

KELLEY DRYE & WARREN LLP

A LIMITED LIABILITY PARTNERSHIP

WASHINGTON HARBOUR, SUITE 400

3050 K STREET, NW

WASHINGTON, D.C. 20007-5108

(202) 342-8400

FACSIMILE

(202) 342-8451

www.kelleydrye.com

EDWARD A. YORKGITIS, JR.

DIRECT LINE: (202) 342-8540

EMAIL: cyorkgitis@kelleydrye.com

NEW YORK, NY

LOS ANGELES, CA

CHICAGO, IL

STAMFORD, CT

PARSIPPANY, NJ

BRUSSELS, BELGIUM

AFFILIATE OFFICE

MUMBAI, INDIA

**Accepted / Filed**

December 21, 2015

DEC 21 2015

Federal Communications Commission  
Office of the Secretary

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, SW, Room TW-A325  
Washington, D.C. 20554

**Re: Promoting Spectrum Access for Wireless Microphone Operations, GN  
Docket No. 14-166; Expanding the Economic and Innovation  
Opportunities of Spectrum through Incentive Auctions, GN Docket  
No. 12-268**

Dear Ms. Dortch:

On December 18, 2015, Marc Ehudin of Textron, Danny Hankins of Textron Aviation and President Emeritus of Aerospace and Flight Test Radio Coordinating Council, Inc. ("AFTRCC") (by telephone), Scott Kotler of Lockheed Martin, Bruce Olcott of Jones Day and counsel to The Boeing Company, Ken Keane of Duane Morris and counsel to AFTRCC, and Edward A. Yorkgitis, Jr., of Kelley Drye & Warren, LLP, and counsel to Raytheon and AFTRCC (collectively, the "AFTRCC representatives") met with Louis Peraertz, Wireless, International, and Public Safety Senior Legal Adviser to Commissioner Mignon Clyburn.

In the meeting, the AFTRCC representatives briefed Mr. Peraertz using the attached PowerPoint slides. The AFTRCC representatives discussed the results of the recently concluded World Radiocommunication Conference (WRC-15) as they apply to flight test spectrum in Region 2, in general, and the United States, in particular. As noted in the attachment, the results of the WRC regarding L-Band aeronautical mobile telemetry ("AMT") incorporated the U.S. position adopted by CITEL for No Change to ITU footnote 5.343 in Region 2, which preserves the priority for AMT in the 1427-1518 MHz band over other mobile applications. The U.S. also advised other Administrations that it has "no intention" to implement International Mobile Telecommunications ("IMT), i.e., commercial mobile wireless, in this band, which was reflected in CITEL's contributions to the WRC.

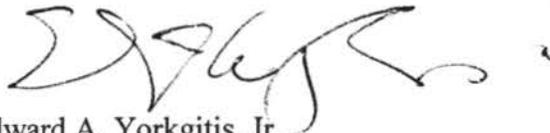
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Ms. Marlene H. Dortch  
December 21, 2015  
Page Two

The AFTRCC representatives also explained the soundness of the U.S. position and the importance of the result given the paramount need for safety and efficient operation in conducting flight testing in the L-band and S-band (2360-2390 MHz) AMT spectrum, and the importance of the U.S. aerospace industry to the nation's economy. Ken Keane, on behalf of AFTRCC showed a video to the Commission attendee describing the rigors of flight testing and the dependence on interference-free operation of the AMT bands during flight tests. A copy of the video is available for review through the Bureau of Consumer & Governmental Affairs.

Please contact the undersigned if there are any questions or if you require further information.

Respectfully submitted,



Edward A. Yorkgitis, Jr.  
*Counsel for Aerospace and Flight Test  
Radio Coordinating Council, Inc.*

Attachments

CC (via e-mail):  
Louis Peraertz

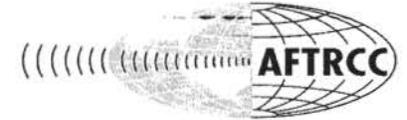


# Flight Testing and the Radio Spectrum

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Post-WRC Presentation by the Aerospace and  
Flight Test Radio Coordinating Council, Inc.

