

APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT

**K247CA - OMAHA, NEBRASKA
FACILITY ID: 156462
96.7 MHz / 250 W ERP DA**

E-STRING WIRELESS, LTD

JULY, 2016

APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **E-String Wireless, Ltd** ("E-String"), permittee of FM translator station K247CA at Iowa City, Iowa, and are in support of their application for modification of construction permit.¹ This application is a 250-mile window application, and seeks to relocate the translator from Iowa City, Iowa to Omaha, Nebraska.

K247CA is currently licensed on FM channel 247 with a maximum effective radiated power of 250 Watts at a center of radiation of 323 meters above mean sea level utilizing a non-directional antenna. E-String proposes that the translator operate on FM channel 244 with a maximum effective radiated power of 250 Watts at a center of radiation of 459.4 meters above mean sea level. The antenna proposed for use at the new site is a Kathrein/Scala CA5-FM/CP/RM directional Yagi. It is proposed that this antenna be oriented at 180 degrees true.

In addition to the change in the channel of operation, it is also proposed that K247CA be relocated. E-String proposes that the translator be relocated from its authorized location at the tower assigned antenna structure registration number 1023689 at Iowa City to the tower assigned ASRN 1025132 at Omaha. The distance of the relocation as calculated through the use of the Commission's online utility is 373.8 kilometers, or 232.3 miles.

The proposed relocation of the translator is depicted in Exhibit E-1. This map illustrates the proposed and authorized sites. Additionally, circles with radii of 373.8 kilometers (232.3 miles) and 402.3 kilometers (250 miles) are illustrated on the map. As this map confirms, the proposed

¹ The Facility ID for K247CA is 154642.

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relocation of the facility is less than the maximum of 250 miles permitted under the AM revitalization translator relocation window.

Under this application, E-String also proposes a change in the primary station associated with the facility. The proposed primary station is class B AM station KMMQ at Plattsmouth, Nebraska.² KMMQ is licensed to NRG License Sub, LLC ("NRG"). A written retransmission agreement for E-String to rebroadcast KMMQ has been obtained from NRG, and is attached to this technical exhibit as Exhibit E-2.

Exhibit E-3 demonstrates that the proposed translator would qualify as a fill-in translator for AM station KMMQ. On this map are indicated the proposed K247CA 60 dBu service contour, the KMMQ 2 mV/m daytime contour, and a circle representing a twenty-five (25) mile radius centered on the KMMQ transmitter site. As this map demonstrates, the proposed K247CA 60 dBu service contour would be wholly contained within the latter two constructs.

The proposed facility complies with the provisions of Section 74.1204 of the Commission's Rules. Due to the proposed channel of operation, Section 74.1205 is not applicable. Exhibit E-4 is a tabular interference study for the proposed facility. This study demonstrates that the contour overlap provisions of Section 74.1204 would be met by the proposed facility to all relevant authorizations with the exception of KISO at Omaha, Nebraska.³ This facility operates on a third adjacent channel to the proposed translator. The interference situation to this full-power station

² The Facility ID for KMMQ at Plattsmouth, Nebraska is 52802.

³ The Facility ID for KISO at Omaha, Nebraska is 71411.

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will be studied under Section 74.1204(d) of the Commission's Rules. The tabular interference study is graphically depicted in the contour map that comprises Exhibit E-5.

Although normally prohibited contour overlap would exist between the proposed translator and KISO, no interference is predicted to occur within any populated region. Exhibit E-6 illustrates the proposed transmitter site for K247CA along with the KISO 102.65 dBu service contour. This map demonstrates that the specified KISO service contour intersects the proposed K247CA transmitter site.

KISO operates third adjacent to the proposed channel of operation for K247CA. Therefore, interference to the reception of KISO is may potentially occur in regions where the translator field strength is at least 40 dB above the field strength of the full-power station. Specifically, interference to KISO may occur in regions where the K247CA field strength is at least 142.65 dBu.

The power density for the interfering field strength is given by the following equation:

$$S = \frac{E^2}{Z_0}$$

In this equation, S represents the calculated power density in Watts per square meter, E is the electric field intensity, and Z₀ is the characteristic impedance of free space of 377 ohms.

