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April 30, 2018

BY ECFS

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

Re: **Elefante Group Notice of Oral *Ex Parte* Presentation; GN Docket Nos. 17-183, 14-177, IB Docket Nos. 17-95, WT Docket No. 10-112 and File No. SAT-LOA-20161115-00117**

Dear Ms. Dortch:

On April 26, 2018, Christopher DeMarche of Elefante Group, Edward A. Yorkgitis, Jr., of Kelley Drye & Warren LLP, on behalf of Elefante Group, Inc. ("Elefante Group"), and Scott Kotler and Dr. Michael Hicks, of Lockheed Martin Corporation ("Lockheed Martin") (collectively, the "Representatives") met with Julie Knapp, Walter Johnston, Howard Griboff, Jamison Prime, Nicholas Oros, Bahman Badipour, and, by telephone, Dr. Rashmi Doshi, of the Office of Engineering and Technology ("OET") to discuss Elefante Group's plans to deploy persistent stratospheric-based communications and infrastructure and to file a petition for rulemaking seeking a regulatory framework for the operation and licensing of the Stratospheric-Based Communications Services ("SBCS") of Elefante Group and other operators.

In the meeting, Mr. DeMarche laid out the progress Elefante Group is making, working closely with Lockheed Martin on stratospheric airship and communications payload technologies, and in design, development, collaboration, and marketing efforts to enable deployment of its systems in the next several years.

Elefante Group explained that its Stratospheric Platform Stations ("STRAPS") are being designed to deliver 1 Tbps broadband infrastructure in each direction to User Terminals ("UTs") within a nominally 70 km radius footprint. By offering such capacity that can be rapidly deployed and upgraded in urban as well as rural areas, Elefante Group will complement ground-based roll out of 5G services in important and unparalleled ways. In brief, stratospheric

deployments of high-capacity systems like those Elefante Group plans to deploy will help the United States to win the race to 5G, but only if the Commission makes accommodation for such stratospheric systems in its spectrum management strategy, allowing them to have access to sufficient amounts of spectrum.

Dr. Hicks reviewed the spectrum needs required to meet Elefante Group's performance requirements of the planned SBCS systems and compatibility requirements to operate with incumbent systems. After examining spectrum bands between 17 and 50 GHz, as Dr. Hicks explained, Elefante Group and Lockheed Martin have identified 21.5-24.0 and 25.25-27.5 GHz as the bands best able to support deployment of SBCS in a manner compatible with incumbent uses, as discussed further below.

SBCS, taking advantage of access to these spectrum bands and deploying spectrally efficient communications architecture (including a high rate of frequency reuse), will present relative advantages compared to other delivery methods. STRAPS maintaining a nominally-fixed position at 19.5 km or more altitude will be able to lay down high levels of capacity and deliver benefits to a service area of 15400 sq. km (6000 square miles) virtually instantaneously.[1] A STRAPS deployment, in other words, will not require access to intermediate physical infrastructure for the SBCS network to be customer-ready throughout the footprint, which, except for the very largest markets, will include the entire metro area and non-urban areas well beyond.[2] Only UTs and gateways will remain to be deployed. By contrast, ground-based deployments, to serve user radios within a metro area, will need to access new antenna structures, utility poles, buildings, and rights-of-way, among other physical infrastructures. These requirements of ground-based systems lead to increased costs and delays, and also lead to practical and potentially persistent limits on the ubiquity of such radio networks.

As a result, SBCS systems would be able to promptly provide over an entire STRAPS operating area the large backhaul and network capacity next-generation deployments will require to deliver potential 5G technologies to users. In short, SBCS could make an entire area 5G-network ready literally overnight, fully deploying spectrum far in advance of ground-based deployment of backhaul and network technologies, such as Upper Microwave Flexible Use

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[1] Elefante Group's offering of SBCS will support high capacity, extremely spectrally efficient, fixed communications operating compatibly with other incumbent users in the same spectrum. Those offerings will include 5G and 4G market wide backhaul, enterprise WAN, and fixed wireless access, on a wholesale basis. Elefante Group's stratospheric systems will also support integrated IoT and communications capabilities for a variety of potential applications.

[2] SBCS network upgrades, when made, could be just as swift as initial deployments, involving the changing out of the platform with an upgraded payload that would have an impact platform footprint-wide.

Service ("UMFUS"). SBCS deployments, such as those planned by Elefante Group, would be more rapid and create greater capacity with lower latencies than satellite systems, including High Throughput Satellites ("HTS") and the proposed and planned non-geostationary orbiting ("NGSO") constellations. Moreover, because multiple STRAPS deployments could serve an area in the same spectrum, the spectrum could be reused to introduce SBCS competition or to densify an existing provider's market capacity beyond that of the initial platform.

As such, Elefante Group urges the Commission to launch expeditiously a rulemaking for SBCS systems to be able to operate on a non-exclusive basis in a compatible manner with existing incumbent uses in the 21.5-24.0 and 25.25-27.5 GHz bands (for fixed UTs) and the 71-76 and 81-86 GHz bands (for feeder links between terrestrial networks and the STRAPS). SBCS would be a fixed service and require Fixed co-primary allocations. Doing so would ensure that the United States reaps the benefits that stratospheric platforms will bring. Failure to do so by instead allowing less compatible commercial mobile uses to come into the 26 GHz band through exclusive licensing, for example, in addition to the many gigahertz of high-band spectrum already being made available for UMFUS, would risk losing the advantages of stratospheric deployments to aid in winning the race to 5G. Such exclusive licensing would also endanger the maintenance, let alone growth, of incumbent uses in the spectrum bands that Elefante Group is proposing SBCS should be allowed to use. SBCS would not adversely impact incumbent uses in the same way as UMFUS. In fact, quite the opposite.

SBCS provides capabilities that will be instrumental to achieving many other Commission objectives as well, such as closing the Digital Divide, supporting reliable communications during and after major weather events and natural disasters, and creating thousands of new American jobs. Elefante Group encourages the Commission to take prudent action now that gives the SBCS – which represents new and innovative technologies and allows for novel services warranting treatment under Section 7 of the Communications Act – access to adequate spectrum. In so doing, the Commission will ensure that this country's next generations of networks that roll out in the coming years will be able to exploit the complementary advantages offered by persistent stratospheric-based communications which are missing from other delivery solutions.

