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July 10, 2023

VIA ECFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: Updated Transition Plan of SES Americom, Inc.
Expanding Flexible Use of the 3.7 to 4.2 GHz Band, GN Docket No. 18-122; Eligible Satellite Operator Transition Plans for the 3.7-4.2 GHz Band, GN Docket No. 20-173

Dear Ms. Dortch:

SES Americom, Inc. ("SES") hereby provides an updated C-band Transition Plan as directed by the Federal Communications Commission's May 15, 2023 Public Notice.[1] The updated Transition Plan accounts for all changes to the SES transition since SES filed its prior transition plan on September 30, 2021.[2]

Please do not hesitate to contact the undersigned with any questions.

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Very truly yours,

/s/ Brian D. Weimer

Brian D. Weimer
for SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

Counsel to SES Americom, Inc.

Attachments

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[1] *See Wireless Telecommunications Bureau Opens Window for Eligible C-Band Satellite Operators to Account for Final Updates to Their Transition Plans*, Public Notice, GN Docket Nos. 18-122 & 20-173, DA 23-409 (rel. May 15, 2023).

[2] Letter from Brian D. Weimer, Counsel to SES Americom, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 20-173, Attachment (filed Sept. 30, 2021).

SES Americom, Inc.
Accelerated C-band Transition Implementation Plan
(filed July 10, 2023)

On June 1, 2020, the Commission's Wireless Telecommunications Bureau ("WTB") confirmed that a sufficient number of eligible space station operators filed accelerated relocation elections, triggering the accelerated relocation of the 3700-4000 MHz band pursuant to the accelerated clearing schedule set out in the Report and Order issued in the C-band proceeding.[1]

By electing to accelerate clearing, SES committed to relocating its services and the associated Incumbent Earth Stations out of the lower 300 MHz of the C-band per the schedule set forth in the *C-Band R&O*.

As of the date of this Transition Plan, SES has:

- Relocated all of its CONUS-exclusive services out of the 3700-4000 MHz band;[2]
- Made necessary equipment changes on all associated Incumbent Earth Stations[3] located in all CONUS Partial Economic Areas ("PEAs");
- Modified telemetry, tracking, and control ("TT&C") operations to receive telemetry above the 4000 MHz band and installed swing antennas at its Brewster and Hawley facilities (collectively "TT&C/Gateway sites") for emergency TT&C operations below 4000 MHz; and
- Completed gateway consolidation to the TT&C/Gateway sites.[4]

The amended transition implementation plan described below ("Transition Plan") details the substantial, complex steps SES took to meet its commitments in coordination with its customers and associated Incumbent Earth Stations. This Transition Plan accounts for all updates through

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[1] *Wireless Telecommunications Bureau Announces Accelerated Clearing in the 3.7-4.2 GHz Band*, Public Notice, GN Docket No. 18-122, DA 20-578 (WTB rel. June 1, 2020); *see also Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343 (2020) ("*C-Band R&O*").

[2] A certain number of services, most notably from SES's international satellite fleet, will continue to be downlinked below 4000 MHz into CONUS. These services will be received at the Hawley or Brewster teleports in accordance with the Commission's rules and the *C-Band R&O*. 47 C.F.R. § 25.203(n); *C-Band R&O* ¶¶ 379-81.

[3] An "Incumbent Earth Station" is defined as "an earth station that is entitled to interference protection pursuant to §25.138(c)" of the Commission's rules. 47 C.F.R. § 27.1411(b)(3).

[4] The gateway services will operate on an unprotected basis in the 3700-4000 MHz band at the TT&C/Gateway sites unless authorized for protected service by the FCC.

the date of its filing to the prior SES transition plan that was filed with the FCC on September 30, 2021.[5]

The relevant elements of this Transition Plan have been communicated to all of SES's U.S. C-band customers that receive services from SES within CONUS. SES has been extensively engaged with its customers and other C-band stakeholders for over five years to develop this Transition Plan. Since 2018, SES has held numerous meetings with its customers to understand their capacity needs now and in the future. SES also held numerous monthly joint meetings with Intelsat over the course of 2018 and 2019 to provide updates on the developing plans for customers, earth station operators, installers and other interested stakeholders. On two occasions (in September 2018 and April 2019), SES and Intelsat held joint in-person meetings with customers, MVPDs, and other earth station operators to demonstrate the capabilities of the filters SES and Intelsat jointly developed (*i.e.*, while receiving satellite signals in the presence of 5G interference) as well as to discuss other elements of the planned transition. Webinars were held with industry groups such as ACA Connects and the National Association of Broadcasters ("NAB") to make their members aware of the impact of the C-band clearing on their operations and the importance of registering their antennas with the International Bureau. At numerous industry conferences and tradeshows, such as SCTE Cable-Tec, the NCTC WEC, the NAB Radio Show, the NAB Show, the Mid-America Cable Show and the ACA Summit, SES had a presence and discussed the C-band clearing, filters and related activities with numerous earth station operators to obtain their feedback. SES has also engaged in numerous direct one-on-one discussions with MVPDs seeking detailed input on the impacts of clearing at MVPD earth stations.

Following the adoption of the *C-Band R&O*, a multi-stakeholder group comprising "incumbent earth stations (including MVPDs and broadcasters), incumbent space station operators, wireless network operators, network equipment manufacturers, and aeronautical radionavigation equipment manufacturers" was formed to "provide valuable insight into the complex coexistence issues in the C-Band and provide a forum for the industry to work cooperatively towards efficient technical solutions to these issues."[6] SES presented its initial transition plan (filed June 19, 2020) to Technical Working Group #2 of the Industry Multi-Stakeholder Group on June 26, 2020 to seek industry input, and presented the revised plan, filed on August 14, 2020, to the Group on September 10, 2020. SES and the other operators have continued to participate in the Technical Working Group #2 meetings to provide updates on their transition activities on a monthly basis.

SES has also been working with numerous radio, cable, and broadcasting associations to communicate the status of the C-band transition. A number of associations have agreed to post information on their websites and newsletters, including NCTC, ACA Connects, NAB, and National Religious Broadcasters. ACA Connects conducts monthly webinars at which SES

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[5] Letter from Brian D. Weimer, Counsel, SES Americom, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 20-173, Attachment (filed Sept. 30, 2021).

[6] *C-Band R&O* ¶ 333.

representatives present status and upcoming activities to ACA Connects members and address any questions and concerns they may have. Additionally, ACA Connects and SES have an ongoing dialog to address specific member questions and concerns outside of the regularly scheduled webinars. In all cases where SES has presented material to groups of stakeholders, Incumbent Earth Station operators that elected to accept the lump sum relocation payment were invited and received all of the same information about SES's transition process and timing as all other SES-associated Incumbent Earth Station operators. We have maintained a helpdesk and email address to answer questions and concerns throughout the transition. SES representatives also participated in industry meetings over the course of the transition, both virtually during the COVID-19 pandemic, and in person after restrictions were lifted.