The power density is also given by:

$$S = \frac{P}{4\pi R^2}$$

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Where S is the same units, P is the total power in Watts and R is the distance from the antenna. Rearranging the terms in the equation, it can be solved for the distance to the desired power density as follows:

$$R^2 = \frac{P}{4\pi S}$$

The results of these calculations for depression angles of 0 degrees to 90 degrees are tabulated in Exhibit E-7. The values listed for the relative field at the various depression angles were obtained from published manufacturer data for the proposed antenna. The listed radii values on this tabulation indicate the boundary of the worst-case three-dimensional region in which interference may occur. The worst-case condition results from the fact that the proposed antenna is directional in the horizontal plane, and this tabulation assumes a relative field in that plane of 1.0. As indicated by the tabulation, the worst-case distance to the boundary of the interference region is 8.17 meters.

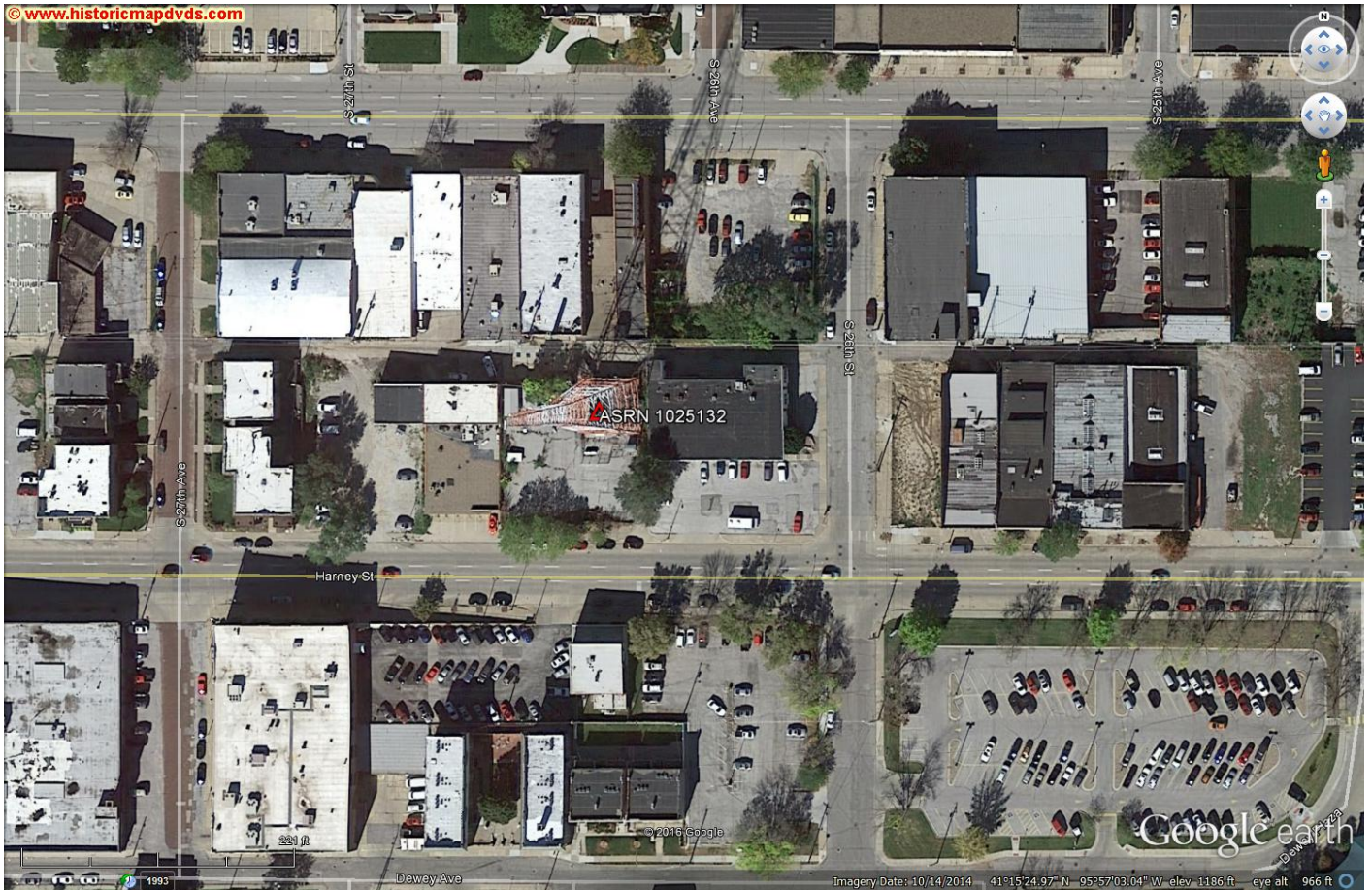
The following satellite image illustrates the proposed structure. From this image, it can be reasonably inferred that there are no structures within an 8.17 meter horizontal radius of the antenna.

