EXHIBIT 43

DG Consents Sub, Inc.
Modification Application
FCC Form 312
September 2018

Application of DG Consents Sub, Inc. for Modification of Authorization

DG Consents Sub, Inc. ("DigitalGlobe") hereby requests modification of its Earth Exploration Satellite Service ("EESS") system to add twelve new non-geostationary satellite orbit ("NGSO") remote-sensing satellites. These new satellites (the "WorldView-Legion satellites") will be organized into two Blocks, increasing the number of satellites licensed under Call Sign S2129 to fifteen.[1] Block-1 will consist of WorldView-Legion-1 through 6, and Block-2 will consist of WorldView-Legion-7 through 12.

Grant of the modification will serve the public interest, allowing DigitalGlobe to launch and operate an improved high-resolution imagery satellite system with superior spectral and revisit characteristics. The Commission has recognized the critical importance of EESS, which "allow[s] for the delivery of enhanced next-generation imaging services" and "enhance[s] national security, environmental monitoring and forecasting functions."[2] The EESS market is increasingly competitive, and the WorldView-Legion satellites will augment DigitalGlobe's groundbreaking enhanced Earth imagery capabilities and the suite of innovative products and services it provides its customers. Specifically, the improved characteristics of the WorldView-Legion system will enable DigitalGlobe to expand its ability to provide its Government and non-Government users with enhanced data and timeliness to meet national defense, mapping, land use, natural disaster monitoring and other critical customer demands. Accordingly, grant of this modification application will serve the public interest.

I. Description of Authority Requested and Required Information

DigitalGlobe provides information in accordance with Section 25.114 of the Commission's rules on FCC Form 312 and Schedule S and in this narrative exhibit.[3] In accordance with Section 25.117(d)(1), DigitalGlobe provides information in this modification application only to the extent that it has changed from the information currently on file for Call Sign S2129 and hereby certifies that the remaining information has not changed and is incorporated by reference.[4]

---

1 The existing satellites licensed under Call Sign S2129 are WorldView-1, WorldView-2 and Worldview-3. *See* DG Consents Sub, Inc., File No. SAT-MOD-20140327-00036 (granted June 5, 2014). Call Sign S2348 authorizes DigitalGlobe to operate the WorldView-4 and GeoEye-1 space stations. *See* File No. SAT-MOD-20160408-00033 (granted Nov. 9, 2016).

2 DigitalGlobe, Inc., Order and Authorization, 20 FCC Rcd 15696, ¶ 1 (I.B. 2005).

3 47 C.F.R. § 25.114.

4 *See* C.F.R § 25.117(d)(1).

A. General Description of Overall Facilities, Operations and Services

As with DigitalGlobe's existing satellites, the WorldView-Legion satellites will transmit high-resolution satellite images and telemetry using the 8025-8400 MHz band allocated to the EESS. DigitalGlobe's ground segment will send command to WorldView-Legion satellites using the 2025-2110 MHz band. All radio frequency communications between the WorldView-Legion satellites and the U.S. will be via the four existing Remote Ground Terminals ("RGT") in Fairbanks and Prudhoe Bay, Alaska; Green River, Wyoming; and Clewiston, Florida. These RGTs currently support WorldView-1, WorldView-2, and WorldView-3 satellites under Call Sign S2129, and GeoEye-1 and WorldView-4 under Call Sign S2348.

Each Block of WorldView-Legion satellites will operate in two circular orbital planes. Each Block of six satellites will be placed into orbit on two separate launches. For each Block two of the satellites to be launched will operate in a sun-synchronous orbital plane, and the remaining four satellites will operate in a 45-degree-inclined plane. The orbital parameters for the twelve WorldView-Legion satellites are provided in the Schedule S document, which is attached to this application. These Block-1 and Block-2 satellites are intended to replenish the operational capacity of the currently-licensed WorldView satellites, which will reach the end of their operational lifetimes as the WorldView-Legion satellites become operational. The launch and deployment sequence for each Block is identical and entails time-sequenced injection of two to four WorldView-Legion satellites into a commissioning orbit, followed by movement of WorldView-Legion satellites into separate "phasing" altitudes over the first year of operations (duration of time in phasing orbits vary but will last no longer than one year), and culminating in movement of the WorldView-Legion satellites to their final mission orbits, each with different Ascending Nodes. This means that their satellites will operate over an altitude range of 450 to 870 kilometers during the initial part of the mission, and they will converge to nominal altitudes of 763 kilometers (equatorial altitude) for the two sun-synchronous satellites, and 518 kilometers (equatorial altitude) for the four 45-degree-inclined satellites. This altitude convergence process will take place within the first year of on-orbit operations. Thus, for purposes of demonstrating compliance with regulatory and technical provisions such as power flux-density limits, link budgets and predicted antenna gain contours, DigitalGlobe includes data and showings for 450 kilometers and 870 kilometers, to encompass the range of operational altitudes.

