ATTACHMENT A
TECHNICAL STATEMENT

A.1 Scope and Purpose

This Technical Statement provides supplemental technical information to support AST & Science, LLC's ("AST SpaceMobile") proposed modification of its authorized 248-satellite non-geostationary orbit ("NGSO") mobile broadband network[1] to include use (or capabilities for use) of additional International Mobile Telecommunications ("IMT") and V-band spectrum specified in Tables 1 and 2 below for international mobile satellite service ("MSS") outside the United States and gateway operations within and outside the United States.

A.2 Proposed Spectrum Use

A.2.1 Frequency Bands

The proposed use (or capabilities for use) of additional IMT and V-band spectrum is set forth in Tables A.2-1 and A.2-2 below.

Table 1: Additional IMT Frequencies for Non-U.S. Service Links

International (Non-U.S.) Capabilities		
Frequencies	**Use**	**Direction**
1710–1785 MHz	Service Links	Earth-to-space
1850–1915 MHz	Service Links	Earth-to-space
1920-1980 MHz	Service Links	Earth-to-space
2305-2320 MHz	Service Links	Earth-to-space
2500-2570 MHz	Service Links	Earth-to-space
1805–1880 MHz	Service Links	space-to-Earth
1930–1995 MHz	Service Links	space-to-Earth
2110–2160 MHz	Service Links	space-to-Earth
2332.5-2345 MHz	Service Links	space-to-Earth
2345-2350 MHz	Service Links	space-to-Earth
2350-2360 MHz	Service Links	space-to-Earth
2620-2690 MHz	Service Links	space-to-Earth

[1] *See AST & Science, LLC*, Authorization and Order, DA 26-391 (SB/WTB/OET/PSHSB rel. Apr. 21, 2026).

Table 2: Additional V-band Frequencies for Feeder Links and TT&C

International (Non-U.S.) Capabilities		
Frequencies	**Use**	**Direction**
42-42.5 GHz	Feeder Links, Routine TT&C	Space-to-Earth
47-47.2 GHz	Feeder Links, Routine TT&C	Earth-to-space
U.S. Capabilities		
Frequencies	**Use**	**Direction**
42-42.5 GHz	Feeder Links, Routine TT&C	Space-to-Earth
45.5-47 GHz	Feeder Links, Routine TT&C	Earth-to-space
47-47.2 GHz	Feeder Links, Routine TT&C	Earth-to-space

A.2.2 Service Allocations

The proposed use of the 42-42.5 GHz band outside the United States is consistent with international allocations for FSS (space-to-Earth) on a primary basis.[2] Additionally, the proposed use of the 45.5-47 GHz band within the United States (in addition to currently authorized use of the band outside the United States) is consistent with U.S. and international allocations for MSS feeder and TT&C uplinks on a primary basis.[3]

To the extent that any proposed spectrum use is inconsistent with U.S. and international allocations (*i.e.,* 42-42.5 GHz downlinks within the United States. and 47-47.2 GHz uplinks), such use will be on a non-conforming, non-interference basis. As discussed in Section A.4.3 below, the proposed use of the 42-42.5 GHz band will comply with relevant PFD and EPFD limits, including under ITU 5.551H, to ensure interference protection of adjacent-band Radio Astronomy Service (RAS) operations. Additionally, as discussed in Section A.4.4 below, the proposed use of the 47-47.2 GHz band will ensure interference protection of Amateur receivers in the band.

A.3 Satellite Antenna Characteristics

AST SpaceMobile's satellites will use independently and electrically steerable beams with up to 46 dBi gain and sidelobe patterns, consistent with ITU-R Recommendation S.672-4's -28 dB limit, for service-link operations on the proposed frequencies in Table 1. The AST SpaceMobile satellite gateway antennas will be consistent with prior filed information for the adjacent gateway frequency bands with gains as high as 47.6 dBi.

[2] *See* 47 C.F.R. § 2.106 (International Table) (allocating the 42-42.5 GHz band internationally for FSS downlinks on a primary basis).

[3] *See* 47 C.F.R. § 2.106 (U.S. and International Tables) (allocating the 45.5-47 GHz band domestically and internationally for MSS on a primary basis and further permitting use of the band, pursuant to international footnote 5.554, for "satellite links connecting land stations at specified fixed points … when used in conjunction with the mobile-satellite service").

A.4 Interference and Coordination Considerations

A.4.1 Satellite Systems and Federal Coordination and Interference Protections

AST SpaceMobile will engage in good-faith coordination with other domestic and international operators, including non-geostationary orbit satellite operators, NTIA and other federal agencies, as appropriate. Use of additional IMT and V-band spectrum specified herein remains subject to applicable license and regulatory requirements to mitigate harmful interference, including requirements under ITU Resolution 770 (WRC-19) and No. 22.2 to operate in the 42.0-42.5 GHz frequency range on an unprotected, non-harmful interference.