SES, Intelsat, and the other satellite operators engage on a weekly basis with RSM US LLP in its role as the Relocation Coordinator to ensure that all Incumbent Earth Stations are either associated with a satellite operator's transition plan or otherwise dispositioned, as reported to the FCC. On May 24, 2023, the Relocation Coordinator filed its final list identifying all Incumbent Earth Stations included on the March 2023 Incumbent Earth Station List Public Notice,[7] and all antennas and feeds associated with each Incumbent Earth Station, including the eligible space station operator responsible for transitioning each antenna and feed (whether by claim, provisional claim or assignment).[8] As of the date of this filing, all Incumbent Earth Stations have been claimed, provisionally claimed, or assigned for clearing by one or more eligible space station operators.[9] Appendix C to this Transition Plan includes all of the Incumbent Earth Stations in the Relocation Coordinator Final IES list that SES has claimed, provisionally claimed, or have been assigned to SES by the Relocation Coordinator for clearing.

The collective input received from years of extensive discussions, webinars, demonstrations, and industry conferences has led to the development of this Transition Plan. SES has made commercially reasonable efforts to incorporate customers' individualized needs but developed this Transition Plan primarily to ensure the completion of accelerated relocation within the deadlines set forth in the *C-Band R&O*, with minimal impact to customers and within a reasonable cost.

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[7] *International Bureau Releases Updated List of Incumbent Earth Stations in the 3.7-4.2 GHz Band in the Contiguous United States*, Public Notice, IB Docket No. 20-205, GN Docket No. 20-305, DA 23-176 (rel. Mar. 3, 2023) ("March 2023 Incumbent Earth Station List Public Notice").

[8] Letter from Sanga Chandel, RSM US LLP, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 23-97 (filed May 24, 2023) ("Relocation Coordinator Final IES List").

[9] *Id. See also International Bureau Identifies Earth Station Antennas on C-band Incumbent List that May be Inactive or Otherwise Not Operational on the 3.7 GHz Band*, Public Notice, IB Docket No. 20-205, DA 23-237 (rel. Mar. 21, 2023) ("90-Day Notice"). SES notes that if an Incumbent Earth Station identified in the FCC's 90-Day Notice is ultimately determined to be receiving SES C-band satellite services, SES will promptly transition the earth station.

SES Americom, Inc.
Accelerated C-band Transition Implementation Plan
(filed July 10, 2023)

I. Details of Transition

A. Existing Space Stations Subject to Transition (§ 27.1412(d)(1)(i))

SES has been providing C-band service in the United States for over 40 years and was instrumental in developing the resilient and cost-effective television and audio distribution and data network ecosystems that rely on C-band satellite service today. In developing this vibrant satellite ecosystem, SES has procured and launched dozens of satellites. Sixteen such satellites with satellite services impacted by the clearing of the 3700-4000 MHz band were in service at the start of the transition.

The Commission's rules require transition plans to list "[a]ll existing space stations with operations that will need to be transitioned to operations above 4000 MHz."[10] SES understands that this would include any satellite that is intentionally downlinking in the 3.7-4.0 GHz band to earth stations in CONUS.[11] SES also understands that this includes any other space station transition activities necessary for SES to cease downlinking to CONUS in the 3.7-4.0 GHz band by the accelerated relocation deadlines.[12] SES operates several satellites under Commission authority to provide service to the United States using the 3.7-4.2 GHz band.[13] A full list of these satellites is provided in Appendix A.

To identify the satellites that must be transitioned to meet the accelerated relocation deadlines, SES leveraged its internal fleet management resources to determine the most efficient way to migrate customers on SES's existing satellite fleet to clear spectrum while ensuring continuity of service.

Among the elements SES considered were:

- Satellite capabilities, performance, and available capacity;
- Orbital location field of view, operational restrictions, and satellite penetration into CONUS earth stations;
- Protection schemes available on the satellites and across the fleet;

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[10] 47 C.F.R. § 27.1412(d)(1)(i).

[11] *See* 47 C.F.R. § 25.147 ("The 3.7-4.0 GHz portion of the band is being transitioned in CONUS from FSS GSO (space-to-Earth) to the 3.7 GHz Service."); *see also C-Band R&O* ¶ 175.

[12] *See C-Band R&O* ¶ 204 (permitting as reimbursable transition costs non-CONUS "system modifications . . . as a direct result of the transition in [CONUS] to make spectrum available for flexible use").

[13] These satellites are authorized through a U.S. license or through a grant of U.S. market access.

- Contractual obligations and future commercial needs;
- Channel line-up and programming requirements; and
- Specific mobility[14] and government customer constraints and requirements.

It is important to note that orbital locations are not fungible, and certain orbital locations are better suited for certain services compared to others. Only satellites located within the U.S. orbital arc are suitable for the delivery of broadcast and cable services on which nearly 120 million American households rely. Yet even within the U.S. orbital arc, not all orbital locations are suitable for all applications. For example, the distribution of cable video services requires strict 50-state coverage, effectively narrowing the orbital locations (between 135° W.L. and 99° W.L.) within which satellites used for cable distribution can be placed to maintain "look" angles able to see New England, Maine, and Alaska. It is critically important for SES to maintain sufficient antenna elevation angles after the transition process is complete because of the aggressive power flux density limit adopted in the *C-Band R&O*, which assumes an earth station antenna elevation angle of at least 19 degrees.[15]

SES has developed a robust broadcast and cable video distribution neighborhood using its orbital locations at 101° W.L., 103° W.L., and 105° W.L. These orbital locations offer 50-state coverage, and earth station antennas receiving content carried on satellites operating at these orbital locations are already pointed to this four-degree slice of the geosynchronous orbital arc.

Orbital locations outside the U.S. arc are not suitable for distribution of broadcast or cable video services because of the low look angles and lack of 50-state coverage. Customers providing this video programming thus could not simply be moved to a C-band satellite outside the U.S. orbital arc to clear spectrum for 5G terrestrial operations. Moreover, SES uses its non-U.S. orbital locations for distribution of broadcast programming in other regions and for data applications such as maritime and aeronautical mobile satellite services. For example, SES satellites in orbital locations 20° W.L. to 47.5° W.L., are unable to provide service to the western portion of the United States but can offer coverage between the east coast of the United States and Europe. Similarly, NSS-9 at 177° W.L. is unable to provide service to the eastern portion of the United States but offers connectivity between the U.S. west coast and Asia.

As a result, clearing the lower 300 MHz of the C-band in CONUS indirectly impacted the loading of satellites that mainly serve areas outside CONUS, but that also need to land services in CONUS for either further distribution to consumers or monitoring of services intended for non-U.S. consumers.

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[14] Specifically, SES considered maritime services where ship-to-shore and shore-to-ship traffic was required to be assessed to develop the most efficient and effective transition approach.

[15] *See C-Band R&O* ¶ 363, n.799.