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The lack of any population and/or structures, other than the tower itself, in the immediate vicinity of the antenna is further confirmed by the following image, which was taken at street level. This photo looks northwest from the intersection of South 26th Street and Harney, which is immediately southeast of the tower.

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The proposed facility would not constitute a significant environmental impact, and is exempt from environmental processing. The translator antenna would utilize an existing structure that is registered with the Commission. The addition of the translator antenna to this tower would not increase the existing environmental impact already present from the structure.

In addition, the proposed facility would not constitute a radiofrequency radiation hazard to persons at the site. The Commission's on-line *FM Model* utility calculates a maximum power density of $1.05 \mu\text{W}/\text{cm}^2$ at a distance of 26 meters from the tower. This value complies with the uncontrolled environment condition of the Commission's safety standard, and is sufficiently low to categorically exclude the facility.

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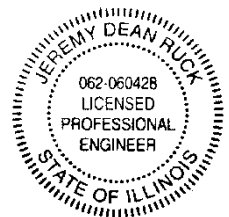
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E-String certifies that it will coordinate with all other users of the site to ensure that workers and other personnel are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Coordination activities will include, but are not necessarily limited to, a reduction in transmitter power or cessation of operation.

The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.



Above signature is digitized copy of actual signature
License Expires November 30, 2017

Jeremy D. Ruck, PE
July 27, 2016

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7.27.2016

K247CA.C

BNPFT20130930BUP
Latitude: 41-41-10 N
Longitude: 091-30-46 W
ERP: 0.25 kW
Channel: 247
Frequency: 97.3 MHz
AMSL Height: 323.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

K247CA.X

BNPFT20130930BUP
Latitude: 41-15-25.40 N
Longitude: 095-57-02.70 W
ERP: 0.25 kW
Channel: 244
Frequency: 96.7 MHz
AMSL Height: 459.4 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

Authorized K247CA
Transmitter Site

Jeremy Ruck & Associates, Inc.

Circle R = 402.3 km

Circle R = 373.8 km

Proposed K247CA
Transmitter Site

Exhibit E-1
Translator Relocation Illustration
K247CA - Omaha, Nebraska
E-String Wireless, Ltd.
July, 2016

