



Frequency Coordination Report

E-Band Earth Station - Benkelman, NE

December 27, 2022



Summary

SpaceX performed a coordination notice under Section 25.203(c), Section 25.251, and Appendix 7 of the ITU's Radio Regulations. Typically, prior-notification letters with earth station details are sent to potentially affected terrestrial licensees; a copy of these details are available in this report. Based on the methodology described below, however, no existing operators met the criteria for notification. This is due in part to the rural nature of this gateway site location.

Methodology

SpaceX has completed an interference analysis based on accepted international and Commission methodologies demonstrating that this satellite earth station will not cause harmful interference to existing terrestrial facilities in the band. Specifically, for each known receiver within the great circle coordination distance surrounding the proposed earth station, SpaceX calculated the expected interference/noise ratio (I/N) to the receiver, assuming the SpaceX antenna properties listed on the following page, free-space propagation without terrain or clutter, and actual characteristics of receiver(s) obtained from the 70/80/90 GHz link-registration database. Even under these conservative assumptions, SpaceX's analysis confirms that this earth station will not cause interference exceeding 1.0 dB of degradation to the static threshold of existing 70/80 GHz links within the great circle coordination distance.

Earth Station Data

This section presents the data that was circulated to all operators that met the criteria for notification for this earth station.

Site Information:

- Transmitting station name: Benkelman Gateway
- Transmitting station coordinates: 40° 6' 17.8" N, 101° 30' 36.9" W
- Ground Elevation (AMSL): 951.9

Frequency Information:

- Transmit: 81-86 GHz
- Receive: 71-76 GHz
- Max Great Circle Coordination Distance: 127 km
- Rain Scatter Coordination Distance Contour: 6 km

Link Information:

- Satellite Type: Low Earth Orbit
- Mode: TR – Transmit-Receive
- Modulation: Digital
- Minimum Elevation Angle: 25.0°
- Azimuth Range: 0.0° to 360.0°
- Antenna Centerline (AGL): 1.7 m

Antenna Information:

- Manufacturer: SpaceX
- Model/Diameter: 1.85m
- Gain: 60.9 dBi at 83.5 GHz
- Max Available RF Power: -26.8 dBW/MHz
- Horizon Gain: -4 dBi
- Maximum EIRP: 34.1 dBW/MHz (main beam)
- Permissible RF Interference Power Level: degradation to static threshold of protected receiver ≤ 1.0 dB
- Antenna Mask: SpaceX's earth station will comply with the following antenna-gain limits. As with Section 25.209(a)(3), "[t]his envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ± 7 -180°, and by up to 6 dB in the region of main reflector spillover energy." The mask can be stated as follows:

$29-25\log_{10}\theta$	dBi	for $2^\circ \leq \theta \leq 7^\circ$.
8	dBi	for $7^\circ < \theta \leq 9.2^\circ$.
$32-25\log_{10}\theta$	dBi	for $9.2^\circ < \theta \leq 25^\circ$.
-4	dBi	for $25^\circ < \theta \leq 180^\circ$.

Horizon Angle by Azimuth:

All values are in degrees

Azimuth	Horizon Angle	Azimuth	Horizon Angle
0	0.53	180	0.02
5	0.69	185	0.12
10	1.33	190	0.29
15	1.34	195	0.11
20	2.20	200	0.27
25	1.92	205	0.42
30	1.15	210	0.36
35	1.08	215	0.44
40	1.09	220	0.61
45	0.81	225	0.65
50	1.11	230	0.57
55	1.12	235	0.57
60	0.56	240	0.40
65	0.58	245	0.41
70	0.31	250	0.57
75	0.22	255	0.66
80	0.13	260	0.54
85	0.17	265	0.55
90	0.04	270	0.47
95	0.06	275	0.75
100	0.00	280	0.71
105	0.00	285	0.43
110	0.00	290	0.34
115	0.00	295	0.33
120	0.00	300	0.38
125	0.07	305	0.49
130	0.20	310	0.40
135	0.21	315	0.31
140	0.28	320	0.39
145	0.05	325	0.34
150	0.17	330	0.27
155	0.28	335	0.32
160	0.22	340	0.35
165	0.06	345	0.32
170	0.00	350	0.50
175	0.05	355	0.46