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April 25, 2019

Marlene Dortch, Secretary
Federal Communications Commission
445 Street, SW
Washington, DC 20554

via ECFS

**Re: Notice of Oral *ex Parte* Presentation: IB Docket No. 18-86 (In the
Matter of Streamlining Licensing Procedures for Small Satellites)**

Dear Ms. Dortch:

On April 23, 2019, Kris Hutchison, Andrew Roy, Gregory Baker of Aviation Spectrum Resources, Inc. ("ASRI"); Edward A. Yorkgitis, Jr., Kelley, Drye & Warren, LLP, counsel for ASRI; Ramsey Abid and Stephen Leger (by telephone) of Collins Aerospace; Christopher Sellen and Zbigniew Jasiukajc (by telephone) of SITAONAIR; and Chris Collings of Harris Corporation (collectively, the "Aviation Representatives") met with Jose Albuquerque, Stephen Duall, Merissa Velez, Alyssa Roberts, Kathryn Medley, Sankar Persaud, Sam Karty, and Joseph Hill, (by telephone) of the Commission's International Bureau, and Scot Stone, Jeff Tobias (by telephone), and Tim Maguire of the Commission's Wireless Telecommunications Bureau. The purpose of the meeting was to discuss the aviation industry's current uses of the band 136-137 MHz for critical VHF data communications in the United States, and internationally, and highlight aviation's concerns that any rules facilitating small satellite use in the 137-138 MHz band be considered only in conjunction with effective methods of mitigating interference to adjacent band aviation safety VHF data communications both domestically and globally.

The Aviation Representatives described the increasing utilization of the 136-137 MHz band for the Very High Frequency Data Link Mode 2 ("VDLM2") system which supports applications critical to aviation safety and efficiency of operations. VDLM2 is a digital, air-to-ground datalink technology providing connectivity for aircraft to send and receive Air Traffic Control ("ATC") and Airline Operational Control ("AOC") communications messages. VDLM2 is a core capability of the Federal Aviation Administration's ("FAA's") Data Comm program that provides Air Traffic Services ("ATS") such as Controller-Pilot Data Link Communications ("CPDLC") which supplements, and increasingly replaces, voice communications with digital

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text messages. The Aviation Representatives provided information on the extensive, and growing, use of Data Comm program in the United States today, and the substantial benefits that Data Comm program provides to the public, as well as users of the National Airspace System (“NAS”), including improved efficiency, improved safety, reduction of flight delays, reduced CO2 emissions, and lower transportation costs. The Aviation Representatives noted that CPDLC services operate in all phases of flight as well as pre-departure clearances at airports. They also described the extent to which VDLM2 is deployed internationally, with existing coverage in the Americas, Brazil, Europe, China, Africa, Asia and Australia. They discussed future planned expansions to improve domestic and worldwide VDL M2 coverage and implement CPDLC services in countries outside the United States. VDLM2 traffic continues to experience double-digit year-over-year growth, making clear its importance to aviation across the globe.

The Aviation Representatives explained that VDLM2 networks uses 136.975 MHz (136.9625-136.9875 MHz) for its Common Signaling Channel (“CSC”) that is designated globally in the International Civil Aviation Organization (“ICAO”) Standards and Recommended Practices (“SARPS”), pursuant to decision in international fora several decades ago and a standardized architecture defined globally by ICAO. The CSC is critical to the VDLM2 network, as it is required to access other dedicated provider frequencies and is also the emergency fallback frequency if the aircraft loses coverage. They explained that the Commission should carefully consider the potential for out-of-band emissions (“OOBE”) from small satellites into the CSC, causing harmful interference to both ground and the aircraft stations using VDLM2. If a VDLM2 station experiences an elevated noise floor due to OOBE, there will be gaps in coverage, and the serviceable range in which the aircraft can communicate through the datalink with air traffic control facilities and airline operational centers may be reduced, leading to delays or even outright failures in transmission of important ATC or AOC messages. Because VDLM2 radio transceivers monitor the power received on the CSC to confirm that there are no other transmissions before transmitting, OOBE interference into the CSC may cause the transceiver to determine the channel is occupied and not transmit messages.