B. New Satellites to be Launched (§ 27.1412(d)(1)(ii))

As described in greater detail below, SES needed to procure six new C-band satellites—designated SES-18 through SES-23—to ensure SES maintained the necessary on-orbit capacity to continue to provide the same quality service to its customers after the transition as it provided before the transition.[16] Four of these six satellites needed to be successfully launched into their designated orbital slots in a timely manner and two of these six satellites were designed to be spare satellites. SES needed to procure the two spare satellites primarily to mitigate the risk of a launch failure or significant delay on one of the dual launches of the first four satellites. In other words, without the two spare satellites, there would be no way for SES to satisfy the Commission's accelerated relocation deadlines in the event of a launch failure or significant delay of one of the two dual launches for the first four satellites.

Prior to the FCC's Notice of Inquiry for the C-band transition,[17] SES was finalizing its long-planned consolidation of cable programming services to its satellites operating at 101° W.L., 103° W.L., and 105° W.L. On that basis, SES determined it could serve its customers with services in the C-band using three satellites operating across the full 500 MHz of downlink bandwidth (3 x 500 MHz = 1500 MHz), including protection transponders (described below). Further, absent a compelling customer use case (for example, long term commitments by major customers), when the time came to replace the satellite at 103° W.L. (SES-3), SES's nominal fleet plan had long been to further consolidate its cable video distribution customers primarily to the two satellites at 101° W.L. and 105° W.L. Thus, prior to the release of the *C-Band R&O*, SES anticipated maintaining 1000 MHz of downlink bandwidth in the C-band across two existing satellites to cover critical video and radio broadcasting services across the country.

Following the completion of the C-band transition, however, SES needs a total of six satellites on-orbit to support its existing C-band cable video distribution customers. Specifically, SES needs five active satellites to ensure at least 1000 MHz of downlink bandwidth is available to continue existing services (*i.e.*, 5 x 200 MHz = 1000 MHz). This means that, in addition to migrating services on the current C-band satellites located at 101° W.L. and 105° W.L., SES needed to replace the C-band satellites at 103° W.L., 131° W.L., and 135° W.L.

SES also needed one additional satellite to provide required capacity for protection from transponder or satellite failures to meet certain customer contractual obligations.[18] From the beginning of the transition, SES has had customers on its existing satellites who have contractual

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[16] *See C-Band R&O* ¶ 153 ("We find our approach here . . . provid[es] incumbent space station operators the flexibility to launch additional satellites to achieve an efficient transition to the upper portion of the band.").

[17] *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, GN Docket No. 17-183, 32 FCC Rcd 6373 (rel. Aug. 3, 2017) ("Notice of Inquiry").

[18] *See C-Band R&O* at n.102 (acknowledging SES's grooming plan included "SES also operating an in-orbit spare").

"protection" rights, which obligate SES to maintain transponders (generally on separate satellites from where the customers are located, in case of a satellite failure) that are always available to restore service within a matter of days if those customers experience transponder failures or service disruptions.[19] Prior to the transition, those commitments were met using transponders on SES's existing satellites.[20] But with only 200 MHz of on-board downlink bandwidth per satellite, after careful analysis, SES determined that the only realistic way to maintain its service restoration obligations was to use a dedicated "in-orbit spare." SES met this obligation by co-locating a second C-band satellite (SES-20) at 103º W.L. to satisfy contractual restoration obligations for customers at 105º W.L., 103º W.L., and 101º W.L., and provide substantially the same or better service after the transition as before the transition.[21]

The in-orbit spare will not be actively broadcasting while it is co-located with an operational satellite at 103° W.L. It will only begin broadcasting in the event one of the satellites in the center of the arc experience a service outage that impacts a customer who has purchased full service protection. The transponders on the in-orbit spare are part of SES's existing service to its customers who have been and continue to pay significant amounts for SES to have that additional restoration capacity available if needed.[22] Without an in-orbit spare, if one of the satellites operating in the U.S. arc fails, it may take months or years to recover the service, forcing SES to breach its contractual obligations to existing customers and significantly disrupting the customers' existing services. Without the in-orbit spare, SES will not be able to provide substantially the same or better service for current customers post-transition as required by the *C-Band R&O*.

In addition to the four new satellites required for SES to maintain equivalent on-orbit capacity after the C-band transition, SES needed to procure two "spare" C-band satellites to backstop the first four satellite programs as a fail-safe to manufacturing and launch delays, or launch or

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[19] *See* Letter from Matthew S. DelNero, Counsel for Discovery, Inc., Fox Corp., The Walt Disney Company, and Univision Communications, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 20-173 (filed July 31, 2020); Letter from Brian D. Weimer, Counsel for SES, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 20-173 (filed July 29, 2020).

[20] Prior to the *C-Band R&O*, 500 MHz of downlink bandwidth at each of the satellites in the three center arc orbital locations provided SES with sufficient spare capacity to satisfy its service restoration obligations.

[21] *See C-Band R&O* ¶ 194 ("'Reasonable' relocation costs are those *necessitated by the relocation* in order to ensure that incumbent space station operators continue to be able to provide substantially the same or better service . . . . So long as the costs for which incumbents are seeking reimbursement are *reasonably necessary* to complete the transition in a timely manner (and reasonable in cost), such expenses would be compensable.") (emphasis added).

[22] *Id*.

in-orbit anomalies.[23] SES needed at least three new C-band satellites on station and operational by the end of 2022 to ensure it had sufficient time to transition customer services out of the lower portion of the C-band and install required filters to meet the FCC's Phase II accelerated relocation deadline of December 5, 2023. As explained in greater detail below, dual launches—*i.e.*, launching two satellites on a single launcher—provided the optimal chance of success for meeting this fundamental transition deadline. Dual launches were also the most cost effective, even when taking into account the costs for two spare satellites. Dual launches, however, present the risk that two satellites will be lost in the event of a launch or deployment failure. Given the condensed timeframe for accelerated relocation, there would not be sufficient time for SES to procure additional satellites and meet the accelerated relocation deadline in the event of a dual launch or deployment failure, or a significant manufacturing or launch delay affecting one or more satellites. Thus, the only way for SES to mitigate the risk of a dual launch or deployment failure as well as the other risks impacting its transition timeline was to procure two spare satellites to backstop the four other satellite programs.

It is a common and commercially reasonable practice in the satellite industry to construct spare satellites to guard against the event of satellite failure (at least when alternate contingency plans are not available, which is the case here given the need to add so many new satellites so quickly to meet aggressive transition deadlines). The manufacturing of the first spare satellite started immediately in order to be ready for launch within a few weeks after any potential launch failure of one of the first two dual launches. The manufacturing of the second spare (SES-23) began on June 1, 2021. While both spare satellites are necessary to mitigate the risk of a dual launch failure or in-orbit anomaly affecting two satellites, SES staggered the procurement schedule for its spare satellites so SES would have the option to cancel construction of the second spare satellite following the successful launch and deployment of the first four C-band satellites. Due to the delays in the manufacture and launch of SES-18 and SES-19, SES-23 was complete by the time SES-18 and SES-19 were launched. SES needed to complete the construction of SES-23 to provide launch failure resiliency for SES-18 and SES-19. Had the SES-18 and SES-19 dual launch failed, SES-23 would have been needed to complete the C-Band mission on schedule. Given the successful launch of SES-18 and SES-19, SES-23 continues to provide mission resiliency in the event two C-band satellites in orbit experience anomalies affecting their operability. In the meantime, however, SES-23 has been placed in storage in accordance with the procurement contract.