Dr. Hicks reviewed the considerable number of compatibility analyses that Elefante Group has undertaken in recent months to support the proposed candidate bands. To rigorously consider the prospects for compatible operations while meeting Elefante Group's performance requirements, the Representatives explained that the analyses were undertaken from the starting point of assuming in-depth worst case conditions before, if even necessary, moving to consider statistical, risk-based assessments. Elefante Group and Lockheed Martin were pleased to report that, by designing compatibility from the outset into the Elefante Group system, the study results have been extremely positive that deployments can occur practicably with minimal to no impact

on current incumbent operations while allowing such incumbent operations to grow and expand even as Elefante Group is deploying its networks. Dr. Hicks focused specific attention on analyses undertaken to demonstrate the anticipated compatibility, following coordination, with existing fixed services in the 21.5-23.6 GHz range. The Representatives explained that the regulatory framework that Elefante Group envisions, and Lockheed Martin's analyses support, will be derived from the coordination that occurs among fixed links today. Further, traditional fixed services would be able to continue to deploy, following coordination, in the presence of SBCS system fixed UT links much as they do now in the presence of other fixed links.

Dr. Hicks also reviewed the companies' compatibility analysis results concerning non-Federal inter-satellite service links (the existing Iridium system and the proposed Audacy constellation). He also explained the high potential for compatibility of multiple SBCS deployments serving the same geographic areas in common spectrum using different deployment architectures. Finally, he briefly reviewed compatibility analyses undertaken with non-Federal systems. The Representatives explained that they have been having meetings with Federal and non-Federal users of the band that are the subject of the compatibility analyses with encouraging results, and with several additional initial meetings to be conducted in the short run.

The Elefante Group Representatives underscored that Elefante Group is offering to do something quite uncommon – introduce a high capacity service that will be essential for full deployment of this country's next generation networks that is highly spectrum efficient (~5bps/Hz and reuse of spectrum >130 times by each STRAPS deployment), in a highly compatible fashion within encumbered spectrum without seeking to have any of the incumbents leave the band or be prevented from future growth.

Elefante Group discussed its preparations to file a petition for rulemaking in the coming weeks to facilitate the deployment of the SBCS as a co-primary Fixed service, outlining the basic elements of the petition as set forth in the Attachment. The scope of the Petition will include both SBCS user links between UTs and STRAPS in the 21.5-24.0 and 25.25-27.5 GHz bands and feeder links in the 71-76 and 81-86 GHz bands. Where Fixed allocations do not already exist, Elefante Group will be seeking changes to the United States Table of Allocations. Elefante Group advocates a regulatory framework that would set technical parameters complementary to and consistent with the goals of compatibility with existing types of operations in the subject bands, including compatibility among diverse types of SBCS deployments. In locations where compatibility may not be achieved solely through adherence to the technical parameters for SBCS, the proposed framework would call for service-area STRAPS and site-specific UT coordination before deployment. Licensing of SBCS should be non-exclusive and on a rolling basis, combined with coordination where required and registration requirements as deployments of STRAPS and UTs occur so that other users of the band – both SBCS operators and incumbent

operators – will be able to coordinate and deploy additional facilities in these non-exclusive spectrum bands.

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

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

Respectfully submitted,

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Bahman Badipour
Dr. Rashmi Doshi

Elefante Group & Lockheed Martin Stratospheric Platform Communications

26 April 2018

Meeting with

FCC Office of Engineering and Technology

Agenda

- Elefante Group's Vision and Basic Business Plan
- Basic Characteristics of Elefante Group Airship-Based Operations, Including Spectral Efficiency and Designs to Operate Compatibly with Incumbent Services
- Update on Spectrum Requirements of the Platforms and Terminals and Identify Bands That Satisfy Performance Requirements and Support Compatible Operations
- Results of Compatibility Analyses Concerning Sharing with Incumbent Services and Other Possible Stratospheric Operations
- Experimental Plan for System Testing including Compatibility & Demonstration
- Overview of Planned FCC Petition for Rulemaking for Stratospheric-Based Communication Services (SBCS)

This presentation was prepared specifically for use in discussions with FCC in connection with Elefante Group and Lockheed Martin positions in present and potential future regulatory proceedings and is not to be used or relied upon for any other purpose.

Overview of Vision and Business Plan

- Elefante Group aspires to be the world leader in transformative persistent stratospheric-based communications and IoT-enabling solutions

- Elefante Group, working closely with Lockheed Martin on the technology, seeks to be the first company to bring new and innovative stratospheric solutions to market

- EG stratospheric solutions bypass significant infrastructure challenges inherent in ground-based wireless and IP network deployments and upgrades
  - Near-instantaneous availability
  - Turnkey, end-to-end capability
  - Ubiquitous reach within footprint
  - Flexible resource management

- EG System supports 1 Tbps (both directions) wholesale fixed communications:
  - 4G/5G Backhaul
  - Enterprise WAN
  - Residential Broadband
  - Sensor & IoT

EG Airship Systems Will Advance Multiple National Objectives

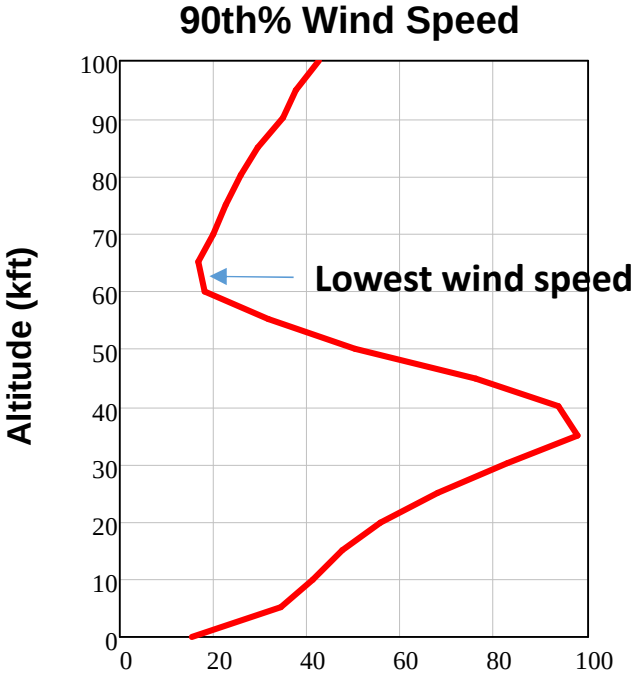
- Represents significant investment in **high speed broadband infrastructure** developed in the USA
- Capability to deploy innovative broadband solutions in both urban and rural areas to help **close the Digital Divide**
- Enables **densification of 4G, 5G and IoT** with greater flexibility and lower cost
- **Maximizes spectral utilization** with significant frequency reuse and other advanced techniques
- Systems architecture optimized for deriving additional uses in encumbered spectrum while **operating compatibly with existing services**
- Enables **continuous market-wide technology upgrades** with modular payloads in multiple bands
- Supports uninterrupted communications during and after major storms and natural disasters and facilitating **rapid restoration for public safety and disaster relief**
- Creates **thousands of US jobs** in engineering, construction, and operations

Why a Stratospheric Airship as a Communications Platform?

