SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT CAPSTAR TX LLC		
MAILING ADDRESS 2625 S MEMORIAL DRIVE, SUITE A		
CITY TULSA	STATE OK	ZIP CODE 74129

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WIBA	MADISON, WI			

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No.

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☐ No

If Yes, explain in an Exhibit.

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☐ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☐ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
Stephen G. Davis		
Title	Date	Telephone Number
Senior Vice President Engineering	10/3/13	918-664-4581

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
Capstar TX LLC

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☐ Station License ☑ Direct Measurement of Power

1. Facilities authorized in construction permit					
Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WIBA	NA	1310	unlimited	5.0	5.0

2. Station location	
State	City or Town
WI	Madison

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
WI	Dane	Madison	2651 S. Fish Hatchery Rd.

4. Main studio location			
State	County	City or Town	Street address (or other identification)
WI	Dane	Madison	2651 S. Fish Hatchery Rd.

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
WI	Dane	Madison	2651 S. Fish Hatchery Rd.

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. Engineering Exhibit

8. Operating constants:	
RF common point or antenna current (in amperes) without modulation for night system 10.4	RF common point or antenna current (in amperes) without modulation for day system 10.9
Measured antenna or common point resistance (in ohms) at operating frequency Night 50 Day 42	Measured antenna or common point reactance (in ohms) at operating frequency Night 0 Day -131

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (ASRN 1035428)	0°	---	1.000	---		
2	-34.0°	---	0.827	---		
3	+96.2°	---	0.525	---		

Manufacturer and type of antenna monitor: Potomac Instruments AM19 (204)

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
see attached	see attached	see attached	see attached	Exhibit No. NA

Excitation ☑ Series ☐ Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude 42 ° 59 ' 58 "	West Longitude 89 ° 25 ' 47 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. Engineering Exhibit

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. NA

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

none

11. Give reasons for the change in antenna or common point resistance.

NA

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
Samuel T. Cox, P.E.	Samuel T. Cox, P.E.
Address (include ZIP Code) 2625 S. Memorial Drive Suite A Tulsa, OK 74129	Date 1/22/2013 Telephone No. (Include Area Code) 918-664-4581

☐ Technical Director

☑ Registered Professional Engineer

☐ Chief Operator

☐ Technical Consultant

☐ Other (specify)

TOWER SUMMARY

	T1	T2	T3
Type Radiator	uniform cross section, guyed steel tower	tapered cross section, self-supporting steel tower	tapered cross section, self-supporting steel tower
Overall height in meters of radiator above base insulator, or above base, if grounded	128.0m	59.4m	59.4m
Overall height in meters above ground (without obstruction lighting)	130.0m	60.0m	60.0m
Overall height in meters above ground (include obstruction lighting)	132.0m	60.0m	60.0m

ENGINEERING EXHIBIT

Application for Direct Power Measurement

WIBA (AM)

Madison, WI

Capstar TX Limited Partnership

FID 17384

1310 kHz

DA-N

Table of Contents

Engineering Statement

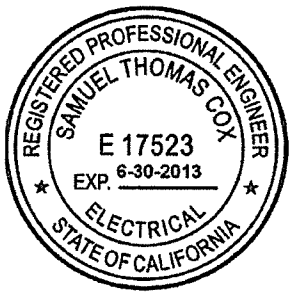
This application is being filed to relicense the existing nighttime operation of WIBA (AM) Madison, WI pursuant to the sections of 47 CFR 73.151 allowing performance verification by computer modeling and sampling system verification. No changes are proposed to the licensed non-directional daytime operation. No changes were made to the ground system or radiators and they remain as authorized in the current station license BZ-20000209ABC. The antenna system measurements included in this application were made on July 24, 2012 by Messrs. Erik W. Kuhlmann and Stephen George unless otherwise noted. Reference point measurements were made by Mr. Scott Schimmele October 9-10, 2012.

Analysis of the nighttime antenna system was performed using a combination of a method of moments model and a circuit model. The method of moments model was produced using the computer program Expert Mininec Broadcast Professional version 14.6 by EM Scientific, Inc. The circuit model was produced using the nodal analysis program WCAP Pro version 1.1 by Westberg Consulting. The impedance of each radiator was measured at the point near the base where the sampling device is placed with the other radiators shorted. All shunting elements attached to the radiators remained in place. The method of moments models and the circuit models for each radiator were adjusted to produce the same matrix impedances as those measured.

Once the models were adjusted to match the measured matrix impedances, the proper base drive voltages were calculated to generate the fields necessary to form the required pattern for nighttime operation utilizing the array synthesis module built into the program. The current distribution was calculated for each radiator and given that the sampling system utilizes base current sampling devices the operating parameters calculated from the resulting currents at each base node and the associated circuit model for each radiator.