SES also determined that procuring two dual launchers and one single launch for its new C-band

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[23] *See Wireless Telecommunications Bureau Releases Final Cost Category Schedule for 3.7-4.2 GHz Band Relocation Expenses and Announces Process and Deadline for Lump Sum Elections*, Public Notice, 35 FCC Rcd 7967, Attachment at 3-4 (2020) (explaining that the range of presumptively reasonable costs for C-band satellites delivered in-orbit includes "the potential to 'backstop' other satellite builds as a fail-safe to delays"). *See C-Band R&O* ¶ 171 ("[Space station operators] must take all steps necessary to allow incumbent earth station operators to continue to receive substantially the same service during and after the relocation that they were able to receive before the transition.").

satellites was the least risky and most cost-effective approach under the circumstances. Consistent with its vendor diversification strategy, SES procured one dual and one single launch from SpaceX, and one dual launch from ULS. Dual launches were chosen chiefly because of the expected limited launch capacity available in H2 2022 caused in part by SES and Intelsat needing to launch more than ten replacement C-band satellites around this time to meet the accelerated clearing deadline. These launches would need to be scheduled in addition to the planned launches of other satellites already in the manifests of launch providers. Thus, launch capacity in the relevant timeframe was expected to be quite limited.[24] Additionally, dual launches offered cost efficiencies compared to multiple single launches and improved by a factor of four the likelihood that SES would meet its transition milestones when compared against alternative approaches. Multiple single launches would also expose SES to additional launch failure risk and increase the likelihood of launch delay due to launch vehicle unavailability. Given that SES needed *all* of its four replacement satellites to be launched successfully and on time to meet the Phase II accelerated relocation deadline, a dual-launch strategy significantly reduced the execution risk.[25]

For the same reasons as the purchase of the two spare satellites, SES purchased one additional launcher for the spare satellites to address the risk of launch failure. Launch vehicles of the type needed for launch of the spare satellites would likely require nearly two years to complete, so the contingency launcher needed to be purchased well in advance to ensure the deadline was met in case of a launch failure.

Consequently, SES's transition required the manufacture of six C-band spacecraft comprising: (i) a replacement at 135º W.L. (SES-22); (ii) a replacement at 131º W.L. (SES-21); (iii) a replacement at 103º W.L. (SES-20); (iv) one in-orbit spare satellite collocated at 103º W.L. (SES-18) to meet existing contractual obligations to customers for in-orbit protection; and (v) two spare satellites to be launched in the event of an anomaly or significant delay affecting SES's transition timeline. These satellites offer C-band-only (*i.e.*, no Ku-, Ka- or other frequency payloads) service over the United States at similar or improved power levels. The satellites have been designed to ensure substantially the same or better service to current customers and Incumbent Earth Station operators.[26]

SES contracted with Boeing, Northrop Grumman, and Thales to manufacture the six necessary spacecraft. The satellites have been launched in the order they were completed with the first

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[24] This concern was demonstrated in the launch delay of SES-18 and SES-19 caused by higher priority U.S. government launches carried out by SpaceX in Q4 2022.

[25] In the course of SES's analysis and discussions with satellite manufacturers and launch service providers, it was determined that use of single launches and one fewer ground spare did not appropriately address the risk of missing the Commission's accelerated clearing timeline.

[26] While these satellites will include incidental coverage of areas around the United States (similar to existing SES satellites at 101 º W.L., 103 º W.L. and 105 º W.L.), such as Mexico, SES does not intend to provide international-only services over these satellites.

completed satellite operating at 135° W.L. (SES-22), the second operating at 131° W.L. (SES-21), the third located as an in-orbit spare at 103° W.L. (SES-20), and the last operated at 103° W.L. (SES-18). The order of operation is slightly revised from that described in SES's September 30, 2021 Transition Plan due to manufacturing and launch delays affecting SES-18 and SES-19.

135ºW	131ºW	105ºW	103ºW		101ºW
SES-22 (AMC-10R)	SES-21 (AMC-11R)	SES-11	SES-20 (in-orbit spare)	SES-18 (SES-3R)	SES-1

Table 1: C-band Fleet Deployment

Specifically, SES launched SES-22 to 135° W.L. on June 29, 2022, where it started operations on August 2, 2022. While originally designated a spare satellite, SES needed to launch SES-22 because of manufacturing and launch delays that made SES-18 and SES-19 unavailable for launch in 2022. Absent the launch of SES-22, SES would not have met its transition milestone of three new satellites operational in space by the end of 2022. Thus, the launch of SES-22 was critical for SES to remain on-track to complete the C-band transition by the Phase II accelerated relocation deadline. With the launch of SES-22, SES was able to begin transitioning services from the center of the arc to the upper C-band frequencies, thereby protecting the overall transition timing.[27]

SES successfully launched SES-20 and SES-21 on October 4, 2022. SES-21 began service at 131° W.L. on December 1, 2022, at which time SES began transitioning services to the new satellite. SES-20 arrived at 103° W.L. on December 16, 2022 where it now operates as an in-orbit spare.

SES-18 and SES-19 were launched on March 17, 2023. SES-18 reached final orbit at 103° W.L. on June 8, 2023, where it replaced the C-band capacity of SES-3. SES-19 has been collocated at 135° W.L. until SES concludes its discussions with the Relocation Payment Clearinghouse as to the appropriate mechanism for realizing the value of any satellites that may no longer be necessary for the relocation process. The launch date for SES-18 and SES-19, originally scheduled for Q3 2022, was rescheduled for Q1 2023 due to a series of manufacturing and launch delays affecting the satellites.

[27] The number of IESs requiring clearing in Phase II is approximately 2.5x that of Phase I. Accordingly, it was critical SES maintained its Phase II transition timeline, as additional time was needed for the clearing. The placement of SES-22 at 135° W.L. in early August 2022 greatly reduced the associated schedule risks and allowed for timely clearing of the spectrum in advance of the December 5, 2023 accelerated clearing deadline.

SES has now designated SES-19 (in space) and SES-23 (on the ground) as the two spare satellites for its Transition Plan. While the risk of launch failure has now passed, SES-19 and SES-23 continue to be necessary to address the risk that SES-18, SES-20, SES-21, or SES-22 experience technical issues that make them inoperable.

As is typical in satellite procurements, industry-wide issues concerning the reliability of certain components and their testing can arise. This was no different for the satellites procured according to this Transition Plan. While some delay outside of SES's control arose as a result of such issues, SES worked collaboratively with its vendors to ensure that the deadlines in the Transition Plan remained on track.