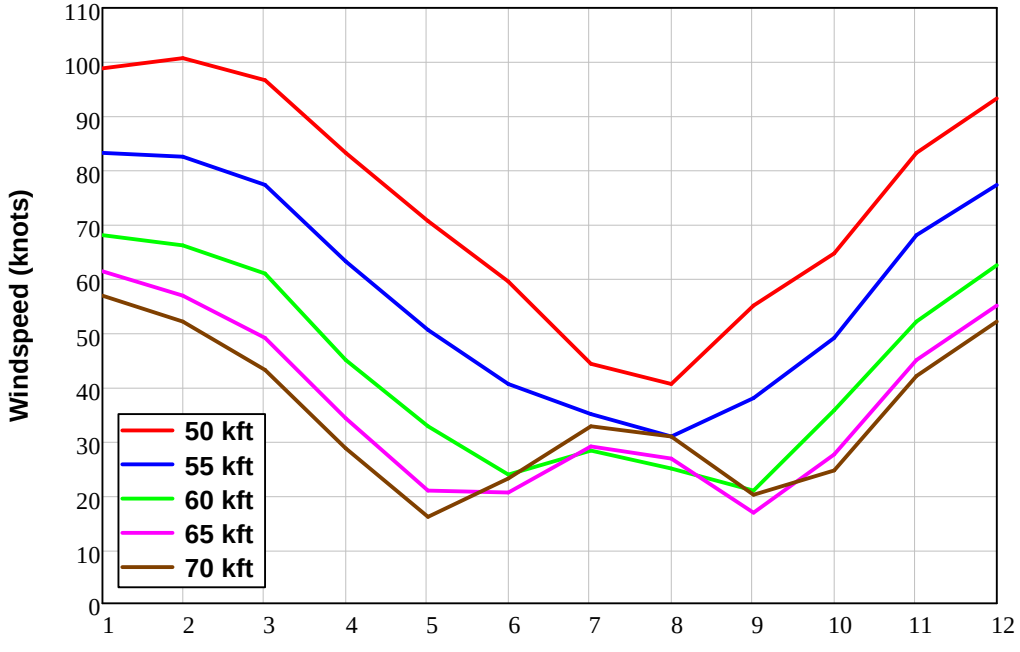
Unmanned Stratospheric Platform Stations (STRAPS) in development by EG/LM:

- Stable-platform at nominally fixed altitude of @ 65kft (19.8 km)
  - Ensures low latency communications (less than 5ms)
  - IoT and high-resolution sensing
  - Above congested airspace and most weather systems
- Nominal coverage of 70 km radius – ~15,400 km^2 per platform
- Possess large payload capability (1000+ kg, 10+ kW power)
- Provide substantial capacity and rapid deployment in both urban and rural areas
- Fully recoverable and serviceable and with upgradable payloads
- Utilize hybrid (solar-based and fuel cell) power/propulsion to support maintain nominally fixed location
- Ultra-long mission (> 6 mo. on avg.) on station with 10-15 year life
- Low operating, maintenance, and overall lifecycle costs

Why fly at 65,000 ft?



Typical year-round wind speed profile in the Northern Hemisphere



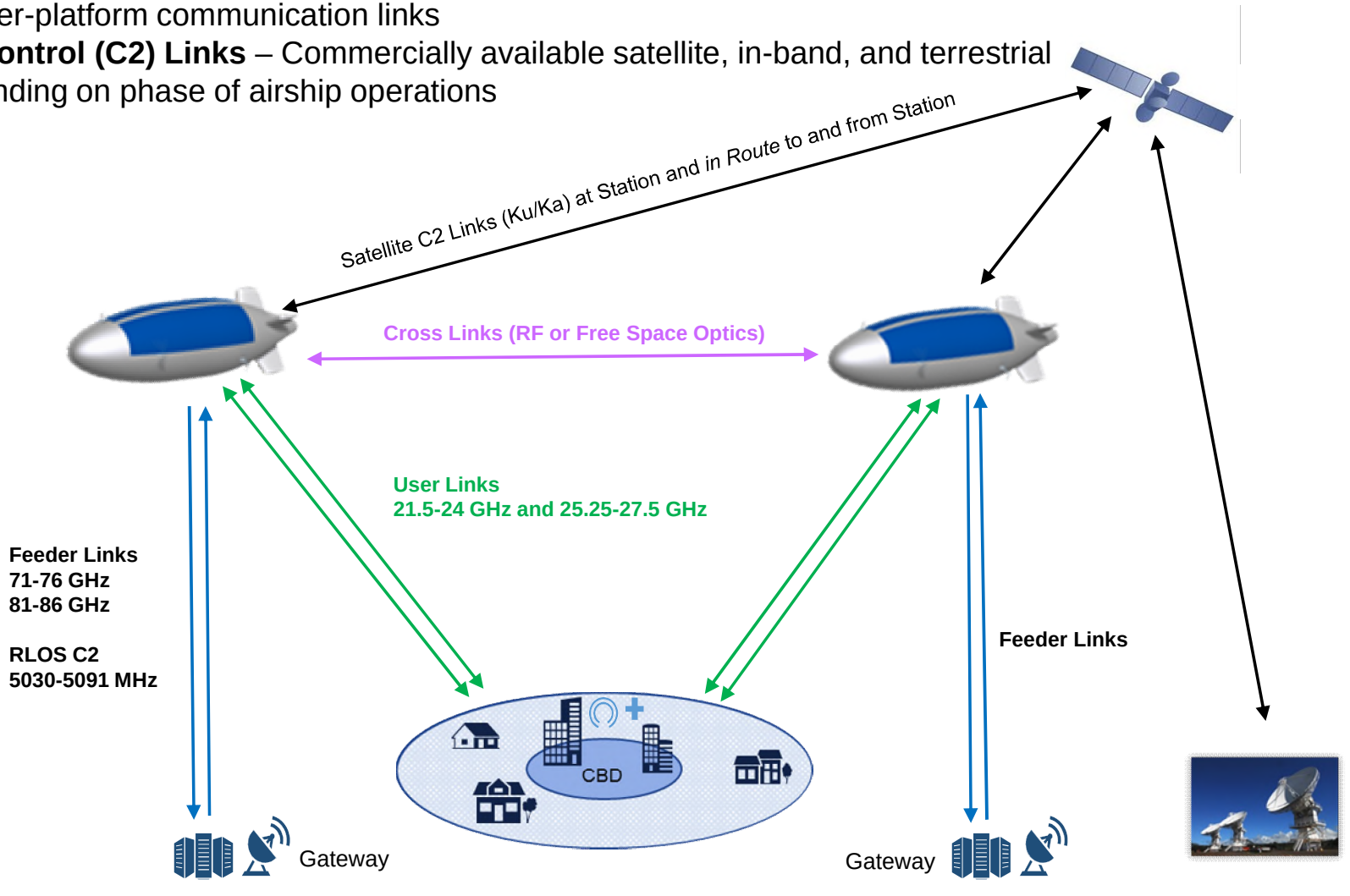
Comparison of the 95th% Monthly Winds in a Northern Hemisphere Location as a Function of Altitude

