ICTS REGION 2 REPORT

By the Region 2 (the Americas) Coordinator:

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The International Consortium for Telemetry Spectrum

www.TelemetrySpectrum.org

Spectrum Demand

Global mobile data traffic grew 63 percent in 2016 from 2015

- 7.2 exabytes (1B Gigabyte) from 4.4 exabytes per month
- Expect 7 fold increase by 2021 to 49 exabytes per month
- North America expects a 5 fold increase

Average smartphone usage grew 38 percent in 2016

- Represented 81 percent of total mobile traffic
- Will grow to total of 86% of mobile traffic by 2021

Mobile video traffic accounted for 60 percent of total mobile data traffic in 2016

- Over three-fourths (78 percent) of the world's mobile data traffic will be video by 2021

5G estimates

- Up to 3 million new jobs
- $275 billion in private sector network investment
- $500 billion added to the GDP

Cisco® Visual Networking Index (VNI) Global Mobile Data Traffic Forecast Update 28 March 2017
Accenture Strategy Highlights 12 January 2017

Spectrum Demand

U.S. National Broadband Plan (17 Mar 2010)

- At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second by the year 2020.
- The United States should lead the world in mobile innovation, with the fastest and most extensive wireless networks of any nation.
- Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose.
- Every American community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals, and government buildings.
- To ensure the safety of the American people, every first responder should have access to a nationwide, wireless, interoperable broadband public safety network.
- To ensure that America leads in the clean energy economy, every American should be able to use broadband to track and manage their real-time energy consumption.