Samuel T. Cox, P.E.

January 22, 2013



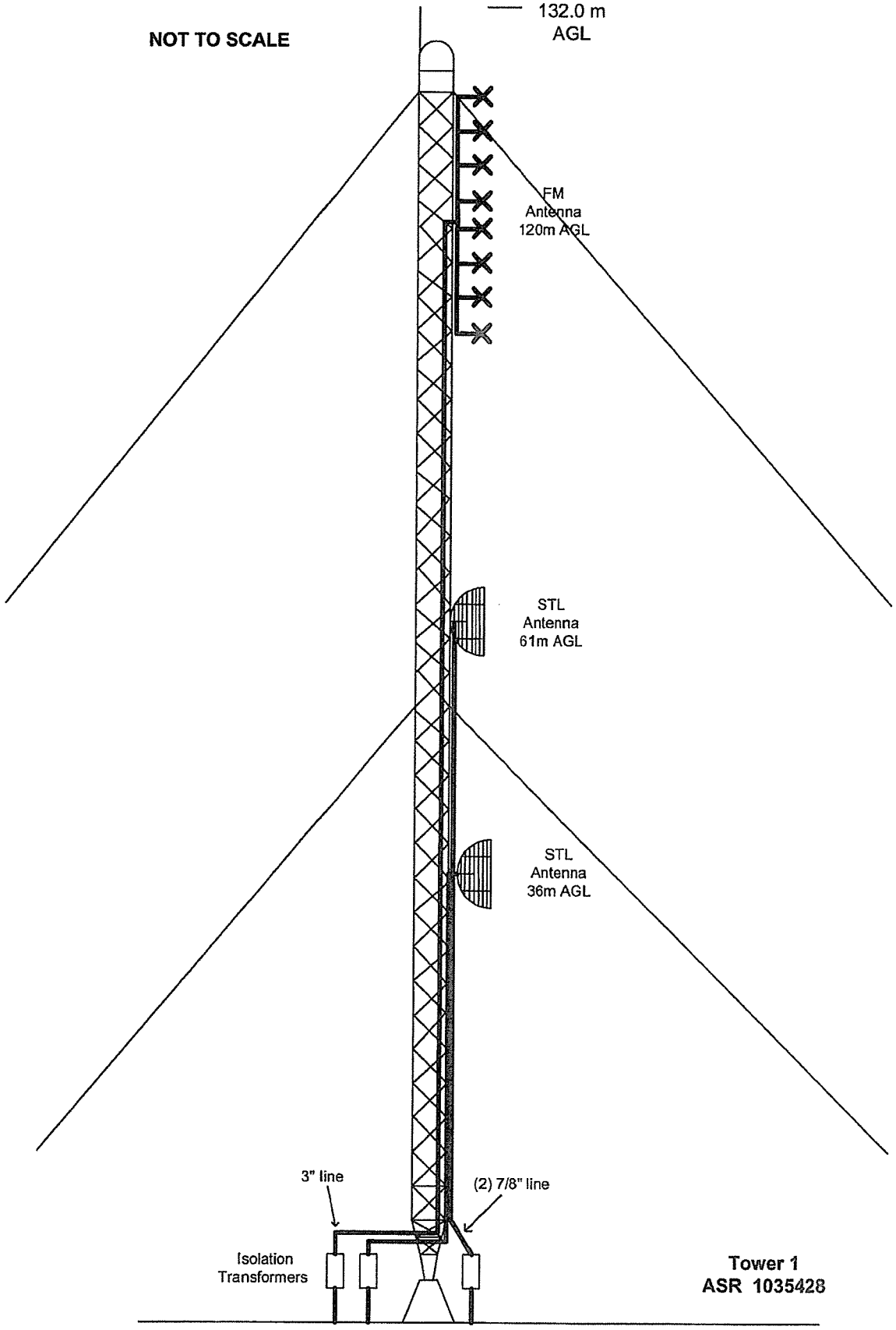
Description of Radiators

The WIBA (AM) nighttime antenna system consists of three radiators: a single triangular, uniform cross section, guyed tower 201.2 electrical degrees in height and two identical triangular self-supporting towers 93.5 electrical degrees in height. The uniform cross section guyed tower has a face width of 76.2 centimeters. The self-supporting towers taper in irregular steps from a width of 203 centimeters at the base to 61 centimeters at the top.

The radiator corresponding to tower number 1 (ASRN 1035428) also serves as the support structure for the WIBA-FM Sauk City, WI auxiliary antenna (BLH-900507KB) and two microwave dishes for studio to transmitter links. An isolation device is associated with each of these three antennas to accommodate the transition of their transmission lines across the base of the tower. The shunt capacitance associated with these isolation devices was accounted for in the circuit model. A sketch of the tower is included as part of this report.