Scale 1:5,000,000

0 70 140 210 km

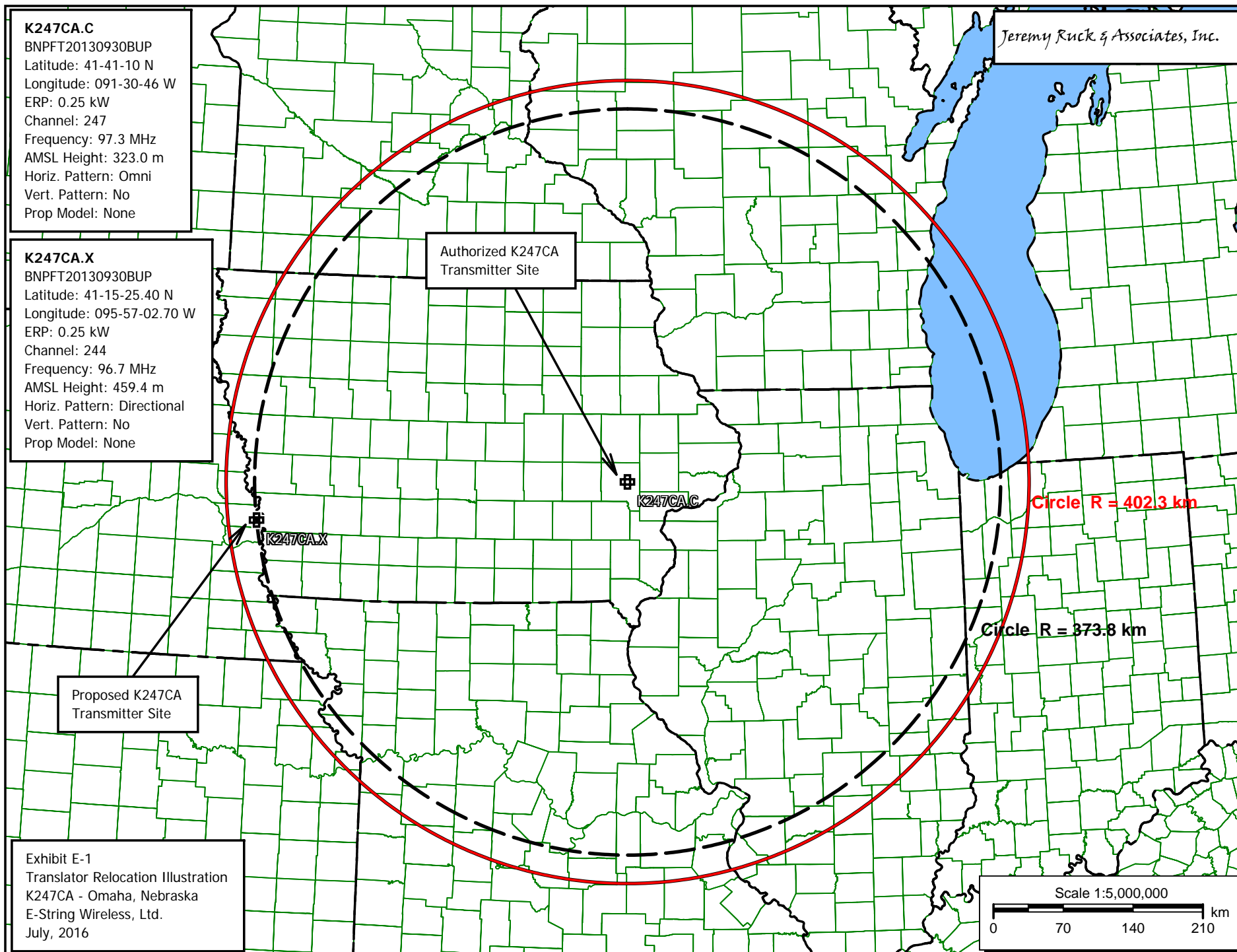




Exhibit E-2
Retrans. Agreement

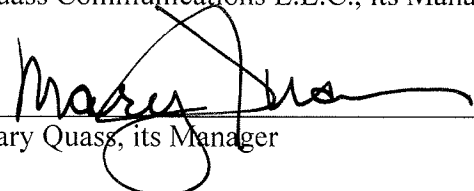
July 26, 2016

To Whom It May Concern:

Licensee NRG License Sub, LLC hereby grants E-String Wireless, LTD. consent to rebroadcast its Omaha, NE, radio station KMMQ-AM (Facility ID 52802) on E-String Wireless' Iowa City, IA, FM Translator K247CA (Facility ID Number 156462, File Number BNPFT-20130930BUP).

NRG License Sub, LLC reserves the right to withdraw the consent to rebroadcast for any reason or no reason whatsoever. This authorization may not be assigned without written permission of NRG License Sub, LLC.

NRG License Sub, LLC
By Quass Communications L.L.C., its Manager

By: 
Mary Quass, its Manager

2875 Mt. Vernon Road SE Cedar Rapids, IA 52403

319.862-0300 - Phone 319.286.9383 - Fax

www.nrgmedia.com

K247CA.X

BNPFT20130930BUP
Latitude: 41-15-25.40 N
Longitude: 095-57-02.70 W
ERP: 0.25 kW
Channel: 244
Frequency: 96.7 MHz
AMSL Height: 459.4 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

Jeremy Ruck & Associates, Inc.

Proposed K247CA
60 dBu Contour

KMMQ 25 mile
Site Radius

K247CA.X

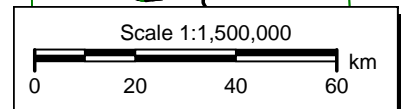
KMMQ

41-00-00 N

40-00-00 N

Exhibit E-3
Service Contour Comparison
K247CA - Omaha, Nebraska
E-String Wireless, Ltd
July, 2016

KMMQ 2 mV/m
Daytime Contour



Jeremy Ruck & Associates, Inc.
Consulting Engineers - Canton, Illinois

Exhibit E-4 - Tabular Interference Study
K247CA - Omaha, Nebraska
CH# 244D - 96.7 MHz, Pwr= 0.25 kW DA, HAAT= 130.8 M, COR= 459.4 M
Average Protected F(50-50)= 14.69 km
Standard Directional

REFERENCE
41 15 25.4 N.
95 57 02.7 W.