Airship: ~65 kft (19.8 km) is the optimum altitude for most locations of interest based on wind speeds and airship payload-carrying capability, and above the weather

Comm Payload: Large potential service area, low latency, low free space path loss permitting high spectral efficiency waveforms

Communications Architecture

- **User Links** - Access and transport/backhaul to customers
- **Feeder Links** – Customer to global network / datacenter connections
- **Cross Links** – Inter-platform communication links
- **Command and Control (C2) Links** – Commercially available satellite, in-band, and terrestrial control links depending on phase of airship operations



Spectrum Requirements

EG reference band plan designed to maximize throughput for an entirely new service while flexibly using spectrum to remain compatible with all existing services

- User Links: Between Platform and Terminals
  - To satisfy performance requirements of 1 Tbps in each direction, operate compatibly with incumbent services, and allow multiple stratospheric solutions, EG and LM have determined the need for 4.75 GHz total spectrum
    - EG reference band plan uses 4x 450 MHz channels in each direction
    - 1.15 GHz additional for protections of incumbent services (alternate channels), flexibility for alternate implementations, guard bands preventing adjacent band and self-interference
  - Highly efficient spectrum reuse (> 130 times per platform) and spectral efficiency (> 4 bps/Hz) minimizes spectrum required
- Gateway Links: Platform to Terrestrial Services
  - Platform gateway links will be in the 71-76 and 81-86 GHz bands, reusing the 10 GHz multiple times per platform.

U.S. Table of Frequency Allocations and Planned Frequency Bands

EESS (passive) 21.2-21.4 **NASA**

Federal and Non-Federal Fixed

Federal Table	Non-Federal Table	Intended Use
21.4-22 FIXED MOBILE		21.5-22 GHz ONLY CPE **Uplink** / Downlink
22-22.21 FIXED MOBILE except aeronautical mobile US342		CPE **Uplink** / Downlink
22.21-22.5 EARTH EXPLORATION-SATELLITE (passive) **NASA, NOAA** FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY **NSF** SPACE RESEARCH (passive) **NASA** US342 US532		CPE **Uplink** / Downlink
22.5-22.55 FIXED MOBILE US211		CPE **Uplink** / Downlink
22.55-23.15 FIXED INTER-SATELLITE US145 US278 **Iridium, Audacy** MOBILE **DOD** SPACE RESEARCH (Earth-to-space) 5.532A US342 **NSF**		CPE **Uplink** / Downlink
23.15-23.55 FIXED INTER-SATELLITE US145 US278 **Iridium, Audacy** MOBILE **DOD**		CPE **Uplink** / Downlink
23.55-23.6 FIXED MOBILE		CPE **Uplink** / Downlink
23.6-24 EARTH EXPLORATION-SATELLITE (passive) **NASA** RADIO ASTRONOMY US74 **NSF** SPACE RESEARCH (passive) **NASA** US246		CPE **Uplink** / Downlink

Federal Fixed

Federal Table	Non-Federal Table	Intended Use
25.25-25.5 FIXED INTER-SATELLITE 5.536 **NASA** MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space)	CPE **Downlink**/ Uplink
25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) **NASA NOAA** FIXED INTER-SATELLITE 5.536 **NASA** MOBILE **DOD** SPACE RESEARCH (space-to-Earth) **NASA** Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	25.5-27 SPACE RESEARCH (space-to-Earth) Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	CPE **Downlink**/ Uplink
27-27.5 FIXED INTER-SATELLITE 5.536 **NASA** MOBILE **DOD**	27-27.5 Inter-satellite 5.536	CPE **Downlink**/ Uplink

- Elefante Group and Lockheed Martin undertaking studies of compatibility with non-Federal fixed and ISS services
- Services from four federal agencies also identified for compatibility analysis and pre-filing discussion
- We are seeking information on any additional federal or non-federal uses not identified

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U.S. Table of Frequency Allocations and Planned Frequency Bands

Federal and Non-Federal Fixed

Federal Table	Non-Federal Table	Intended Use
71-74 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) US389		(Gateway Downlink)
74-76 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Space research (space-to-Earth) US389	74-76 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE BROADCASTING BROADCASTING-SATELLITE Space research (space-to-Earth) US389	(Gateway Downlink)
…		
81-84 FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) US161 US342 US389		(Gateway Uplink)
84-86 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY US161 US342 US389		(Gateway Uplink)

- Elefante Group and Lockheed Martin undertaking studies of compatibility with non-Federal fixed services
- No Federal Agency uses currently identified for compatibility analysis with Elefante Group gateways
- We are seeking information on any federal uses not identified

Topics: EG System Compatibility Analyses

- Compatibility Analyses Undertaken to Consider All Incumbent Uses
  - Compatibility with Non-Federal Systems:
    Fixed, ISS, multiple SBCS
  - Compatibility with Federal Agency Systems:
    DOD, NASA, NOAA, NSF
- Results and Conclusions

