

KTNW Minor Modification

Attachment 2, Antenna Technical Data

Washington State University

This attachment describes the proposed antenna to increase coverage of KTNW (DTV, Richland, WA, facility ID 71023) as part of its Phase 1 transition from the current channel 38 assignment to the required channel 22 assignment. Washington State University (“WSU”) is the licensee of KTNW.

This application proposes to locate this antenna at approximately the same position as its proposed replacement antenna (reference LMS application 0000025245) to facilitate the transition to channel 22.

WSU proposes the use of a Micronetixx SFN-3030 10 bay elliptically polarized UHF slotted directional antenna attached to a top-mounted pole. In accordance with the requirements of 47 CFR § 73.625(c), the following information is presented in this attachment:

1. Description: Micronetixx SFN-3030-B-10 (E/P) side mounted, 10 bay center fed elliptically polarized UHF slotted directional antenna, using a “B” non-directional pattern. The elliptical polarization is split between 70% horizontal and 30% vertical. Elevation gain is 8.19 (9.13 dB).
2. Vertical plane pattern plots: *Figure 1* contains the vertical pattern, while *Figure 2* shows vertical field strength values below 10 percent. A vertical plane pattern plot showing detail around the main lobe is in *Figure 3*, clearly demonstrating the 1-degree beam tilt specification.
3. A vertical plane pattern plot in dBk is contained in *Figure 4*. Note that the vertical or elevation pattern is identical for all azimuths, so only one vertical plane pattern is shown.
4. Vertical plane pattern tabulation: The manufacturer’s tabulation of relative field values for the vertical planes is contained in *Table 1*.
5. Depression angle tabulation: The calculations of HAAT, depression angle and ERP at depression angle, considering electrical beam tilt for 36 azimuths are shown in *Table 2*. HAAT was determined using the Commission’s HAAT Calculator¹.

