ATTACHMENT G
Astro Digital-U.S., Inc.
FCC Form 312, Exhibit 43

POWER FLUX DENSITY CALCULATIONS FROM LANDMAPPER SPACECRAFT TO GLOBALSTAR ORBIT

In order to complete Schedule S of our Form 312 submission it was necessary to compute PFD levels for the transmit beam from a Landmapper satellite to the Globalstar Constellation orbit, as contained in that submission. We understand, however, that normally this PFD would be associated with an Earth Station transmitting to a satellite. In this case, however, the geometry is different. It is a link from a Landmapper NGSO satellite to a Globalstar NGSO satellite.

In order to explain our PFD results it is important to define a coordinate system so that the power flux computations can be interpreted. The geometry and a reference 2D coordinate system is defined here in Figure G-1.

We note that the worst-case PFD would be from the highest altitude possible orbit for Landmapper. That orbit is a 625 km sun-synchronous orbit and the highest PFD would occur at the apogee of that orbit. This highest instant altitude is 648 km. We assume that Landmapper is NADIR-looking but, is making use of its ZENITH-mounted patch antenna to transmit to Globalstar. The antenna roll-off of this antenna away from zenith is given by the antenna pattern if Figure G-2. We note that this antenna's gain is defined as a function of off-point angle θ; measured as zero at the Landmapper satellite horizon. This will yield a maximum PFD from Landmapper toward Zenith at $\theta = 90°$.

In addition, a single case PFD was calculated for the direction where the Globalstar transmit beam from Landmapper intersects the Earth. This occurs at a negative angle of θ: $\theta = -24.8°$. At the point where Landmapper's Globalstar beam intersects the Earth the range from the satellite to a station at this location would be 2947 km and the Globalstar patch antenna will have rolled-off to -17.5 dBi net gain.

The calculated PFD levels along the Globalstar orbit arc and for the one case calculated for the PFD to an Earth station at 0° elevation is given in Table G-1.