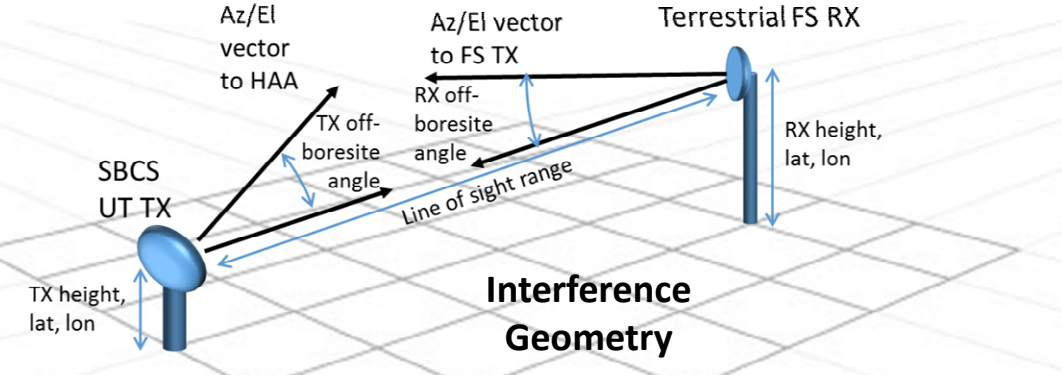
Compatibility analyses undertaken assuming worst case geometries and other worst case operating assumptions before turning to risk-based approaches, if necessary and as appropriate, to examine real world operating conditions

Compatibility Analysis Summary – Non-Federal

Org	Other Service	Other Link	Proposed STRAP Band	STRAP Link	EG Plan to Mitigate Interference	Study Results
FWCC	FS	P-P	25.25-27.5	User DL	Not Required	Airship transmission managed below satellite PFD limits per 25.208 (c)
FWCC	FS	P-P	21.5-24.0	User DL	Not Required	Airship transmission managed below satellite PFD limits per 25.208 (c)
FWCC	FS	P-P	25.25-27.5	User UL	Yes	Compatibility Analysis performed for each geographic area; limited site-specific coordination may be needed when UTs located in very close proximity to existing co-channel FS sites
FWCC	FS	P-P	21.5-24.0	User UL	Yes	Compatibility Analysis performed for each geographic area; limited site-specific coordination may be needed when UTs located in very close proximity to existing co-channel FS sites
FCC	FS-SBCS	User DL	25.25-27.5	User DL	Not Required	Adjacent SBCS service areas can overlap significantly – not mutually exclusive
FCC	FS-SBCS	User UL	21.5-24.0	User UL	Not Required	Adjacent SBCS service areas can overlap significantly – not mutually exclusive
Iridium	ISS	LEO->LEO	21.5-24.0	User UL	Not Required	Protection Criteria met under all conditions
Audacy	ISS	MEO->LEO	21.5-24.0	User UL	Not Required	Anticipate Protection Criteria met (pending analysis with Audacy receive characteristics)

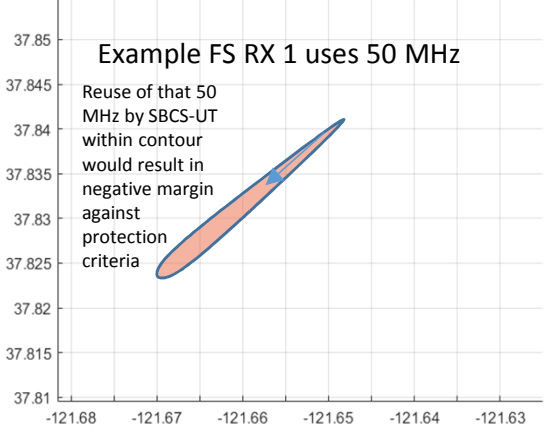
FS Point to Point over 21.5-23.6 GHz– Interference from EG System User Uplink
Interference Geometry & Analysis Results

- SBCS-UT antennas have high rolloff and elevation angle – present low EIRP to terrestrial receivers
- Analysis determines protection contour for each licensed receiver
  - UT in contour cannot reuse RX licensed channels
  - Allows pre-coordination for rapid deployment
- Protection contours are small enough that SBCS network controller can assign bands to UTs based on constraints that honor coordinations
- Conventional FS systems can continue to deploy

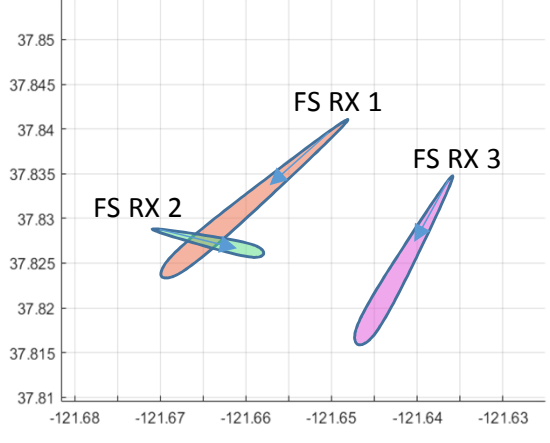


Interference Geometry

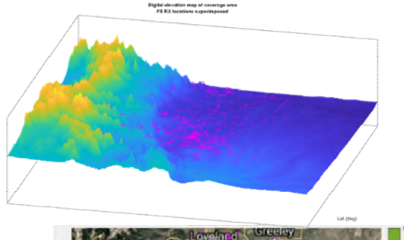
Terrestrial FS System Protection Contour