A.4.2 Interference Assessment of Non-U.S. Service-link Operations on Additional IMT Frequencies

Additional information and assessment of cross-border interference and out-of-band emissions from AST SpaceMobile's non-U.S. service-link operations in the proposed additional IMT frequency bands is contained in the attached Annex 1. As detailed in Annex 1, the analysis demonstrates the AST SpaceMobile system capabilities for service-link operations in the additional IMT frequency bands outside the United States, and further shows adaptability of the system to various national borders to ensure interference protection of operations in neighboring countries.

A.4.3 Interference Protections for Adjacent V-band Radio Astronomy Systems

The 42-42.5 GHz international downlink band is adjacent to RAS operations in the 42.5–43.5 GHz band. AST SpaceMobile's system is designed to comply with relevant PFD and EPFD limits, including under ITU 5.551H. AST SpaceMobile will further comply with all relevant procedures for coordination with all current and future RAS operators in the United States and internationally.

A.4.4 Interference Protection of V-band Amateur Systems

The 47.0-47.2 GHz band is allocated domestically to Amateur and Amateur-Satellite services on a primary basis, but not widely used, as evidenced by only three ITU API filings for use of the band. Only one of those three satellite filings includes Amateur-Satellite services, in addition to MSS on a non-interference basis under ITU RR No. 4.4. AST SpaceMobile nonetheless is committed to ensuring interference protection of Amateur and Amateur-Satellite operations in the band.

Table 3 below demonstrates the scenario for an amateur receiver with a 10 dBi gain towards an AST SpaceMobile transmitter. The receiving antenna is 25 km away from the AST SpaceMobile transmitter, which is a conservative estimate based on the number of AST SpaceMobile gateway stations and limited Amateur usage in this band. Additionally, the 6 dBi off-axis gain of the AST SpaceMobile gateway is a conservative assumption that would only occur in a worse-case scenario. At a temperature of 300K and a noise figure of 3 dB, the

Amateur receiver has a noise floor of -140.8 dBW/MHz. As shown in Table 3 below, the power spectral density from AST SpaceMobile's transmitter to the Amateur receiver is -185.1 dBW/MHz, resulting in a -44.3 dB I/N for the receiver and thus showing that harmful interference to the Amateur receiver is extremely unlikely. Even at higher I/N levels, the interference would result in a negligible impact on the Amateur receiver's performance.

Table 3: Power Spectral Density into Amateur Receiver

Frequency	GHz	47
Rx Gain towards AST SpaceMobile Earth Station	dBi	10
Transmit Power	dBW	0
Transmit Gain	dBi	6
Distance between Rx and Tx	km	25
P.452 Propagation Loss	dB	201.1
PSD	dBW/MHz	-185.1
Noise Floor (PSD)	dBW/MHz	-140.8
I/N	dB	-44.3

A.5 ITU Filings

ITU filings for the USASAT-NGSO-20 network will be updated to include these frequency bands and corresponding technical details.

A.6 Certification

I hereby certify that I am the technically qualified person responsible for the preparation or review of the engineering information contained in this document, that I am familiar with applicable technical and regulatory requirements, and that the information provided herein is complete and accurate to the best of my knowledge and belief.

/s/ Benjamin J. Wagner

Benjamin J. Wagner
Director, Regulatory Engineering
AST SpaceMobile
July 31, 2026

Annex: IMT-band Technical Analysis

Analyzing the AST SpaceMobile satellite system in the IMT-band complementing existing terrestrial cellular networks while maintaining out-of-band PFD limits

Prepared by RKF Engineering Solutions, LLC
for AST & Science, LLC

July 2026

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This report presents analyses showing that the AST SpaceMobile satellite system's international operations in mid-band International Mobile Communications (IMT) spectrum can effectively complement existing terrestrial cellular networks by delivering continuous, viable 5G service, commingled with co-channel services in the neighboring countries. At the same time, the system complies with out-of-band emission (OOBE) PFD limits everywhere.

1. Background

Each satellite in the AST SpaceMobile low-Earth orbit (LEO) constellation uses an active direct radiating array with thousands of actively controlled radiating elements. Because of this high flexibility, AST SpaceMobile satellites can control beam beamwidth and beam sidelobes as well as the beam transmit power and beam pointing direction to mitigate interfering transmission beyond a serving area boundary. This flexibility allows AST SpaceMobile to provide 4G/5G cellular service within a desired country, commingled with co-channel services in the neighboring countries.