¹ Antenna Height Above Average Terrain (HAAT) Calculator, Media Bureau, fcc.gov

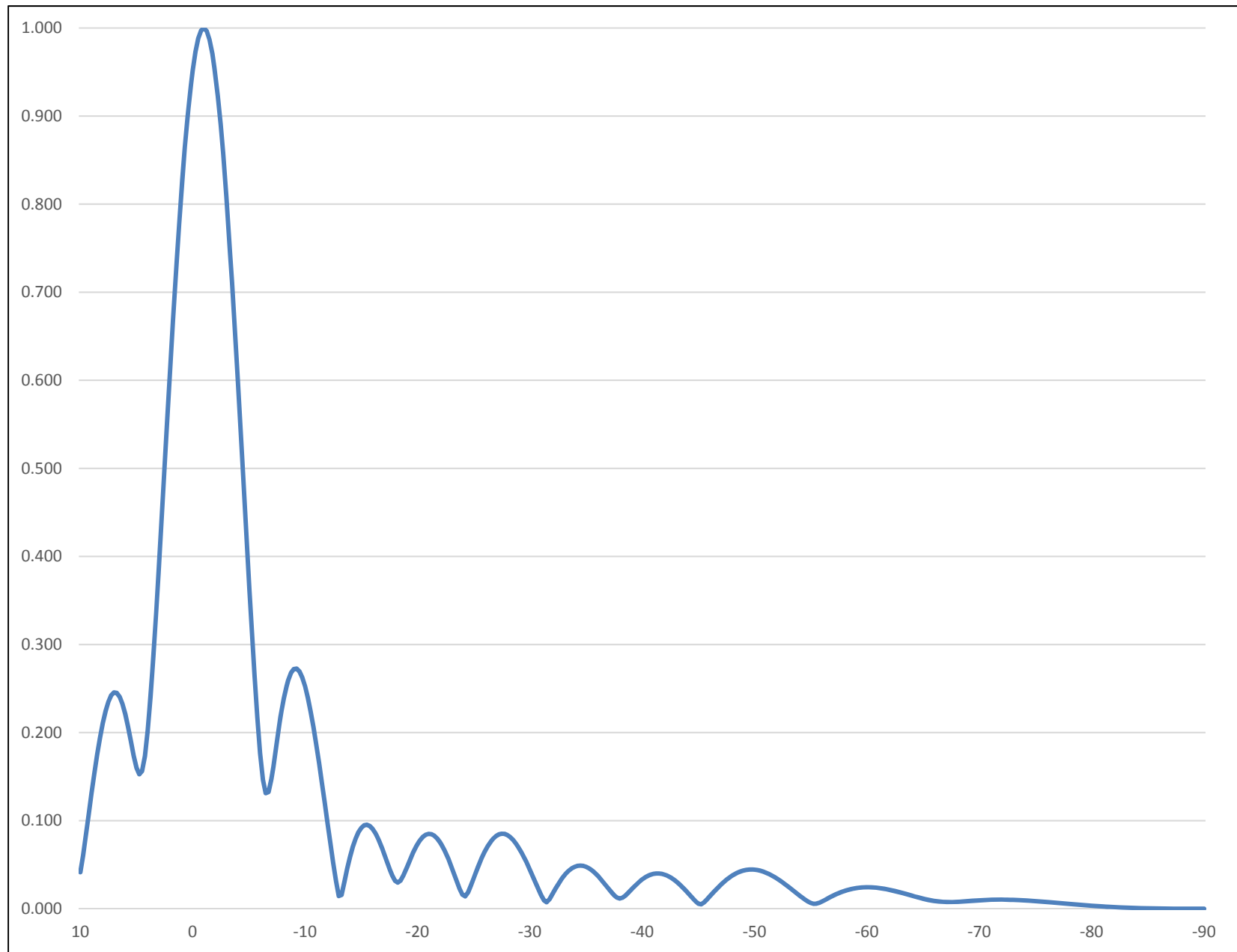


Figure 1. Antenna Vertical Plane Plot

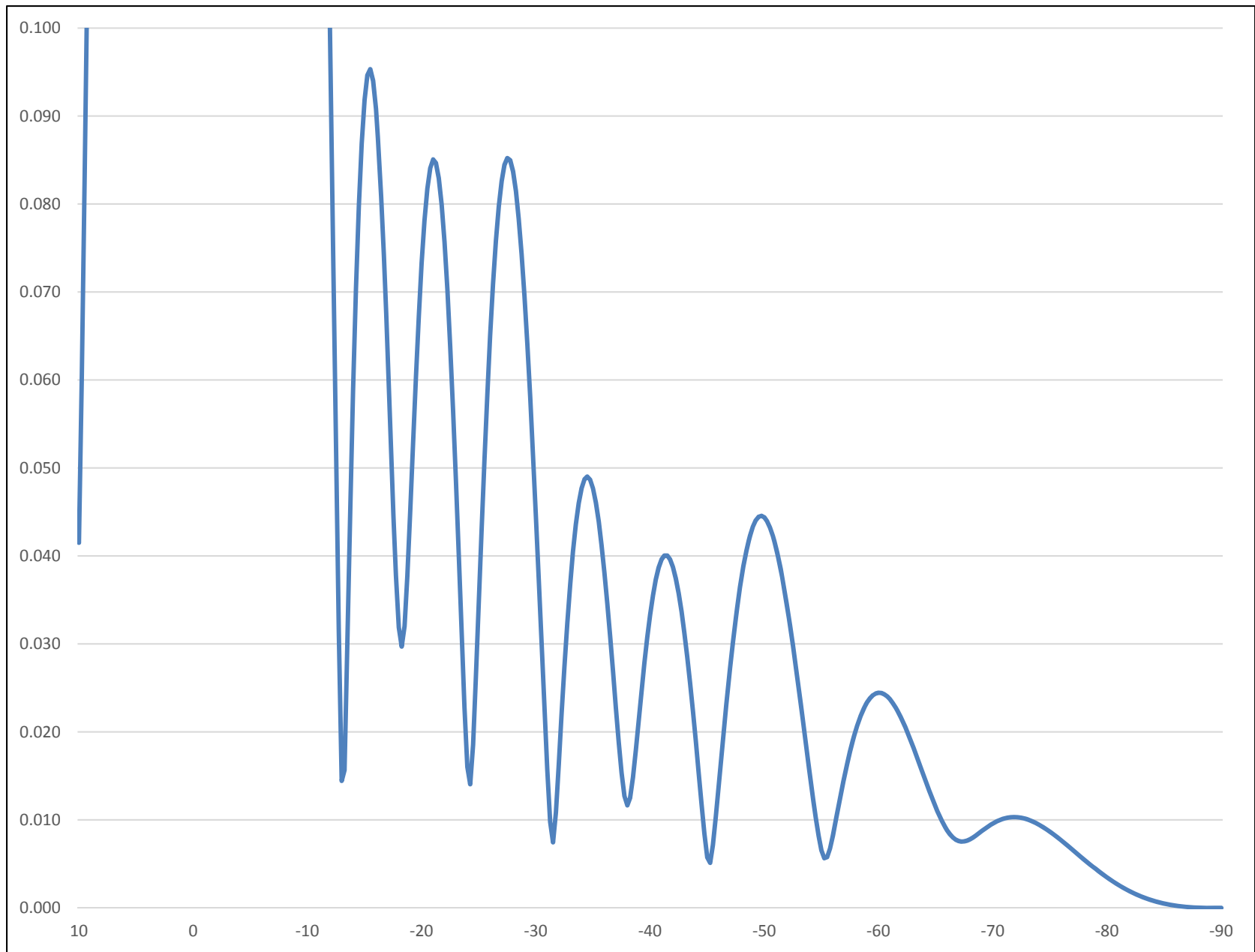


Figure 2. Antenna Vertical Plane Plot, Enlarged Scale

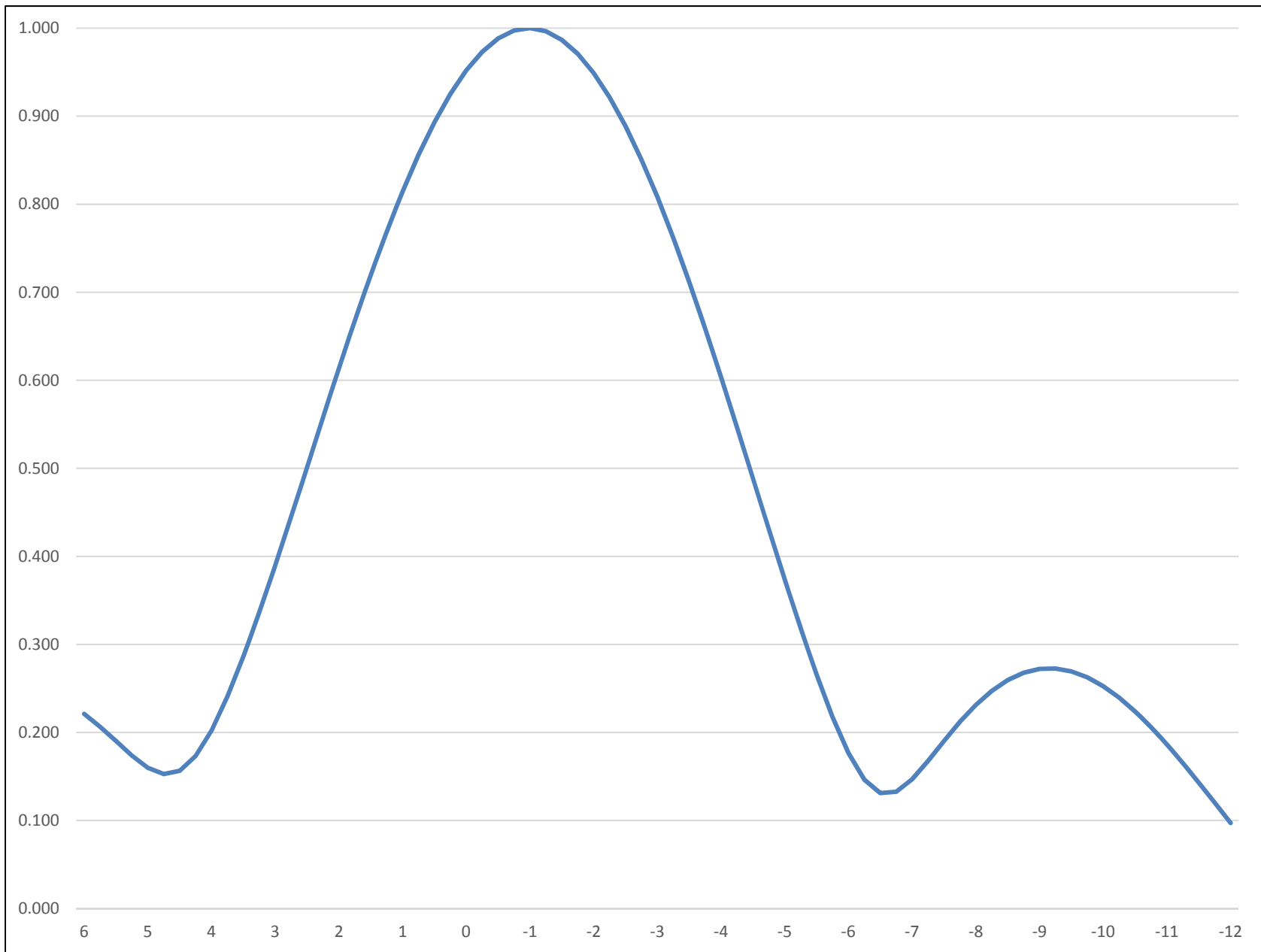


Figure 3. Antenna Vertical Plane Plot, near main lobe

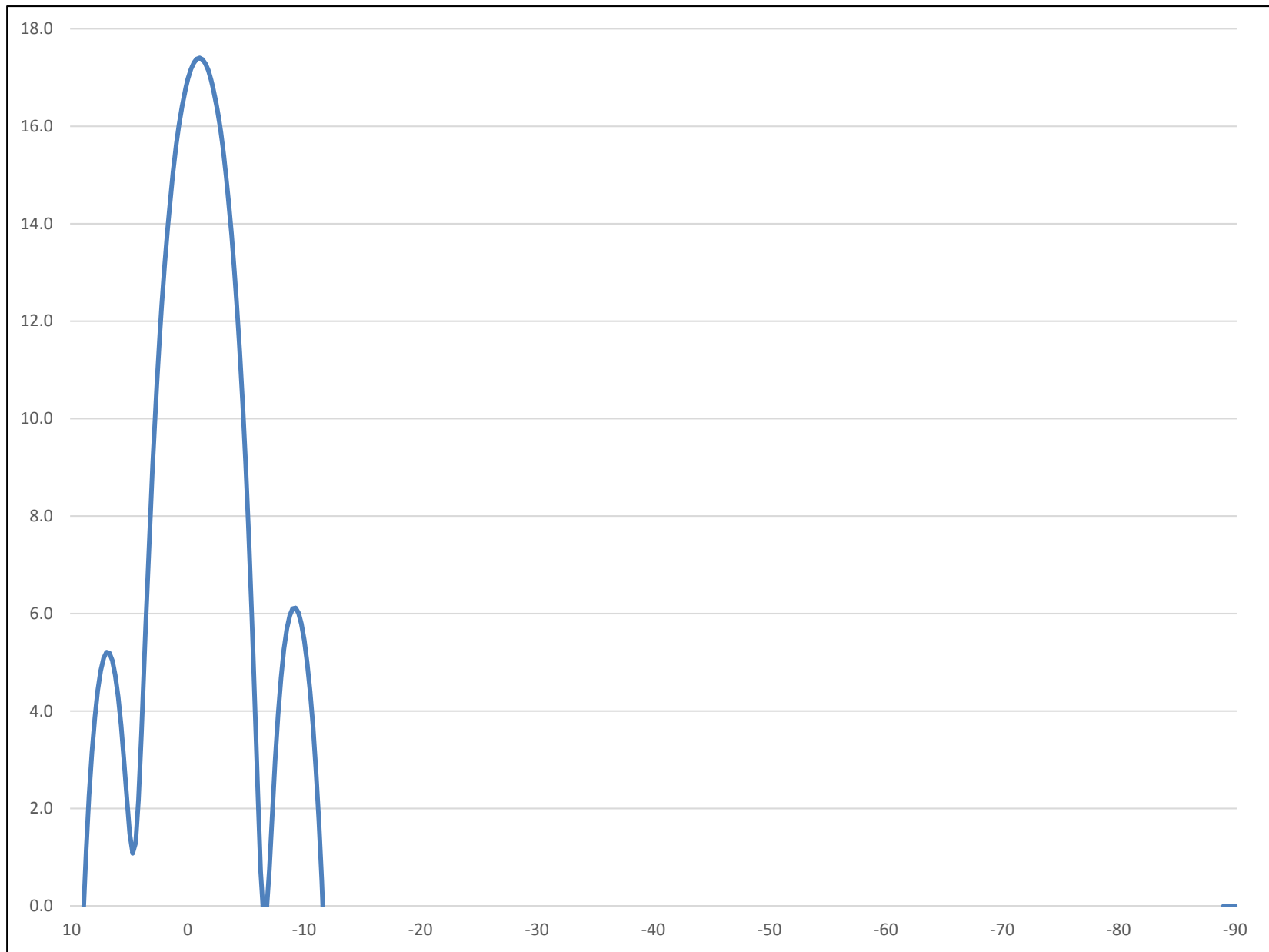


Figure 4. Antenna Vertical Plane Plot in dBk

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
90	0.000	80	0.004	70	0.023	60	0.022	50	0.008
89.75	0.000	79.75	0.004	69.75	0.024	59.75	0.024	49.75	0.011
89.5	0.000	79.5	0.005	69.5	0.024	59.5	0.026	49.5	0.014