Due to the concern that small satellite frequency assignments close to the band edge of 137 MHz will cause harmful interference to the VDLM2 CSC at 136.975 MHz, the Aviation Representatives urged the Commission to adopt a guard band of at least one channel (25 kHz) at the bottom of the 137-138 MHz band (i.e., at 137.000 to 137.025). The potential for interference is of particular concern because of the prospective quantity of small satellites that could be transmitting in frequencies near the band edge. If small satellites’ frequency oscillator drifts and other fault conditions are not properly regulated and monitored, the potential for harmful interference from OOBE emissions would increase.

The Aviation Representatives also noted that both aviation and satellites transmissions are international in nature in and around 137 MHz, which underscores the need for the

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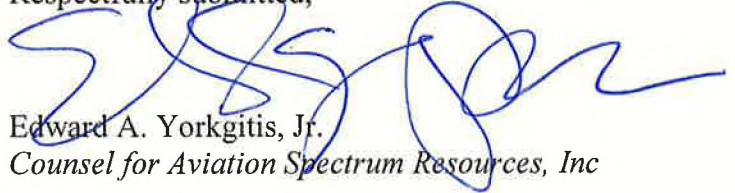
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Commission to consider any global implications. The Representatives noted that, to date, there are no International Telecommunications Radiocommunication Sector ("ITU-R") Recommendations for Space Operation Service OOB emissions below 1 GHz, and that uncertainty has increased because of differing views among administrations about what is needed to protect aviation and the proposed removal of Radio Regulation 9.11A governing coordination. In addition, they observed that there have been no relevant adjacent band compatibility studies conducted in either ITU-R Working Party 7B or 5B, explaining that studies are needed to ensure that VDL M2 is not impacted by small satellite usage of the 137-138 MHz band.

A copy of the written presentation materials used in the meeting is attached.

Pursuant to Section 1.1206(b) of the Commission's rules, this letter is being filed electronically.

Respectfully submitted,



Edward A. Yorkgitis, Jr.
Counsel for Aviation Spectrum Resources, Inc

EAY/am

Attachment

cc: Jose Albuquerque
Stephen Duall
Merissa Velez
Alyssa Roberts
Kathryn Medley
Sankar Persaud
Sam Karty
Joseph Hill
Scot Stone
Jeff Tobias
Tim Maguire



CubeSats and VDLM2

ASRI, Collins Aerospace, SITAONAIR, Harris
Corporation

Prepared for FCC International Bureau and the Wireless Telecommunications Bureau
April 23rd 2019

- Introductions
- VHF Data Link Mode 2 (VDLM2) System
- US Datalink Operations
- International VDLM2 Coverage
- Aviation Concerns with CubeSats
- Q&A

VHF Data Link Mode 2 System

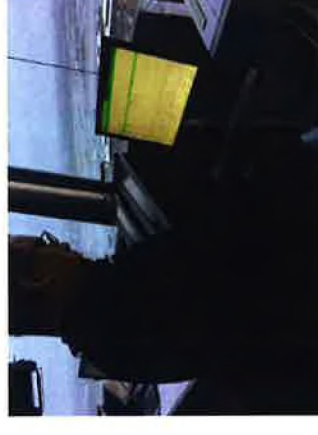
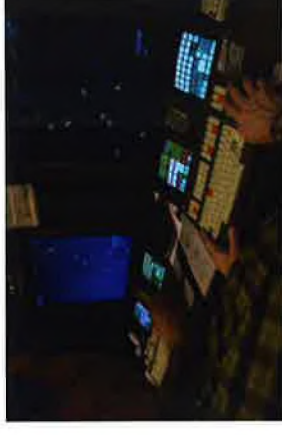
- VDLM2 is an internationally standardized air-ground datalink
 - Second generation system developed by the aviation industry
 - Designed for safety and regulatory of flight messages
 - Equipped on majority of medium/large commercial aircraft for operational control messages
 - Uses a Carrier Sense Multiple Access (CSMA) to prevent collisions
- ICAO specified common signaling frequency on 136.975 MHz worldwide
 - Core network frequency for all other VDLM2 channels
 - Initial route to log into network and emergency fallback frequency
- US aviation has developed a national channel plan across the 136-137 MHz band
 - Primary band for all VDLM2 channels
 - Ensures a known interference environment for safety critical messages