Interference into these co-channel neighboring areas is managed through a combination of beamforming strategy and antenna sidelobe control based on service elevation angle, cell power management, and selectively vacating cells that are in close proximity to the neighboring non-partner co-channel license areas. Through these techniques, a viable service to the desired country can be achieved from the LEO orbit while allowing service to continue unimpeded in the co-channel border countries.

In addition, the report shows that the AST SpaceMobile satellites can meet the aggregate out of band PFD limit of -120 dBW/m^2/MHz[4] everywhere.

2. Approach

This analysis demonstrates that the AST SpaceMobile satellite network can meet acceptable power levels – both in-band and out-of-band – and considers IMT mid-band spectrum at 1805-1880 MHz and 2620-2690 MHz.

Beams are continually re-shaped as an AST SpaceMobile satellite passes overhead, ensuring continuous service that does not cause unacceptable levels of interference in-band (i.e., meeting the PFD limit of -107.22 dBW/m^2/MHz for the 1842.5 MHz center frequency and -104.05 dBW/m^2/MHz for 2655 MHz center frequency) to the cross-border countries. The in-band cross-border PFD limits are derived from the protection interference limit of -6 dB I/N assuming 4 dB received UE body loss, 9 dB receiver noise figure and -3 dBi UE receiver gain. The in-band cross-border analysis considered a full deployment of cells within Germany for all the satellites in view (as needed) and examined the aggregate co-channel interference power levels into the neighboring countries including some farther out.

[4] *Single Network Future: Supplemental Coverage from Space*, Space Innovation, Report and Order and Further Notice of Proposed Rulemaking, 39 FCC Rcd 2622 (2024) (SCS R&O).

In addition, the results show that the AST SpaceMobile satellites meet the OOBE PFD limit of -120 dBW/m^2/MHz everywhere in the adjacent bands for both frequency bands. The OOB analysis considered a full deployment of cells over for all the satellites in view and examined resulting aggregate out-of-band interference power levels everywhere (the orange cells in **Error! Reference source not found.**) to ensure interference limit compliance.

In this report, all 248 satellites in AST SpaceMobile's full constellation were simulated and the results for two satellite constellation time instances (one for in-band cross-border analysis and another for out-of-band) were generated.

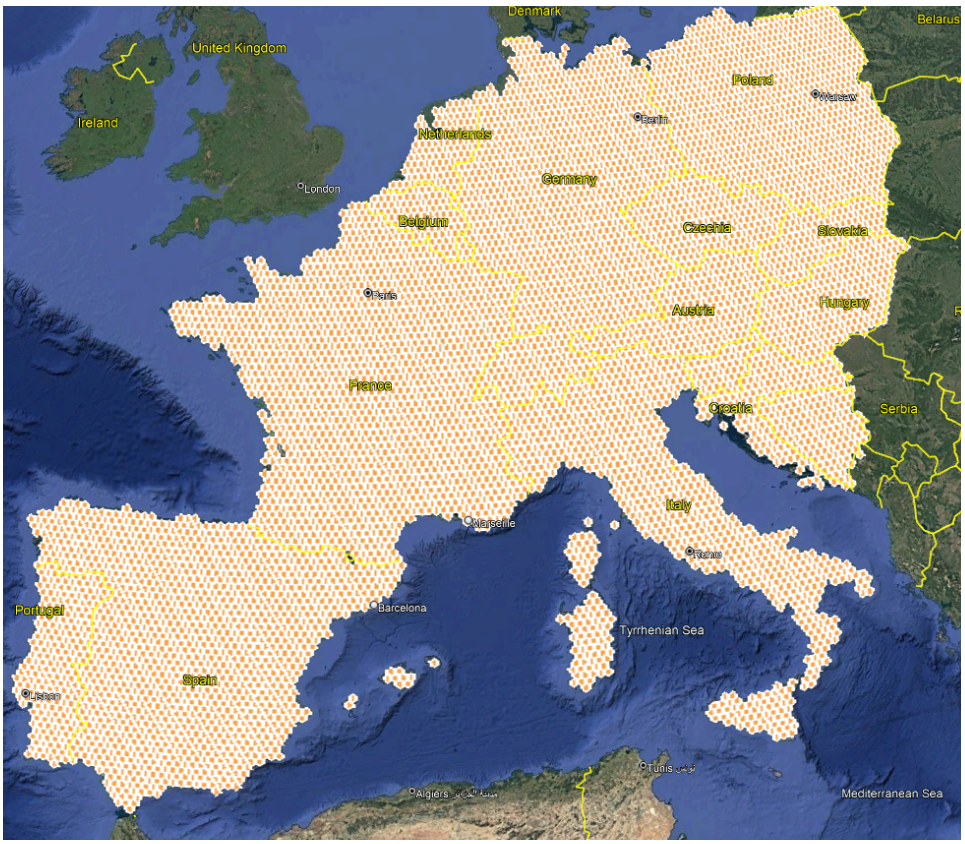

Figure 1 – Countries in Europe considered in the OOB analysis

2.1 AST SpaceMobile Satellite System Characteristics

As an example, and consistent with the AST SpaceMobile's contemplated architecture, the analysis assumes each satellite can support thousands of beams dependent on the beam bandwidth within the constraint of the total RF power.

