



**May 14, 2018**

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

**Via Electronic Filing**

**Re: NOTICE OF EX PARTE**  
**GN Docket No. 17-183:** *Expanding Flexible Use in Mid-Band*  
*Spectrum Between 3.7 and 24 GHz*

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Dear Ms. Dortch:

On May 10, 2018, Jacquelynn A. Green, President and Chief Technology Officer of Alteros, Inc. ("Alteros"), Erin Fitzgerald, Counsel to Alteros, and the undersigned met with the Wireless Telecommunications Bureau and Office of Engineering and Technology staff listed in Attachment A. On May 11, 2018, Ms. Green, Ms. Fitzgerald, and the undersigned met with: (1) Commissioner O'Rielly and Erin McGrath, Wireless Legal Advisor to Commissioner O'Rielly; and (2) Rachael Bender, Wireless Advisor to Chairman Pai, in separate meetings.

Alteros, an Audio-Technica company, was formed in 2016 and is dedicated to the research, development, and sales of innovative technology products with a special focus on the evolving RF landscape and to creating high-end wireless solutions for live audio production, broadcast studios, sports events, and theater applications in the ever shrinking frequency spectrum. Alteros products capitalize on Audio-Technica's extensive research in ultra-wideband ("UWB") and RF technology and innovative digital solutions to solve the most demanding technical problems.

Alteros was formed in response to the FCC's desire to develop technology solutions that will allow wireless microphones and other broadcast auxiliary services, both licensed and unlicensed, to successfully operate outside of the television bands without disrupting existing licensed services. To this end, Audio-Technica invested millions of dollars in the research, development, production and launch of the world's first ultra-wideband digital wireless microphone system and then followed this innovation with the formation of Alteros. In just over a year since its initial product launch, Alteros is winning awards and recognition for providing technically advanced digital wireless products used in the highest level venues and most critical performance applications. Most recently, it won a "Best of NAB" and two "Best of Show" awards at the 2018 National Broadcasters Association show in April.

Alteros discussed its research and development efforts and innovative products with staff, and distributed the PowerPoint presentation attached to this letter as Attachment B. Alteros also reiterated the points it made in its Reply Comments in this proceeding,<sup>1</sup> specifically noting that millions of consumers

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<sup>1</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Reply Comments of Alteros, Inc.](#), GN Docket No. 17-183 (Nov. 15, 2017).



already benefit from products and services operating in the Lower and Upper 6 GHz bands as a result of the FCC's efficient spectrum sharing policies and existing Part 15 rules. From January 1, 2013 through May 7, 2018 there have been 78 new equipment authorizations in the 6.0 – 7.5 GHz range. 65% of these authorizations have been UWB development. Using technology innovations, these authorizations have all been able to comply with existing Part 15 rules, sharing this spectrum successfully in a balanced fashion. While Alteros supports unlicensed operations in the Lower and Upper 6 GHz bands (5.925 – 6.425 GHz and 6.425 – 7.125 GHz), such operations must comply with existing technical standards that have been carefully crafted to protect critical safety and infrastructure operations in the 6 – 10 GHz bands. Alteros also discussed its support for several parties' rebuttals of a study prepared by RKF Engineering Services, LLC filed on January 26, 2018.<sup>2</sup>

Please do not hesitate to contact the undersigned with any questions you may have. Pursuant to Section 1.1206 of the FCC's rules, this ex parte is being filed electronically with the Office of the Secretary.

Best regards,

/s/ Howard S. Shapiro

Howard S. Shapiro  
Counsel for Alteros, Inc.

Enclosure

CC: Rachael Bender  
Erin McGrath  
Ariel Diamond  
Brian Wondrack  
Hugh Van Tuyl  
Brian Butler  
Nick Oros  
Bahman Badipour  
Jamison Prime

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<sup>2</sup> See *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Cheng-yi Liu and Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, GN Docket No. 17-183 (Mar. 13, 2018); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Stacey Black, AT&T, GN Docket No. 17-183 (Mar. 26, 2018); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Dave Meyer, Board Member, National Spectrum Management Association, GN Docket No. 17-183 (Mar. 27, 2018); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Doug Davies, Microwave Engineer – Mobile Networks, Nokia, Prakash Moorut, Spectrum Lead – Nokia Bell Labs & CTO, Nokia, and Jeffrey Marks, Senior Counsel, Policy and Regulatory – Government Relations, Nokia, GN Docket No. 17-183 (Mar. 28, 2018); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Eddie Carrera, Assistant Director of ITS – YRCS Division, City of Yuma, GN Docket No. 17-183 (Apr. 23, 2018); *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, [Ex Parte Letter](#) to Ms. Marlene H. Dortch, Secretary, FCC from Arman Kolukcija, Sr. MW Engineer, Wireless Applications, Corp., GN Docket No. 17-183 (May 11, 2018).