Controller Pilot Data Link Communications

- CPDLC programs being developed worldwide
 - Allowing Air Traffic Control (ATC) messages across networks
 - ATC shared with other aircraft traffic on a priority/preemption basis
 - Beginning to replace voice communications for routine ATC commands
 - More efficient use of spectrum
- Basis for terrestrial control networks worldwide
 - European SESAR
 - Japanese CARATS
 - US Data Comm
- Programs using existing industry networks from the two worldwide service providers

FAA Data Comm Program

- ✈ Provides data communications services between pilots and air traffic controllers, supplementing existing voice communications capabilities
- ✈ Provides a data link between ground automation systems and flight deck avionics for air traffic control (ATC) clearances, instructions, traffic flow management, and flight crew requests
- ✈ Controllers will be able to deliver instructions with a push of a button and without the need to utilize voice frequencies
- ✈ Enables the transmission of complex instructions that can be quickly and correctly loaded into an aircraft's flight management system, upon acceptance by the pilot
- ✈ Enables NextGen Initiatives and Trajectory-Based Operations



Data Comm Metrics



13 US Air Carriers
(Part 121)



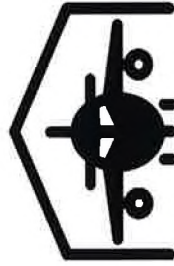
53 Non-US Air Carriers
(Part 129)



1,600+ Business Aviation Operators
(Parts 91, 91K, 135)