DISPLAY DATES
DATA 07-27-16
SEARCH 07-27-16

CH CITY	CALL	TYPE STATE	ANT	AZI <--	DIST FILE #	LAT LNG	PWR(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
241C0 Omaha	KISO	LIC NCX NE		312.6 132.5	8.51 BLH20060531ANS	41 18 32.0 96 01 33.0	82.000 331	10.2 674	73.1 Clear Channel	-6.6*	-64.7*
245C1 Seward	KZKX	LIC _CX NE		258.9 78.3	75.41 BLH20160408AAU	41 07 23.6 96 50 03.7	100.000 183	95.3 614	64.3 Alpha 3e Licensee Lic	-27.8*	0.1
243C1 Audubon	KSOM	LIC _CN IA		77.6 258.4	95.34 BLH19950817KB	41 26 07.0 94 50 00.0	100.000 161	93.2 556	62.6 Meredith Communications L.	-4.3	23.3
247C3 Blair	KBLR-FM	LIC ZEN NE		333.3 153.1	47.60 BLH20010830AAH	41 38 21.0 96 12 31.0	25.000 92	4.1 436	37.8 Walnut Radio, Lic	37.4	7.9

Terrain database is NED 03 SEC, R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
In & Out distances between contours are shown at closest points. Reference zone= West Zone, Co to 3rd adjacent.
All separation margins (if shown) include rounding.
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
"*"affixed to 'IN' or 'OUT' values = site inside restricted contour.

K247CA.X

BNPFT20130930BUP

Latitude: 41-15-25.40 N

Longitude: 095-57-02.70 W

ERP: 0.25 kW

Channel: 244

Frequency: 96.7 MHz

AMSL Height: 459.4 m

Horiz. Pattern: Directional

Vert. Pattern: No

Prop Model: None

Jeremy Ruck & Associates, Inc.

- 60 dBu F(50,50) Service Contour
- 40 dBu F(50,10) Interference Contour
- 54 dBu F(50,10) Interference Contour
- 100 dBu F(50,10) Interference Contour

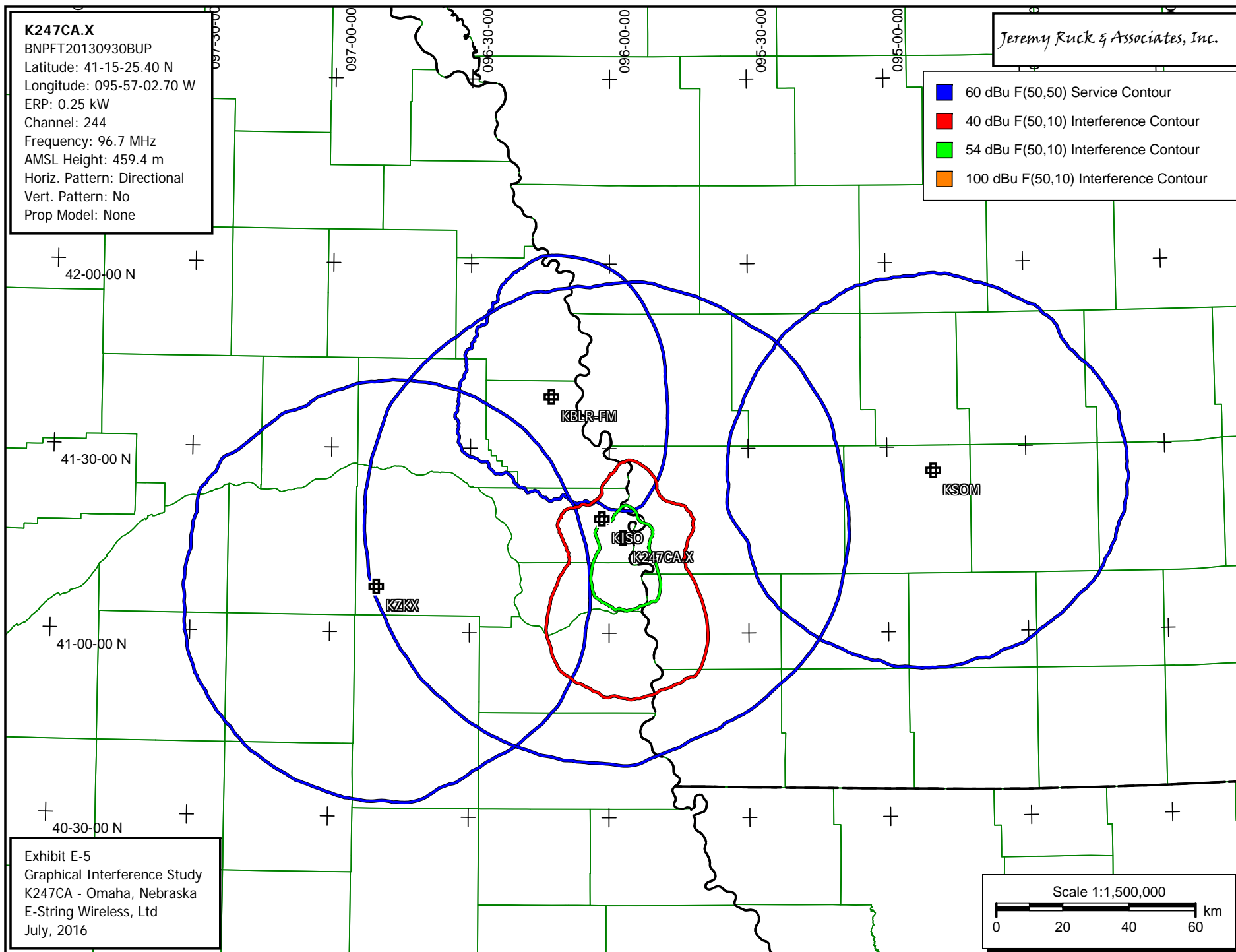
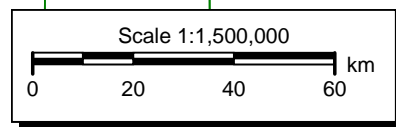