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Paul Murray  
Karen Rackley  
Barbara Pavon  
Tom Derenge  
Chris Andes  
Julius Knapp



**Attachment A**

Ariel Diamond – WTB  
Brian Wondrack – WTB  
Hugh Van Tuyl – OET  
Brian Butler – OET  
Nick Oros – OET  
Bahman Badipour – OET  
Jamison Prime – OET  
Paul Murray – OET  
Karen Rackley – OET  
Barbara Pavon – OET  
Tom Derenge – WTB  
Chris Andes – WTB  
Julius Knapp – OET



**Attachment B**

## GTX Ultra Wideband Wireless Microphone System Successes

**alteros**

- Since its April 2017 product launch, our innovative product has received major broadcasting industry awards and been the subject of positive trade press articles.
- **2018 “Best of NAB” Award:** *Streaming Media* and *Streaming Media Producer* editors made the final decisions.



- **2018 Pro Sound Media and TV Technology “Best of Show” Awards:** Evaluated by a panel of engineers and industry experts, and are selected based on innovation, feature set, cost efficiency and performance in serving the industry.
- **2017 IABM “Game Changer” Award:** The key judging criteria are that winners should be able to demonstrate not only real innovation, but also deliver significant operational and business benefits that open up new opportunities as a result of that innovation.
  - “Microphone receivers in 3RU and 6.5GHz! Whew, what a relief, no issues with UHF etc.! All digital! Every imaginable audio standard! THE GAME CHANGER in Audio! Period!”





## GTX Ultra Wideband Wireless Microphone System Successes

**alteros**

- **Live From the US Open: ESPN Audio Team Unfazed by Sonic Challenges**
- *Noisy Spectators, RF Reallocation Are Just Part Of A Day's Work* (Sept. 1, 2017)
  - “ESPN is using the new 24-channel GTX Series 6.5-GHz Ultra-Wideband wireless microphone system from Alteros...at Practice Court 1 and for on-set interviews... ‘The Alteros system is fantastic. We extended the antennas, and it was up and running in two minutes. The learning curve is next to nothing, and the system itself is plenty robust. We’re trying to move ourselves up higher [in frequency] this year, since the RF situation has changed.’ The system does not require frequency coordination.”



## GTX Ultra Wideband Wireless Microphone System Successes

**alteros**

- **Live From the US Open: In Year 3 of ESPN Rights Deal, Innovation Takes Center Stage**

- *ESPN Has Taken Over Unilateral-Content Distribution For USTA, Tests Bleeding-Edge Tech* (Sept. 1, 2017)
- “In the wake of the recent RF reallocation, ESPN is exploring new technologies that it hopes will alleviate wireless-camera and -microphone challenges in the future.”





## GTX Ultra Wideband Wireless Microphone System Successes

**alteros**

- **Altero's GTX system is operating flawlessly in RF-crowded Manhattan at ESPN's new flagship "Seaport" studios. Here's what ESPN said about their choice:** "We want to be able to use the whole space, ..... Alteros RF mics and beltpacks will help in that process, and a massive lighting infrastructure can make every corner usable as a shooting location. Alteros provides 24 channels of audio, and we will have 12 RF packs between the studios," says **Chris Strong**, senior operations specialist. "But the novelty of the system is, if there is an influx of talent or guests in one studio, we can move them over to the other studio." SVG News, *ESPN's Big Apple Home Opens on April 1*, by Ken Kerschbaumer, (March 30, 2018)



## GTX Ultra Wideband Wireless Microphone System Successes

**alteros**

- Use in a live “talk show” environment.





## GTX Ultra Wideband Wireless Microphone System Successes

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- **A very successful test in a perfect target market area for this product.**
  - This professional musical theater production featured 16 trolls wearing large neoprene masks.
  - The show's former wireless mic system experienced coordination and interference problems.
  - The Alteros 6.5GHz system was set-up overnight and went directly to live with no frequency coordination, no interference, and perfect performance for 15 shows!
  - The transmitters were used \*inside\* the costumes.