62 Airports



58 Aircraft Types

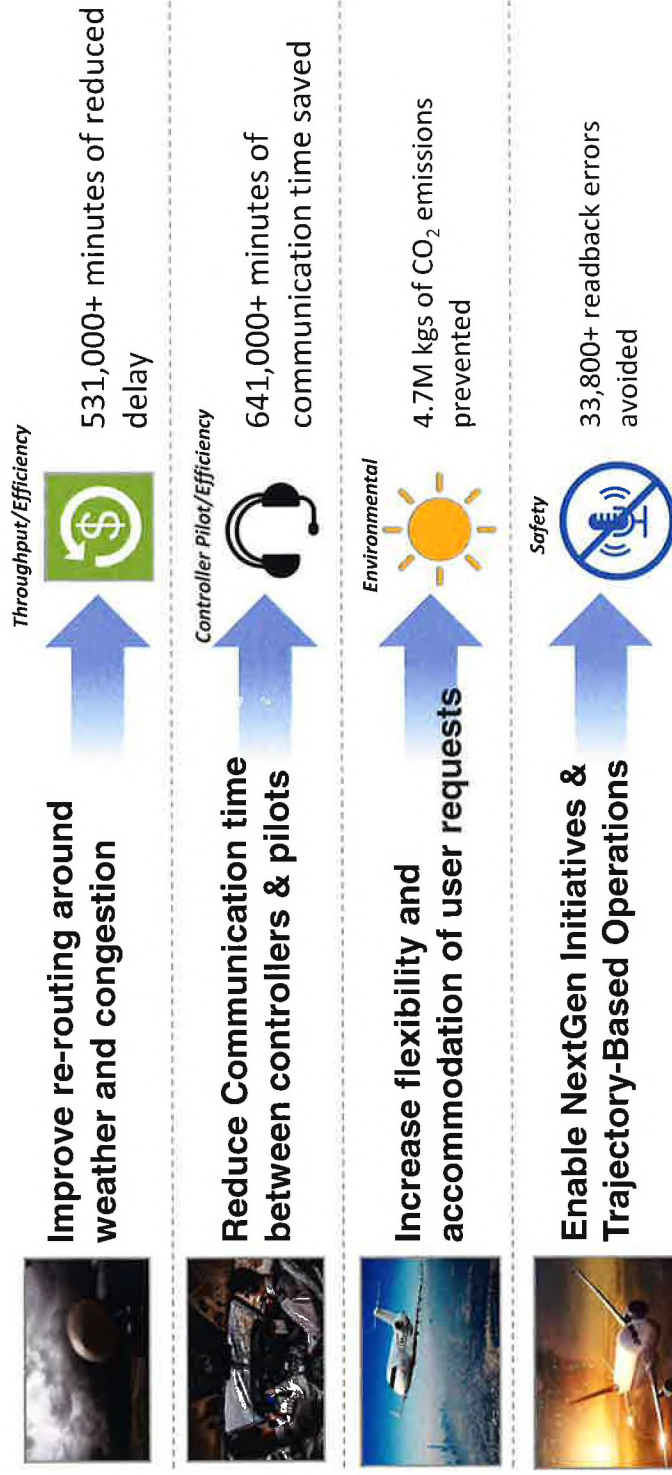


Over 5,900 Equipped Aircraft



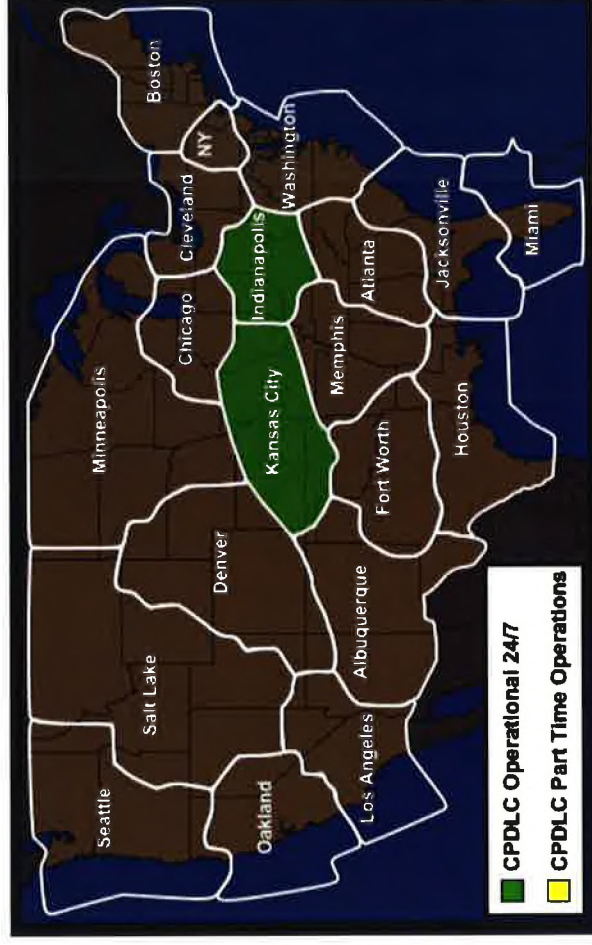
7.8M CPDLC Messages Sent 2018

Data Comm Tower Benefits 2018



Data Comm En Route

- En route services projected to deliver significantly more benefits than tower
- Air-ground network supports tower and en route services
- En route services currently in early operations
 - Kansas City & Indianapolis airspace
 - Expected national deployment by 2021