Additionally, as noted in SES's prior Quarterly Reports, the COVID-19 crisis impacted SES's satellite manufacturing programs. All SES-associated satellite manufacturers received notifications from their subcontractors indicating that the COVID-19 pandemic impacted their production capabilities, and consequently, some component forecast delivery dates were delayed. Notwithstanding the impacts of the industry-wide issues affecting certain satellite components and the COVID-19 pandemic, the contingency fleet plan that was built into the Transition Plan enabled a timely transition.

In the event of any in-orbit failures, SES will submit a claim to the insurers. In the event the claim results in a reimbursement to SES from the insurers, and to the extent the claim covers amounts that have been reimbursed by the Relocation Payment Clearinghouse, SES will in turn refund the appropriate amount to the Relocation Payment Clearinghouse. Furthermore, SES is in discussions with the Relocation Payment Clearinghouse as to the appropriate mechanism for realizing the value of any satellites that may no longer be necessary for the relocation process.

C. Plan to Migrate Existing Services (§ 27.1412(d)(1)(iii))

From the beginning of the C-band transition, SES committed to relocating all services that are contracted as of the date of each accelerated clearing deadline in advance of the deadline.[28] SES transitioned all Phase I services prior to October 1, 2021 and all of the Phase II services prior to June 1, 2023. To accomplish this, SES developed an efficient transition process for all affected services to minimize as much as possible the impact to SES customers and their affiliated earth stations. Under this amended Transition Plan, there were 180 services in total that were impacted by the C-band repurposing.

To maintain continuous service and service quality, when a service was migrated from one frequency to another on the same satellite or a different satellite SES provided customers with a period of dual illumination during which customers commenced the new service on a phased basis before giving up access to the prior service. These dual-illumination periods allowed Incumbent Earth Stations to have sufficient time to repoint or install new antennas, as well as

[28] 47 C.F.R. § 27.1411(b)(4) (defining "Earth station migration").

make other necessary adjustments (such as installing feeds and LNBs). Dual illumination minimizes service interruption arising from the transition.

Appendix B provides (1) a detailed list of the services that were migrated under the plan, (2) the satellites and frequencies they were moved to, and (3) the start and end of the transition period for each service. It should be noted that due to the dynamic nature of the C-band satellite ecosystem, including changing customer requirements, the satellite service transitions evolved over the clearing process. The changes are reflected in each of the Transition Plan amendments.

Since the services shown in Appendix B are for actual SES customers, to protect the confidentiality of SES's customers each service is identified by a "Service ID."[29] Each customer was informed of its Service ID, and therefore could easily confirm that the transition described in Appendix B reflects the plan SES had communicated to it. Services already above 4.0 GHz and not requiring any type of transition are not included in Appendix B.

D. Technology Upgrades Implemented (§27.1412(d)(1)(iv))

The *C-Band R&O* notes that "upgrades such as video compression, modulation/coding, and HD to SD down-conversion at downlink locations, may be necessary to accomplish efficient clearing."[30] To ensure that it could deliver substantially the same-or-better services with only 40 percent of the spectrum being usable for continuing C-band communications, SES explored ways to reduce the capacity needs of existing services through technology upgrades.

SES determined that one customer originally receiving services from 11 transponders on one SES satellite required compression/modulation technology upgrades for the service to continue to be provided at the same quality level after the relocation.[31] Specifically, the pre-transition

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[29] One commenter requested that SES identify its customers by name. Comments of Verizon, GN Docket Nos. 18-122 & 20-173, at 2-3 (filed July 13, 2020) ("Verizon Comments"). But due to SES's confidentiality obligations to its customers, SES cannot disclose the names of its customers in this appendix. *See also C-Band R&O* at n.684 ("We clarify that nothing in this *Report and Order* is intended to affect or change the terms of any private contractual arrangement."). And given that Service IDs already provide SES's customers with the information needed to ensure that their services are being migrated appropriately, SES has not identified a need to specify confidential customer information. *See id.* at n.694.

[30] *C-Band R&O* ¶ 194.

[31] *Id.* ¶ 201 ("Earth station migration includes . . . technology upgrades necessary to facilitate the repack, such as compression technology or modulation."); Letter from Brian D. Weimer, Counsel for SES, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5 (filed July 8, 2020) ("the space station operators' control over video quality is inherently limited to a defined network distribution architecture that involves transmit and receive antennas located on the spacecraft and in rare cases—most of which are not video networks—at antennas located at earth stations.").

services encoded using MPEG-2 were upgraded to MPEG-4, which support substantially the same or better service using much less bandwidth. With technology upgrades, the customer's post-transition needs were reduced to only 6 transponders in Phase I and to 4 ½ transponders in Phase II,[32] which allowed those services to continue to be downlinked on a single satellite as required for this particular service. Changes were needed at the customer's uplink locations as well as at the receiving Incumbent Earth Station locations. At the customer uplink locations, encoding, statistical multiplexing, modulator and other equipment was required. At the Incumbent Earth Station downlink locations, integrated satellite receiver/decoders ("IRDs"), and other equipment was required. SES purchased the quantity of equipment necessary to transition all active Incumbent Earth Station downlink locations known at the time of the equipment purchase.

This use of compression technology is necessary in light of the very limited orbital slots available to SES to maintain its C-band service obligations with only 40 percent of the available capacity. This approach works well from a technological (and economic) perspective because of the large number of transponders used by this customer; the same approach would not have been as effective for customers using a small number of transponders.

All Incumbent Earth Stations subject to compression were transitioned by October 31, 2021.

For services below 4.0 GHz that operated within a platform at SES or customer facilities, SES built a duplicate platform, including hub chassis, line cards, modems, core network components, and other equipment at the Hawley TT&C/Gateway site where downlinking services below 4.0 GHz is permitted. The services were transitioned from the existing platforms to the new platform in coordination with SES customers to minimize service disruptions. All services have been transitioned from their original platforms to the new platform and the original platforms are no longer receiving services below 4.0 GHz.

SES also relocated downlink services associated with international video feeds, data and other services that could not be transitioned out of the 3.7-4.0 GHz band to Hawley.[33] For services below 4.0 GHz on SES's international satellites that could not be transitioned above 4.0 GHz due

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[32] All of the existing SES satellites were designed to provide broadcast services over the United States using 24 transponders that cover 500 MHz of downlink C-band spectrum. Once satellite services are limited to 200 MHz over CONUS, only 9 ½ transponders will be available on each satellite for CONUS services. The customer's business model required that all of its services be distributed from one satellite, so it was not possible to distribute the original 11 transponders of service to multiple SES satellites, necessitating compression. Furthermore, to accommodate all of the SES services pre-transition, compression of some services would be required. For both of these reasons, the 11 transponders mentioned were considered ideal candidates for compression technology.

[33] *C-Band R&O* at n.826 ("[The Commission] expect[s] that all incumbent space station operators will have the opportunity to co-locate their TT&C and international gateways at [consolidated TT&C/Gateway sites].").

to unavailable capacity on those international satellites, SES downlinked the services at the Hawley TT&C/Gateway site where downlinking services below 4.0 GHz is permitted and, via terrestrial means (*i.e.*, fiber backhaul), provided the services to the CONUS-based locations that formerly received the services directly from an SES international satellite.