Exhibit E-5
Graphical Interference Study
K247CA - Omaha, Nebraska
E-String Wireless, Ltd
July, 2016



K247CA.X

BNPFT20130930BUP
Latitude: 41-15-25.40 N
Longitude: 095-57-02.70 W
ERP: 0.25 kW
Channel: 244
Frequency: 96.7 MHz
AMSL Height: 459.4 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

KISO

BLH20060531ANS
Latitude: 41-18-32 N
Longitude: 096-01-33 W
ERP: 82.00 kW
Channel: 241
Frequency: 96.1 MHz
AMSL Height: 674.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

KISO Transmitter
Site Location

Jeremy Ruck & Associates, Inc.

FCC F(50-50) 102.65 dBu (FCC HAAT)

KISO 102.65 dBu
F(50,50) Contour

Proposed K247CA
Transmitter Site

Exhibit E-6
Interference Study
K247CA - Omaha, Nebraska
E-String Wireless, Ltd
July, 2016

Scale 1:150,000

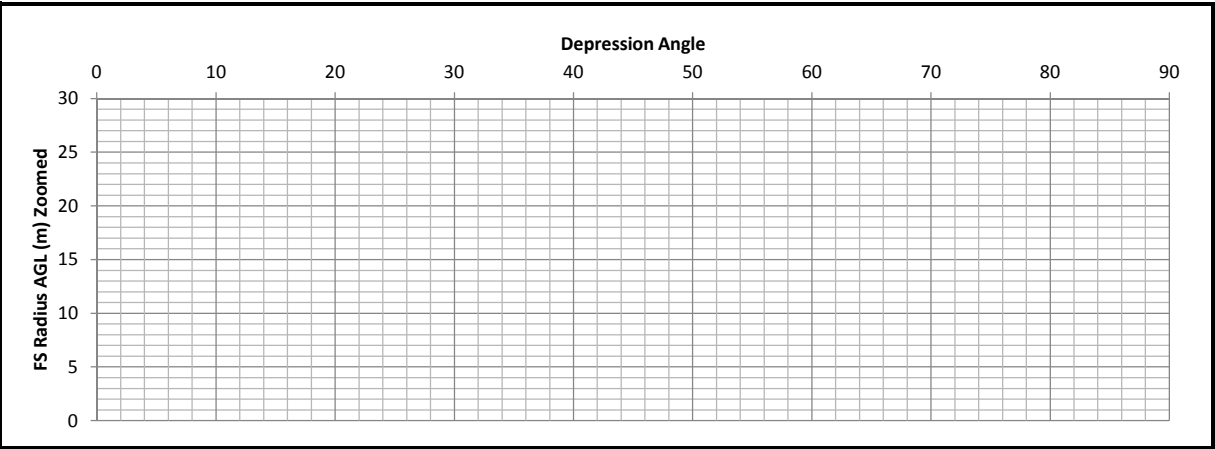
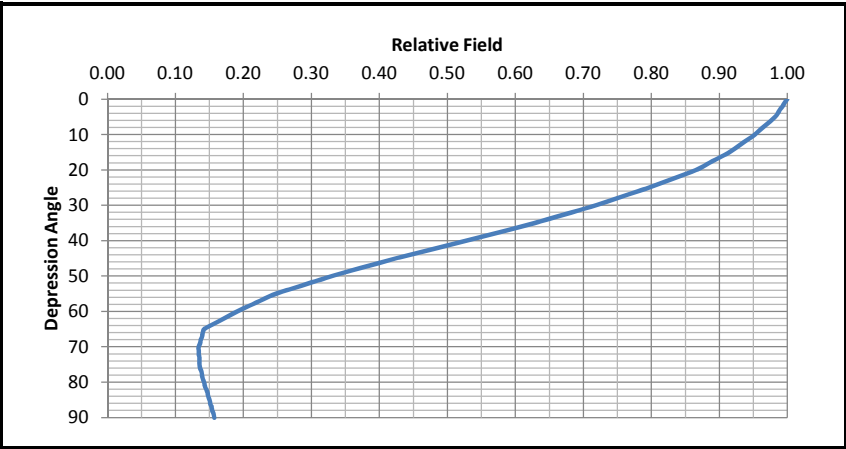
0 2 4 6 km