Spectrum Demand
AWS-3

Advanced Wireless Services – 3 (AWS-3) Spectrum Auction Value

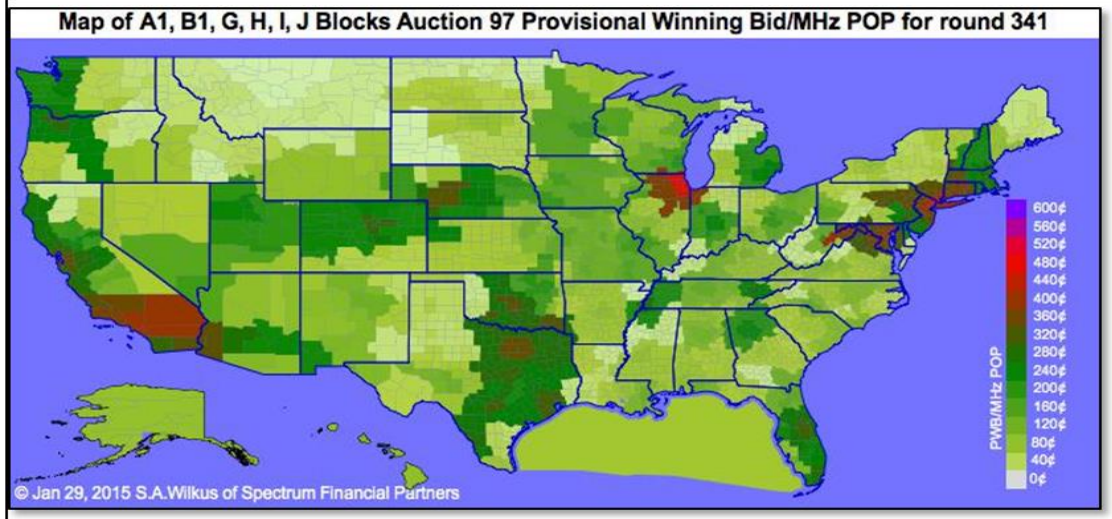
$50B

$40B

$30B

$20B

$10B



Total Winning Bids*
$44.89B

Optimistic Predictions
~$18B

FCC Reserve Price
~$10B

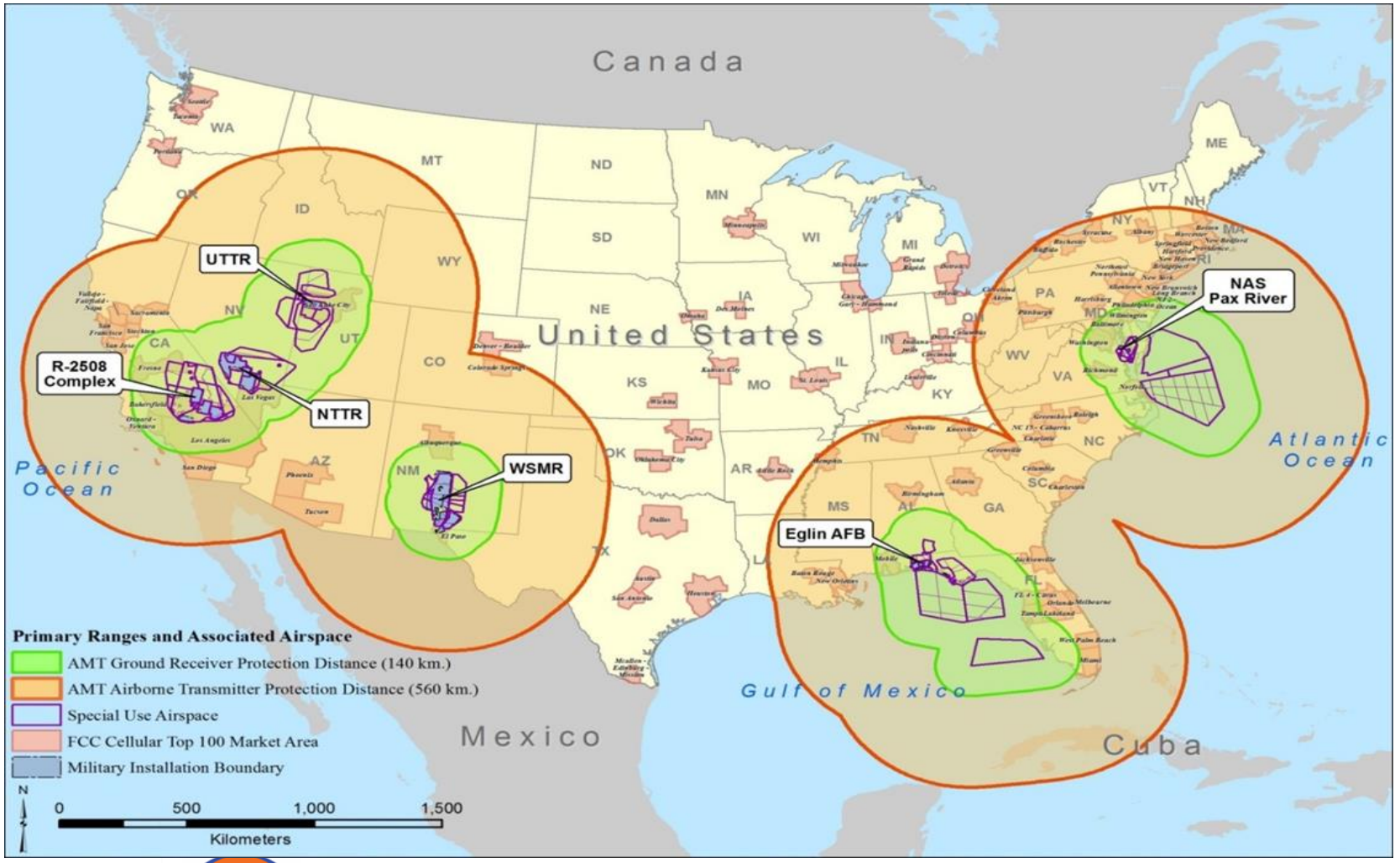
SOURCES: FCC Website and 30 Jan 2015 Telecoms.com article "US AWS-3 Auction Raises Record $45 Billion" by Auri Aittokallio

* NOTE: After discounts to certain categories of bidders were applied, the Government actually received $41.329B.