Other data services that operate through a VSAT-type managed platform were migrated in whole (*i.e.*, the platform itself was relocated to the Hawley site) and the two-way data service were interconnected via terrestrial means with existing customer hub locations.

Appendix B sets forth information on when a particular service required a technology upgrade as part of its transition.

E. Number and Location of Incumbent Earth Stations to be Transitioned (§27.1412(d)(1)(v)-(vi))

In its Phase II Procedure PN, the WTB directed the Relocation Coordinator to file, by June 1, 2023, a final list of all Incumbent Earth Stations included on the March 2023 Incumbent Earth Station List Public Notice and all antennas and feeds associated with each Incumbent Earth Station, including the eligible space station operator responsible for transitioning each antenna and feed (whether by claim or assignment), utilizing a prescribed format.[34] The WTB further directed all eligible space station operators to utilize the prescribed format to report their transition work relating to Incumbent Earth Station antennas and feeds.[35]

On May 24, 2023, the Relocation Coordinator filed its final list of Incumbent Earth Stations pursuant to the Phase II Procedure PN.[36] In addition to identifying all antennas and feeds associated with each Incumbent Earth Station, the filing includes information about each eligible space station operator responsible for transitioning each antenna and feed. Appendix C to this Transition Plan provides a subset directly copied from the Relocation Coordinator's filed list and reflects all of the antennas and feeds associated with each Incumbent Earth Station as well as the antennas and feeds associated with SES, either by claim or assignment. This information is formatted consistent with the template adopted by the WTB in its Phase II Procedure PN.[37]

SES has also noted in Appendix C, where applicable: (1) antennas and feeds for which the transition involves circumstances beyond the control of the eligible space station operator and

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[34] *Wireless Telecommunications Bureau Announces Procedures for Filing of C-Band Phase II Certifications of Accelerated Relocation and Implementation of the Commission's Incremental Reduction Plan for Phase II Accelerated Relocation Payments*, Public Notice, GN Docket Nos. 18-122 & 23-97, DA 23-408, at 5 (rel. May 15, 2023) ("Phase II Procedure PN").

[35] *Id*. At 6.

[36] Letter from Sanga Chandel, RSM US LLP, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 18-122 & 23-97 (filed May 24, 2023).

[37] Phase II Procedure PN at 6.

therefore have been subject to a transition delay notice (none as of the date of this Transition Plan); (2) antennas and feeds that have been included on an active 90 day public notice or are otherwise pending removal from the most recent Incumbent Earth Station list, which are identified as provisional claims; and (3) antennas and feeds subject to a written agreement regarding the transition between the eligible space station operator and the earth station operator, with the exception of self-installations by the earth station operator.[38] SES also acknowledges that it remains responsible for any remedial transition work and will take commercially reasonable efforts to promptly complete the work necessary to resolve any issues.[39]

SES has endeavored to repoint antennas at Incumbent Earth Stations where possible, but this was not possible for the vast majority of earth stations. For example, if a service was transferred to another satellite, in most circumstances a new antenna was needed rather than repointing the existing antenna as the existing antenna had to continue to receive other services, either from the original satellite or other satellites operated by SES or other satellite operators. Also, repointing an antenna could create a significant service outage that may not be acceptable to an Incumbent Earth Station operator and could be avoided by installing a new antenna.

When creating its initial list of associated Incumbent Earth Stations, SES threw a wide net based on the assumption it would identify Incumbent Earth Stations that were not in fact receiving SES services as transition activities progressed. Specifically, SES developed its initial list of the Incumbent Earth Station sites from customers' affiliate lists, research, and from the FCC's IBFS database. The owner/operator of each of the Incumbent Earth Stations included on the initial list was contacted by an outreach vendor initially to confirm general earth station information, such as contact details, site location information, and number of antennas accessing SES satellites at the site. An installation vendor then coordinated with each Incumbent Earth Station operator to determine the equipment required for the transition (antenna equipment, filters, etc.) depending on the needs of the site in accordance with the service transitions described in Appendix B and the status of the Incumbent Earth Station on the FCC's updated Incumbent Earth Station list. The installation vendor confirmed the number of Incumbent Earth Stations at the site accessing SES satellites, which defined the number of passband filters that had to be installed. The installation vendor determined if an additional or replacement antenna was needed for the Incumbent Earth Station to continue accessing SES's services, which may have been migrated to a different SES satellite. For example, a site may only have one antenna available, but two antennas may have been needed to continue downlinking the equivalent SES services post-transition.

For Incumbent Earth Stations requiring equipment (other than filters), prior to the service transition periods defined in Appendix B, SES-hired installation teams contacted each SES-

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[38] *See Wireless Telecommunications Bureau Opens Window for Eligible C-Band Satellite Operators to Account for Final Updates to Their Transition Plans*, Public Notice, GN Docket Nos. 18-122 & 20-173, DA 23-409, at 5 (rel. May 15, 2023).

[39] Phase II Procedure PN at 10.

associated Incumbent Earth Station operator to schedule a time during which they would install the equipment. For example, SES anticipated that all MVPD Incumbent Earth Stations would be scheduled for equipment and filter installations within the last six months of the Phase I and Phase II clearing timelines because most MVPD Incumbent Earth Stations require access to several satellites and all transitions on those satellites had to be completed before any filters were installed. For Phase I, MVPD Incumbent Earth Station filtering began in May 2021 and was completed by August 31, 2021. For Phase II, MVPD Incumbent Earth Station filtering began in September 2022 and was completed on June 30, 2023. On the other hand, some Incumbent Earth Stations, such as those that only needed access to one service on one satellite, were able to accommodate the installation of filters at any time. SES's internal communications team, through the assistance of a third-party outreach vendor and its third-party installers working with SES customers and industry groups, provided Incumbent Earth Station operators with a notification as to the overall timeframe when filter installation was expected to occur. Generally each Incumbent Earth Station operator, who had not otherwise elected to accept the lump sum, cooperated with SES to grant installers access to their facilities and equipment within the defined timeframe to ensure a smooth transition process.

SES recognized that some Incumbent Earth Stations may have unique characteristics or requirements, including old and obsolete facilities, requiring a customized approach to timely transition the associated Incumbent Earth Station. When the installer visited the site, the installation technician was equipped to address a number of potential scenarios, including cases where an antenna was not performing adequately when tested prior to any work that needed to be done, the inability to install a filter due to antenna mechanical issues, and antennas in hard-to-reach locations. During both Phase I and Phase II, this additional work may have included optimization of antenna systems by "peaking and poling" the antenna—*i.e.,* making slight adjustments to the antenna pointing and the rotation of the feed to optimize polarization coherency with the polarized satellite signal—installing additional waveguide, retrofitting feed assembly weather covers due to fit issues with filter lengths, pointing antennas not pointed at any satellite upon request of the earth station operator, installing new feed assemblies, including multi-feed assemblies, retrofitting antenna elements, installing spare antennas to support dual illumination, reinstalling reflector weather cover systems, replacing LNB, general system troubleshooting activities, and others.