Description of Sampling System

The sampling system consists of equal lengths of 3/8" solid outer jacket coaxial cable connected to a Delta Model TCT-1 toroidal current transformer located near the base of each radiator. The sampling lines are buried and exposed to similar environmental conditions. The antenna monitor is a Potomac Instruments AM19 (204) S/N 497 last calibrated by the manufacturer on 5/8/2012.



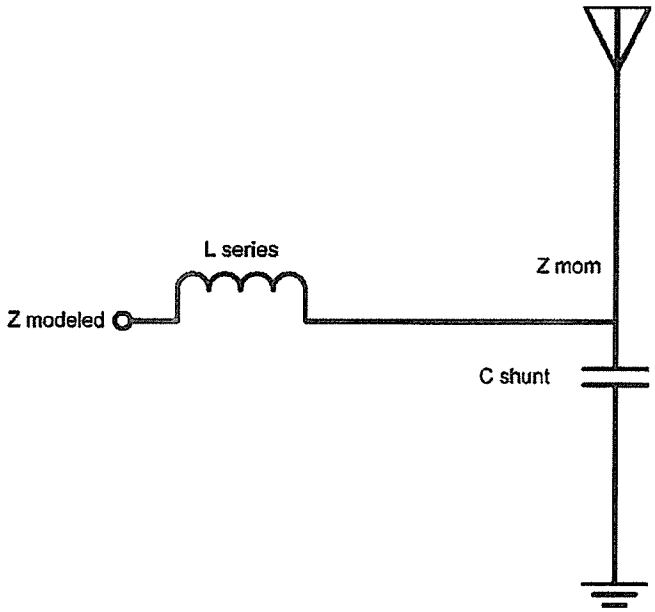
Sketch of Additional Antennas

Description of Model

The overall model of the antenna system consists of two components: the method of moments model and the circuit model. The method of moments model utilizes an equivalent radius wire model for the guyed tower while an equivalent stepped radius "wedding cake" model is used for the self-supporting towers. The effective radius used for the guyed tower falls within the range of 80-150% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides. The effective radius for each wire representing a step used in the self-supporting towers falls within the range of 80-150% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides. In those sections with tapering cross sectional areas, the mean face width of the section is used for the calculation. The method of moments model was adjusted by varying the electrical height of the radiators to produce an impedance at the base node such that when combined with the circuit model produced an impedance within +/- 2Ω and +/- 4% of the measured matrix resistance and reactance at the measurement point. The modeled electrical heights used fall within the range of 75-125% of the physical height. No less than one segment for each ten electrical degrees of the towers' *physical height* is used for each element in the array.

The method of moments computer program generated no errors when evaluating the problem definition used in the model however it does generate a segment length to ratio warning associated with the base segment of each self-supporting tower therefore a stability analysis has been included in this report to show the stability of the model relative to segment lengths with the overall radiator height held constant.

The circuit model consists of a lumped series inductive reactance and a lumped shunt capacitive reactance combined with the calculated base impedance produced by the method of moments model. The general form of the circuit model is:



MoM Calculated Impedance Tower 1 Driven All Others Shorted

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT1DAOS 12-17-2012 12:01:09

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.31	**51.689**	**-213.39**	219.56	283.6	19.569	-.88849	-7.328

INPUT FILE

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT1DAOS 12-17-2012 12:01:41

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	21
		0	0	220.7		
2	none	90.	175.5	0	.6791	2
		90.	175.5	7.7		
3	none	90.	175.5	7.7	.3881	4
		90.	175.5	35.7		
4	none	90.	175.5	35.7	.3274	4
		90.	175.5	64.5		
5	none	90.	175.5	64.5	.2911	4
		90.	175.5	93.		
6	none	180.	175.5	0	.6791	2
		180.	175.5	7.7		
7	none	180.	175.5	7.7	.3881	4
		180.	175.5	35.7		
8	none	180.	175.5	35.7	.3274	4
		180.	175.5	64.5		
9	none	180.	175.5	64.5	.2911	4
		180.	175.5	93.		