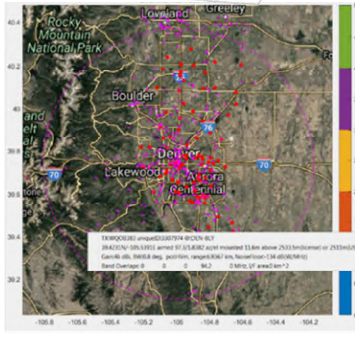


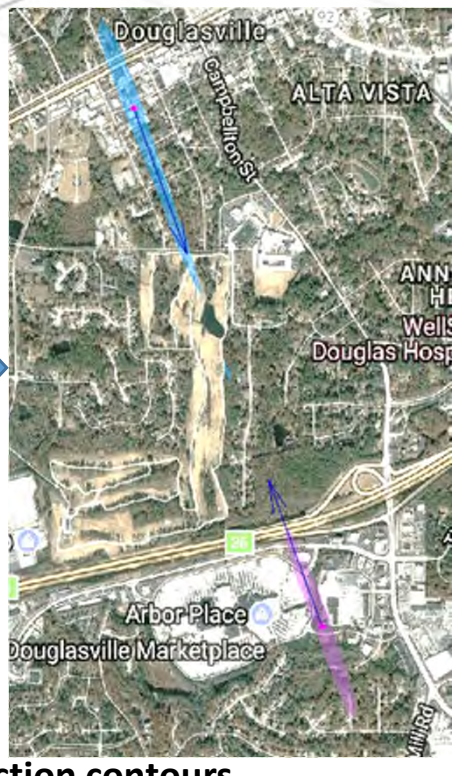
SBCS-UT Deployment Planning Map



Notional Protection Contours





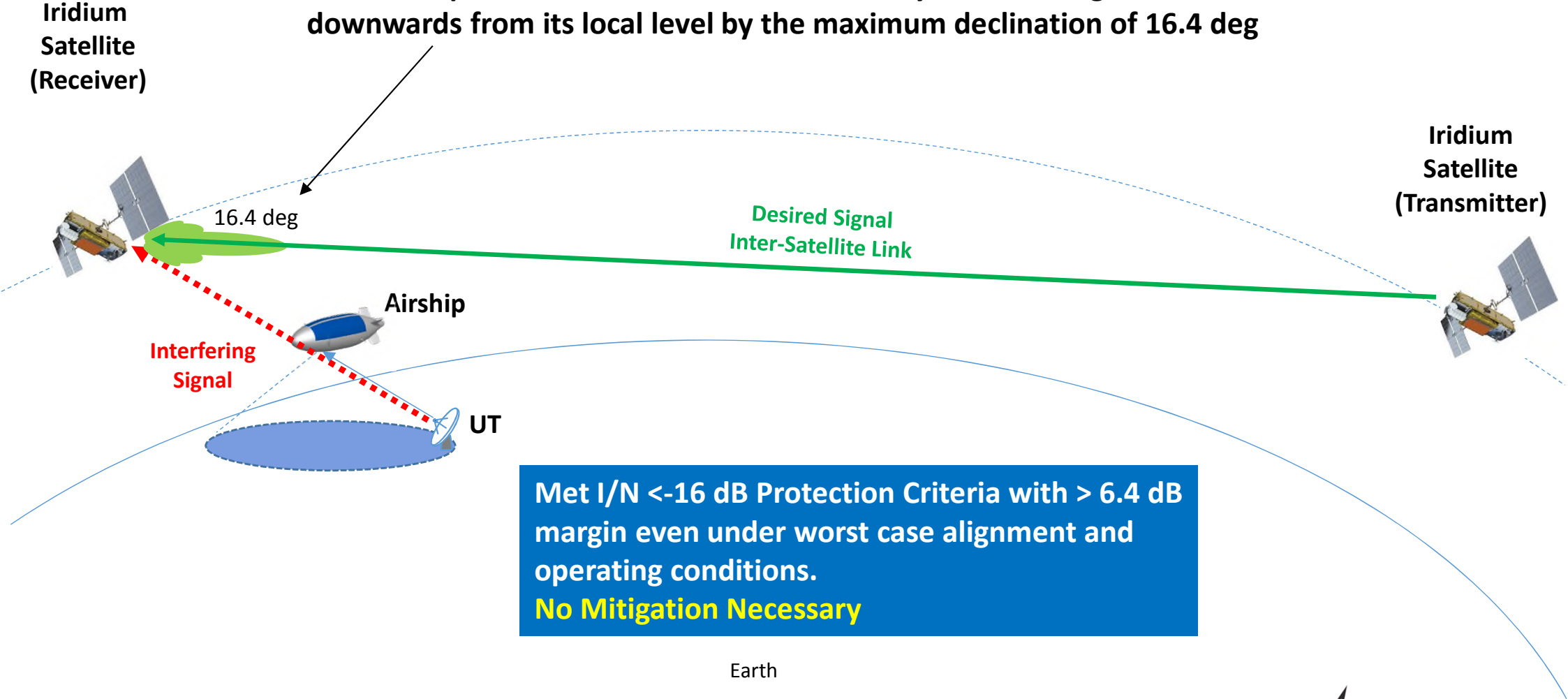


Terrain and FCC license database data used to evaluate realistic protection contours

FS fully protected by coordinating constraints on UT location and/or spectrum

Worst-case interference occurs rarely and momentarily when:

- **UT located at the edge of coverage area (minimum elevation angle) and Iridium satellite receiver are co-aligned**
- **The minimum off-boresight angle to the interferer occurs when the Iridium receiver is pointed over the center of the EG system coverage area and downwards from its local level by the maximum declination of 16.4 deg**



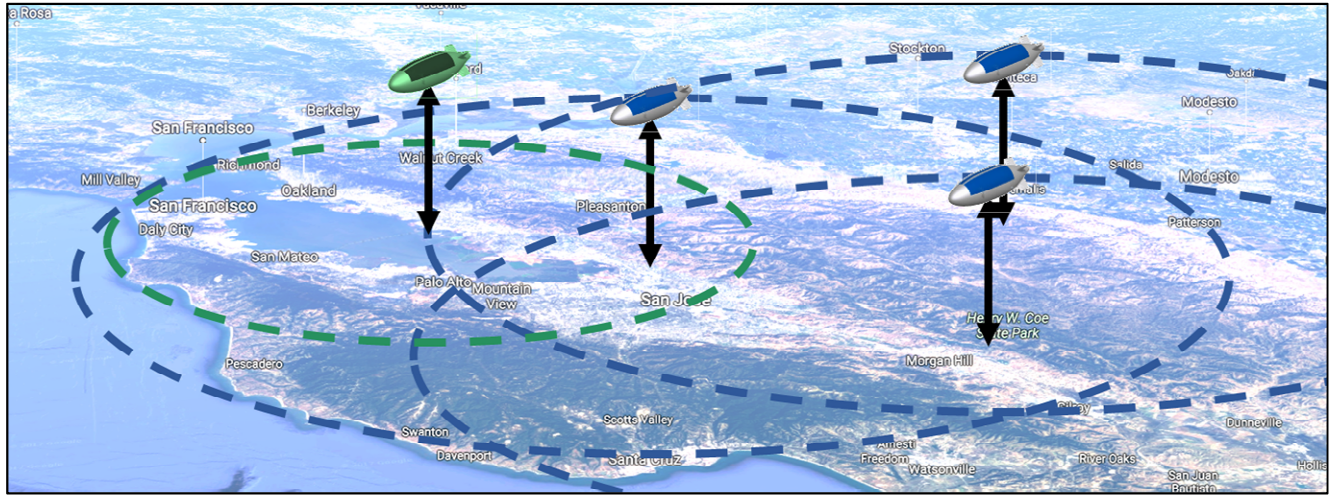
Met I/N <-16 dB Protection Criteria with > 6.4 dB margin even under worst case alignment and operating conditions.
No Mitigation Necessary

Compatibility with ISS Audacy– Interference from EG Terminal Uplink (21.5-24)