89.25	0.000	79.25	0.005	69.25	0.024	59.25	0.027	49.25	0.016
89	0.000	79	0.006	69	0.024	59	0.029	49	0.019
88.75	0.000	78.75	0.006	68.75	0.024	58.75	0.031	48.75	0.021
88.5	0.000	78.5	0.006	68.5	0.024	58.5	0.032	48.5	0.023
88.25	0.000	78.25	0.007	68.25	0.024	58.25	0.034	48.25	0.025
88	0.000	78	0.007	68	0.024	58	0.035	48	0.027
87.75	0.000	77.75	0.008	67.75	0.024	57.75	0.036	47.75	0.028
87.5	0.000	77.5	0.008	67.5	0.024	57.5	0.037	47.5	0.029
87.25	0.000	77.25	0.008	67.25	0.024	57.25	0.038	47.25	0.030
87	0.000	77	0.009	67	0.023	57	0.039	47	0.030
86.75	0.000	76.75	0.009	66.75	0.023	56.75	0.040	46.75	0.030
86.5	0.000	76.5	0.010	66.5	0.022	56.5	0.040	46.5	0.030
86.25	0.000	76.25	0.010	66.25	0.022	56.25	0.040	46.25	0.030
86	0.000	76	0.011	66	0.021	56	0.040	46	0.029
85.75	0.000	75.75	0.012	65.75	0.021	55.75	0.040	45.75	0.028
85.5	0.000	75.5	0.012	65.5	0.020	55.5	0.040	45.5	0.026
85.25	0.000	75.25	0.013	65.25	0.019	55.25	0.040	45.25	0.025
85	0.001	75	0.013	65	0.018	55	0.039	45	0.023
84.75	0.001	74.75	0.014	64.75	0.017	54.75	0.038	44.75	0.021
84.5	0.001	74.5	0.014	64.5	0.017	54.5	0.037	44.5	0.019
84.25	0.001	74.25	0.015	64.25	0.016	54.25	0.036	44.25	0.017
84	0.001	74	0.016	64	0.015	54	0.034	44	0.015
83.75	0.001	73.75	0.016	63.75	0.014	53.75	0.033	43.75	0.013
83.5	0.001	73.5	0.017	63.5	0.013	53.5	0.031	43.5	0.012
83.25	0.001	73.25	0.017	63.25	0.012	53.25	0.029	43.25	0.012
83	0.001	73	0.018	63	0.012	53	0.027	43	0.014
82.75	0.002	72.75	0.018	62.75	0.011	52.75	0.024	42.75	0.016
82.5	0.002	72.5	0.019	62.5	0.011	52.5	0.022	42.5	0.019
82.25	0.002	72.25	0.020	62.25	0.011	52.25	0.019	42.25	0.022
82	0.002	72	0.020	62	0.012	52	0.016	42	0.025
81.75	0.002	71.75	0.021	61.75	0.012	51.75	0.014	41.75	0.028
81.5	0.003	71.5	0.021	61.5	0.013	51.5	0.011	41.5	0.031
81.25	0.003	71.25	0.022	61.25	0.015	51.25	0.008	41.25	0.034
81	0.003	71	0.022	61	0.016	51	0.005	41	0.036
80.75	0.003	70.75	0.022	60.75	0.017	50.75	0.003	40.75	0.039
80.5	0.004	70.5	0.023	60.5	0.019	50.5	0.003	40.5	0.041
80.25	0.004	70.25	0.023	60.25	0.021	50.25	0.006	40.25	0.043

