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March 13, 2017

VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street S.W.
Washington D.C. 20554

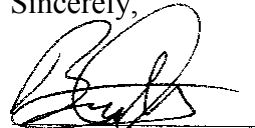
**Re: *Oral Ex Parte* Notice, FCC Call Sign S2966
IBFS File Nos. SAT-LOA-20160622-00058 &
SAT-AMD-20170301-00030**

Dear Ms. Dortch:

On March 9, 2017, representatives of The Boeing Company (“Boeing”) met with staff of the Satellite Division of the FCC’s International Bureau to present and discuss Boeing’s recently filed amendment to its currently pending application for authority to launch and operate a non-geostationary satellite orbit (“NGSO”) satellite system operating in the fixed-satellite service (“FSS”) in the V-band. Participating in the meeting on behalf of the Satellite Division were Jose Albuquerque, Karl Kensinger, Kerry Murray, Stephen Duall, Jennifer Balatan, Diane Garfield, Merissa Velez, and Chip Fleming. Participating on behalf of Boeing were Bruce Chelsey, Audrey Allison, Kim Kolb, and the undersigned. The discussion tracked closely with the attached presentation materials, which were distributed during the meeting.

Thank you for your attention to this matter. Please contact me if you have any questions.

Sincerely,



Bruce A. Olcott

Counsel to The Boeing Company

Attachment



Boeing NGSO System

FCC Application March 1 2017 Amendment Discussion

9 March 2017

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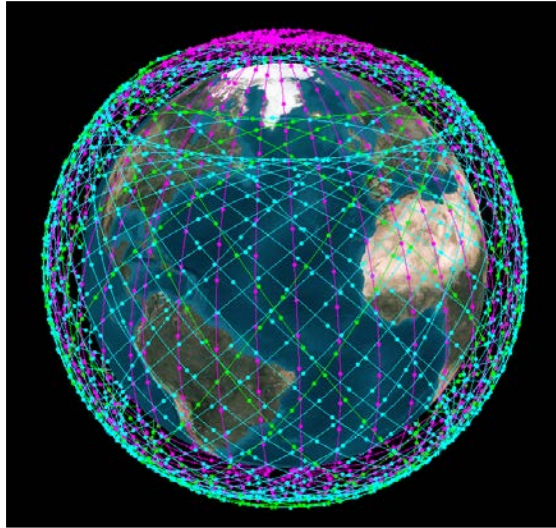
Broadband NGSO System FCC Application Amendment Discussion



- **Broadband NGSO System Description - Updated**
- **Orbital Altitude Changes and Rationale**
- **EIRP, EIRP Density and PFD Capabilities**

Boeing Global Broadband System (V-Band LEO)

March 1 2017 Amendment (changes in **BLUE** font)