Number of wires = 9
current nodes = 49

	minimum wire	minimum value	maximum wire	maximum value
Individual wires				
segment length	2	3.85	1	10.5095
radius	5	.2911	2	.6791

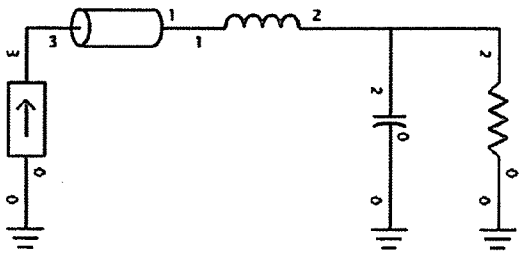
ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.31	0	1	.0106944	.0291931

Sources

source	node	sector	magnitude	phase	type
1	1	1	1.	0	voltage

WCAP – WIBA TOWER 1 BASE MODEL



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES

Node:	1	130.9239 ∠	-78.5010° V
Node:	2	156.0101 ∠	-80.3694° V
Node:	3	130.9235 ∠	-78.5010° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	1.00 ∠	0.000° A	1.00 ∠	-0.000° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	3.10000000	25.52 ∠	90.000° V	1.00 ∠	-0.000° A
C	2→0	0.00023000	156.01 ∠	-80.369° V	0.30 ∠	9.631° A
R	2→0	51.70000000	156.01 ∠	-80.369° V	0.71 ∠	-3.988° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	3.10000000	26.10 - j	128.299	26.10 - j	153.815
C	2→0	0.00023000	0.00 - j	528.227	0.00 + j	0.000
TL	3→1	50.00000000	**26.10 - j**	**128.296**	26.10 - j	128.299
R	2→0	51.70000000	**51.70 - j**	**213.400**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	14.9839

WCAP INPUT DATA:

	1.3100	0.00000000	0		
L	3.10000000	1	2	0.00000000	
C	0.00023000	2	0		
I	1.00000000	0	3	0.00000000	
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	51.70000000	2	0	-213.40000000	

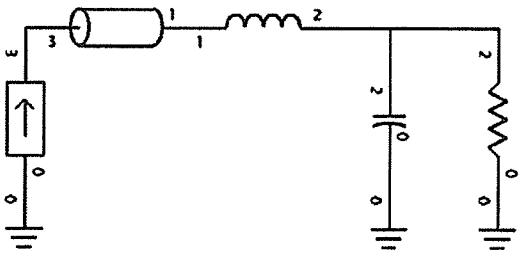
MoM Calculated Impedance Tower 2 Driven All Others Shorted

```
C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBAT2DAOS  12-17-2012   13:10:46

IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR     S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)              dB        dB
source =  1; node 22, sector 1
1.31      63.29     46.388    78.47     36.2      2.3013   -8.0862   -.73335
```

INPUT FILE

```
C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBAT2DAOS  12-17-2012   13:11:30

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire  caps Distance     Angle        Z            radius      segs
 1    none 0            0            0            .3638        21
           0            0            220.7
 2    none 90.          175.5        0            .6791        2
           90.          175.5        7.7
 3    none 90.          175.5        7.7          .3881        4
           90.          175.5        35.7
 4    none 90.          175.5        35.7         .3274        4
           90.          175.5        64.5
 5    none 90.          175.5        64.5         .2911        4
           90.          175.5        93.
 6    none 180.         175.5        0            .6791        2
           180.         175.5        7.7
 7    none 180.         175.5        7.7          .3881        4
           180.         175.5        35.7
 8    none 180.         175.5        35.7         .3274        4
           180.         175.5        64.5
 9    none 180.         175.5        64.5         .2911        4
           180.         175.5        93.

Number of wires          =  9
          current nodes  =  49

                          minimum                  maximum
Individual wires      wire    value              wire  value
segment length         2      3.85               1     10.5095
radius                 5      .2911              2     .6791


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   1.31         0            1       .0106944       .0291931

Sources
source node    sector  magnitude      phase          type
 1      22      1       1.             0              voltage
```

WCAP - WIBA T2 BASE MODEL



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES

Node:	1	93.5064 ∠	38.9053° V
Node:	2	84.1483 ∠	30.1487° V
Node:	3	93.5067 ∠	38.9055° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	1.00 ∠	0.001° A	1.00 ∠	-0.001° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	2.00000000	16.46 ∠	89.999° V	1.00 ∠	-0.001° A
C	2→0	0.00019000	84.15 ∠	30.149° V	0.13 ∠	120.149° A
R	2→0	63.30000000	84.15 ∠	30.149° V	1.07 ∠	-6.093° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	2.00000000	72.76 + j	58.726	72.76 + j	42.264
C	2→0	0.00019000	-0.00 - j	639.433	0.00 + j	0.000
TL	3→1	50.00000000	**72.77 + j**	**58.726**	72.76 + j	58.726
R	2→0	63.30000000	**63.30 + j**	**46.400**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.7231

WCAP INPUT DATA:

	1.3100	0.00000000	0			
L	2.00000000	1	2	0.00000000		
C	0.00019000	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	63.30000000	2	0	46.40000000		

MoM Calculated Impedance Tower 3 Driven All Others Shorted

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT3DAOS 12-17-2012 13:15:42

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 36, sector 1							
1.31	**53.851**	**38.039**	65.931	35.2	2.0567	-9.2261	-.55274

