  - 600 MHz equipment was purchased prior to notice of the Incentive Auction
  - Replacing equipment a second time is unfair and a financial hardship
  - The Commission has the authority to mandate compensation

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Thank you!

Joe Ciaudelli | 860-848-0411 | spectrum@sennheiserusa.com

Laura Stefani | 703-812-0450 | stefani@fhhlaw.com

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