Exhibit E-7

Proximity Interference Analysis

K247CA - Omaha, Nebraska

Antenna No:	82	↕	↕	Center of Radiation:	100 m AGL
Manufacturer:	Scala	↕↕↕		Effective Radiated Power:	250 Watts
Model:	CA5-FM-CPRM			FS Contour:	142.65 dBu
Number of Bays:	N/A			E Field Strength:	13.56751 V/m
Bay Spacing:	Log			Z0:	377 Ohms
				Power Density:	0.488268435 W/m^2



Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	250.00	8.17	8.17	0.00	100.00
1	0.9960	0.9920	248.00	8.14	8.14	0.14	99.86
2	0.9930	0.9860	246.51	8.12	8.11	0.28	99.72
3	0.9890	0.9781	244.53	8.08	8.07	0.42	99.58
4	0.9860	0.9722	243.05	8.06	8.04	0.56	99.44
5	0.9820	0.9643	241.08	8.03	8.00	0.70	99.30
6	0.9760	0.9526	238.14	7.98	7.93	0.83	99.17
7	0.9700	0.9409	235.23	7.93	7.87	0.97	99.03
8	0.9640	0.9293	232.32	7.88	7.80	1.10	98.90
9	0.9580	0.9178	229.44	7.83	7.73	1.23	98.77
10	0.9520	0.9063	226.58	7.78	7.66	1.35	98.65
11	0.9450	0.8930	223.26	7.72	7.58	1.47	98.53
12	0.9370	0.8780	219.49	7.66	7.49	1.59	98.41
13	0.9300	0.8649	216.23	7.60	7.41	1.71	98.29
14	0.9220	0.8501	212.52	7.54	7.31	1.82	98.18
15	0.9150	0.8372	209.31	7.48	7.22	1.94	98.06
16	0.9050	0.8190	204.76	7.40	7.11	2.04	97.96
17	0.8950	0.8010	200.26	7.32	7.00	2.14	97.86
18	0.8850	0.7832	195.81	7.23	6.88	2.24	97.76
19	0.8760	0.7674	191.84	7.16	6.77	2.33	97.67
20	0.8660	0.7500	187.49	7.08	6.65	2.42	97.58
21	0.8520	0.7259	181.48	6.96	6.50	2.50	97.50
22	0.8380	0.7022	175.56	6.85	6.35	2.57	97.43
23	0.8240	0.6790	169.74	6.74	6.20	2.63	97.37
24	0.8100	0.6561	164.03	6.62	6.05	2.69	97.31
25	0.7960	0.6336	158.40	6.51	5.90	2.75	97.25
26	0.7800	0.6084	152.10	6.38	5.73	2.80	97.20
27	0.7650	0.5852	146.31	6.25	5.57	2.84	97.16
28	0.7490	0.5610	140.25	6.12	5.41	2.87	97.13
29	0.7340	0.5388	134.69	6.00	5.25	2.91	97.09
30	0.7180	0.5155	128.88	5.87	5.08	2.93	97.07
31	0.7000	0.4900	122.50	5.72	4.90	2.95	97.05
32	0.6820	0.4651	116.28	5.57	4.73	2.95	97.05
33	0.6640	0.4409	110.22	5.43	4.55	2.96	97.04
34	0.6460	0.4173	104.33	5.28	4.38	2.95	97.05
35	0.6280	0.3944	98.60	5.13	4.21	2.94	97.06
36	0.6080	0.3697	92.42	4.97	4.02	2.92	97.08
37	0.5880	0.3457	86.44	4.81	3.84	2.89	97.11
38	0.5680	0.3226	80.66	4.64	3.66	2.86	97.14
39	0.5480	0.3003	75.08	4.48	3.48	2.82	97.18
40	0.5280	0.2788	69.70	4.32	3.31	2.77	97.23
41	0.5070	0.2570	64.26	4.14	3.13	2.72	97.28
42	0.4860	0.2362	59.05	3.97	2.95	2.66	97.34
43	0.4650	0.2162	54.06	3.80	2.78	2.59	97.41
44	0.4440	0.1971	49.28	3.63	2.61	2.52	97.48
45	0.4230	0.1789	44.73	3.46	2.45	2.45	97.55