*Minor change in altitude(s)
to accommodate
OneWeb and others*

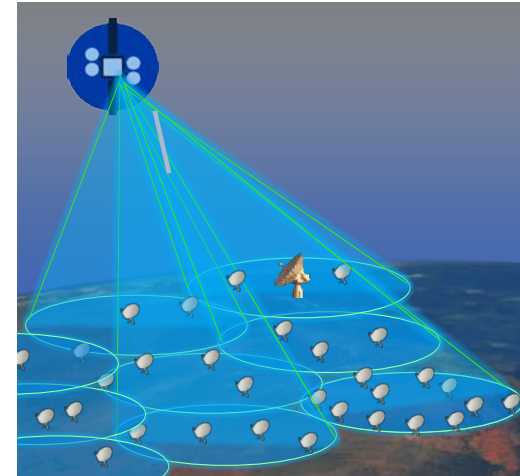
Global Constellation

Spacecraft Qty: 1396/2956

Orbit Altitudes: 1086 km, 1034km, 970km

Orbit Inclinations: 45°, 55° & 88°

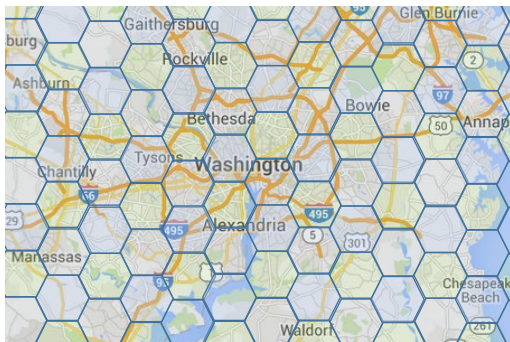
Provides Global Coverage



System Design

Broad Coverage LEO Satellites with Flexible Beam-forming Technology
Phased array antennas form robust links with high throughput and isolation and low side-lobe beams
Millimeter wave technology proven and deployed in government and commercial FSS and terrestrial systems

8-11 km cells over Washington DC



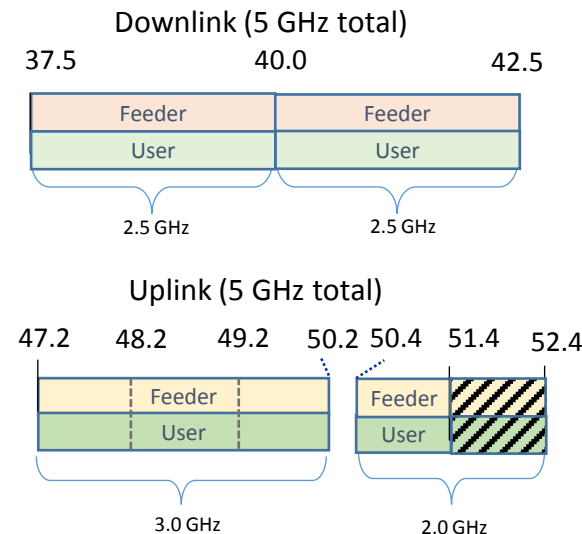
Service Density

3-Color (Time) reuse allows for very high throughput that is competitive to serve both urban and rural areas