INPUT FILE

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT3DAOS 12-17-2012 13:16:20

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	21
		0	0	220.7		
2	none	90.	175.5	0	.6791	2
		90.	175.5	7.7		
3	none	90.	175.5	7.7	.3881	4
		90.	175.5	35.7		
4	none	90.	175.5	35.7	.3274	4
		90.	175.5	64.5		
5	none	90.	175.5	64.5	.2911	4
		90.	175.5	93.		
6	none	180.	175.5	0	.6791	2
		180.	175.5	7.7		
7	none	180.	175.5	7.7	.3881	4
		180.	175.5	35.7		
8	none	180.	175.5	35.7	.3274	4
		180.	175.5	64.5		
9	none	180.	175.5	64.5	.2911	4
		180.	175.5	93.		

Number of wires = 9
current nodes = 49

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	3.85	1	10.5095
radius	5	.2911	2	.6791

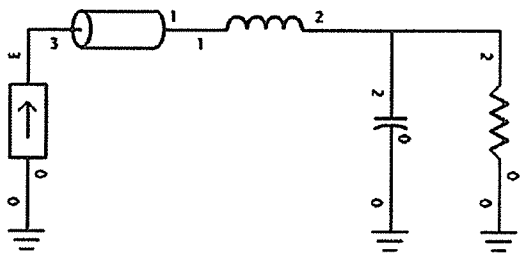
ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.31	0	1	.0106944	.0291931

Sources

source	node	sector	magnitude	phase	type
1	36	1	1.	0	voltage

WCAP - WIBA T3 BASE MODEL



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES

Node:	1	83.2316 ∠	41.6615° V
Node:	2	70.8337 ∠	28.6168° V
Node:	3	83.2319 ∠	41.6617° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	1.00 ∠	0.000° A	1.00 ∠	-0.001° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	2.60000000	21.40 ∠	89.999° V	1.00 ∠	-0.001° A
C	2→0	0.00024000	70.83 ∠	28.617° V	0.14 ∠	118.617° A
R	2→0	53.90000000	70.83 ∠	28.617° V	1.07 ∠	-6.567° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	2.60000000	62.18 + j	55.327	62.18 + j	33.926
C	2→0	0.00024000	0.00 - j	506.218	0.00 + j	0.000
TL	3→1	50.00000000	**62.18 + j**	**55.327**	62.18 + j	55.327
R	2→0	53.90000000	**53.90 + j**	**38.000**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.6557

WCAP INPUT DATA:

	1.3100	0.00000000	0			
L	2.60000000	1	2	0.00000000		
C	0.00024000	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	53.90000000	2	0	38.00000000		

Matrix Impedance Measurements

Tower 1 driven with all others shorted	26.6 - j128.5 Ω
Tower 2 driven with all others shorted	72.2 + 58.5 Ω
Tower 3 driven with all others shorted	62.3 + j55.7 Ω

All measurements above made with a Hewlett Packard 8753E vector network analyzer and directional coupler in a calibrated measurement system.

Comparison of Modeled and Measured Matrix Impedances

T	Z_{mom}	L_{series}	C_{shunt}	$Z_{modeled}$[1]	$Z_{measured}$
1	51.7-j213.4Ω	3.1 uH	230 pF	26.1-j128.3Ω	26.6-j128.5Ω
2	63.3+j46.4Ω	2.0 uH	190 pF	72.3+j58.7Ω	72.2+j58.5Ω
3	53.9+j38.0Ω	2.6 uH	240 pF	62.2+j55.3Ω	62.3+j55.7Ω

[1]Modeled impedance at measurement point. A mathematically insignificant length of transmission line was inserted into the circuit model at the measurement point to allow the program to calculate the impedance.