Each beam is assumed to have a channel bandwidth of 10 MHz centered at 1842.5 MHz or 2655 MHz.

Each beam serves a coverage cell with a diameter of 24 km. Each satellite has a nominal Total Radiated Power (TRP) of 36 dBW in linear operation that ensures 45 dB[5] Adjacent Channel Leakage Ratio (ACLR) for using LTE/5G waveforms. For each satellite beam, the transmit power that achieves the targeted 20 dB nominal Carrier-to-Noise Ratio (C/N) on the ground is determined. Each satellite beam has a minimum of 15 dB transmit power control range for operation and interference management if needed.

The AST SpaceMobile constellation is designed to operate at minimum ground elevation angles of 15° and 30° for the bands centered at 1842.5 MHz and 2655 MHz respectively.

Each active satellite beam tracks a given coverage cell on the ground while passing the coverage area. The satellite signal is received by the SCS User Equipment (UE) with 0 dBi antenna gain and system noise temperature of 2367 Kelvin.

The C/N is computed using the Equation (1) below:

C/N = EIRP – FSPL + UE Rx Gain – 10*log10(kTB), (Eqn. 1)

Where

- EIRP (dBW) = TRP + Transmit Gain (obtained from beamforming)
- FSPL is the Free Space Path Loss (dB) = 92.45 + 20*log10(frequency in GHz) + 20*log10(range in km)
- UE Rx Gain = 0 dBi
- k = Boltzmann's constant = 1.380649×10^{-23} m^2 kg s^{-2} K^{-1}
- T = UE System Noise Temperature = 2367 K
- B = UE Rx Bandwidth = 10 MHz

2.1.1 In-Band Cross-Border PFD Calculations

The simulation is done with AST SpaceMobile network coverage over Germany and the power flux density (PFD) on the ground is measured – per Equation (2) below – at 0 kilometer from the border of Germany:

PFD (dBW/m^2/MHz) = EIRP (dBW/MHz) – 20*log10(range in meters) – 10*log10(4*π) (Eqn. 2)

Over each point on the ground that needs to be protected, the resulting aggregate PFD (over all satellite beams) is compared against the PFD limit of -107.22 dBW/m^2/MHz (1842.5 MHz) or -104.05 dBW/m^2/MHz (2655 MHz).

[5] As explained in Section 2.2.2, the out-of-band analysis assumed 43.7 dB ACLR that is more conservative.

2.2 Analysis Methodology

2.2.1 In-band Analysis Methodology

Two in-band analyses were performed, one for 1842.5 MHz center frequency and another for 2655 center frequency.

From the 248 simulated satellites in the constellation, two worst-case satellite constellation time instances (t_1 and t_2) were selected with satellites in view of Europe and different beam laydowns were selected for the various interference analyses:

1. For the *In-band Cross-Border* study, satellite constellation time instance t_1 was chosen to simulate beams with lower elevation angles for a worst-case analysis as it results in higher interference to the cross-border countries. In this analysis, beams over Germany are assigned to the satellite with the highest elevation angle. This is shown in **Error! Reference source not found.**.

2. For the *Out-of-Band Interference* study, the satellite constellation time instance t_2 was chosen to cover most of Europe. For a worst-case analysis, all beams operate at max transmit power (while meeting the satellite capacity limits) with no cross-border limits. In addition, the beams over all of the European countries (as shown in Figure 3) are assigned to one of the satellites randomly while meeting the satellite's capacity limits.

The satellite capacity limits included a max number of beams per satellite (based on the maximum back-haul capacity for 10-MHz beams) and a max total radiated power per satellite. In addition, a minimum elevation angle to satellite of 15° (for 1842.5 MHz) and 30° (for 2655 MHz) was maintained. This results in analyzing interference from fully loaded satellites.

