The facilities proposed herein by TowerStream have been designed to operate without causing interference to existing FSS earth stations and Federal Government operations in the 3650 - 3700 MHz band. Rules for the deployment of such facilities have been adopted by the Commission in its Report And Order And Memorandum Opinion And Order, FCC 05-56, (ET Docket No. 04-151) adopted March 10, 2005 ("R&O"). In the instant proposal, permission is requested to conduct tests within the 150 km protection zone of existing grandfathered FSS stations. Otherwise, and as described earlier, all base stations and remote devices utilized by TowerStream for these will operate in compliance with Part 15 and within the parameters and power levels adopted in the R&O.

To demonstrate protection of incumbent FSS stations in the 3650 - 3700 MHz band located within 150 km of the requested facilities, a detailed interference analysis was conducted to predict the worst-case impact of the proposed operations. The methodology for this analysis involved

- identification of all facilities to be studied,
- calculation of worst-case antenna patterns for both FSS and proposed facilities,
- establishing sample and worst-case test points to model proposed CPE emissions,
- selecting an appropriate terrain and propagation model to calculate path losses and
- compiling the worst-case parameters of the proposed system elements for use in the studies.

Identification of Facilities To Be Considered In Studies

No Federal Government radiolocation stations were identified within 80 km of the proposed facilities.

The following grandfathered FSS stations were found within 150 km of the proposed service area:

Call Sign, File No.: E950208, SESMOD2001032600656
Location . . . . . THREE PEAKS, CA: 38-8-52, 122-47-38
Distance, Bearing to: . . . . . 51.6 km (32.1 miles) . . 320°

Call Sign, File No.: E6241, SESMOD2000112902270
Location . . . . . SAN RAMON, CA: 37-45-40, 121-47-57
Distance, Bearing to: . . . . . 54.3 km (33.7 miles) . . . 94°

Call Sign, File No.: KA232, SESLIC1997103001576
Location . . . . . LIVERMORE, CA: 37-45-40, 121-47-53
Distance, Bearing to: . . . . . 54.4 km (33.8 miles) . . . 94°

Call Sign, File No.: KA86, SESMOD2000022200265
Location . . . . . MOUNTAIN HOUSE, CA: 37-45-2, 121-35-39
Distance, Bearing to: . . . . . 72.4 km (45.0 miles) . . . 94°

Call Sign, File No.: KA206, SESMOD2000022200272
Location . . . . . MOUNTAIN HOUSE, CA: 37-45-1, 121-35-38
Distance, Bearing to: . . . . . 72.4 km (45.0 miles) . . . 94°

Call Sign, File No.: KA371, SESRWL1999101201864
Location . . . . . SALT CREEK (SCK 3A), CA: 38-56-20, 122-8-48
Distance, Bearing to: . . . . . 129.3 km (80.4 miles) . . . 10°

Call Sign, File No.: KA372, SESRWL2003103101527
Location . . . . . SALT CREEK (SCK 1A), CA: 38-56-21, 122-8-49
Distance, Bearing to: . . . . . 129.3 km (80.4 miles) . . . 10°

Call Sign, File No.: KA373, SESRWL2000121502350
Location . . . . . SALT CREEK (SCK 2A), CA: 38-56-22, 122-8-50
Distance, Bearing to: . . . . . 129.4 km (80.4 miles) . . . 10°

Fixed Satellite Antenna Patterns

The antenna pattern and gain for each fixed satellite system receiving antenna was calculated based on the method in the Report and Order and Memorandum Opinion and Order, Appendix D. The antenna pattern is a worst case or maximum envelope pattern which assumes that the antenna is always oriented along the arc at the position which produces the highest gain toward the horizon.

For each fixed station, the visible arc with a minimum elevation of five degrees (5º) above the horizon was determined. The antenna was assumed to point first to the Easternmost point on the visible arc. Horizontal azimuths were considered from a bearing of True North or 0º clockwise to 359º at one degree increments. The antenna gain was calculated based on Equations 4 and 5 in Appendix D, implementing Section 25.209(a)(2). The fixed station was then incremented one degree of azimuth along the geostationary orbital arc and the antenna gain was calculated at 360 points around the antenna. The receiving antenna was incremented throughout the viewable arc to the Westernmost point, producing a matrix of antenna gains. Then, for each azimuth around the fixed station antenna, the maximum horizontal gain was extracted to form the antenna pattern.