Spectrum Demand AWS-3

1755-1780 MHz Transition Plan

DOD AMT Receiver & Airborne Transmitter Protection Distance



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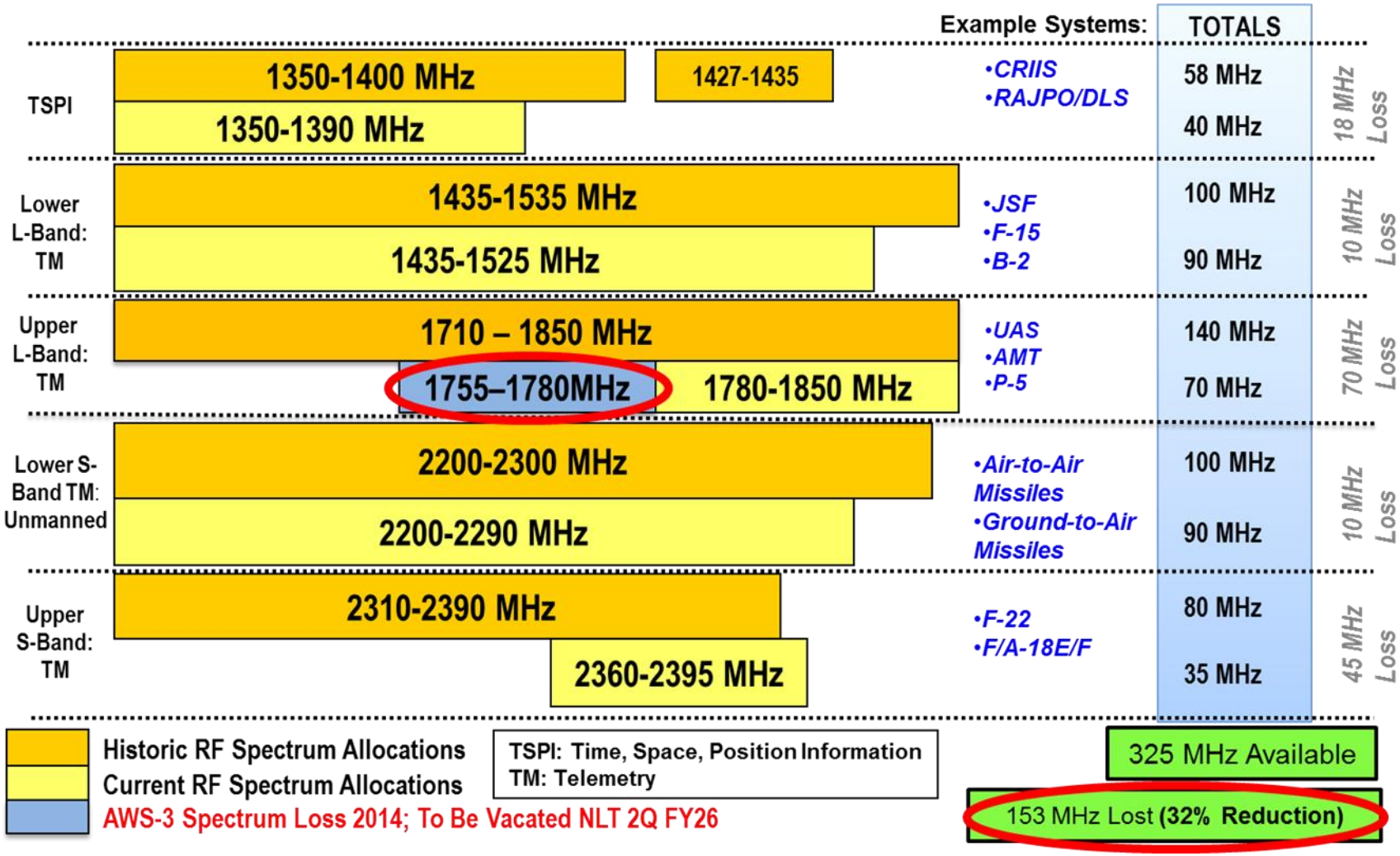
Spectrum Demand AWS-3