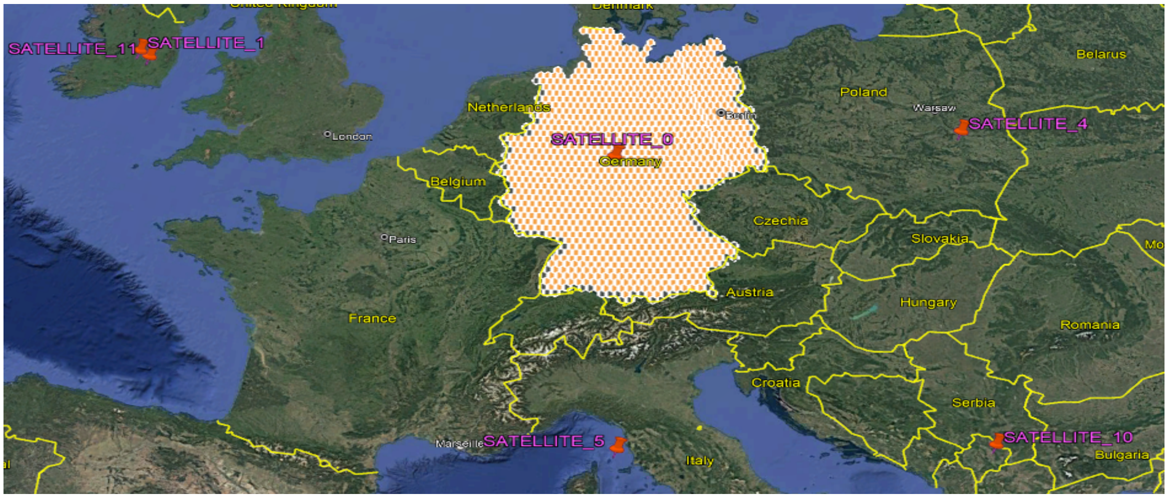

Figure 2 – Location of the five satellites (pink markers) in view of Europe at the simulated time instance t_1 on the map and beam laydown (used for the Cross-Border analysis).

Figure 3 - Location of the three satellites (pink markers) in view of Europe at the simulated time instance t_2 on the map and the beam laydown (used for the OOB analysis)

Figure 4 shows the satellite beam antenna pattern of an AST SpaceMobile service cell when the satellite is above the center of the cell in the constellation time instance t_2 (i.e. when the cell has a high elevation angle of about 90° to the satellite).

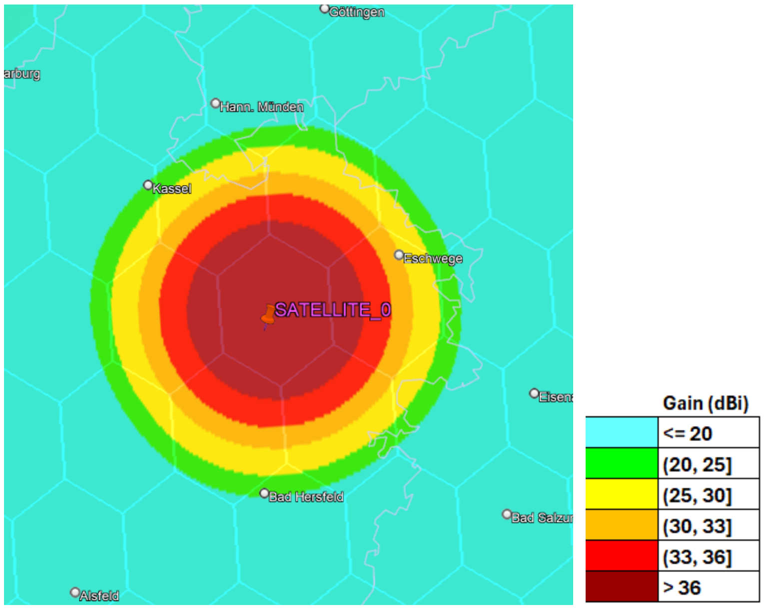

Figure 4: Satellite Beam Antenna Pattern of a Cell with High Elevation Angle (89.37°) to SATELLITE_0 in the constellation time instance t_1

For the in-band Cross-Border analyses, satellite transmit powers were selected to achieve a C/N = 20 dB at the SCS UE under ideal transmission conditions. However, power levels were reduced when required – within the beam power control range – to ensure that aggregate interference power levels (over all the satellites serving the beams over Germany) fell below the cross-border PFD limit (per Section 2.1.1) in the neighboring European countries. When more than 15 dB reduction in power level was required in a cell, that cell was turned off to provide a larger buffer zone for cross-border country (such cells are colored Black in **Error! Reference source not found.**). The calculation of C/N is described in Section **Error! Reference source not found.**.

Operationally, not all the Physical Resource Blocks (PRBs) would be used simultaneously in all time slots and channels in every cell. Instead, the eNodeB dynamically assigns the PRBs to ensure there is no interference among the adjacent cells by using different RPBs in both frequency and time domains. The in-band analysis models such adjacent cell coordination by reducing the aggregate interference power by a factor of five assuming 20% average loading in each cell. For the out-of-band analysis (as described in Section 2.2.2), 100% loading is assumed conservatively.