Peak User Rates

Exceeds FCC's Broadband Goals
>25 Mbps Down / >3 Mbps Up

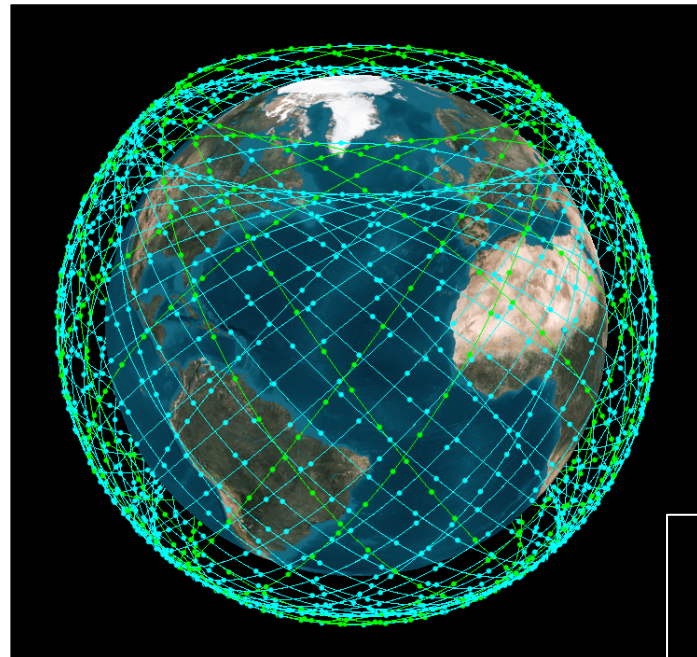
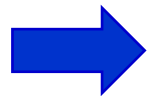
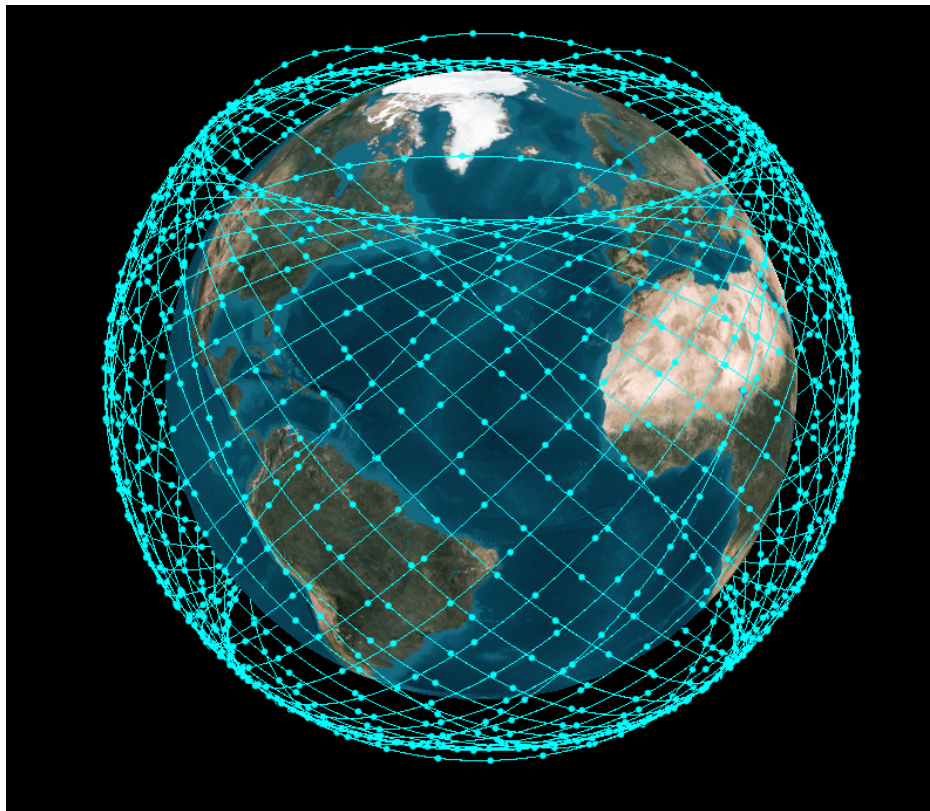
Broadband speeds are available to all global users



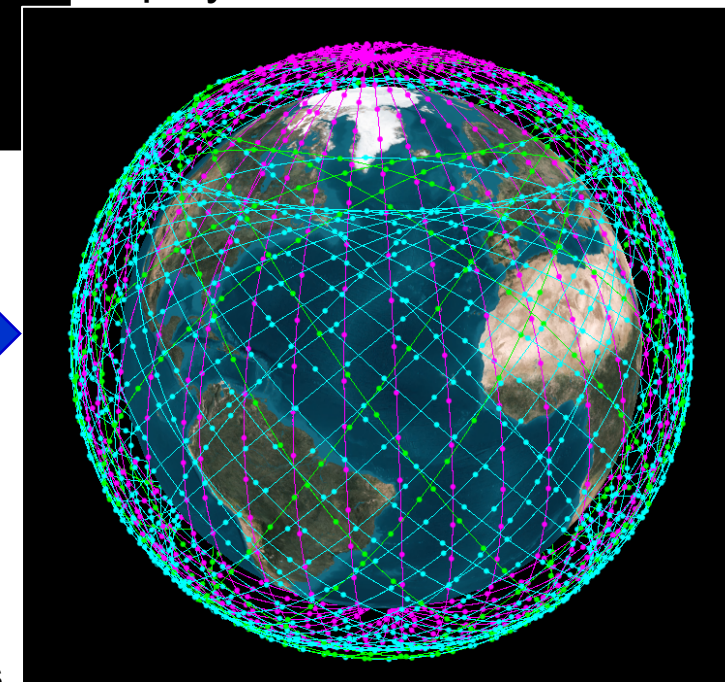
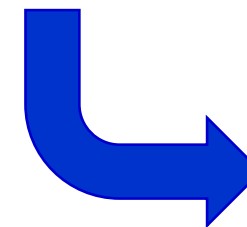
Frequency Plan