The *C-Band R&O* holds incumbent satellite operators individually responsible for migrating customer services out of the lower 300 MHz.[40] MVPD Incumbent Earth Station operators have antennas that access multiple satellite operators, which could have created logistical challenges if migration was not managed efficiently.

Given the added complexity at these earth stations, Intelsat and SES agreed to coordinate some of the commonly required activities. Both operators took individual responsibility for their antenna seeding plans, for their customer compression upgrades, and for any other customer-specific work required at an earth station. After the customer migrations were completed,

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[40] *C-Band R&O* ¶ 287.

Intelsat and SES agreed to coordinate filter installation for Incumbent Earth Stations located at MVPDs and any other Incumbent Earth Station sites that have antennas accessing both Intelsat and SES satellites. Such coordination minimized the burden on the earth station technical staff and reduced the risk of issues occurring during the filter installation process.

Following the installation of filters at joint sites, installers that conducted transition activities for both SES and Intelsat at joint Incumbent Earth Station sites provided feedback to SES and Intelsat on the antennas that were transitioned, and in the case of multifeed antennas, the feeds that received Intelsat or SES filters. SES and Intelsat then provided that information to the Relocation Coordinator. The Relocation Coordinator then identified unclaimed Incumbent Earth Station antennas or feeds.

To ensure a smooth transition of services, SES and Intelsat also agreed to install filters on all antennas located at Incumbent Earth Station sites at the same time they installed filters on the collocated Incumbent Earth Stations that receive services from either SES or Intelsat satellites irrespective of the antenna's registration status, which was often not clear.

From the beginning of the transition, SES anticipated that certain Incumbent Earth Station operators would prefer to install equipment needed for the transition on their own.[41] For such self-installations, SES requested the Incumbent Earth Station operator notify SES in email format to Cbandhelp@ses.com. SES provided the Incumbent Earth Station Operator with the necessary equipment at no cost to the operator and, upon receipt of the necessary equipment by the Incumbent Earth Station operator, SES provided the Incumbent Earth Station operator remote assistance via SES's help desk as needed to support the installation.

F. Gateway and TT&C Transition

The *C-Band R&O* requires SES to identify two of the four protected TT&C locations in its transition plan.[42] For the avoidance of doubt, SES has selected the Hawley and Brewster sites as its two protected TT&C locations.

SES supplemented its TT&C services to support the new and existing satellites in compliance with the FCC's clearing requirements. To that end, SES enhanced the capabilities at Hawley and Brewster to support the testing and operations of SES's North America fleet utilizing C-band. To accomplish these requirements, SES installed full-motion antennas and associated satellite

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[41] These self-install Incumbent Earth Station operators are not the ones electing to receive a lump sum payment – SES has previously noted that it has no obligations with regard to the operators electing the lump sum payment beyond providing necessary equipment where a technology upgrade is required and responding to the electing earth station operator's request to coordinate with SES, as necessary.

[42] *C-Band R&O* ¶ 374 ("Should the incumbent space station operators fail to come to consensus, we expect that SES would identify two locations and Intelsat would identify the other two locations.").

ground control equipment at each location. Once the new full-motion antennas were installed and tested, SES stopped receiving TT&C signals below 4.0 GHz at all CONUS locations other than Hawley and Brewster, which are permitted by the *C-Band R&O* to receive TT&C signals below 4.0 GHz on a protected basis. Additionally, SES will continue to use its existing teleports to receive signals in the 4.0-4.2 GHz band and perform TT&C services for the existing and new satellites. In support of the new satellites (SES-18 through SES-22), SES required diverse TT&C operations for each satellite, which in turn required new and upgraded antenna, ground control, and operational facilities at its South Mountain, Manassas, and Woodbine teleports.

As part of the services it provides, SES monitors the C-band signals it provides and maintains geolocation solutions to identify potential interference from its teleports in Woodbine, MD, and Manassas, VA. These services require the ability to receive the same signal that is being provided for the customer. Therefore, monitoring and geolocation operations associated with interference detection and response had to be moved to Hawley so they could continue on an unprotected basis. Geolocation services must be maintained and continued for both existing and new C-Band satellites, as well as satellites with C/Ku cross strapped payloads, and as such, SES had to build two new C/Ku-band steerable antennas at Hawley with associated hardware/software.

All of the above Gateway and TT&C service transitions were completed by June 30, 2023.

II. Reporting and Certification of Clearance

Concurrent with the filing of this amended Transition Plan, SES is filing its Phase II Certification of Accelerated Relocation with the Relocation Payment Clearinghouse and in the FCC's Electronic Filing System.

III. Timeline (§ 27.1412(d)(1)(vii))

The full scope of the service transitions described above and in Appendix B are reflected in the timeline provided in Appendix E. The timeline is a high-level description of all of the many complex and time-consuming activities SES has completed to meet the accelerated relocation deadlines and reflects the extensive discussions SES held with customers and other C-band stakeholders. A more detailed description of each element of the timeline is provided below.

Transitions: During the time periods designated for "Transition" in the Appendix E timeline, SES performed all necessary activities to migrate services on its satellites and install all necessary equipment resulting from the satellite service migrations at affected Incumbent Earth Stations and requisite passband filters. In some cases, services that were affected by the Phase II deadline were transitioned during the Phase I period to improve efficiencies and reduce the impact on Incumbent Earth Station operators.

Technology Upgrades: As described in Section I.D above, SES worked with one of its customers receiving a compression/modulation technology upgrade to install encoding, statistical multiplexing, modulators and other equipment at the customer's uplink sites while simultaneously installing IRDs, multiplexing and other equipment at the associated Incumbent

Earth Stations, including lump sum electees. The compression/modulation technology upgrade for all services was completed by October 31, 2021. For other technology upgrades described in Section I.D (other than platform migrations), SES worked with affected customers to assess the most efficient method for effectuating upgrades, including identifying specific equipment requirements such as demodulators, networking equipment and terrestrial service requirements to allow customer downlinks to be migrated to Hawley and delivered via terrestrial means to current customer downlink locations.

Platform Migrations: Platform migrations as described in Section I.D are complex and time-consuming, and as such, were performed over an extended period. As an individual platform may carry services that require transition over both Phase I and Phase II, necessary upgrades such as line cards were installed in stages such that prioritization was given to services that had to be migrated in Phase I. All migrations for Phase I and Phase II were completed by October 31, 2022.

Filter Installations: For all associated Incumbent Earth Stations, once all of the services received by the antenna were transitioned to their final frequencies, polarizations, or satellites, SES or the Incumbent Earth Station operator could install a passband filter. All filter installations were completed by June 30, 2023.

Gateway Migrations: The gateway migrations consisted of installing downlink equipment at the Hawley and Brewster sites to access all satellites shown in Appendix A. The gateway and teleport equipment and facilities for all customer transitions were complete as of June 30, 2023.