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.4230	0.1789	44.73	3.46	2.45	2.45	97.55
46	0.4050	0.1640	41.01	3.31	2.30	2.38	97.62
47	0.3860	0.1490	37.25	3.16	2.15	2.31	97.69
48	0.3670	0.1347	33.67	3.00	2.01	2.23	97.77
49	0.3480	0.1211	30.28	2.84	1.87	2.15	97.85
50	0.3290	0.1082	27.06	2.69	1.73	2.06	97.94
51	0.3130	0.0980	24.49	2.56	1.61	1.99	98.01
52	0.2960	0.0876	21.90	2.42	1.49	1.91	98.09
53	0.2800	0.0784	19.60	2.29	1.38	1.83	98.17
54	0.2630	0.0692	17.29	2.15	1.26	1.74	98.26
55	0.2470	0.0610	15.25	2.02	1.16	1.65	98.35
56	0.2350	0.0552	13.81	1.92	1.07	1.59	98.41
57	0.2240	0.0502	12.54	1.83	1.00	1.54	98.46
58	0.2130	0.0454	11.34	1.74	0.92	1.48	98.52
59	0.2010	0.0404	10.10	1.64	0.85	1.41	98.59
60	0.1900	0.0361	9.03	1.55	0.78	1.35	98.65
61	0.1800	0.0324	8.10	1.47	0.71	1.29	98.71
62	0.1710	0.0292	7.31	1.40	0.66	1.23	98.77
63	0.1610	0.0259	6.48	1.32	0.60	1.17	98.83
64	0.1510	0.0228	5.70	1.23	0.54	1.11	98.89
65	0.1420	0.0202	5.04	1.16	0.49	1.05	98.95
66	0.1400	0.0196	4.90	1.14	0.47	1.05	98.95
67	0.1390	0.0193	4.83	1.14	0.44	1.05	98.95
68	0.1370	0.0188	4.69	1.12	0.42	1.04	98.96
69	0.1360	0.0185	4.62	1.11	0.40	1.04	98.96
70	0.1340	0.0180	4.49	1.10	0.37	1.03	98.97
71	0.1340	0.0180	4.49	1.10	0.36	1.04	98.96
72	0.1340	0.0180	4.49	1.10	0.34	1.04	98.96
73	0.1350	0.0182	4.56	1.10	0.32	1.06	98.94
74	0.1350	0.0182	4.56	1.10	0.30	1.06	98.94
75	0.1350	0.0182	4.56	1.10	0.29	1.07	98.93
76	0.1360	0.0185	4.62	1.11	0.27	1.08	98.92
77	0.1380	0.0190	4.76	1.13	0.25	1.10	98.90
78	0.1390	0.0193	4.83	1.14	0.24	1.11	98.89
79	0.1400	0.0196	4.90	1.14	0.22	1.12	98.88
80	0.1420	0.0202	5.04	1.16	0.20	1.14	98.86
81	0.1430	0.0204	5.11	1.17	0.18	1.15	98.85
82	0.1450	0.0210	5.26	1.19	0.16	1.17	98.83
83	0.1470	0.0216	5.40	1.20	0.15	1.19	98.81
84	0.1480	0.0219	5.48	1.21	0.13	1.20	98.80
85	0.1500	0.0225	5.63	1.23	0.11	1.22	98.78
86	0.1510	0.0228	5.70	1.23	0.09	1.23	98.77
87	0.1530	0.0234	5.85	1.25	0.07	1.25	98.75
88	0.1540	0.0237	5.93	1.26	0.04	1.26	98.74
89	0.1560	0.0243	6.08	1.28	0.02	1.28	98.72
90	0.1570	0.0246	6.16	1.28	0.00	1.28	98.72