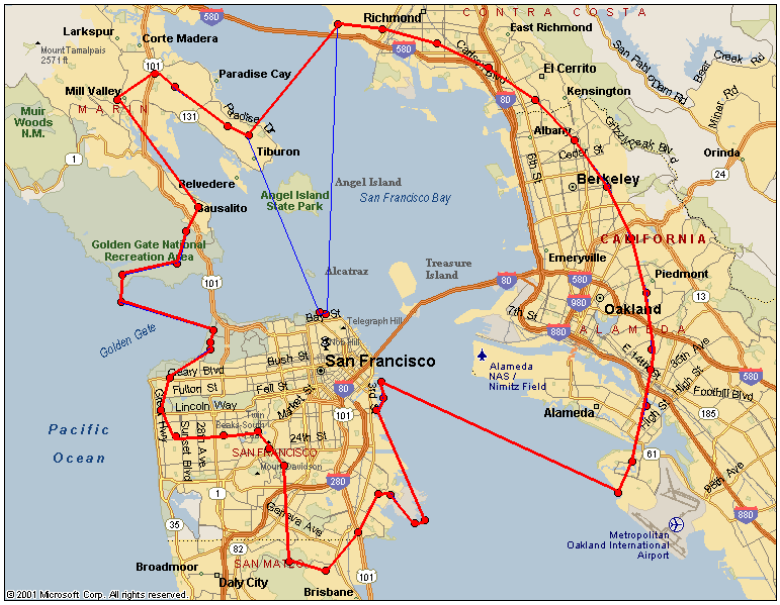
The FSS antenna pattern plots and tabulated data compiled for each facility are provided in **Exhibit 2**.

Base Station and Customer Premise Equipment Antenna Patterns

The antenna patterns for the fixed base station and fixed customer premise equipment antennas were derived from manufacturer's data. The patterns are maximum envelope patterns which are smoothed to incorporate major and minor lobes. The pattern was made symmetrical to allow for inverted installation.

The CPE and base station antenna pattern plots and tabulated data are provided in **Exhibit 2**.

Location of Test Points



The proposed base station is a high elevation location chosen to provide 16.1 kilometer (10 mile) coverage. The boundary of the proposed service area is a 16.1 kilometer radius circle which is reduced where there are terrain or other obstructions preventing service. Test points are located on the service area boundary beginning at True North (0º) and then at 10º increments for 36 locations. Note that because the boundary is reduced by terrain obstructions, test points which are at reduced distance follow the highest elevation profile around the base station. Two additional points are studied for each fixed satellite station, the theoretical worst case points. One point is located at the service area boundary at its closest point to the fixed satellite station. That is the point nearest to the fixed satellite station where the attenuation due to distance will be at its minimum. The second point is diametrically opposite the closest point. At the farthest point, the customer premises equipment antenna is oriented directly toward the fixed station satellite antenna and therefore provides no antenna pattern discrimination to reduce the signal toward the fixed station antenna.

Propagation parameters

The studies were conducted using the Longley-Rice propagation model v1.2.2 as implemented in EDX SignalPro. The terrain data was extracted at 100 meter increments from a 3 arcsecond terrain database. The study uses 4/3 earth radius, ground conductivity of 8.0 mS/M, ground dielectric constant of 15.0, non atmospheric absorption, continental temperate climate, with land use clutter loss and height, ground reflection, and Fresnel zone loss. Rain outage is based on Crane's methods, using Crane 1996 data for region A.

Proposed System Parameters

The fixed base stations were modeled at an EIRP of 6 watts in 6 MHz. The customer premise equipment was modeled with a directional maximum EIRP of 1 watt in 1 MHz and an antenna height of 31 meters AGL. The customer premise equipment was oriented toward the base station antenna in both azimuth and elevation. The operating power of the customer premise equipment was fixed at its maximum without use of adaptive power control in order to provide a worst case signal toward the fixed satellite station.

The allowable interference level, based on ITU-R S.1432, to reach delta T/T of 0.5% is -170.1 dBW.

A summary of the study results for each FSS location is provided on the following pages. Details of the path studies for both the base station and CPE test locations are attached as **Annex 1**.