MoM Calculated Current Distribution for Night Pattern

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBANIGHT 12-17-2012 13:47:17

CURRENT rms
Frequency = 1.31 MHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**7.87207**	**172.**	-7.79613	1.09083
2	0	0	10.5095	5.98079	169.8	-5.88551	1.06328
3	0	0	21.0191	4.5017	167.1	-4.38781	1.00623
4	0	0	31.5286	3.05146	162.5	-2.9098	.918969
5	0	0	42.0381	1.64703	150.8	-1.43739	.804121
6	0	0	52.5476	.665481	89.1	.0108889	.665392
7	0	0	63.0571	1.49364	19.9	1.40481	.507405
8	0	0	73.5667	2.73091	7.1	2.71022	.335541
9	0	0	84.0762	3.89581	2.3	3.89269	.155826
10	0	0	94.5857	4.91978	359.7	4.91972	-.0251781
11	0	0	105.095	5.76576	358.	5.76227	-.200516
12	0	0	115.605	6.40635	356.8	6.39606	-.363027
13	0	0	126.114	6.82117	355.7	6.80241	-.505586
14	0	0	136.624	6.99669	354.9	6.96904	-.621393
15	0	0	147.133	6.92631	354.2	6.89042	-.704256
16	0	0	157.643	6.61047	353.5	6.56792	-.748868
17	0	0	168.152	6.05625	352.9	6.0095	-.750982
18	0	0	178.662	5.27652	352.3	5.22887	-.707502
19	0	0	189.171	4.28814	351.7	4.24361	-.616359
20	0	0	199.681	3.10761	351.2	3.07096	-.47585
21	0	0	210.191	1.73957	350.6	1.71645	-.282664
END	0	0	220.7	0	0	0	0
GND	-89.7226	-7.06133	0	**9.50743**	**136.6**	-6.9103	6.52986
23	-89.7226	-7.06133	3.85	9.85835	134.5	-6.90879	7.03247
END	-89.7226	-7.06133	7.7	9.95496	133.6	-6.87086	7.20364
2J2	-89.7226	-7.06133	7.7	9.95496	133.6	-6.87086	7.20364
25	-89.7226	-7.06133	14.7	9.9477	132.7	-6.75134	7.30589
26	-89.7226	-7.06133	21.7	9.76411	132.	-6.53452	7.25519
27	-89.7226	-7.06133	28.7	9.41581	131.4	-6.22703	7.0627
END	-89.7226	-7.06133	35.7	8.90516	130.9	-5.82848	6.7328
2J3	-89.7226	-7.06133	35.7	8.90516	130.9	-5.82848	6.7328
29	-89.7226	-7.06133	42.9	8.26759	130.5	-5.36434	6.29102
30	-89.7226	-7.06133	50.1	7.4762	130.1	-4.81338	5.72058
31	-89.7226	-7.06133	57.3	6.54485	129.7	-4.18469	5.03224
END	-89.7226	-7.06133	64.5	5.47666	129.4	-3.47986	4.22899
2J4	-89.7226	-7.06133	64.5	5.47666	129.4	-3.47986	4.22899
33	-89.7226	-7.06133	71.625	4.35215	129.2	-2.75062	3.37273
34	-89.7226	-7.06133	78.75	3.10502	129.	-1.95286	2.41403
35	-89.7226	-7.06133	85.875	1.7275	128.8	-1.08158	1.34702
END	-89.7226	-7.06133	93.	0	0	0	0
GND	-179.445	-14.1227	0	**5.80868**	**270.3**	.025836	-5.80862
37	-179.445	-14.1227	3.85	5.85067	270.2	.0243332	-5.85062
END	-179.445	-14.1227	7.7	5.83559	270.2	.0228899	-5.83554
2J6	-179.445	-14.1227	7.7	5.83559	270.2	.0228899	-5.83554
39	-179.445	-14.1227	14.7	5.75084	270.2	.0199002	-5.75081
40	-179.445	-14.1227	21.7	5.57741	270.2	.0155415	-5.57738
41	-179.445	-14.1227	28.7	5.32172	270.1	.0101321	-5.32171
END	-179.445	-14.1227	35.7	4.98435	270.	3.97E-03	-4.98435
2J7	-179.445	-14.1227	35.7	4.98435	270.	3.97E-03	-4.98435
43	-179.445	-14.1227	42.9	4.58781	270.	-2.17E-03	-4.58781

MoM Calculated Current Distribution for Night Pattern (cont.)

44	-179.445	-14.1227	50.1	4.11497	269.9	-8.09E-03	-4.11496
45	-179.445	-14.1227	57.3	3.57452	269.8	-.0131448	-3.57449
END	-179.445	-14.1227	64.5	2.96875	269.7	-.0166956	-2.9687
2J8	-179.445	-14.1227	64.5	2.96875	269.7	-.0166956	-2.9687
47	-179.445	-14.1227	71.625	2.34307	269.6	-.0179671	-2.343
48	-179.445	-14.1227	78.75	1.66044	269.4	-.0164904	-1.66036
49	-179.445	-14.1227	85.875	.917661	269.3	-.0114158	-.91759
END	-179.445	-14.1227	93.	0	0	0	0

MoM Calculated Base Drive Voltages for Night Pattern

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBANIGHT 12-17-2012 13:31:38

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.31 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	1.13	131.4
3	.637	270.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	1,590.71	89.7	7.87206	172.
22	493.51	181.4	9.50743	136.6
36	51.9135	358.7	5.80868	270.3

Sum of square of source currents = 372.203
Total power = 5,000. watts

INPUT FILE

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBANIGHT 12-17-2012 13:32:50

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	21
		0	0	220.7		
2	none	90.	175.5	0	.6791	2
		90.	175.5	7.7		
3	none	90.	175.5	7.7	.3881	4
		90.	175.5	35.7		
4	none	90.	175.5	35.7	.3274	4
		90.	175.5	64.5		
5	none	90.	175.5	64.5	.2911	4
		90.	175.5	93.		
6	none	180.	175.5	0	.6791	2
		180.	175.5	7.7		
7	none	180.	175.5	7.7	.3881	4
		180.	175.5	35.7		
8	none	180.	175.5	35.7	.3274	4
		180.	175.5	64.5		
9	none	180.	175.5	64.5	.2911	4
		180.	175.5	93.		