AWS-3 Spectrum Auction (1750-1780 MHz) T&E RF Spectrum Allocations – TSPI, L-Band, S-Band

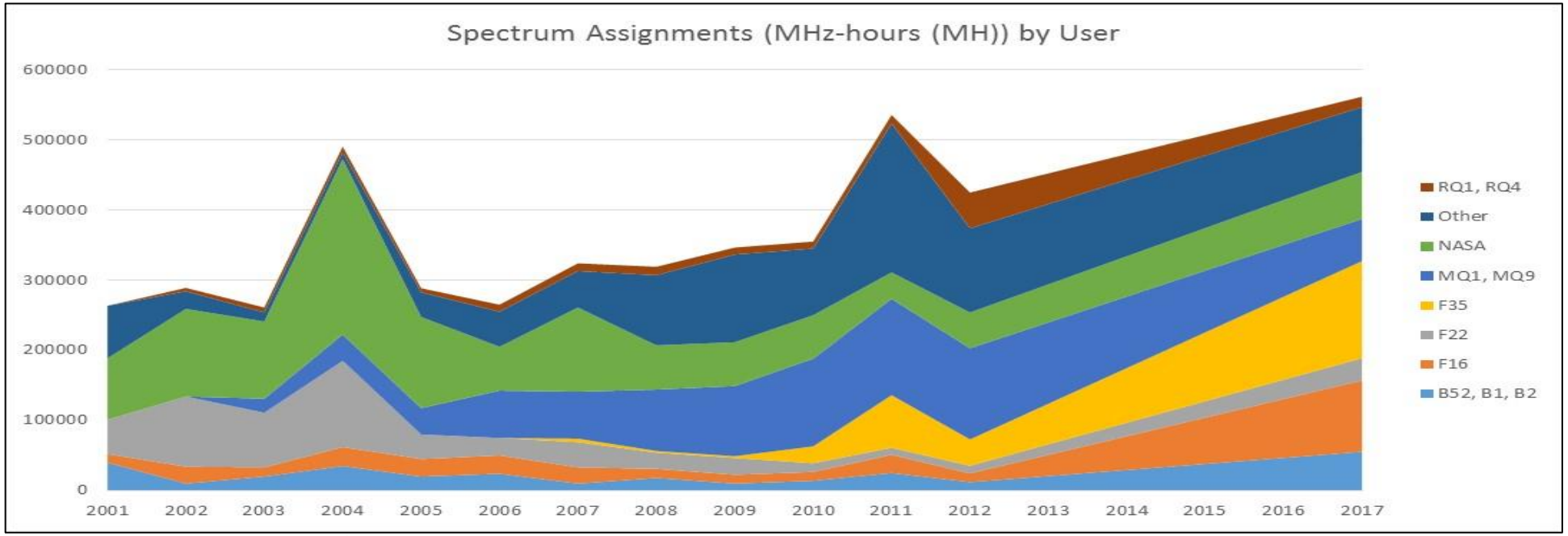


Spectrum Demand
AWS-3

- Vacate the 1755-1780 MHz band in a timely and smooth transition
- Compatible air and ground capabilities between all MRTFBs
  - Air borne assets can be supported at each others Test Ranges
  - Maintain compatibility in step with Service Test Range SRF upgrades
- Continue to operate in remaining spectrum by operating efficiently and effectively.
  - Multi-Band
  - Multi- Mode
  - Controlled in real-time
  - Spectrum Monitoring