Block 1 of the WorldView-Legion satellites are under construction.[5] The launches of WorldView-Legion Blocks 1 and 2 will be staggered and ensure continuity of service to DigitalGlobe's customers. On January 24, 2018, DigitalGlobe received a license from the National Oceanic and Atmospheric Administration ("NOAA") to operate the twelve WorldView-Legion satellites as part of the DigitalGlobe EESS system.[6]

---

[5] *See* 47 C.F.R. § 25.113(f).

[6] *See* License from National Oceanic and Atmospheric Administration to operate a private space-based remote sensing system, dated January 24, 2018.

B. Schedule S

The technical characteristics of the proposed WorldView-Legion satellites are detailed in the Schedule S portion of the FCC Form 312. DigitalGlobe completed the Schedule S to the best of its ability and the limitations of the Commission's software. The Schedule S form software would not allow entry of an orbit epoch date later than three years from application date. Since the actual orbit epoch date is expected to be later than this three year window, the latest possible date was entered.

C. Link Budgets and Power Flux Density Calculation

The proposed satellites' link budgets and power flux density ("PFD") limits at the surface of the Earth are included as Attachment C hereto. The PFDs at the Earth's surface produced by WorldView-Legion data and telemetry transmissions satisfy the PFD limits in Table 21-4 of the ITU Radio Regulations.[7] Tables C-1, C-2, C-3 and C-4 in Attachment C to this Exhibit 43 show that the PFDs at the Earth's surface produced by the WorldView-Legion satellite's data and telemetry transmissions satisfy the PFD limits in Article 21 of the ITU Radio Regulations, under assumed free-space propagation conditions, for all angles of arrival. DigitalGlobe notes that the WorldView-Legion wideband (image data) and narrowband (telemetry) transmitters include internal power control, allowing the maximum output power to be attenuated by 0 to -4 dB in 0.5 dB increments. This enables both robust link margins and full compliance with PFD limits over the entire 450 to 870 kilometer altitude range.

No. 22.5 of the ITU Radio Regulations specifies that in the frequency band 8025-8400 MHz, which the EESS using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum PFD produced at the geostationary satellite orbit ("GSO") by any EESS space station shall not exceed -174 dB(W/m^2) in any 4 kHz band. The calculation below shows that the PFD produced by the transmissions from the proposed WorldView-Legion satellites does not exceed the limit in No. 22.5, even in the worst possible hypothetical case.

The PFD at the GSO produced by the WorldView-Legion transmissions are:

$$\text{Wideband PFD } [\text{dB(W/m}^2\text{/4 kHz)}] = \text{EIRP} - 20\cdot\log(\text{D}) - 117.98$$
$$\text{Narrowband PFD } [\text{dB(W/m}^2\text{/4 kHz)}] = \text{EIRP} - 20\cdot\log(\text{D}) - 92.9$$

Where:

- EIRP is the Maximum EIRP of the transmission, in dBW;
- D is distance between the WorldView-Legion satellite and GSO, in km.

The minimum possible distance between the WorldView-Legion satellites and the GSO is 34,916 kilometers for the highest possible satellite orbit of 870 kilometers. Under a hypothetical assumption that the WorldView-Legion satellite antennas are radiating at their peak EIRP toward the GSO, the wideband data downlink transmission with the peak EIRP = 30.5 dBW (peak antenna gain, 0 dB power control, maximum transmitter output power over temperature at BOL) produces a PFD at GSO of −178.34 dB(W/m^2) in any 4 kHz band. Under the same hypothetical assumptions, the narrowband telemetry transmission from the WorldView-Legion satellite has a peak EIRP = −0.7 dBW and produces a PFD at

[7] FCC Rule 25.208 does not contain PFD limits at the Earth's surface produced by emissions from NGSO EESS space stations operating in the 8025-8400 MHz band.

the GSO of -184.5 dB(W/m^2) in any 4 kHz band by setting the internal transmitter power control to 0 dB. This setting still provides positive link margin to ground stations for all normal operations.

D. Space Station Antenna Patterns

The satellite wideband downlink, narrowband downlink, and command uplink antenna patterns are included as Attachment D hereto.