Customer	North Latitude	West Longitude	Site	Received	Azimuth to	Elevation	Distance
CT001	37-48-32.54	122-24-51.44	1.9	-58.4	180.0	5.2	1.8
CT002	37-56-9.19	122-22-57.22	0.0	-72.2	190.0	0.6	16.1
CT003	37-55-45.64	122-21-6.47	14.9	-72.2	199.9	0.5	16.1
CT004	37-55-7.18	122-19-22.56	29.3	-72.2	209.9	0.5	16.1
CT005	37-54-14.99	122-17-48.64	45.8	-72.2	219.9	0.4	16.1
CT006	37-53-10.65	122-16-27.56	69.4	-72.1	229.9	0.3	16.1
CT007	37-51-56.12	122-15-21.8	94.0	-72.1	239.9	0.2	16.1
CT008	37-50-33.65	122-14-33.34	73.2	-72.1	250.0	0.3	16.1
CT009	37-49-5.76	122-14-3.67	56.0	-72.1	260.0	0.4	16.1
CT010	37-47-35.12	122-13-53.68	51.6	-72.1	270.0	0.4	16.1
CT011	37-46-4.48	122-14-3.67	0.0	-72.2	280.1	0.6	16.1
CT012	37-44-36.59	122-14-33.34	0.0	-72.2	290.1	0.6	16.1
CT013	37-46-44.23	122-23-0.36	0.0	-59.6	300.1	3.0	3.1
CT014	37-46-17.95	122-22-55.45	0.0	-60.6	310.1	2.5	3.7
CT015	37-45-59.15	122-23-9.97	0.3	-60.9	320.1	2.4	3.9
CT016	37-43-1.62	122-21-32.47	0.0	-67.9	330.1	1.0	9.7
CT017	37-43-44.58	122-23-5.7	40.5	-65.7	340.1	0.9	7.6
CT018	37-42-42.62	122-23-46.45	61.9	-105.1	350.0	0.6	9.2
CT019	37-41-41.73	122-24-51.44	120.5	-68.8	0.0	0.2	10.9
CT020	37-41-55.84	122-26-6.82	228.8	-68.6	10.0	-0.4	10.6
CT021	37-44-29.21	122-26-16.7	170.2	-63.7	19.9	-0.1	6.1
CT022	37-44-57.8	122-26-45.89	240.5	-63.1	29.9	-0.8	5.6
CT023	37-45-23.96	122-27-10.12	215.9	-62.5	39.9	-0.6	5.3
CT024	37-45-17.55	122-28-18.03	171.5	-64.4	49.9	-0.1	6.6
CT025	37-45-15.75	122-29-55.63	42.4	-66.8	59.9	0.8	8.6
CT026	37-45-58.71	122-30-25.21	29.3	-66.9	69.9	0.9	8.7
CT027	37-46-50.8	122-30-8.2	120.9	-65.9	80.0	0.3	7.9
CT028	37-47-35.12	122-28-46.26	54.7	-63.4	90.0	1.1	5.7
CT029	37-48-7.02	122-28-39.46	47.3	-63.3	100.1	1.2	5.7
CT030	37-49-34.56	122-31-44.94	49.1	-68.7	110.1	0.6	10.7
CT031	37-49-53.7	122-29-53.92	179.3	-66.6	120.1	-0.1	8.5
CT032	37-50-44.7	122-29-36.13	190.6	-67.2	130.1	-0.2	9.1
CT033	37-54-14.99	122-31-54.24	64.6	-72.2	140.1	0.4	16.1
CT034	37-54-36.44	122-29-57.96	93.8	-71.5	150.1	0.3	15.0
CT035	37-53-18.48	122-27-28.92	124.7	-69.1	160.1	0.2	11.3
CT036	37-48-35.78	122-25-4.92	5.1	-57.8	170.1	4.7	1.9
CT116	37-43-46.3	122-15-0.24	0.0	-72.2	296.1	0.6	16.1
CT153	37-42-57.69	122-21-53.31	0.0	-67.8	333.1	1.0	9.6
CT156	37-43-43.36	122-22-41.42	59.4	-66.0	336.1	0.8	7.8
CT273	37-47-46.5	122-28-45.82	42.6	-63.4	93.5	1.2	5.7
CT283	37-48-51	122-31-45.59	0.0	-68.4	103.0	0.9	10.4
CT318	37-51-24.11	122-29-11.25	41.7	-67.6	138.1	0.7	9.5
CT328	37-54-57.8	122-30-40	59.6	-72.2	148.1	0.4	16.1
CT336	37-53-32.77	122-28-12.09	121.0	-69.7	156.1	0.2	12.1
CT362	37-56-16.8	122-24-28.48	46.5	-72.2	182.0	0.4	16.1
CT093	37-47-3.25	122-13-54.9	31.9	-72.2	273.6	0.5	16.1
CT120	37-46-44.23	122-23-0.36	0.0	-59.6	300.1	3.0	3.1
CT300	37-49-53.7	122-29-53.92	179.3	-66.6	120.1	-0.1	8.5