Table 1. Vertical Plane Field Relative Field Strength Tabulation

Note that positive angles are above the radio horizon

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
40	0.044	30	0.045	20	0.084	10	0.042	0	0.952
39.75	0.045	29.75	0.038	19.75	0.086	9.75	0.061	-0.25	0.973
39.5	0.045	29.5	0.031	19.5	0.086	9.5	0.083	-0.5	0.988
39.25	0.045	29.25	0.024	19.25	0.086	9.25	0.107	-0.75	0.997
39	0.044	29	0.017	19	0.083	9	0.131	-1	1.000
38.75	0.043	28.75	0.010	18.75	0.079	8.75	0.154	-1.25	0.996
38.5	0.041	28.5	0.008	18.5	0.073	8.5	0.175	-1.5	0.987
38.25	0.039	28.25	0.013	18.25	0.066	8.25	0.194	-1.75	0.971
38	0.036	28	0.020	18	0.057	8	0.211	-2	0.949
37.75	0.033	27.75	0.027	17.75	0.047	7.75	0.224	-2.25	0.921
37.5	0.029	27.5	0.034	17.5	0.036	7.5	0.235	-2.5	0.888
37.25	0.025	27.25	0.041	17.25	0.024	7.25	0.242	-2.75	0.851
37	0.020	27	0.047	17	0.015	7	0.246	-3	0.808
36.75	0.016	26.75	0.053	16.75	0.017	6.75	0.245	-3.25	0.762
36.5	0.012	26.5	0.057	16.5	0.029	6.5	0.241	-3.5	0.712
36.25	0.009	26.25	0.061	16.25	0.044	6.25	0.233	-3.75	0.659
36	0.010	26	0.064	16	0.059	6	0.221	-4	0.603
35.75	0.014	25.75	0.066	15.75	0.075	5.75	0.207	-4.25	0.546
35.5	0.019	25.5	0.067	15.5	0.091	5.5	0.190	-4.5	0.489
35.25	0.025	25.25	0.066	15.25	0.106	5.25	0.174	-4.75	0.431
35	0.031	25	0.065	15	0.121	5	0.160	-5	0.374
34.75	0.036	24.75	0.063	14.75	0.134	4.75	0.153	-5.25	0.318
34.5	0.042	24.5	0.059	14.5	0.146	4.5	0.156	-5.5	0.266
34.25	0.048	24.25	0.055	14.25	0.156	4.25	0.173	-5.75	0.218
34	0.053	24	0.050	14	0.164	4	0.202	-6	0.177
33.75	0.057	23.75	0.044	13.75	0.171	3.75	0.241	-6.25	0.146
33.5	0.062	23.5	0.037	13.5	0.175	3.5	0.286	-6.5	0.131
33.25	0.065	23.25	0.031	13.25	0.176	3.25	0.336	-6.75	0.133
33	0.068	23	0.025	13	0.176	3	0.390	-7	0.147
32.75	0.071	22.75	0.020	12.75	0.172	2.75	0.445	-7.25	0.168
32.5	0.072	22.5	0.020	12.5	0.166	2.5	0.502	-7.5	0.190
32.25	0.073	22.25	0.024	12.25	0.157	2.25	0.558	-7.75	0.212
32	0.073	22	0.031	12	0.146	2	0.614	-8	0.231
31.75	0.072	21.75	0.039	11.75	0.133	1.75	0.668	-8.25	0.247
31.5	0.071	21.5	0.047	11.5	0.117	1.5	0.720	-8.5	0.259
31.25	0.068	21.25	0.055	11.25	0.099	1.25	0.769	-8.75	0.268
31	0.065	21	0.063	11	0.080	1	0.814	-9	0.272
30.75	0.061	20.75	0.069	10.75	0.060	0.75	0.856	-9.25	0.273
30.5	0.056	20.5	0.075	10.5	0.043	0.5	0.893	-9.5	0.269
30.25	0.051	20.25	0.080	10.25	0.034	0.25	0.925	-9.75	0.263

Table 1 (continued).

Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10	0.253	-20	0.073	-30	0.045	-40	0.033
-10.25	0.239	-20.25	0.078	-30.25	0.037	-40.25	0.036
-10.5	0.224	-20.5	0.082	-30.5	0.030	-40.5	0.037
-10.75	0.206	-20.75	0.084	-30.75	0.023	-40.75	0.039
-11	0.186	-21	0.085	-31	0.016	-41	0.040
-11.25	0.165	-21.25	0.085	-31.25	0.010	-41.25	0.040
-11.5	0.143	-21.5	0.083	-31.5	0.007	-41.5	0.040
-11.75	0.120	-21.75	0.080	-31.75	0.011	-41.75	0.040
-12	0.097	-22	0.076	-32	0.016	-42	0.039
-12.25	0.074	-22.25	0.070	-32.25	0.022	-42.25	0.037
-12.5	0.052	-22.5	0.064	-32.5	0.027	-42.5	0.036
-12.75	0.031	-22.75	0.057	-32.75	0.032	-42.75	0.034
-13	0.014	-23	0.049	-33	0.037	-43	0.031
-13.25	0.016	-23.25	0.040	-33.25	0.041	-43.25	0.029
-13.5	0.030	-23.5	0.031	-33.5	0.044	-43.5	0.026
-13.75	0.045	-23.75	0.023	-33.75	0.046	-43.75	0.022
-14	0.059	-24	0.016	-34	0.048	-44	0.019
-14.25	0.070	-24.25	0.014	-34.25	0.049	-44.25	0.015
-14.5	0.080	-24.5	0.019	-34.5	0.049	-44.5	0.012
-14.75	0.087	-24.75	0.026	-34.75	0.049	-44.75	0.008
-15	0.092	-25	0.035	-35	0.048	-45	0.006
-15.25	0.095	-25.25	0.043	-35.25	0.046	-45.25	0.005
-15.5	0.095	-25.5	0.051	-35.5	0.044	-45.5	0.007
-15.75	0.094	-25.75	0.058	-35.75	0.041	-45.75	0.010
-16	0.091	-26	0.065	-36	0.038	-46	0.014
-16.25	0.086	-26.25	0.071	-36.25	0.035	-46.25	0.017
-16.5	0.080	-26.5	0.076	-36.5	0.031	-46.5	0.021
-16.75	0.072	-26.75	0.080	-36.75	0.027	-46.75	0.024
-17	0.064	-27	0.083	-37	0.023	-47	0.027
-17.25	0.055	-27.25	0.084	-37.25	0.019	-47.25	0.030
-17.5	0.046	-27.5	0.085	-37.5	0.015	-47.5	0.033
-17.75	0.038	-27.75	0.085	-37.75	0.013	-47.75	0.035
-18	0.032	-28	0.084	-38	0.012	-48	0.038
-18.25	0.030	-28.25	0.081	-38.25	0.013	-48.25	0.039
-18.5	0.032	-28.5	0.078	-38.5	0.015	-48.5	0.041
-18.75	0.038	-28.75	0.074	-38.75	0.018	-48.75	0.042
-19	0.045	-29	0.070	-39	0.021	-49	0.043
-19.25	0.053	-29.25	0.064	-39.25	0.025	-49.25	0.044
-19.5	0.060	-29.5	0.058	-39.5	0.028	-49.5	0.044
-19.75	0.067	-29.75	0.051	-39.75	0.031	-49.75	0.045

Table 1 (continued).

Angle	Field	Angle	Field	Angle	Field	Angle	Field
-50	0.044	-60	0.024	-70	0.010	-80	0.003
-50.25	0.044	-60.25	0.024	-70.25	0.010	-80.25	0.003
-50.5	0.043	-60.5	0.024	-70.5	0.010	-80.5	0.003
-50.75	0.042	-60.75	0.024	-70.75	0.010	-80.75	0.003
-51	0.041	-61	0.024	-71	0.010	-81	0.003
-51.25	0.040	-61.25	0.023	-71.25	0.010	-81.25	0.002
-51.5	0.038	-61.5	0.023	-71.5	0.010	-81.5	0.002
-51.75	0.036	-61.75	0.022	-71.75	0.010	-81.75	0.002
-52	0.034	-62	0.022	-72	0.010	-82	0.002
-52.25	0.032	-62.25	0.021	-72.25	0.010	-82.25	0.002
-52.5	0.030	-62.5	0.020	-72.5	0.010	-82.5	0.002
-52.75	0.027	-62.75	0.019	-72.75	0.010	-82.75	0.001
-53	0.025	-63	0.018	-73	0.010	-83	0.001
-53.25	0.023	-63.25	0.018	-73.25	0.010	-83.25	0.001
-53.5	0.020	-63.5	0.017	-73.5	0.010	-83.5	0.001
-53.75	0.017	-63.75	0.016	-73.75	0.010	-83.75	0.001
-54	0.015	-64	0.015	-74	0.009	-84	0.001
-54.25	0.013	-64.25	0.014	-74.25	0.009	-84.25	0.001
-54.5	0.010	-64.5	0.013	-74.5	0.009	-84.5	0.001
-54.75	0.008	-64.75	0.012	-74.75	0.009	-84.75	0.001
-55	0.007	-65	0.011	-75	0.009	-85	0.000
-55.25	0.006	-65.25	0.011	-75.25	0.008	-85.25	0.000
-55.5	0.006	-65.5	0.010	-75.5	0.008	-85.5	0.000
-55.75	0.007	-65.75	0.009	-75.75	0.008	-85.75	0.000
-56	0.008	-66	0.009	-76	0.008	-86	0.000
-56.25	0.010	-66.25	0.008	-76.25	0.007	-86.25	0.000
-56.5	0.012	-66.5	0.008	-76.5	0.007	-86.5	0.000
-56.75	0.013	-66.75	0.008	-76.75	0.007	-86.75	0.000
-57	0.015	-67	0.008	-77	0.007	-87	0.000
-57.25	0.016	-67.25	0.008	-77.25	0.006	-87.25	0.000
-57.5	0.018	-67.5	0.008	-77.5	0.006	-87.5	0.000
-57.75	0.019	-67.75	0.008	-77.75	0.006	-87.75	0.000
-58	0.020	-68	0.008	-78	0.005	-88	0.000
-58.25	0.021	-68.25	0.008	-78.25	0.005	-88.25	0.000
-58.5	0.022	-68.5	0.008	-78.5	0.005	-88.5	0.000
-58.75	0.023	-68.75	0.008	-78.75	0.005	-88.75	0.000
-59	0.023	-69	0.009	-79	0.004	-89	0.000
-59.25	0.024	-69.25	0.009	-79.25	0.004	-89.25	0.000
-59.5	0.024	-69.5	0.009	-79.5	0.004	-89.5	0.000
-59.75	0.024	-69.75	0.009	-79.75	0.004	-89.75	0.000
						-90	0.000