## What is operating in the GTX 6.5 GHz spectrum?

We are successfully SHARING with many users...

**alteros**

- **Point-to-Point Microwave Links:**
  - Used by railroads, oil and gas companies, the U.S. Power Grid control
  - 5925 – 6700 MHz
- **Tactical Safety:**
  - 6 GHz band is heavily used and relied upon for fixed point-to-point microwave links essential to public safety services, including backhaul for mission critical land mobile radio systems that support dispatch and tactical communications
- **Medical Devices:**
  - UWB is uniquely suited for close-range low power (SAR and multiple device safe) medical device use
- **Asset tag, and Location Tracking:**
  - Since UWB regulations put into place, an entire U.S. infrastructure has been deployed across large manufacturing environments in order to automate the production and tracking of assets
- **VSAT Satellite Terminals:**
  - Provide communication links for convenience stores, fast food chains, (point of sale, RFID, credit card transactions).
- **Broadcast TV Satellite:**
  - C Band Transmits 5925 – 6425 MHz; (Receives on 3700 – 4200 MHz)
- **Local Television Transmission Service (LTTS):**
  - 5925-6525 GHz

## What is operating in the GTX 6.5 GHz spectrum?

We are successfully SHARING with many users...

**alteros**

- **Wireless Cameras** are used at many events and venues over a range of frequencies:
  - 403 – 474 MHz;
  - 2 – 2.7 GHz with many around 2.4 and 2.5 GHz;
  - 3.5 GHz;
  - Many around 5.8 GHz.
  - Lower bands are crowded, and more frequently cameras can tune from 1.3 GHz – 7 GHz, with heavy use in the higher frequencies due to spectrum crowding.
- **Broadcast Auxiliary Service (BAS):**
  - Wireless mics and cameras consider these frequencies with SBE coordinators when deciding where to operate.
  - In 2010, main operation went from 17-18 channels between 1990 and 2110 MHz to 7 channels between 2025.5 and 2109.5 MHz, and 3 channels around 2.5GHz.
  - Digital/aural BAS allowed 950 MHz, 2 GHz, 2.5 GHz, 7 GHz, 13 GHz, and 18 GHz.
  - Cable relay and BAS at 6425-6525 MHz.
- **If there's so much there, how can we operate?**
  - There are currently no higher power pervasive operating area devices in our frequency range.
  - The spectrum in which we operate is mostly filled with geographically specific “uplink facing” devices.
  - The higher frequency signals allow for use of smaller, highly directional equipment allowing each device to work within its “own” space.



## GOOD FENCES MAKE GOOD NEIGHBORS

### Get Better Performance and Be a Good Neighbor!

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- Tightly-controlled, narrow patterns from antennas at these frequencies is like a fence that contains the signal, so there can be more good neighbors in a given area.
- Operating in higher frequency bands allows for increased sharing of space and fewer interference problems. It also allows for higher bandwidth – giving more users better signals.
- Given the Alteros GTX system's extremely low output power (under -41dBm), it does not interfere with any other gear. We squeeze in the spaces, and nothing "sees" us.



## How We Do What We Do

alteros

- **6 GHz – 10GHz spectrum is a good home for professional UWB wireless microphones:**
  - We share spectrum well with the many band users (wireless cameras, C-band uplinks, etc.).
  - Technology lends itself to a much more efficient use of wireless in a specific location.
  - Instead of a limited number of higher power, traditional wireless signals (which are pervasive throughout a venue and limit the number of possible users), the use of multiple smaller operation “cells” allows for many more users and RE-USE of the same spectrum.
  - The system’s performance is superior to what has been traditionally used.
    - Sound quality is superior;
    - Set-up time and ease of use is superior;
    - Interfacing with advanced technology equipment for new workflows (such as AoIP and fiber) is easier.
  - Range *is not* superior – which is ok. We no longer can afford indiscriminate RF propagation around a venue.
  - Many events require hundreds of RF channels. If a venue utilizes 24 Alteros GTX 6.5 GHz wireless channels, they have removed 24 channels (approximately 7.2 MHz of spectrum) from their coordination/mix. We CLEAN and FREE UP more than a full TV channel of spectrum! This allows for maintaining interference-free use of existing traditional wireless mic systems for as long as possible despite the shrinking available UHF spectrum when systems are used in combination.