Customer Terminal	Azimuth to hub	Azimuth to Three Peaks	Distance to Three Peaks (km)	Path loss (dB)	Received Signal Level from CT (dBW)	Margin (dB) Relative to -170.1 dBW
CT001	180.0	318.7	50.2	243.5	-289.6	119.5
CT002	190.0	303.3	43.0	242.7	-282.4	112.3
CT003	199.9	302.2	45.7	241.6	-274.8	104.7
CT004	209.9	301.8	48.5	242.5	-275.5	105.4
CT005	219.9	302.0	51.3	242.5	-275.5	105.4
CT006	229.9	302.7	54.0	240.8	-274.1	104.0
CT007	239.9	303.8	56.6	238.0	-268.5	98.4
CT008	250.0	305.2	59.0	246.5	-277.5	107.4
CT009	260.0	306.9	61.2	242.4	-274.0	103.9
CT010	270.0	308.8	63.1	241.4	-265.9	95.8
CT011	280.1	310.9	64.7	242.3	-265.3	95.2
CT012	290.1	313.1	66.0	240.5	-262.2	92.1
CT013	300.1	318.9	54.5	244.5	-259.4	89.3
CT014	310.1	319.3	55.2	244.6	-252.1	82.0
CT015	320.1	320.0	55.4	244.9	-250.3	80.2
CT016	330.1	321.6	61.2	246.8	-254.1	84.0
CT017	340.1	322.3	58.5	247.5	-262.1	92.0
CT018	350.0	324.4	59.7	251.4	-277.8	107.7
CT019	0.0	326.6	60.3	252.7	-279.5	109.4
CT020	10.0	327.9	59.0	252.2	-284.0	113.9
CT021	19.9	325.5	54.9	251.6	-288.1	118.0
CT022	29.9	325.6	53.8	251.5	-288.2	118.1
CT023	39.9	325.6	52.8	251.6	-291.3	121.2
CT024	49.9	327.2	52.0	251.6	-291.6	121.5
CT025	59.9	329.5	50.8	250.2	-290.7	120.6
CT026	69.9	329.4	49.3	250.1	-290.6	120.5
CT027	80.0	328.0	48.1	251.5	-297.8	127.7
CT028	90.0	325.2	48.1	251.5	-297.3	127.2
CT029	100.1	324.3	47.4	250.9	-298.2	128.1
CT030	110.1	327.1	42.6	249.7	-297.5	127.4
CT031	120.1	323.7	43.6	247.3	-294.4	124.3
CT032	130.1	322.0	42.7	253.8	-297.4	127.3
CT033	140.1	319.8	35.5	234.8	-276.1	106.0
CT034	150.1	315.8	36.9	233.3	-275.5	105.4
CT035	160.1	314.5	41.2	233.6	-278.7	108.6
CT036	170.1	318.9	49.9	243.2	-289.2	119.1
CT140	320.1	320.0	55.4	244.9	-250.3	80.2
CT320	140.1	319.8	35.5	234.8	-276.1	106.0
Max						128.1
Min						80.2
Mean						108.1

Note: Details of these path studies are attached as **Annex 1-1**.

Customer Terminal	Azimuth to hub	Azimuth to Salt Creek	Distance to Salt Creek (km)	Path loss (dB)	Received Signal Level from CT (dBW)	Margin (dB) Relative to -170.1 dBW
CT001	180.0	10.4	127.7	248.9	-296.4	126.3
CT002	190.0	10.4	113.4	247.4	-293.1	123.0
CT003	199.9	9.0	113.6	246.2	-293.9	123.8
CT004	209.9	7.7	114.4	242.5	-293.3	123.2
CT005	219.9	6.4	115.7	260.4	-311.2	141.1
CT006	229.9	5.4	117.5	255.9	-306.7	136.6
CT007	239.9	4.5	119.7	259.2	-308.3	138.2
CT008	250.0	3.9	122.1	260.1	-309.3	139.2
CT009	260.0	3.5	124.8	261.1	-304.2	134.1
CT010	270.0	3.3	127.6	261.3	-304.4	134.3
CT011	280.1	3.3	130.4	257.6	-300.7	130.6
CT012	290.1	3.6	133.1	256.4	-299.5	129.4
CT013	300.1	9.0	130.6	249.9	-293.0	122.9
CT014	310.1	8.9	131.3	248.8	-288.7	118.6
CT015	320.1	9.0	132.0	250.6	-290.5	120.4
CT016	330.1	7.7	137.0	242.0	-273.4	103.3
CT017	340.1	8.7	136.1	249.5	-279.5	109.4
CT018	350.0	9.0	138.1	252.2	-272.2	102.1
CT019	0.0	9.5	140.2	248.3	-260.5	90.4
CT020	10.0	10.3	140.1	251.0	-260.8	90.7
CT021	19.9	10.7	135.5	250.5	-262.2	92.1
CT022	29.9	11.1	134.8	247.3	-266.9	96.8
CT023	39.9	11.4	134.1	248.3	-278.1	108.0
CT024	49.9	12.0	134.6	250.2	-281.1	111.0
CT025	59.9	13.0	135.2	245.0	-284.4	114.3
CT026	69.9	13.4	134.1	249.6	-289.0	118.9
CT027	80.0	13.4	132.4	254.5	-296.4	126.3
CT028	90.0	12.7	130.6	248.1	-290.9	120.8
CT029	100.1	12.8	129.6	250.5	-293.3	123.2
CT030	110.1	15.0	128.1	256.9	-299.4	129.3
CT031	120.1	13.9	126.8	249.8	-293.3	123.2
CT032	130.1	13.9	125.2	248.8	-297.5	127.4
CT033	140.1	16.1	119.8	251.0	-299.3	129.2
CT034	150.1	14.9	118.4	249.3	-299.6	129.5
CT035	160.1	13.0	119.9	246.7	-297.1	127.0
CT036	170.1	10.6	127.7	250.5	-299.5	129.4
CT_10	190.0	10.4	113.4	247.4	-293.1	123.0
CT190	10.0	10.3	140.1	251.0	-260.8	90.7
max						141.1
min						90.4
mean						119.9