Number of wires = 9
current nodes = 49

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	3.85	1	10.5095
radius	5	.2911	2	.6791

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.31	0	1	.0106944	.0291931

Sources

source	node	sector	magnitude	phase	type
1	1	1	2,249.6	89.7	voltage
2	22	1	697.929	181.4	voltage
3	36	1	73.4167	358.7	voltage

MoM Calculated Current Moments for Night Pattern

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBANIGHT 12-17-2012 13:35:24

CURRENT MOMENTS(amp-degrees) rms

Frequency = 1.31 MHz
Input power = 5,000. watts

wire	magnitude	phase (deg)	vertical current moment magnitude	phase (deg)
1	510.941	360.	510.941	360.
2	67.7921	134.8	67.7921	134.8
3	242.625	132.1	242.625	132.1
4	190.816	130.2	190.816	130.2
5	76.373	129.1	76.373	129.1
6	40.4025	270.2	40.4025	270.2
7	138.827	270.2	138.827	270.2
8	105.211	269.9	105.211	269.9
9	41.0311	269.5	41.0311	269.5

Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	510.941	360.
2	577.363	131.4
3	325.469	270.

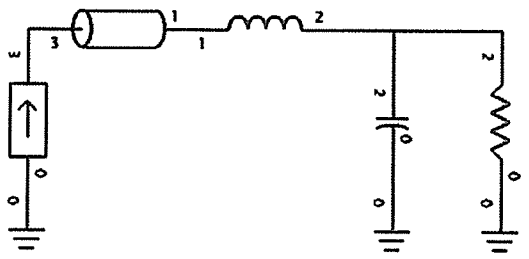
Normalized to Tower 1

tower	magnitude	phase (deg)
1	1.00	0.
2	1.13	131.4
3	0.637	270.

MoM Calculated Drive Impedances for Night Pattern

```
C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBANIGHT  12-17-2012   13:51:39

IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR      S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)               dB        dB
source =  1; node 1, sector 1
1.31      26.818    -200.28   202.07    277.6     32.284    -.53826   -9.3343

source =  2; node 22, sector 1
1.31      36.841    36.567    51.908    44.8      2.4039    -7.6927   -.80981

source =  3; node 36, sector 1
1.31      .23721    8.9341    8.9372    88.5      217.52    -8.E-02   -17.394
```

WCAP – WIBA Night Tower 1 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES

Node:	1	1315.1622 ∠	90.7816° V
Node:	2	1590.8270 ∠	89.6210° V
Node:	3	1315.1577 ∠	90.7816° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	**10.86 ∠**	**174.107° A**	10.86 ∠	174.107° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	3.10000000	277.22 ∠	-95.893° V	10.86 ∠	174.107° A
C	2→0	0.00023000	1590.83 ∠	89.621° V	3.01 ∠	179.621° A
R	2→0	26.80000000	1590.83 ∠	89.621° V	**7.87 ∠**	**172.000° A**

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	3.10000000	14.07 - j	120.231	14.07 - j	145.747
C	2→0	0.00023000	0.00 - j	528.227	0.00 + j	0.000
TL	3→1	50.00000000	14.07 - j	120.229	14.07 - j	120.231
R	2→0	26.80000000	26.80 - j	200.300	0.00 + j	0.000

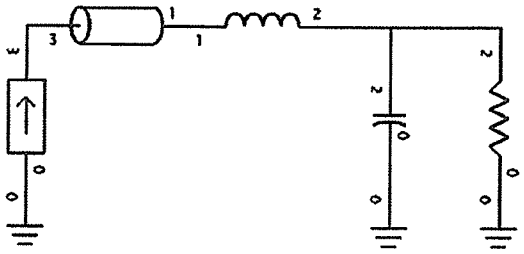
	WCAP PART		VSWR
TL	3→1	50.00000000	24.3419

WCAP INPUT DATA:

	1.3100	0.00000000	0			
L	3.10000000	1	2	0.00000000		
C	0.00023000	2	0			
I*	**10.86466400**	**0**	**3**	**174.10700000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	26.80000000	2	0	-200.30000000		