Satellite Procurement: SES procured six satellites to effectuate the transition according to the Commission's aggressive timetable. Three satellites were launched by the end of Q4 2022. The fourth and fifth satellites were launched in Q1 2023. Unless two or more of the five satellites on orbit experience an anomaly, SES does not plan to launch the sixth satellite. As discussed above, SES undertook dual launches to reduce the potential impact of a launch or satellite failure. However, some additional launch reservations were purchased for contingency to address potential manufacturing delays or launch failures. All satellites were launched and operational by June 14, 2023.

Service Migrations: All service migrations were complete by May 31, 2023.

IV. Estimated Costs

Appendix D provides the costs associated with the Transition Plan described herein.

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Appendix A

Authorized Space Stations Subject to Transition

The table below details the SES satellites on the list of space stations licensed under Part 25 of the Commission's regulations or granted access to the U.S. market pursuant to Section 25.137 of the Commission's rules that carried services impacted by the transition.

Space Station	Call Sign	Orbital Location (Deg. W.L.)	Station-kept (SK) / Inclined (I)	Services impacted?
NSS-7	S2463	20	I	
SES-4	S2828	22	SK	Y
NSS-10	S2415	37.45	I	Y
SES-6	S2870	40.5	SK	Y
SES-14	S2974	47.5	SK	Y
AMC-3	S2162	72	I	Y
AMC-6	S2347	139	SK	
SES-2	S2826	87	SK	Y
SES-1	S2807	101	SK	Y
SES-3	S2892	103	SK	Y
SES-11	S2964	104.95	SK	Y
AMC-11[43]	S2433	131	SK	Y
AMC-4[44]	S2135	134.9	I	
AMC-8[45]	S2379	135	I	
AMC-18	S2713	83	SK	
NSS-9	S2756	176.93	SK	Y
SES-18	S3096	103.1	SK	
SES-20	S3098	103.1	SK	
SES-21	S3099	131	SK	
SES-22	S3138	135	SK	

[43] AMC-11 was transferred to Telesat Canada and relocated to 111.1° W.L. *See* Telesat Canada, File No. SAT-ASG-20221109-00156, granted Jan. 12, 2023; *See also* SES Americom, Inc., File No. SAT-MOD-20221108-00154, granted Feb. 17, 2023.

[44] AMC-4 was re-orbited in February 2023. *See* Letter from Kelsie Rutherford, SES Americom, Inc., filed in File No. SAT-MOD-20211217-00201 (Call Sign S2135) (Feb. 22, 2023).

[45] AMC-8 was re-orbited over November and December 2022. *See* Letter from Kelsie Rutherford, SES Americom, Inc., filed in File No. SAT-MOD-20200413-00033 (Call Sign S2379) (Dec. 6, 2022).

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Appendix B

Plan to Migrate Existing Services

This appendix provides a description of the accompanying MS Excel file that details the services impacted by the SES Transition Plan. The format of the Appendix B Excel file is described in the MS Excel file, along with a description of each field. Note that in some cases, a service was transitioned to a frequency below 4.0 GHz or remained below 4.0 GHz when the services was either (i) part of earlier transitions where we needed to move some services down in frequency as part of the clearing strategy and then subsequently moved them above 4.0 GHz, (ii) was a Phase I transition which placed the service between 3.82 GHz and 4.0 GHz and then subsequently as part of the Phase II clearing was transitioned above 4.0 GHz, (iii) a non-CONUS service that was transitioned down in frequency to make space for the transition of CONUS services to above 4.0 GHz, (iv) the service was transitioned to the Hawley, PA gateway location and remained below 4.0 GHz or (v) a service that was transitioned in Phase I and then subsequently not renewed prior to the Phase II clearing.

As discussed previously, SES refined its plan over the course of the transition through discussions with customers and additional internal review. As a result, a number of changes have been made to the Appendix B Excel file submitted in the September 2021 Transition Plan.

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Appendix C

This appendix provides a description of the accompanying MS Excel file that details the Incumbent Earth Stations, as set forth in the FCC's March 2023 Incumbent Earth Station List Public Notice[46] that: (i) currently receive services from SES satellites and therefore are "claimed" as associated with SES satellites, (ii) were assigned to SES by the Relocation Coordinator, or (iii) were provisionally claimed by SES. The provisionally claimed Incumbent Earth Stations are those that are either (a) currently on an FCC 90-day Public Notice[47] and previously claimed by SES, (b) determined to be decommissioned or not operating in the 3.7-4.2 GHz band based on correspondence with the respective Incumbent Earth Station Operator, or (c) have a license pending modification and therefore appear twice in the FCC's March 2023 Incumbent Earth Station List Public Notice.

The appendix provides a subset directly copied from the Relocation Coordinator Final IES List and reflects all of the antennas and feeds associated with each Incumbent Earth Station as well as the antennas and feeds associated with SES, either by claim or assignment. This information is formatted consistent with the template adopted by the WTB in its Phase II Procedure PN.[48]

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[46] *International Bureau Releases Updated List of Incumbent Earth Stations in the 3.7-4.2 GHz Band in the Contiguous United States*, Public Notice, IB Docket No. 20-205; GN Docket No. 20-305, Public Notice, DA 23-176 (rel. Mar. 3, 2023).

[47] The FCC published a number of Public Notices informing Incumbent Earth Station owners of inactive or otherwise non-operational antennas in the 3.7 GHz Band. The earth stations on these lists that also appear on the March 2023 Incumbent Earth Station List Public Notice have been provisionally claimed by one or more space station operators.

[48] Phase II Procedure PN at 6.

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Appendix D

Estimated Costs

Category	Total
Satellite replacement program (total estimated cost)	$1,329,000,000
• Satellites (6 satellites)	$869,000,000
• Launches (2 dual launches + 2 single launches)[49]	$340,000,000
• Satellite ground control and TT&C systems, program management and insurance	$120,000,000
Filters and LNBs[50]	$57,065,000
Antennas[51]	$12,995,000
Dual Illumination	$7,000,000
Other Services[52]	$5,650,000

[49] SES's estimated costs assume two dual-launches and two single-launches. While SES would have needed to procure two single-launches in the event two satellites experienced manufacturing, launch, or in-orbit anomalies affecting the transition timeline, as of the date of this Transition Plan, SES has only needed to procure two dual-launches and one single-launch.

[50] Includes installation.

[51] Includes installation.

[52] Includes outreach, data collection, data analysis, stakeholder communications, technical consulting, and installation help desk.

Technology Upgrades	$133,000,000
TT&C / Gateway Consolidation	$56,000,000
Other[53]	$16,000,000
Total	**$1,616,710,000**

Our initial budget for the transition was as shown above. The total cost of the clearing will be lower than our initial estimate. The level of favorability versus our initial budget will depend on the timely processing of our reimbursement claims, as processing delays lead to additional manpower and financing costs.

[53] Includes expenses associated with legal, communications, the Relocation Payment Clearinghouse, etc.

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Appendix E

Transition Timeline

The following represent SES's overall transition timeline.