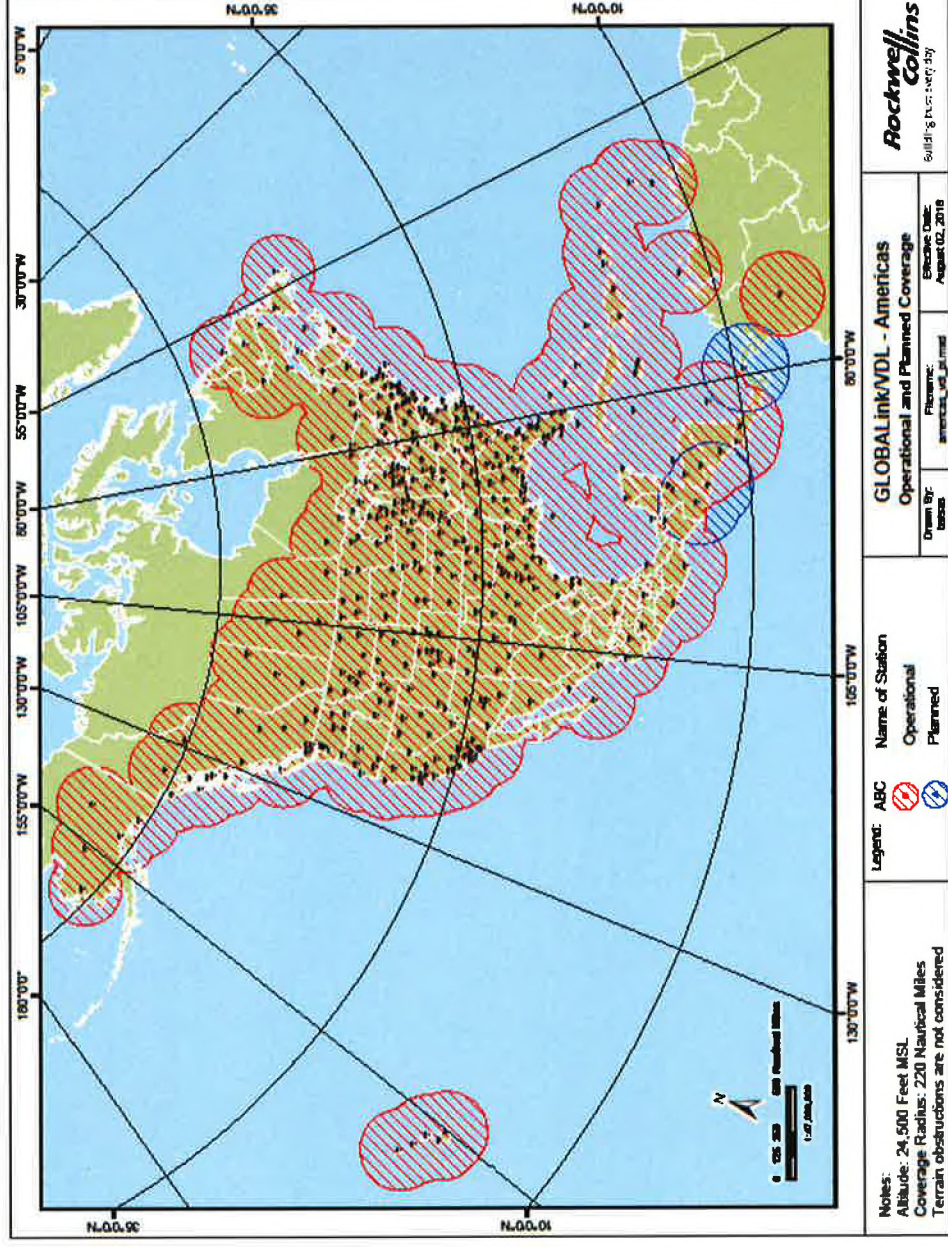
International Coverage

GLOBALINK/VDL NORTH AMERICA

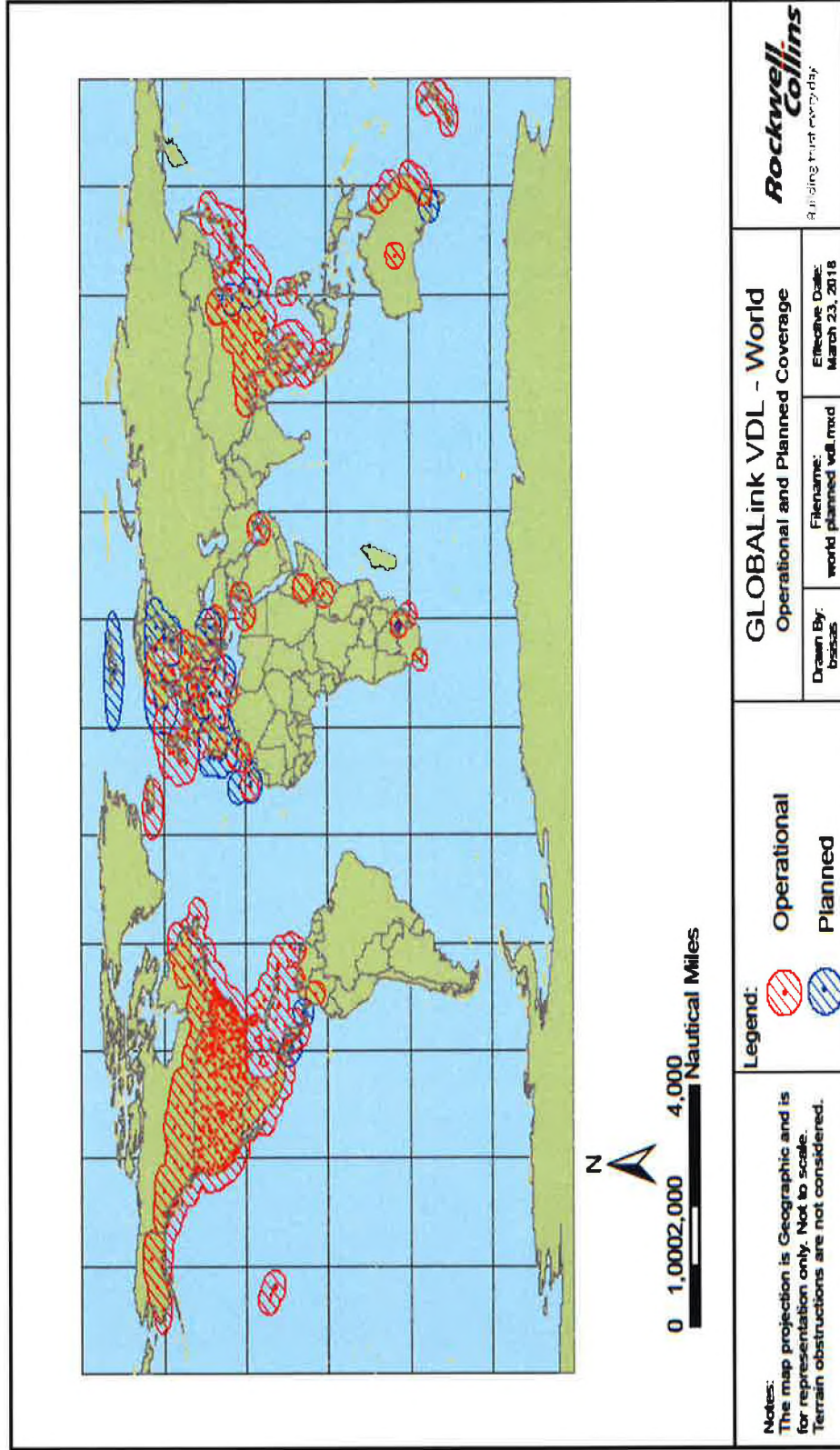
- 453 VDL Stations across the Americas
- Since 2000, VDL operated on Common Signaling Channel (CSC), 136.975 MHz
- Carrying over 50 million AOC & ATC messages/month for over 11,000 Air Transport class aircraft in the Americas and Europe.
- Today over 81% of data link equipped aircraft support VDL M2.
- VDL M2 usage has been experiencing double digit year-on-year growth.
- VDL avg. round trip transit time: < 2 sec.



