

## Exhibit A

### Technical Analysis

The Commission's rules permit GSO FSS use of the 27.5-28.35 GHz band segment for gateway-type earth stations on a secondary basis to Upper Microwave Flexible Use Service ("UMFUS"). Viasat submits the following showing to demonstrate that the proposed gateway-type earth station, or satellite access node ("SAN") is compatible with UMFUS operations in accordance with Section 25.136.

In selecting the site, Viasat relied on both computer database and RF measurement surveys conducted by Comsearch at the actual earth station location. The field measurements showed no measurable radio-frequency activity in the 27.5-28.35 GHz frequencies (see attached Comsearch report). The Comsearch report includes photographs and maps of the earth station location. Additionally, a Prior Coordination Notice (PCN) has been sent out to coordinate with the terrestrial licensees in and around the coverage contour. No terrestrial licensees have objected.

Viasat conducted a technical analysis to determine the region around the earth station where the power flux density (PFD) at a height of 10 m above ground level would be equal to or greater than  $-77.6 \text{ dBm}/(\text{m}^2 * \text{MHz})$ .

The analysis was performed both using a simple spreadsheet approach as well as by using the Visualyse Pro software to perform an area analysis around the earth station.

In the case of the spreadsheet analysis, the parameters used were taken from the FCC Form 312 application and supporting exhibits.

Antenna Diameter	4.1	m
Antenna Gain	59.6	dB(i)
Antenna Input Density	-25.8	dB(W/MHz)
EIRP Density	33.8	dB(W/MHz)
EIRP Density	9.8	dB(W/4 kHz)
Antenna Disc toward Horizon	70.8	dB
Density toward Horizon	-37.0	dB(W/MHz)
Density toward Horizon	-61.0	dB(W/4 kHz)
Additional losses toward victim	10.0	dB
Boundary Limit in flux density	-107.6	dB(W/(m <sup>2</sup> *MHz))
Required distance	301.9	m

Table 1 – Required Distance to  $-77.6 \text{ dBm}/(\text{m}^2 * \text{MHz})$  Limit

The distance calculated in Table 1 is along the azimuth of the main lobe of the antenna. The formula used to calculate the required distance is:

$$\text{SQRT}(10^{((\text{Density toward horizon} - \text{Additional losses} - \text{Boundary Limit})/10) / (4 * \text{PI}())})$$

The above calculation provides a simple baseline estimate of the required separation distance in the direction of the main lobe of the antenna. An additional loss of 10 dB over free space is also included to account for clutter. This conservative estimate is well below the median value for clutter loss for the distance as calculated by the statistical model of Recommendation ITU-R P.2108.

To perform a more detailed analysis of the other directions around the antenna, the software tool Visualyse Pro by Transfinite Systems, Ltd<sup>1</sup> was used.

To perform the analysis, the 4.1 m antenna pattern was imported into Visualyse, then a link defined to use appropriate power per MHz reflecting the values used in the FCC license application. The antenna was configured to point at the ViaSat-2 satellite at 69.9° W.L. in order to establish the operational azimuth and elevation angles.

To measure the PFD in the area around the Viasat SAN antenna, a reference antenna was created in Visualyse with 50.4 dBi gain. This is needed because Visualyse performs its calculation using power density not PFD. The 50.4 dBi gain effectively converts the power density value to a PFD value so Visualyse displays the results in terms of PFD. The gain of a meter square area at 28.1 GHz is calculated in dBi as  $G = 10 * \log(4 * \pi / \lambda^2)$ , where  $\lambda = 1.06$  cm at 28.1 GHz

As Visualyse works in dBW rather than dBm, the -77.6 dBm/(m<sup>2</sup> \* MHz) is converted to dBW/(m<sup>2</sup> \* MHz) by subtracting 30 dB.

An area analysis region is created around the SAN earth station and the reference antenna is then moved in small steps all around the area to measure the value of received power at each location step. The display settings of the area analysis are set to -107.6 to reflect the PFD limit in dBW. Once the area analysis has been completed, the contour can be exported as a .kmz file for viewing in Google Earth or other GIS mapping software such as MapInfo or ArcGIS.

Figure 1 shows the contour as calculated by Visualyse and imported into GIS mapping software. When importing the contour into GIS mapping software it can be observed that the earth station contour is located entirely within Richmond county. A search of the IBFS database for other earth stations licensed in the 27.5-28.35 GHz band indicates that there are no other earth stations licensed in these bands in this county.

The contour covers portions of three different census blocks (1022, 1025, and 1026). Block 1022 has a population of 714, block 1025 has 21, and block 1026 has a population of zero. Based on a visual inspection of the Google Earth map image in Figure 2, the contour covers only a very small portion of the bottom edge of census block 1023 which is heavily forested, and no houses are located inside that portion of the contour. Therefore, only the population in Blocks 1025 and 1026 (population of 21 and 0, respectively) should be included in the calculation.