Table 1 (continued).

Direction, Degrees	HAAT	Depression Angle	Vertical Plane Field*	Composite Field	ERP, kW	ERP, dBk
0	517.1	0.63	1.000	1.000	55.00	17.4
10	531.6	0.64	1.000	1.000	55.00	17.4
20	534	0.64	1.000	1.000	55.00	17.4
30	541.9	0.64	1.000	1.000	55.00	17.4
40	543.5	0.65	1.000	1.000	55.00	17.4
50	534.1	0.64	1.000	1.000	55.00	17.4
60	525.7	0.64	1.000	1.000	55.00	17.4
70	521	0.63	1.000	1.000	55.00	17.4
80	490.1	0.61	1.000	1.000	55.00	17.4
90	459.3	0.59	1.000	1.000	55.00	17.4
100	413.2	0.56	1.000	1.000	55.00	17.4
110	376.7	0.54	1.000	1.000	55.00	17.4
120	311.5	0.49	1.000	1.000	55.00	17.4
130	296.7	0.48	1.000	1.000	55.00	17.4
140	281.3	0.46	1.000	1.000	55.00	17.4
150	280.4	0.46	1.000	1.000	55.00	17.4
160	299.4	0.48	1.000	1.000	55.00	17.4
170	294.5	0.48	1.000	1.000	55.00	17.4
180	293.7	0.47	1.000	1.000	55.00	17.4
190	301.8	0.48	1.000	1.000	55.00	17.4
200	311.5	0.49	1.000	1.000	55.00	17.4
210	311.3	0.49	1.000	1.000	55.00	17.4
220	315	0.49	1.000	1.000	55.00	17.4
230	286.9	0.47	1.000	1.000	55.00	17.4
240	246.5	0.43	1.000	1.000	55.00	17.4
250	205.6	0.40	1.000	1.000	55.00	17.4
260	159.9	0.35	1.000	1.000	55.00	17.4
270	155.7	0.35	1.000	1.000	55.00	17.4
280	200.8	0.39	1.000	1.000	55.00	17.4
290	258.2	0.45	1.000	1.000	55.00	17.4
300	348	0.52	1.000	1.000	55.00	17.4
310	386.7	0.54	1.000	1.000	55.00	17.4
320	418.7	0.57	1.000	1.000	55.00	17.4
330	444.6	0.58	1.000	1.000	55.00	17.4
340	467	0.60	1.000	1.000	55.00	17.4
350	490.9	0.61	1.000	1.000	55.00	17.4

*Since the depression angle for all azimuthal directions is less than 1 degree, the minimum relative field strength in the vertical plane is 0.952. Referring to 47 CFR § 73.625(c), this must be rounded to maximum radiation, or 1.000

Table 2. Depression Angle Calculation