Collins Aerospace



WORLDVIEW: COLLINS VDLM2 COVERAGE



Collins Aerospace

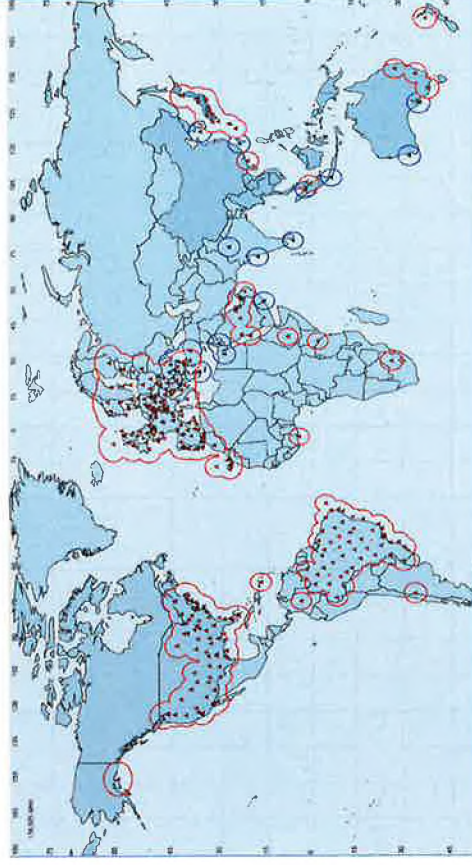
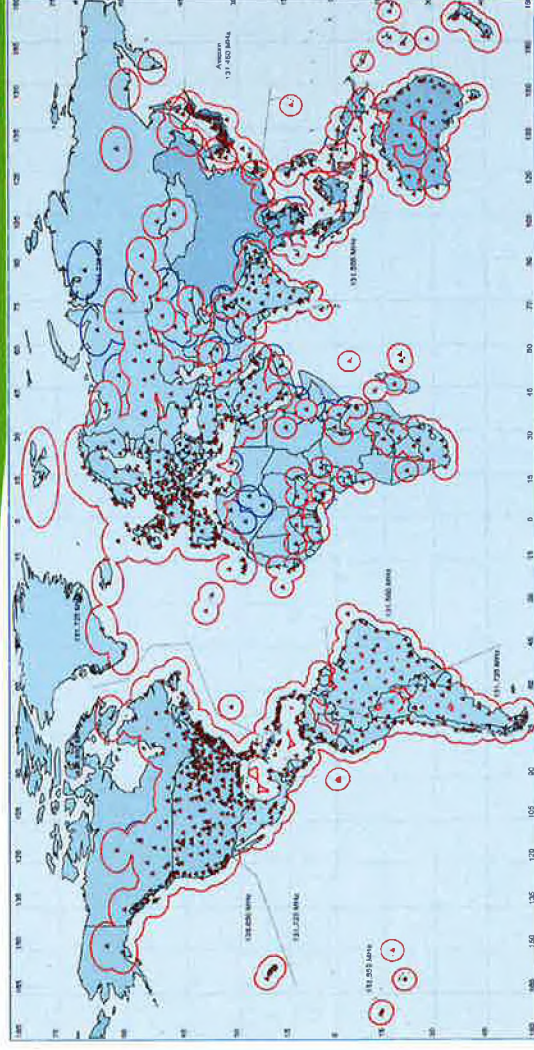
SITAONAIR Global Service

VHF datalink network

- 1000+ airports
- Over 150 countries
- 16,000+ aircraft
- 2000 radios by Feb 2019

Sites in **red** - operational

SITAONAIR



VDL Mode 2- supports AOC and ATS services

- 186 VDL radios - US
- 53 VDL radios - Brazil
- 165+ radios - Europe

VDL Coverage/Expansion

1. United States

- VDL Full Service Sites deployed at over 60 major cities – supporting Departure Clearance
- Enroute Coverage Expansion –
- 2018 – 61 sites deployed
- 2019 - 16 additional sites operational, 38 sites planned
- 2020 – 43 schedule sites

2. Brazil –

- VDL deployed at 55 sites through out Brazil
- Expansion of coverage to include 11 additional sites – 2020 time frame
- Complete 24.5 FL contiguous coverage over Brazil
- CPDLC Testing Discussions to follow



CubeSats

International and Domestic

- No ITU-R Recommendation for SOS Out-of-band Emissions below 1 GHz
 - Different spectrum mask in ITU-R studies and Part 25
- CubeSats have no international RF equipment standards
- Uncertainty around proposed coordination changes in 137 – 138 MHz
 - Removal of 9.11A
 - Impact on VDLM2 needs to be considered if CubeSats operate closer to band edge

CubeSats

- Non-traditional space participants will have market access
- Differing views between administrations on what will protect aviation
- Goal should be a common understanding among all administrations
- Necessary international regulatory framework needed
 - Allows certainty in aviation planning criteria
 - CubeSats must coordinate prior to launch to protect aviation

CubeSats (cont.)

- FCC NPRM actions protecting aviation
 - CubeSats only transmitting when in line of sight to the ground station
 - Requiring ability to shut off
- CubeSat solutions available for compatibility
 - Guard Band
 - Filtering
- CubeSat enforcement costly and difficult
- CubeSat failure states are a concern given the record of high failures
- **There are significant concerns about harmful interference into VLM2 from frequency assignments on the band edge of 137 MHz or first adjacent channel**

Summary

- VDLM2 networks are fundamental for worldwide ATC datalink operations
- Risk of unwanted emissions from CubeSats into adjacent AM(R)S allocation impacting VDLM2
 - 136.975 MHz is essential for VDLM2 operations
- International regulatory framework based on common understanding of what constitutes protection needed to provide certainty
 - By contrast, case-by-case decisions evaluated on different assumptions and protection levels pose risk



Questions?