- Audacy geometry similar to Iridium geometry: SBCS User Terminal uplink has line of sight to LEO satellites
- Interference likely lower
  - Iridium cross-link antennas directed in Iridium orbital plane, at small angle below local horizontal
  - Audacy receivers presumably directed at high elevation angles to track MEO relays, presenting only backlobes to ground
  - Similar low probability of worst case alignment
- Interference analysis to confirm preliminary conclusion requires performance characteristics for Audacy receivers – not available in license application
  - Receiver gain patterns
  - Receiver noise floor
  - Receiver pointing

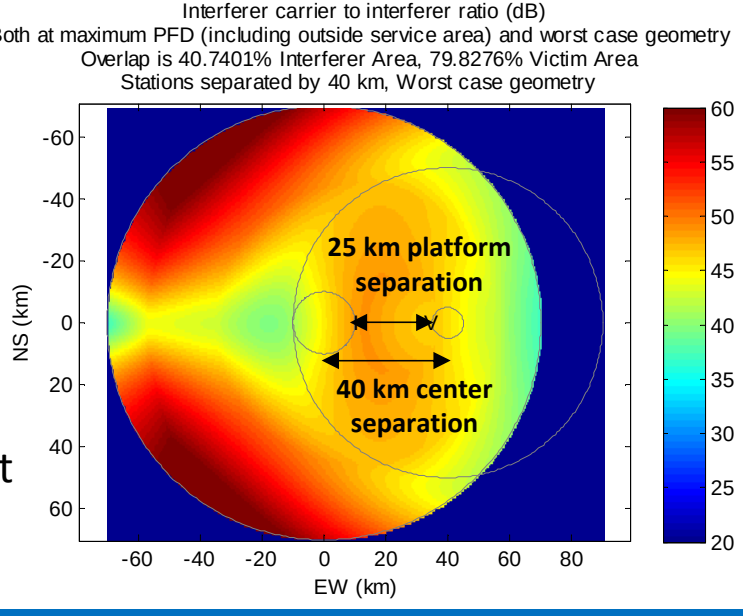
SBCS Peer to Peer Compatibility

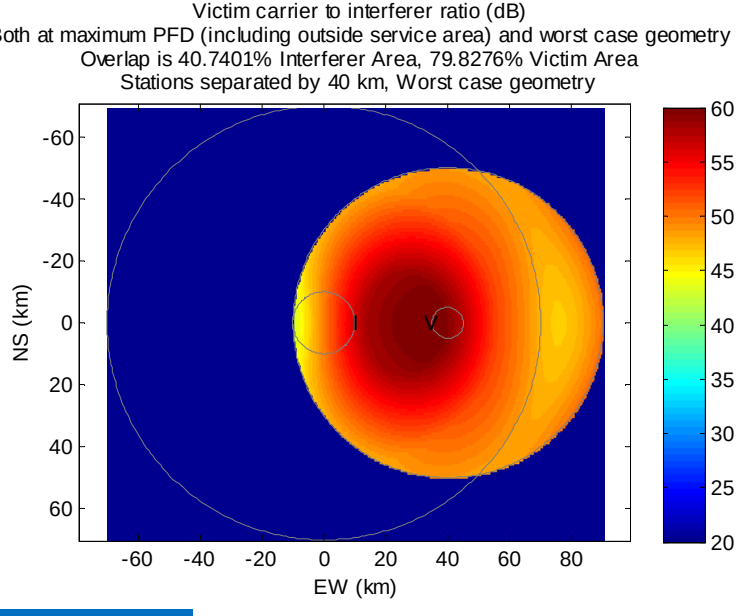
- Spectrum Utilization Is Maximized by Multiple Platform Re-use
- Stratospheric platform geometry permits complete spectrum re-use on a coordinated basis
- Analysis in downlink and uplink directions both show sufficient positive margin for overlapping systems following proposed regulations



Relying on spatial diversity, multiple airships can serve overlapping geographic areas in the same frequency bands

- Example DL analysis with EG reference system and system from ITU working party 5C
- Carrier to interferer ratio of both systems remains high enough to permit 5.9 bps/Hz with centers separated at most 40 km and airships separated at most 25 km