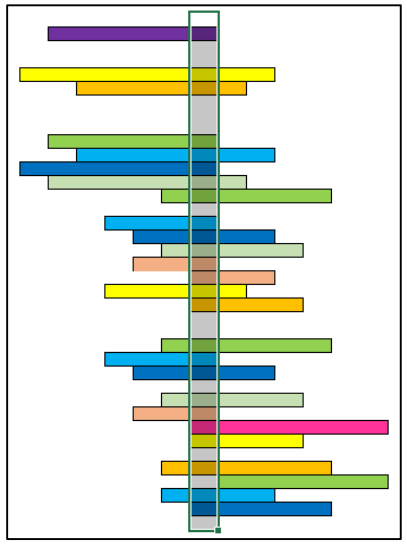
Telemetry Spectrum Metrics

- **The total number of spectrum assignments doubled between 2012 and 2017 (7,050 to 14,207).**
- **The total MHz-hours scheduled increased by ~25% between 2012 and 2017 (423K to 563K).**
- **MHz-hours per frequency assignment was reduced by a third between 2012 and 2017 (60MHz-hours/request to 40 MHs).**
- **Shorter average test durations and a higher number of requests account for this change.**



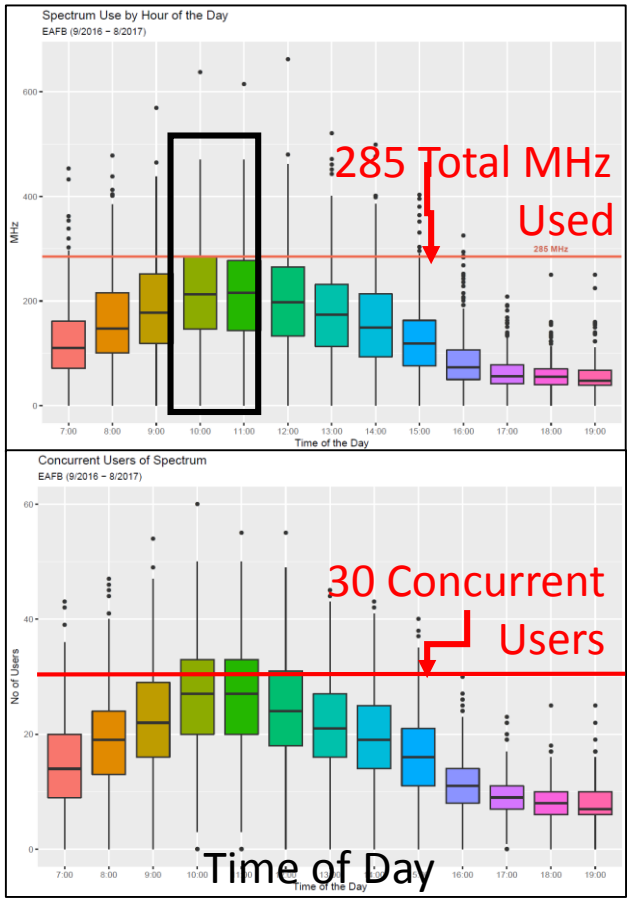
Telemetry Spectrum Metrics

285	MHz available at any one time
9.5	MHz (on average) per request
30	Max # of concurrent assignments



The expected, maximum number of non-overlapping, concurrent frequency assignments that can be supported is 30.

$$\frac{285\ \text{MHz}}{9.5\ \text{MHz per Assignment}} = 30\ \text{Assignments}$$



At EAFB in FY17, the number of concurrent assignments exceeded this threshold between 10AM and noon more than a third of the time.

From 10AM to noon, on average, the total MHz used at EAFB exceeded the spectrum available 25% of weekdays.

The difference was handled by using the C-band.

Continued increases in spectrum demand may require lengthening test schedules.