Each Beam uses all 5 GHz, dual polarization, up and down
Time domain division between adjacent cells
Gateways and user terminals share uplink and downlink bands

Constellation Summary and Deployment Plan



Additional 55-deg inclination satellites (552 – total 1948)



Final Deployments

(e) Number of Orbit Planes	(f) No. of Satellites in Plane	(g) Inclination Angle (degrees)	(i) Altitude (km)	Total Number of satellites
12	46	55.0	1082.0	552
21	48	88.0	970.0	1008

(from Schedule S, Table S4 data)

Initial Deployment: 1396 satellites (45-deg + 55-deg inclinations, 1030 and 1082 km)

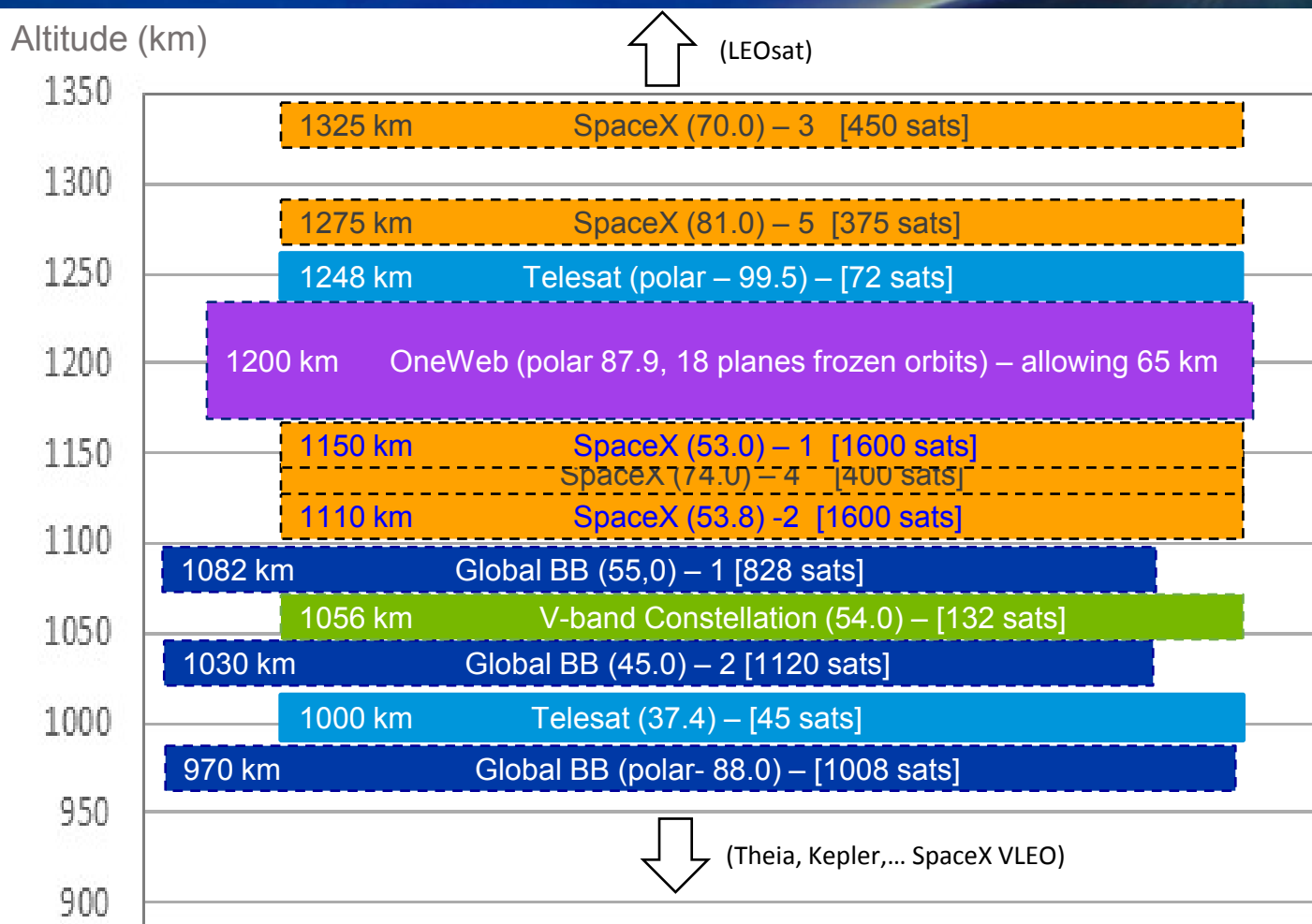
(e) Number of Orbit Planes	(f) No. of Satellites in Plane	(g) Inclination Angle (degrees)	(i) Altitude (km)	Total Number of satellites
35	32	45.0	1030.0	1120
6	46	55.0	1082.0	276