Note: Details of these path studies are attached as **Annex 1-2**.

Customer Terminal	Azimuth to hub	Azimuth to San Ramon	Distance to San Ramon (km)	Path loss (dB)	Received Signal Level from CT (dBW)	Margin (dB) Relative to -170.1 dBW
CT001	180.0	95.5	54.3	232.3	-264.6	94.5
CT002	190.0	110.6	54.8	238.6	-277.5	107.4
CT003	199.9	110.9	52.0	239.7	-278.7	108.6
CT004	209.9	110.7	49.2	239.9	-278.8	108.7
CT005	219.9	109.9	46.5	244.8	-288.1	118.0
CT006	229.9	108.3	43.9	246.6	-290.7	120.6
CT007	239.9	106.0	41.8	243.0	-288.0	117.9
CT008	250.0	103.0	40.0	238.2	-282.0	111.9
CT009	260.0	99.3	38.8	238.9	-278.5	108.4
CT010	270.0	95.2	38.2	233.0	-269.7	99.6
CT011	280.1	91.0	38.3	229.6	-263.5	93.4
CT012	290.1	87.0	39.0	224.5	-258.2	88.1
CT013	300.1	92.0	51.4	230.9	-268.7	98.6
CT014	310.1	91.1	51.2	231.4	-268.6	98.5
CT015	320.1	90.5	51.6	231.8	-266.7	96.6
CT016	330.1	84.2	49.5	220.5	-249.6	79.5
CT017	340.1	85.9	51.6	220.9	-246.6	76.5
CT018	350.0	83.9	52.8	234.1	-256.9	86.8
CT019	0.0	82.1	54.6	223.1	-244.2	74.1
CT020	10.0	82.8	56.3	220.3	-242.0	71.9
CT021	19.9	87.6	56.2	222.4	-248.9	78.8
CT022	29.9	88.5	56.9	221.8	-245.8	75.7
CT023	39.9	89.3	57.4	224.9	-249.7	79.6
CT024	49.9	89.1	59.1	238.6	-255.8	85.7
CT025	59.9	89.1	61.5	241.9	-256.6	86.5
CT026	69.9	90.3	62.2	233.1	-240.9	70.8
CT027	80.0	91.8	61.8	230.9	-231.1	61.0
CT028	90.0	93.2	59.9	230.8	-228.6	58.5
CT029	100.1	94.2	59.8	230.8	-229.5	59.4
CT030	110.1	96.2	64.5	239.9	-244.2	74.1
CT031	120.1	97.1	61.9	223.7	-240.7	70.6
CT032	130.1	98.6	61.7	218.7	-239.5	69.4
CT033	140.1	103.7	66.2	226.5	-249.9	79.8
CT034	150.1	104.9	63.7	227.5	-259.8	89.7
CT035	160.1	103.6	59.6	225.4	-258.5	88.4
CT036	170.1	95.5	54.6	232.8	-265.1	95.0
CT273	93.5	93.7	38.1	234.5	-268.4	98.3
CT093	273.6	93.5	59.9	231.0	-229.0	58.9
max						120.6
min						58.5
mean						87.9

Note: Details of these path studies are attached as **Annex 1-3**.