2.2.2 Out-of-band Analysis Methodology

The out-of-band analysis uses the results from the in-band analysis - particularly, the list of beams assigned to each satellite, transmit power per beam and the beam weights for the several thousand Higher Power Amplifiers (HPA) on the satellite. The aggregate out-of-band PFD at each point on the ground is calculated from the satellites' HPA intermodulation products (IM) power levels that are within the adjacent channels. In this analysis, the adjacent channels are the 10 MHz bands above and below the edge of the analyzed band. For the non-adjacent channels, the OOBE levels will be lower than the ones in the adjacent channels due to the nature of intermodulation products even without considering any out-of-band rejection from the output filters implemented in the phased array antenna on each satellite.

The analysis consists of two parts: the first part assumes that all intermodulation power generated in each HPA of each satellite is incoherent; the second part of the analysis utilizes a practical quantification of spatial coherency effects to add to the incoherent IM levels to subsequently arrive at the intermodulation power at each point in the far field. Note that since the intermodulation power is dominated by 3rd order effects, this analysis quantifies the 3rd order intermodulation for both the incoherent and coherent effects.

In the first part of the analysis, the intermodulation power at the radiated from each satellite is calculated as follows. Each satellite has a maximum output power of 36 dBW. Furthermore, at maximum output power, the HPA's, each of which is linearized by Digital Pre-Distortion (DPD), are operated at a minimum 8 dB, nominally 9 dB, output backoff. Analysis of the HPAs used when bandlimited Gaussian noise is passed through the HPA and an output backoff of 9 dB, gives a signal to intermodulation power ratio of 43.7 dB. The system utilizes a technology that actively distributes power to form each beam among different HPA's in the system and effectively maintains each HPA operating at the same signal to IM ratio. The HPA output backoff is computed by using the actual satellite output power, and the 36 dBW output power corresponding to 9 dB output backoff. Next, the signal to IM power ratio is calculated by comparing the actual output backoff to 9 dB and modifying the 43.7 dB value as changing by 2 dB per dB change in output backoff. This is then used to compute the intermodulation power at the satellite output. This power is from the satellite using the pattern of a single antenna element which is assumed to have a peak gain of 4 dBi with a cosine roll-off.

Note that the intermodulation energy distribution varies over the geography. As such, the second part of the analysis adds this spatial coherency to the incoherent results to arrive at the intermodulation power at each point in the far field. This calculation is performed for each satellite, and subsequently, the IM levels from each satellite are aggregated to obtain the IM level at each point in the far field.

At a single point on the ground, the PFD (dBW/m^2) is calculated assuming Free Space Path Loss from the satellite to the point on the ground. Finally, the occupied bandwidth of all signals in the HPA is used to convert the PFD value to Spectral PFD (dBW/m^2/Hz). Note that IM power is distributed over a larger bandwidth than the signals input to the HPA. As such, using the in-band bandwidth is conservative in that it overestimates the spectral density of IM power.

This analysis is performed for each satellite, and the Spectral PFD values (in dBW/m^2/Hz) are aggregated for all points on the ground (spaced every 0.05 degrees in latitude and longitude) over the European countries in Figure 1. Each point on the ground is then compared to the interference limit of -120 dBW/m^2/MHz to determine whether the OOB emissions meet this interference limit.

2.3 In-Band Results

The in-band cross-border simulation results – from the beam laydown over Germany (per Section 2.2.1) – indicated that over the analyzed constellation time instance t_1, more than 91.95% of the time (1842.5 MHz) and over 98.4% of the time (2655 MHz), AST SpaceMobile can operate over the target cells with no power reduction to meet the interference limits.

Figure 5 and Figure 6 below show the CDF of the PFD levels – from satellite transmissions over AST SpaceMobile service areas operating within Germany - across Germany's neighboring countries (i.e., Austria, Belgium, Croatia, Czech Republic, France, Italy, Luxemburg, Netherlands, Poland, Slovenia and Switzerland) for the 1842.5 MHz and 2655 MHz center frequencies respectively. The CDFs show that the aggregate Cross-Border PFD limit is met over all those countries.