December 2015

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# Issues Covered

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- Introduction
- WRC-15 and AMT
- Flight Test Operations
- Flight Test Safety Is Jeopardized by Harmful Interference
- Interference to AMT Has Significant Economic Implications
- Conclusion

# Aerospace and Flight Test Radio Coordinating Council Members

**Bell Helicopter** **TEXTRON**

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**Rockwell**  
**Collins**

  
**communications**  
Telemetry-West

**SAT CORPORATION**  
An Integral Systems Company [www.sat.com](http://www.sat.com)

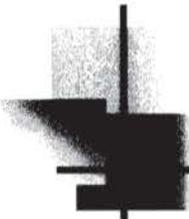
 **Agilent Technologies**

## WRC-15 and AMT

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- In preparation for the 2015 World Radiocommunication Conference, the U.S. agreed to support a CITEI Inter-American Proposal ("IAP") for identification of the band 1427-1518 MHz for International Mobile Telecommunications ("IMT"), i.e. mobile broadband, *provided that . . .*
- CITEI administrations supported *No Change* to ITU Radio Regulation 5.343 which reads:

"In Region 2, the use of the band 1435-1535 MHz by the aeronautical mobile service for telemetry *has priority* over other uses by the mobile service"  
(emphasis added).

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## WRC-15 and AMT (cont.)

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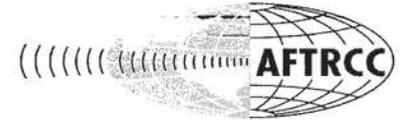
- Per this compromise, the United States *further* advised the international community that:
  - “In the United States, the 1 435-1 525 MHz band is used extensively for Aeronautical Telemetry (AMT); consequently, the United States has no intention of implementing IMT in the 1 427-1 518 MHz band” (Addendum 3 to WRC Document 7(Add.1)-E, at page 2).
- These commitments were embodied in CITELE’s contributions to the WRC. See Addenda 3 and 4 to WRC Document 7 (Add.1)-E).

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## WRC-15 and AMT (cont.)

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- As a result, the WRC identified the band 1427-1518 MHz for IMT in the Americas, and the band or portions thereof in other ITU Regions.
- *The record is clear.* AMT has priority over any other mobile use of 1427-1518 MHz in the Americas and, for its part, IMT is not to be allocated in this band in the U.S.
- As the following slides show, there is very good reason for these positions . . .



# Flight Test Operations

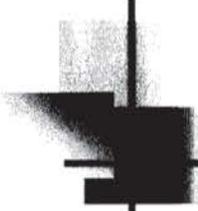
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- Flight testing is a rigorous process whereby aerospace vehicles, their systems and sub-systems, are tested in real-world conditions.
- Flight testing is a dangerous enterprise. During flight tests, aircraft and missiles are often stressed to the limits of their design.
- In order to reduce the risk to pilots and/or persons on the ground, engineers monitor the condition and performance of the aircraft or missile via real-time telemetry at every stage of its flight so as to safely determine its limits.



## Flight Test Operations (cont.)

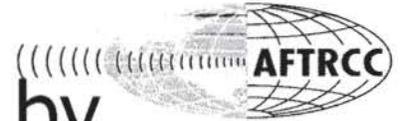
- In the event engineers detect an anomaly -- conditions the pilot is often unaware of -- they are able to warn him or her to abort the maneuver.
- Similar considerations may require aborting or support modifying missile flight tests.
- Moreover, via the telemetry stream the control center can clear the pilot to proceed to the next and succeeding test points, thereby maximizing the efficiency of a test flight and expediting the completion of a test program. This enhances the global competitiveness of U.S. manufacturers.

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## Flight Test Operations (cont.)

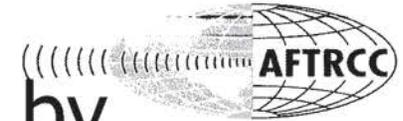
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- In the event disaster strikes and the test aircraft or missile is lost, the real-time data collected via AMT enables engineers to more quickly isolate the cause, and effect design changes.



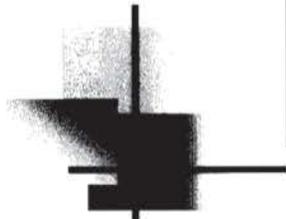
# Flight Test Safety is Jeopardized by Harmful Interference

- Recognizing the importance of aerospace development to our economy and national security, and the safety implications of flight test telemetry, the Commission has allocated specific bands for flight testing.
- Two bands are designated for manned aircraft testing: 1435-1525 MHz (aka, the "L-band") and 2360-2390 MHz (the "S-band"). These Bands are "Restricted" per Commission Rule 15.205.
- Using this spectrum, aircraft are often tested many miles from the control center (e.g. 200 miles or even more) due to weather, air traffic restrictions, the need to avoid population centers, and the like.



## Flight Test Safety is Jeopardized by Harmful Interference (cont.)

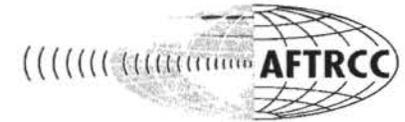
- Telemetry signals are weak to begin with and become weaker as the test aircraft climbs, dives and banks
  - Telemetry signals are subject to fades on the order of 30 dB.
  - Antennas used to receive the telemetry are large, dish-type, tracking antennas.
  - They are designed to be extremely sensitive in order to maintain "lock" on the aircraft being tracked.
  - This means AMT receivers are vulnerable to radio interference.