Current AMT Considerations

5150-5250 MHz OOBE

Radio local area network ("RLAN") interests want to relax FCC OOBE limits for emissions from RLANs into AMT band

AFTRCC filed Oppositions with FCC to RLAN proposal; filing coordinated with TRMC and CIO

Wireless microphones at 1435-1525 MHz

FCC approved secondary wireless microphone use in 2015 subject to stringent terms and conditions to protect AMT

Current AMT Considerations

Medical Telemetry

Medical telemetry allowed to operate on secondary basis in 2360-2390 MHz AMT band, again subject to stringent terms and conditions

WCS

AFTRCC, in consultation with DOD AFCs, has coordinated thousands of AT&T base stations in 2345-2360 MHz to protect AMT operations against OOBE

Current AMT Considerations

Congress has enacted the MOBILE NOW bill

- Identify 255 megahertz for potential repurposing
- Conduct or support studies on 3 GHz, spectrum incentives, bi-directional sharing, and unlicensed spectrum

Ongoing spectrum repurposing activities

- Spectrum Pipeline Act implementation
- FCC's Spectrum Frontiers and CBRS (3.5 GHz) proceedings
- AWS-3 transition

Brazil: WRCs-15 & -19 Concerns L-band

- **L-Band**: At WRC-15 the band 1427-1518 MHz was identified for International Mobile Telecommunications (IMT), but Brazil has been operating AMT in the 1452-1472 MHz band since 2005. However, their national telecommunication agency(ANATEL) will identify a 20 MHz-wide Brazilian AMT band that shall remain inside the 1435-1525 MHz range. Still, chances are this AMT band will eventually be shifted from 1452-1472 MHz in order to accommodate the supplementary downlink of the IMT

Brazil: WRCs-15 & -19 Concerns S-band

- **S-Band (temporary use)**: The Brazilian ANATEL extended the time-frame for the use of frequencies temporarily allocated in the 2230-2260 and 2330-2360 MHz bands. These are now the most heavily-used AMT bands in Brazil
- **S-band (final resolution)**: The ANATEL approved a resolution to have the band of 2200 to 2290 Mhz allocated to AMT use. EMBRAER will accommodate its AMT link inside the new S-band (2200 to 2290 Mhz)

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Brazil: WRCs-15 & -19 Concerns C-band

- Brazil is concerned about the status of the "Aeronautical Mobile Airport Communications System" (AeroMACS) implementation in ITU Region 2; AeroMACS is a new data link technology intended to support airport surface communications related to safety and regularity of flight **worldwide**, it is based on IEEE 802.16e (the WiMAX standard) and uses the 5091-5150 MHz AMT band.
- WRC 19 – AI 1.16: The Brazilian Air Force intends to send a "no change" proposal to AI 1.16 to the Brazilian ANATEL; it will be a Brazilian contribution to next CITEL CCPII meeting at Mexico in order to keep the band 5150-5250 Mhz allocated to AMT.

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Brazil: WRCs-15 & -19 Concerns C-band

- Proposal background:
  - At WRC07, the frequency band 5150 to 5 250 MHz was allocated to aeronautical mobile service on a primary basis, as follows:

    "Footnote 5.446C - Additional allocation: in Region 1 (except in Algeria, Saudi Arabia, Bahrain, Egypt, United Arab Emirates, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Syrian Arab Republic, Sudan, South Sudan and Tunisia) and in Brazil, the band 5150-5 250 MHz is also allocated to the aeronautical mobile service on a primary basis, limited to aeronautical telemetry transmissions from aircraft stations (see No. 1.83), in accordance with Resolution 418 (WRC-07). These stations shall not claim protection from other stations operating in accordance with Article 5. No. 5.43A does not apply. (WRC-12)"

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Brazil: WRCs-15 & -19 Concerns C-band

- Proposal reasoning:
  - No change to the Table of Frequency Allocations in the band 5150-5250 MHz, as further study of currently available mitigation measures indicate that there are no feasible mitigation techniques to facilitate sharing between RLAN and Fixed Satellite Services (FSS), in according the last chairman's report WP5A (Annex 23), Mobile Services and Aeronautical Radionavigation (ARNS) in the band 5 150-5250 MHz