E. Predicted Antenna Gain Contours

Attachment E hereto shows the predicted antenna gain contours required by Section 25.114(d)(3) of the Commission's rules at the following DigitalGlobe earth station sites: Prudhoe Bay, Alaska; Fairbanks, Alaska; Green River, Wyoming; and Clewiston, Florida. *See* 47 C.F.R. § 25.114(d)(3). The gain contours are plotted for WorldView-Legion satellites at the corresponding minimum (470 km), maximum (800 km) and nominal (763 km) orbital altitudes for the sun-synchronous orbits and the minimum (450 km), maximum (870 km) and nominal (518 km) orbital altitudes for the inclined orbits. The Attachment E showing depicts the contours from a 90° elevation angle.

F. Interference Analysis

Attachment C demonstrates that the WorldView-Legion transmissions will meet the limits specified by the ITU for protection of the Fixed Service in the 8025-8400 MHz band. Likewise, Section I.C. above demonstrates that WorldView-Legion transmissions will meet ITU-specified limits for the geostationary FSS satellites using this band for their uplinks. Coordination avoids interference between WorldView Legion transmissions and those of other EESS systems operating in the band 8025-8400 MHz

G. Orbital Debris Mitigation

DigitalGlobe confirms that the WorldView-Legion satellites will not undergo any planned release of debris during its normal operations. In addition, all separation and deployment mechanisms, and any other potential source of debris will be retained by the spacecraft or launch vehicle. DigitalGlobe also has assessed the probability of the spacecraft becoming a source of debris by collision with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. DigitalGlobe has taken steps to limit the effects of such collisions through redundancy, shielding, separation of components, and physical characteristics.

DigitalGlobe has assessed and limited the probability of accidental explosions during and after completion of mission operations. The assessment was based on possible failure modes that could result in explosions, and operational procedures were adopted to limit the probability that they occur. As part of the satellite manufacturing process, DigitalGlobe has taken steps to ensure that debris generation will not result from the conversion of energy sources on the satellite into energy that fragments the satellite. All sources of stored energy on board each spacecraft will have been depleted when no longer required for mission operations or post-mission disposal.

DigitalGlobe has assessed and limited the probability of the spacecraft becoming a source of debris by collisions with large debris or other operational spacecraft. DigitalGlobe does not intend to

place WorldView-Legion satellites in orbits that are identical to or very similar to an orbit used by other space stations, and, in any event, will work closely with the WorldView-Legion launch provider to ensure that the satellite is deployed in such a way as to minimize the potential for collision with any other spacecraft.

To DigitalGlobe's understanding, the International Space Station is the inhabited orbiting object. The operational altitude of the International Space Station is approximately 400 kilometers significantly below the minimum possible initial and final operational orbital altitudes of the Worldview Legion spacecraft. DigitalGlobe will be proactive to ensure that the risk of collision to inhabitable orbiting objects and non-inhabited orbiting objects from Legion are mitigated. This will include coordinating with NASA to assure protection of the International Space Station on an ongoing basis, and daily coordination with USSTRATCOM Joint Space Operations Center (JSpOC). DigitalGlobe will provide both agencies with all information they need to assess risks and ensure safe flight profiles, and with contact information for DigitalGlobe personnel on a 24 hours per day/7 days per week basis. It should also be noted that DigitalGlobe is a member of the Commercial Integration Cell (CIC) at the JSpOC. DigitalGlobe works closely with Iridium and Planet Labs, routinely sharing orbital parameter information. With these measures, collisions will be able to be avoided even if there is at some future point less separation in orbits than is anticipated at a minimum today.

As a final measure, DigitalGlobe provides in Table 1 below the Commission with the information called for in Section 25.114(d)(14)(iii) of the Commission's Rules, and "discloses the accuracy – if any – with which the orbital parameters of [its] non-geostationary satellite orbit space stations will be maintained, including apogee, perigee, inclination, and the right ascension of the ascending node(s)." While WorldView-Legion is still in operational condition and propellant is still available, the orbit will be maintained to within the Table 1 accuracies.

Table 1: Anticipated Ranges of Accuracy to Which WorldView-Legion Orbital Parameters Will Be Maintained

Orbital Parameters	Maintenance Accuracy
Inclination Angle	±0.2°
Apogee	±2 km
Perigee	±2 km
Right Ascension of the Ascending Node	±5°

To the extent that Section 25.114(d)(14)(iii) also calls for indication of the anticipated evolution over time of the satellite's orbit, DigitalGlobe notes that after orbit maintenance is no longer possible, WorldView Legion's apogee and perigee altitudes will gradually decay over time due to atmospheric drag until the satellite reenters the atmosphere. During this period the inclination and right ascension of the ascending node will also drift outside of the Table 1 maintenance limits due to gravitational perturbations. Table 2 below shows predicted worst-case (shortest) propellant life and reentry times for the lowest, nominal and highest Legion operational altitudes.