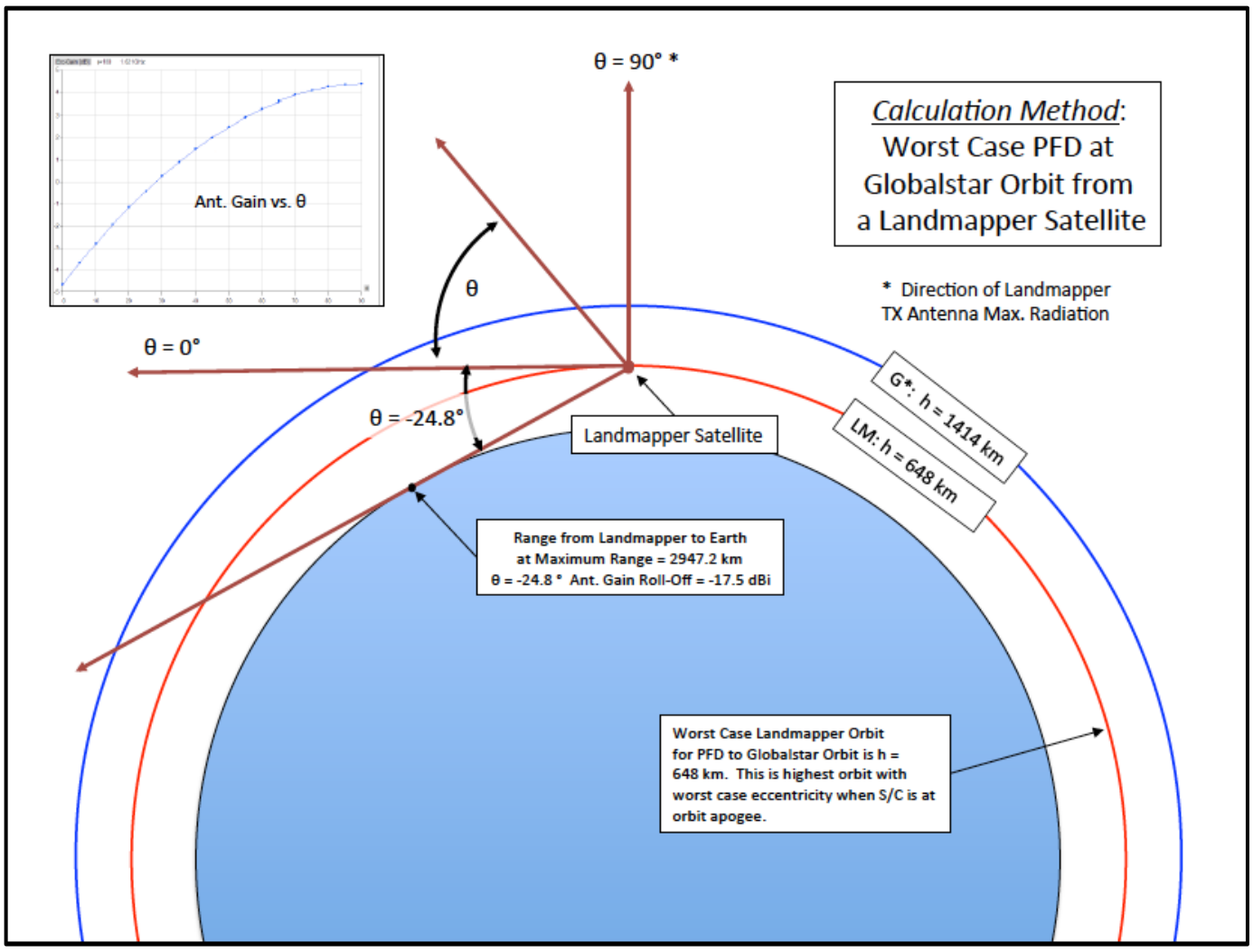

Figure G-1: Landmapper-to-Globalstar Geometry

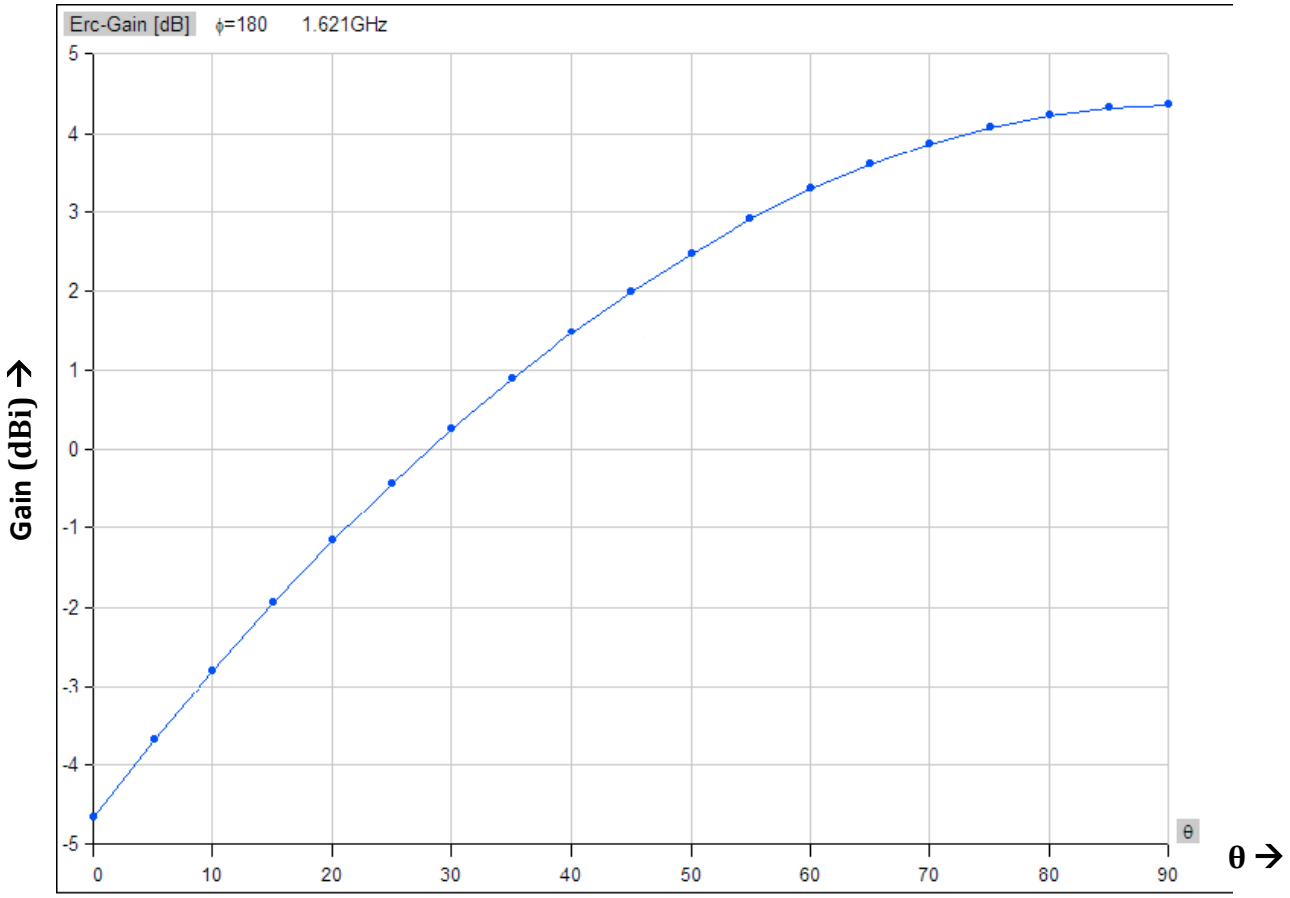

Figure G-2: Landmapper Transmit Patch Antenna Gain (dBi) vs. Angle θ (°)

Table G-1: Landmapper-to-Globalstar Orbit PFD

PFD from Landmapper Spacecraft to Globalstar Orbit

Landmapper Elevation Angle (θ)	TX Antenna Gain (Patch Antenna)	Range to Globalstar Orbit (Km)	PFD ($dBW/m^2/1$ MHz)	PFD ($dBW/m^2/4$ kHz)
90°	4.31 dBi	766.00	-127.2	-151.2
25°	-0.40 dBi	1521.68	-137.9	-161.9
20°	-1.15 dBi	1735.14	-139.8	-163.8
15°	-1.95 dBi	2009.82	-141.9	-165.8
10°	-2.80 dBi	2363.22	-144.1	-168.1
5°	-3.70 dBi	2811.43	-146.5	-170.5
0°	-4.65 dBi	3369.10	-149.0	-173.0
-24.8°	-17.5 dBi	2947.20 *	-160.7	-184.7

Max. TX Power: 0.760 watts
TX Losses: -0.70 dB
Peak Ant. Gain: +4.31 dBi

* Range from Landmapper to Earth at 0° Elevation Angle