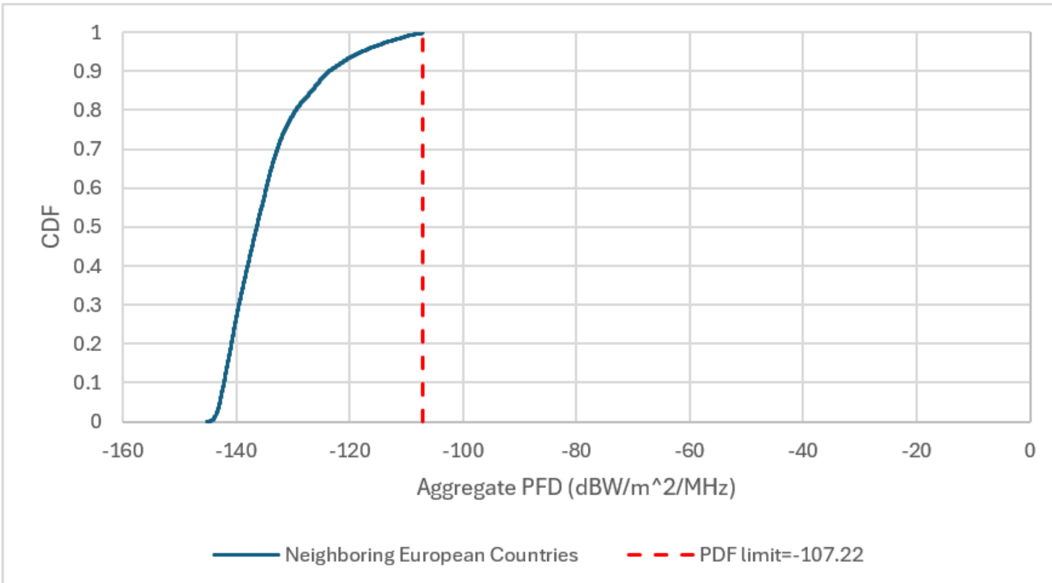

Figure 5: CDF of resulting aggregate interference PFD over Germany's neighboring European countries (1842.5 MHz Cross-Border analysis)

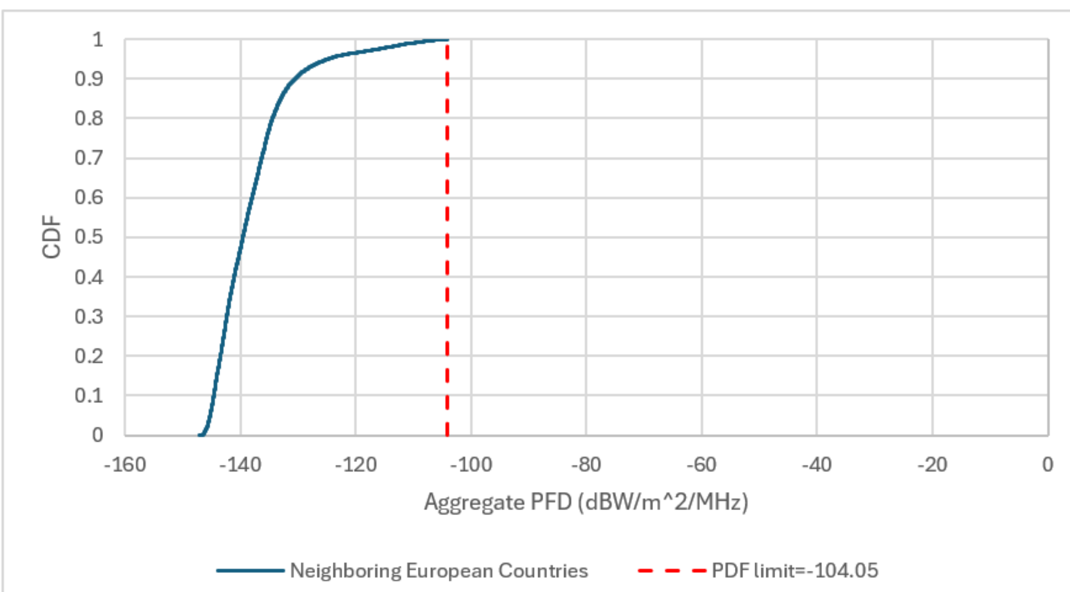

Figure 6: CDF of resulting aggregate interference PFD over Germany's neighboring European countries (2655 MHz Cross-Border analysis)

2.4 Out-of-Band Results

Figure 7 and Figure 8 below show the CDF of the resulting aggregate OOB PFD levels - due to satellite transmissions to locations spaced every 0.05 degrees in latitude and longitude within all the European countries in **Error! Reference source not found.** using the satellite constellation time instance t_2 for 1842.5 MHz and 2655 MHz bands respectively. As indicated, the OOB PFD levels are all below the -120 dBW/m^2/MHz limit. The highest OOB PFD level is 13 dB below the OOB PFD limit for the 1842.5 MHz band and 12.6 dB below the limit for the 2655 MHz band.