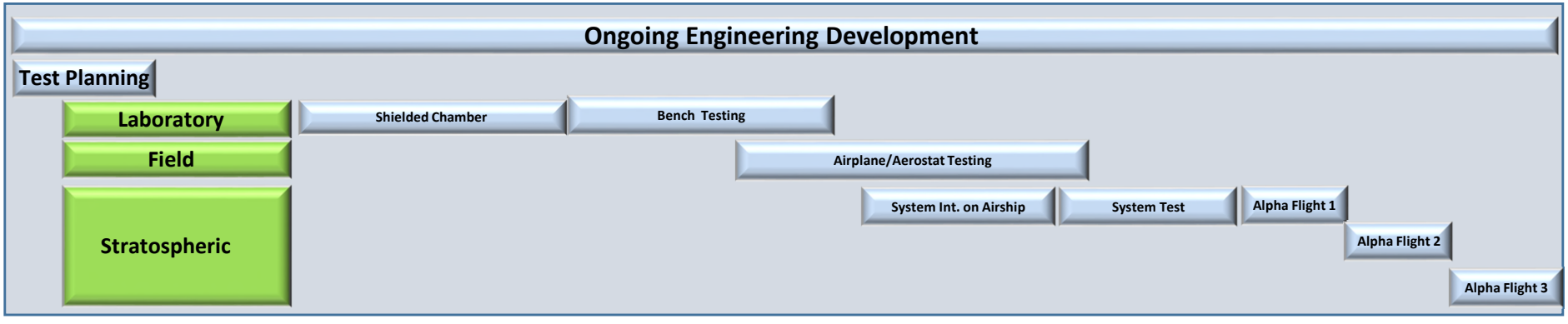


SBCS service areas are not mutually exclusive

Compatibility Analysis Summary - Federal

Org	Other Service	Other Link	Proposed STRAP Band	STRAP Link	EG Plan to Mitigate Interference	Study Results
DOD	MS	Aero-> Ground	25.25-27.5	User DL	Not Required	Minimal likelihood of interference
DOD	MS	Ground->Aero	21.5-24.0	User DL	Not Required	Minimal likelihood of interference
DOD	MS	Aero->Ground	25.25-27.5	User UL	Not Required	Minimal likelihood of interference
DOD	MS	Ground->Aero	21.5-24.0	User UL	Yes	Coordination/cooperation when <150 km of separation
NASA	ISS (DRS RTN)	NGSO->GSO	25.25-27.5	User DL	Not Required	Protection Criteria met under all conditions
NASA	ISS (DRS FWD)	GSO->NGSO	21.5-24.0	User DL	Not Required	Protection Criteria met under all conditions
NASA	ISS (DRS RTN)	NGSO->GSO	25.25-27.5	User UL	Not Required	Protection Criteria met under all conditions
NASA	ISS (DRS FWD)	GSO->NGSO	21.5-24.0	User UL	Not Required	Protection Criteria met under all conditions
NASA	EESS	GSO->ES	25.25-27.5	User DL	Yes	Airship can be placed to avoid interference assuming basic mission info available
NASA	EESS	GSO->ES	25.25-27.5	User UL	Yes	UTs placed relative to ES to avoid interference assuming basic mission info available
NASA	EESS	NGSO->ES	25.25-27.5	User DL	Yes	Airship can be placed to avoid interference assuming basic mission info available
NASA	EESS	NGSO->ES	25.25-27.5	User UL	Yes	UTs placed relative to ES to avoid interference assuming basic mission info available
NASA	SRS	Space->ES	25.25-27.5	User DL	Yes	Airship can be placed to avoid interference assuming basic mission info available
NASA	SRS	Space->ES	25.25-27.5	User UL	Yes	UTs placed relative to ES to avoid interference assuming basic mission info available
NASA	EESS	Passive sensors	21.5-24.0	User UL	Not Required	Determined proposed isolation criteria for 21.2-21.4, 22.21-22.5, 23.6-24 GHz
NSF	RAS	RAS passive	25.25-27.5	User DL	Not Required	Determined proposed isolation criteria for 23.6-24 GHz adjacent band
NSF	RAS	RAS passive	21.5-24.0	User UL	Not Required	Determined proposed isolation criteria for 23.6-24 GHz adjacent band

Communications Experimental Program Objectives



- Communications performance testing utilizing a subset of the beams

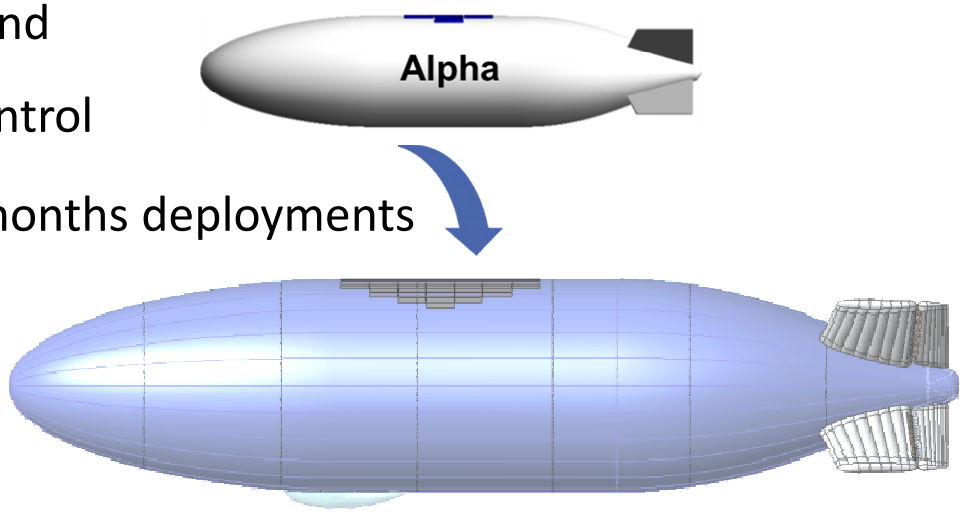
- Verify Channel modeling
- Loopback & Link performance of Ka & Antennas for Nadir& off-Nadir coverage
- Loopback & Link tests of Links to Gateways
- Beam Frequency Coloring & C/I performance
- Measurements to verify spectrum compatibility
- Demonstrate payload with End-to-End testing
- Beam level switching & management operations
  - Between Multiple Beams
  - Between Ka & E band beams
- Verify pointing, stabilization and other functions required to confirm link reliability
- User Terminals (full & allocated channels)
- Subscale Network and Resource Management

Communications system scalability to 1 Tbps & permanent operations in the stratosphere

Airship Experimental Program Objectives

Need to demonstrate a series of STRAPS "firsts" to operate as a reliable communication platform

- Successful ascent, transit to coverage area and station-keeping in a "fixed location"
- Flight Operations Center/ Command and Control
- Autonomous operations in the stratosphere
- Helium retention at altitude to support >6 months deployments
- Descent, recovery and relaunch



Refine Production Airship Design that includes

- Calibrate thermal models
- Verify helium cell expansion dynamics
- Verify aerodynamic drag estimates
- Characterize platform motion, vibration inputs to payload
- Assess subsystem performance of multiple systems (pressurization, power, etc.)
- Manufacturing techniques and scale

First to achieve sustained stratospheric flight with a recoverable airship

Petition for Rulemaking

- Scope: Limited to SBCS User Links (21.5-24.0, 25.25-27.5 GHz) and Feeder Links (70/80 GHz)
- Seek new primary FIXED allocations or footnotes in the 23.6-24.0 and 25.25-27.5 GHz bands
  - New allocations could be limited to stratospheric-based communications service (SBCS) operations, if appropriate
- Service and operational rules for non-exclusive systems operating as a FIXED service in both urban and rural areas
- Foundation for SBCS would be compatibility with incumbent operators in shared spectrum allowing both SBCS and incumbent uses to grow
  - Proposed technical rules standing alone will ensure compatibility with incumbents in many scenarios (e.g., ISS, EESS, some AMS)
  - Proposed rules would provide for coordination with other Fixed Services in 21.5-23.6 GHz range and in E-Band in fashion consistent with current framework with slight modifications
  - Proposed rules would provide for service-area specific coordination with incumbents where necessary (AMS, EESS, SRS, RAS)

SBCS offers new technologies and services meriting Section 7 treatment of the Petition and the ensuing rulemaking

Petition for Rulemaking (cont'd)

- SBCS licensing rules should provide for non-exclusive SBCS assignments
  - Through coordination, multiple SBCS systems can serve the same geography in the same bands
  - No mutual exclusivity among fixed services
    - In UL bands, would also share with "traditional" Fixed Services
  - SBCS licenses should be granted on a rolling-wide area basis (REAs)
    - STRAPS and User Terminal links (uplinks) should be registered prior to deployment
  - Appropriate rural commitments should be considered
- Bringing-into-use obligations, discontinuance rules, and transfer restrictions
- Licensees can choose to operate as a private carrier or a common carrier