(from Schedule S data)

Altitude Changes only
No change to Deployment Plan

Additional 88-deg inclination satellites (1008 – total 2956, at 970 km)

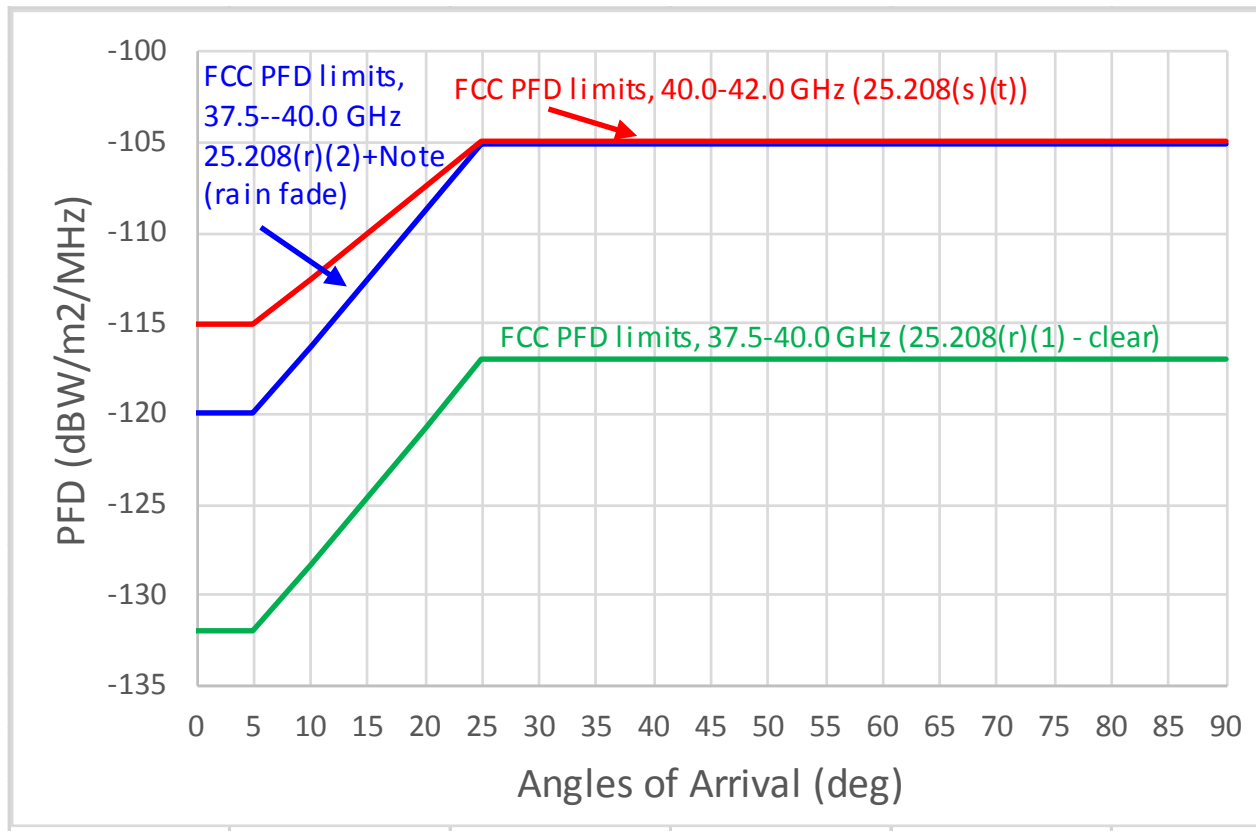
Major Filed LEO Orbit Constellations (FCC) – March 2017