**ViaSat**

## L- and S-band Range Telemetry Systems

L-Band, S-Band, Fixed and Mobile



For Decades ViaSat has been a leading supplier of high quality tracking antennas to the telemetry users of the world. Using our experience we have refined our products into simple, robust, and technically superior telemetry systems.

The Patented ESCAN tracking feed provides low sidelobes, high scanning rates, and superior multi-path resistance. We also produce conical scan and single channel monopulse tracking feeds to fit a wide range of requirements.

The series 13000 pedestal features patented bearing technology that combines long trouble free life with ease of service and maintenance. Pulse Width Modulated (PWM) servo power amplifiers are matched with brushless DC servo motors to assure long trouble free operation. These pedestals are in service around the world, some in extreme harsh environments providing daily service.

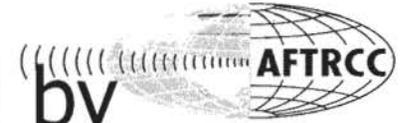
The heart of the control system is ViaSat's 3880 Antenna Control Unit (ACU). The 3880 is ViaSat's fourth generation ACU and provides unequalled performance for tracking systems. The 3880 provides for control, testing, and mission monitor (track files), far better than any previous control unit.

Telemetry Systems are available in fixed and mobile configurations as well as many size offerings (in addition to those listed here).



L- AND S-BAND RANGE TELEMETRY  
AT-A-GLANCE

- A leading source for more than 40 years
- Highly multi-path resistant ESCAN feed
- High dynamics, high accuracy tracking pedestal
- Fourth generation touch screen antenna control unit
- Mobile and fixed configurations
- Remote control



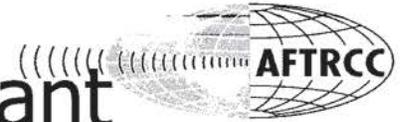
## Flight Test Safety Is Jeopardized by Harmful Interference (cont.)

- Interference means loss of data.
  - Loss of data blinds engineers in the control center to dangerous conditions aboard the aircraft.
  - Loss of data means maneuvers, or even entire tests, must be re-flown at significant cost.
- Note: Unlike *many* incumbent radio services and users, the flight test community has demonstrated a willingness to consider co-channel allocations even in Restricted AMT Bands ... *but* only ones which are low power and further subject to strong rules and regulations designed to protect aviation safety by preventing interference.

# Interference to AMT Has Significant Economic Implications



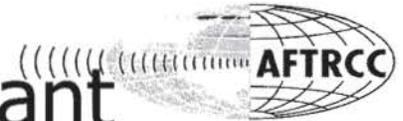
- Flight testing is expensive. It often involves the marshaling of scores of test and support personnel, and a large infrastructure of ancillary, supporting facilities from search and rescue aircraft to chase planes to theodolites, to name just a few elements.
- Test flight costs for advanced technology aircraft or missiles can exceed \$1,000,000 per flight -- many such flights are required before an aircraft can be certified as airworthy per FAA directives.



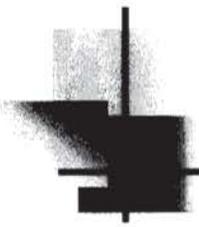
## Interference to AMT Has Significant Economic Implications (cont.)

- Flight testing is *in the critical path* for U.S. aerospace development, which in turn is critical to our economy and national security.
  - The U.S. aerospace industry consistently leads all other industry sectors in its contribution to a net positive balance of trade, i.e. nearly \$62 billion for the year 2014 (source: Aerospace Industries Association ("AIA")).

## Interference to AMT Has Significant Economic Implications (cont.)



- For 2014, aerospace industry shipments totaled \$260 billion (source: AIA).
- For the year 2014, the aerospace industry employed over 610,000 people, at an average annual wage of \$98,507 -- more than twice the national average of \$46,481 (source: AIA and Social Security Admin. (<https://www.ssa.gov/oact/cola/AWI.html>)).

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## Conclusion

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- Flight testing is vital to one of the nation's most important industries.
  - It is vital to continuation of the historic U.S. leadership in aerospace.
  - It is vital to U.S. national security.
  - It is vital to the many thousands of jobs aerospace supports.
- Continued, interference-free use of the L- and S-bands for flight testing, remains essential.

DOCKET NO. 14-166; 12-268

Attachment A

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