The population for Richmond county is 200,549 which is less than 450,000. Thus the 450 population limit of 25.136(a)(1)(ii) applies. As illustrated in Figures 1 and 2, the contour covers

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<sup>1</sup> <https://www.transfinite.com/content/professional>

most but not all of the area of the census block with a population of 21. However, even if the contour covered the entire geographic area of that census block, the relevant population of 21 would be well below the 450 population limit. Thus, the actual population in the partial coverage of the contour is well within that limit. No further analysis of actual population covered is required.



Figure 1 – Census block view of contour

The area covered by the  $-77.6 \text{ dBm}/(\text{m}^2 * \text{MHz})$  contour does not contain any major event venue, urban mass transit route, passenger railroad, or cruise ship port. In addition, by inspection in Google Earth and GIS mapping software tools, the contour does not cover any roadway that is identified as an Interstate, Other Freeway and Expressway, or Other Principal Arterial, in the Federal Highway Administration Office of Planning, Environment, and Realty Executive Geographic Information System map.<sup>2</sup>

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<sup>2</sup> <https://hepgis.fhwa.dot.gov/fhwagis/#>.

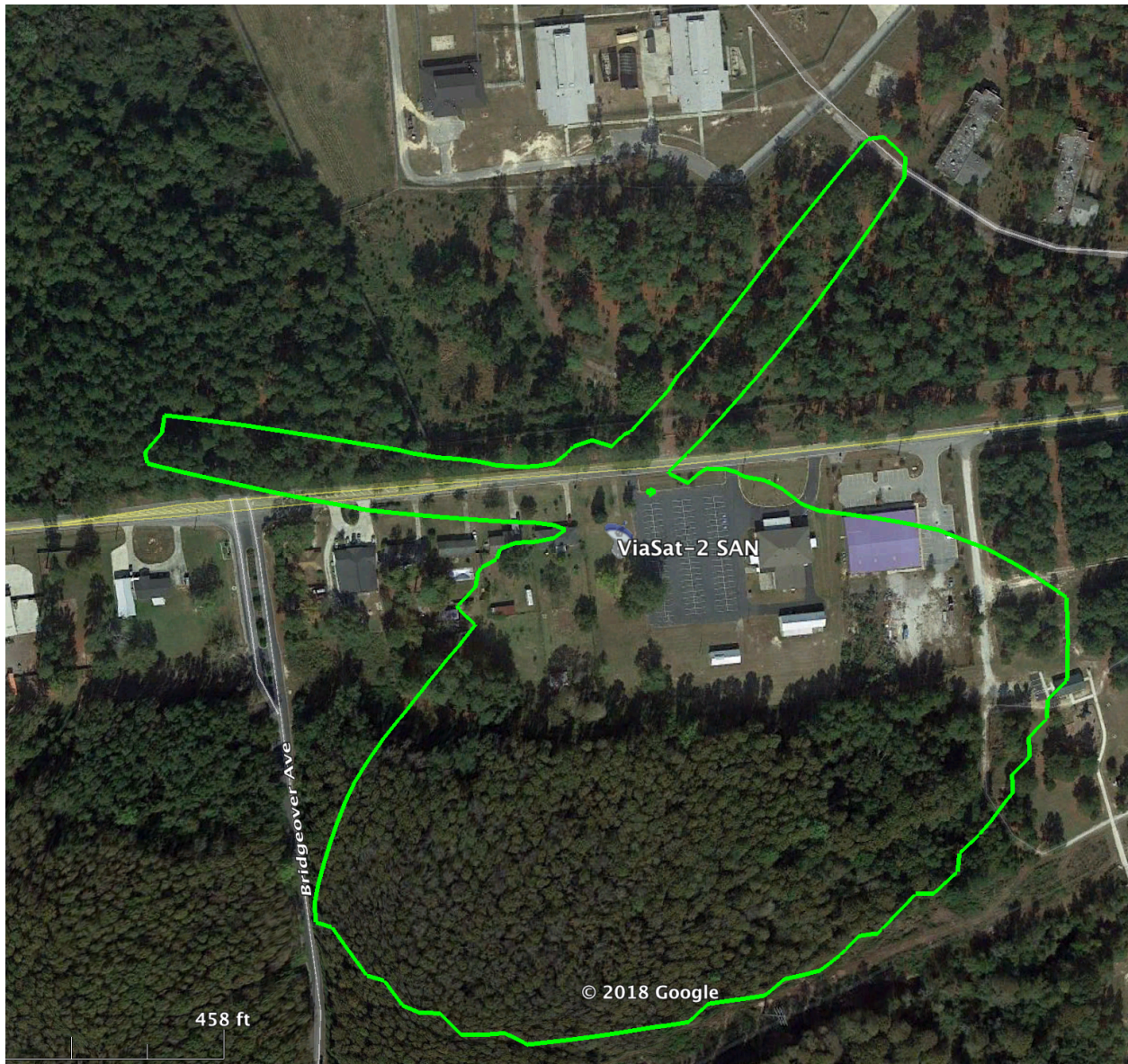


Figure 2 – Augusta -77.6 dBm/(m<sup>2</sup> \* MHz) PFD contour