- Allowing for a OneWeb altitude range of ~65 km
- All LEO satellite applicants assumed to use “frozen” orbits to minimize altitude variations
- All LEO satellite applications assumed to perform constellation stationkeeping within each set of inclined planes
 - Each set of planes is assumed to occupy a maximum of 25 km altitude range
- Altitude separations between inclined planes are shown per filing
- Global Broadband LEO mid-inclined planes situated below SpaceX and above Telesat and other LEO applicants
- Global Broadband polar planes are situated below Telesat LEO and above other LEO applicants

Altitude Change accommodates OneWeb – but all LEO operators need to minimize orbit variation(s)

EIRP, EIRP Density and PFD Capabilities



Clarifications of PFD Limits and system operations only
No change to PFD, ePFD, or minimal UMFUS interference

- Boeing NGSO System operation is fully compliant with current FCC regulations
- In the 40.0-42.5 GHz band, satellites operate up to -105 dBW/m²/MHz in any conditions
- In the 37.5-40.0 GHz band, satellites operate below -117 dBW/m²/MHz in clear air conditions
- Satellites will raise their EIRP and EIRP density in rain fade only and operate below the -105 dBW/m²/MHz maximum limit
- NO CHANGE to planned PFD operations or ePFD and the minimal interference introduced into UMFUS receivers
 - As fully documented in Boeing's *Spectrum Frontiers* submittals
- Waiver request for 25.208(r)(2) is maintained based on an abundance of caution
- Boeing NGSO System will accept a license contingent on the outcome of *Spectrum Frontiers* proceedings



Frequency Plan, Channels, and Connectivity

Figure II-21. Communication Channel Downlink Frequency Plan

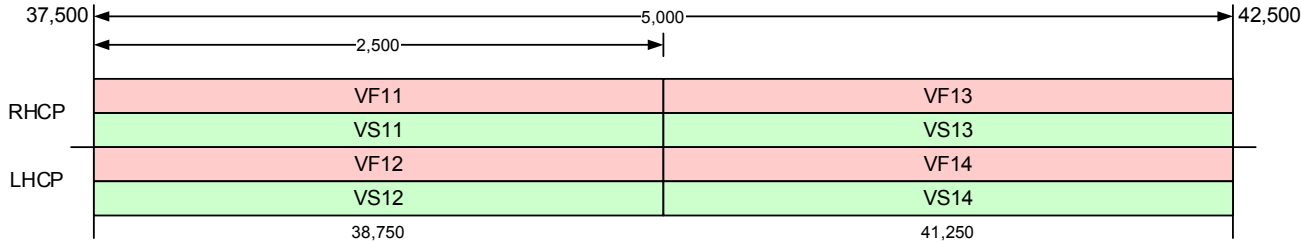
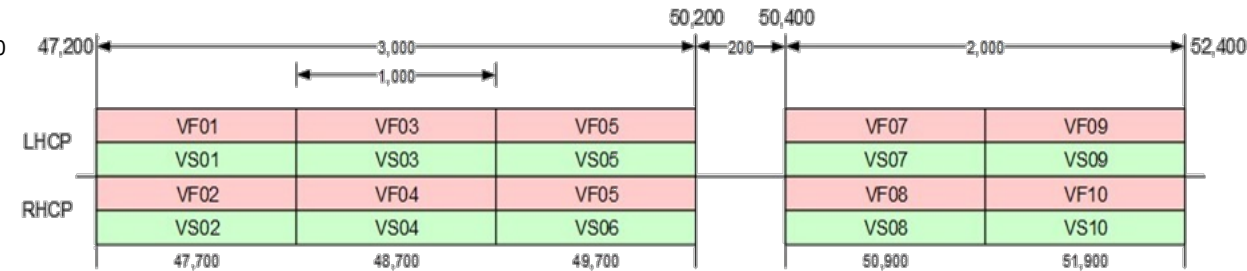