Table 2: Predicted Propellant Life and Time to Reentry

Mission Altitude	Mission Inclination	Post-EOL Lowering Altitude	Time to Reentry After Lowering	Total Time in Orbit
450 km (lower bound)	45.0 deg or 97.243 deg	RE-ENTRY	N/A	10 years*
518 km mid-inclined (planned mission)	45.0 deg	RE-ENTRY	N/A	10 years*
763 km sun-synchronous (planned mission)	98.473 deg	RE-ENTRY	N/A	10 years*
870 km (upper bound)	45.0 deg or 98.937 deg	381 km	1.75 years	11.75 years

*upon completion of the mission satellites are able to lower their orbits such that re-entry will occur without need for gradual orbital decay.

Notes:
1. Propellant Life is calculated assuming 3-sigma launch dispersions are removed and all remaining propellant is used to maintain the orbit throughout nominal mission life (7 years).
2. Time to Reentry is calculated from the point when all propulsive orbit maintenance ceases at end of nominal mission).
3. Actual mission duration may exceed 10 years if satellite remains functional

II. Requests For Waiver

A. Modified Processing Round Rules

DigitalGlobe requests waiver of FCC Rules 25.156 and 25.157, which stipulate the processing of "NGSO-like satellite systems" under a modified processing round framework.[8] Instead, DigitalGlobe requests that this application be processed pursuant to the first-come, first- served procedure adopted for "GSO-like satellite systems" under FCC Rule 25.158.[9]

---

[8] 47 C.F.R. §§ 25.156 & 25.157.

[9] 47 C.F.R. § 25.158.

The Commission has authority to waive its rules "for good cause shown."[10] Good cause exists if "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest" better than adherence to the general rule.[11] In determining whether waiver is appropriate, the Commission should "take into account considerations of hardship, equity, or more effective implementation of overall policy."[12]

The Commission has routinely granted these waivers for other similarly-situated EESS operators because of "the opportunity for additional entrants to operate in the 8025-8400 MHz band[.]"[13] The instant modification will not preclude subsequent EESS applicants from operating in the 8025-8400 MHz band or cause harmful interference to other EESS systems currently operating in the band. Therefore, good cause exists to waive the modified processing rules here consistent with precedent.

B. Default Service Rules

DigitalGlobe also requests a waiver of the default service rules under FCC Rule 25.217(b).[14] The Commission has granted waivers for similarly-situated EESS operators because they "must comply with technical requirements in Part 2 of the Commission's rules and power flux-density limits, which should prevent harmful interference to other operations in the band."[15] The same rationale applies to the instant application. Accordingly, good cause exists for the Commission to grant waiver of the default service rules.

III. Additional Considerations

C. Milestones and Bond

The WorldView-Legion satellites will operate using the same frequency bands and coverage areas as DigitalGlobe's initial licensed WorldView satellites and are intended to replenish the existing WorldView constellation as they reach the end of their operational lifetimes. As such, the milestone and bond requirements set forth in Sections 25.164 and 26.165 should not apply.

D. ITU Advance Publication Materials and Cost Recovery

DigitalGlobe will prepare the International Telecommunication Union ("ITU") Advance Publication Information submission for WorldView-Legion, and will provide this information to the Commission under separate cover. DigitalGlobe will separately provide the Commission with a letter acknowledging that it is responsible for any and all cost recovery fees associated with filings for the proposed system.

---

10 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969).

11 *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

12 *WAIT Radio*, 418 F.2d at 1159.

13 Planet Labs Inc., IBFS File Nos. SAT-MOD-20170713-00101, SAT-AMD-20171025-00144; SAT-AMD20171106-00151, at Condition 12 (granted Dec. 8, 2017) ("Planet Labs MOD").

14 47 C.F.R. § 25.217.

15 Planet Labs MOD, at Condition 13 (citing *DigitalGlobe*, ¶ 15).

E. License Term

DigitalGlobe requests that the Commission specify an extended license term applicable to its WorldView-Legion satellites, beginning on 3 a.m. Eastern Time on the date when DigitalGlobe notifies the Commission that operation of an initial second-generation space station is compliant with the terms and conditions of this authorization and that the space station has been placed in its authorized orbit, and ending 15 years later.[16]

IV. Conclusion

For the reasons given, DigitalGlobe respectfully requests that the Commission grant the modification application as detailed herein.

---

16 *See Iridium NEXT Order*, 31 FCC Rcd 8675, para. 42 (2016).