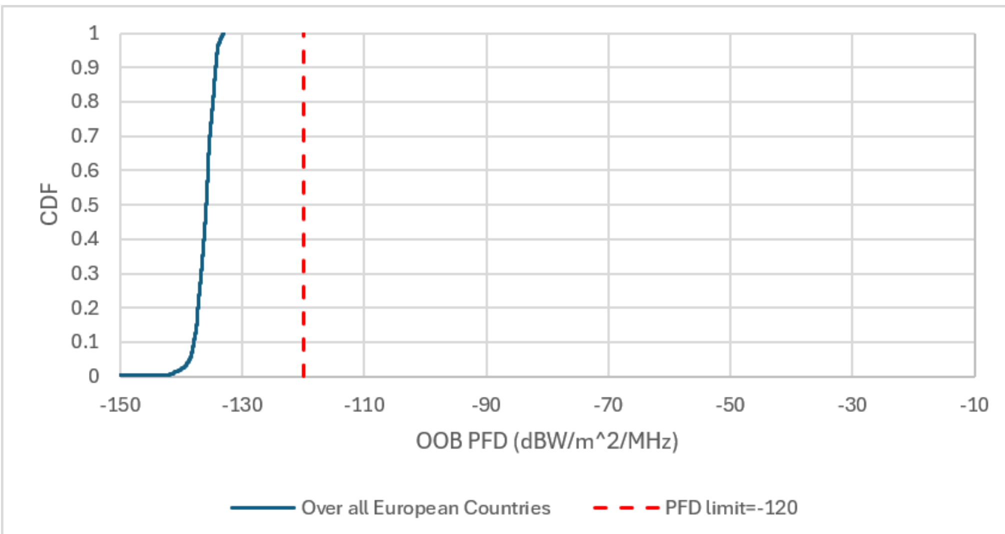

Figure 7: CDF of resulting aggregate interference OOB PFD levels (1842.5 MHz)

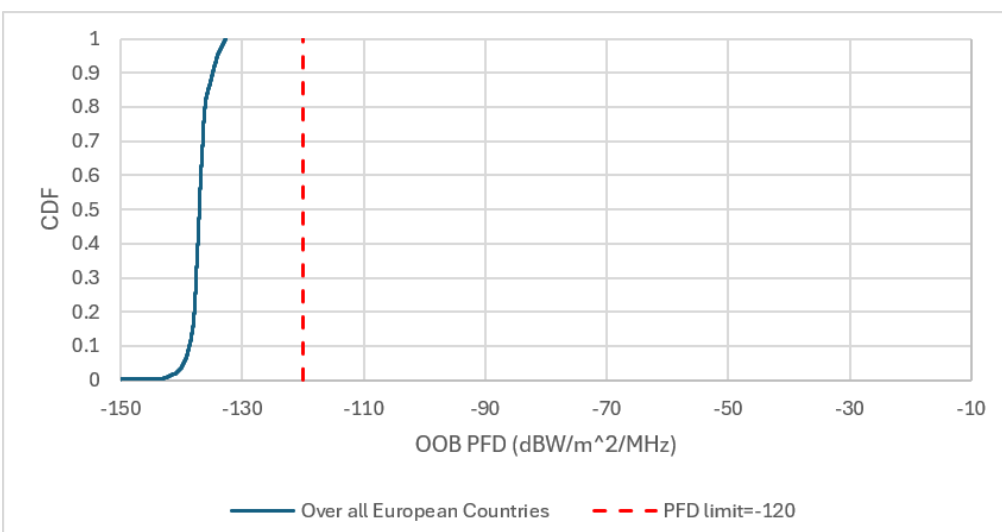

Figure 8: CDF of resulting aggregate interference OOB PFD levels (2655 MHz)

3. Conclusions

This report presents interference analyses of the AST SpaceMobile satellite constellation over Europe, demonstrating that AST SpaceMobile can meet the in-band PFD limit in cross-border countries and meet out-of-band limits in adjacent bands everywhere, while still being able to deliver reliable service over the mid-band IMT bands.

The cross-border analysis evaluated all AST SpaceMobile cells within Germany (as an example country). By selectively deactivating AST SpaceMobile cells near Germany's neighboring countries and reducing power levels in others (if needed), the study shows that AST SpaceMobile can maintain service continuity in both AST SpaceMobile-operated areas and cross-border areas. The evaluation considered satellite elevation angles down to the minimum operational threshold.

Furthermore, the study calculated aggregate OOB PFD levels across Europe, confirming that AST SpaceMobile's operations remain well within the applicable limits.

In fact, due to the high flexibility of the AST SpaceMobile satellites in controlling power levels on the ground, these results are applicable to other regions internationally – thus assuring AST SpaceMobile's international use of the mid-band IMT bands in compliance with the relevant interference limits in all regions worldwide – both in-band and out-of-band.