Figure II-19. Communication Channel Uplink Frequency Plan



NO CHANGE TO UPLINK FREQUENCY PLAN

- Minor change in frequency plan to acknowledge regulatory boundaries
- **NO CHANGE to PFD operations (see next slide)**

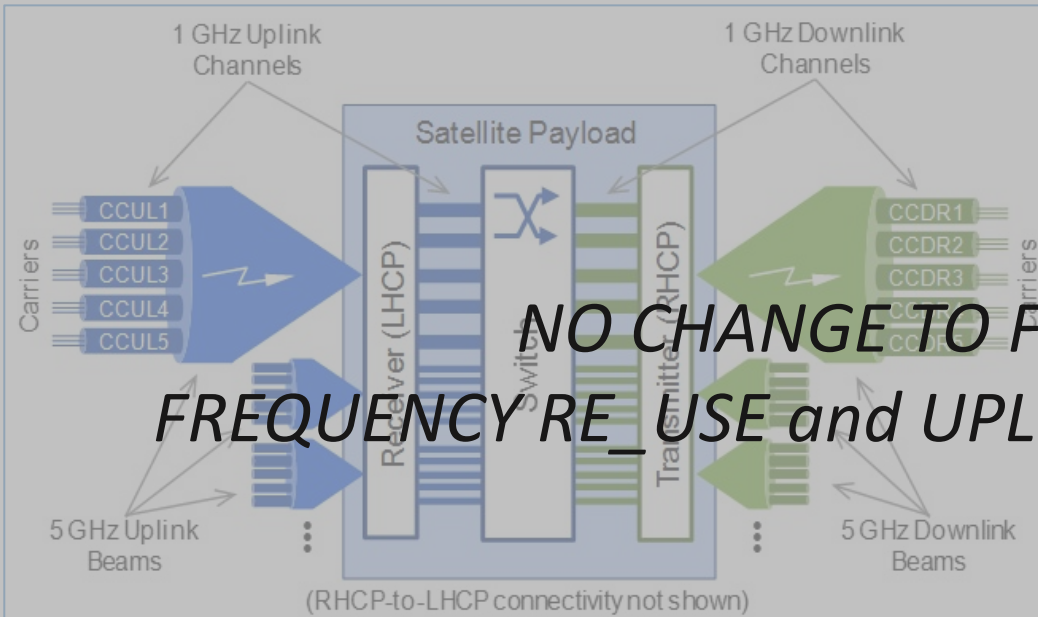


Figure II-23. Communication Channel Uplink/Downlink Connectivity

- Flexible and efficient re-use achieved by timeslot, frequency, bandwidth, and polarization assignments
- Satellite spot beams are switched across the cells within the satellite footprint
- Any uplink channel in any uplink beam may generally be connected to any downlink channel in any downlink beam
- Aligns the satellite capacity with NGSO satellite motion and accommodates the varying nature of the traffic demand

NO CHANGE TO FLEXIBLE SUBCHANNELIZATION, FREQUENCY RE-USE and UPLINK-TO-DOWNLINK ROUTING CAPABILITIES



Figure II-26. Frequency Re-use Examples for NGSO System Cells