*** current required to produce the current predicted by the MoM model at base of radiator**

WCAP – WIBA Night Tower 2 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES
Node: 1 601.4433 ∠ -167.9234° V
Node: 2 493.4530 ∠ -178.5558° V
Node: 3 601.4463 ∠ -167.9231° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**8.98 ∠ 140.094° A**	8.98 ∠ 140.094° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	2.00000000	147.83 ∠ -129.906° V	8.98 ∠ 140.094° A
C	2→0	0.00019000	493.45 ∠ -178.556° V	0.77 ∠ -88.556° A
R	2→0	36.80000000	493.45 ∠ -178.556° V	**9.51 ∠ 136.600° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	2.00000000	41.25 + j 52.766	41.25 + j 36.304
C	2→0	0.00019000	-0.00 - j 639.433	0.00 + j 0.000
TL	3→1	50.00000000	41.25 + j 52.767	41.25 + j 52.766
R	2→0	36.80000000	36.80 + j 36.600	0.00 + j 0.000

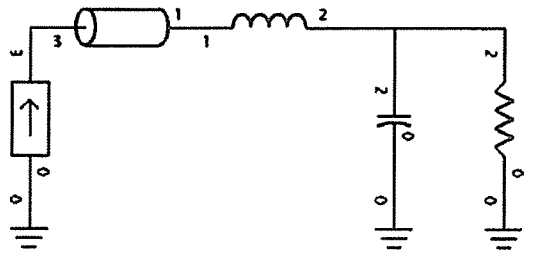
	WCAP PART		VSWR
TL	3→1	50.00000000	3.0603

WCAP INPUT DATA:

	1.3100	0.00000000	0			
L	2.00000000	1	2	0.00000000		
C	0.00019000	2	0			
I*	**8.97984800**	**0**	**3**	**140.09400000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	36.80000000	2	0	36.60000000		

*** current required to produce the current predicted by the MoM model at base of radiator**

WCAP – WIBA Night Tower 3 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.310 MHz

NODE VOLTAGES

Node:	1	173.8257 ∠	-0.1397° V
Node:	2	51.7160 ∠	-1.2443° V
Node:	3	173.8281 ∠	-0.1397° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**5.71 ∠ -89.672° A**	5.71 ∠ -89.672° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	2.60000000	122.12 ∠ 0.328° V	5.71 ∠ -89.672° A
C	2→0	0.00024000	51.72 ∠ -1.244° V	0.10 ∠ 88.756° A
R	2→0	0.24000000	51.72 ∠ -1.244° V	**5.81 ∠ -89.700° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	2.60000000	0.25 + j 30.460	0.25 + j 9.059
C	2→0	0.00024000	0.00 - j 506.218	0.00 + j 0.000
TL	3→1	50.00000000	0.25 + j 30.460	0.25 + j 30.460
R	2→0	0.24000000	0.24 + j 8.900	0.00 + j 0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	275.6949

WCAP INPUT DATA:

	1.3100	0.00000000	0			
L	2.60000000	1	2	0.00000000		
C	0.00024000	2	0			
I*	**5.70652700**	**0**	**3**	**270.32800000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	0.24000000	2	0	8.90000000		

*** current required to produce the current predicted by the MoM model at base of radiator**

Calculated Operating Parameters from Modeled Currents at Sampling Point

	Current	Phase	Ratio	Phase
Night				
Tower 1	10.865 A	+174.1°	1.000	0.0°
Tower 2	8.980 A	+140.1°	0.827	-34.0°
Tower 3	5.707 A	+270.3°	0.525	+96.2°

Model Stability Analysis

The WIBA directional antenna consists of a combination of a single uniform cross section guyed tower and two identical self-supporting towers. The method of moments model used in this report depicts the self-supporting towers using an equivalent stepped radius "wedding cake" model consisting of 4 wires per tower and a total of 14 segments per tower. The problem definition evaluation function of the program diagnostics produces a segment length to ratio warning associated with the base segment of each self-supporting tower as shown below:

```
C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBAT2DAOS  12-17-2012   15:03:51

PROBLEM DEFINITION EVALUATION
maximum frequency = 1.31 MHz
shortest wavelength = 228.855 meters
number of wires =  9

INDIVIDUAL WIRES
segment length to wavelength ratio: No detected violations!
segment length to radius ratio:
  wire  2  - warning  3.604
  wire  6  - warning  3.604
radius to wavelength ratio:         No detected violations!
checking for wires in ground plane:  No detected violations!

WIRE JUNCTIONS
junction segment length ratio:      No detected violations!
junction radius ratio:              No detected violations!

ELECTRICAL DESCRIPTION
    No detected violations!
```

In order to validate the stability of the model, additional models were run using the same number of wires and the same wire lengths and radii for the self-supporting towers but with smaller and larger numbers of segments per tower. Additional models using 10 and 18 segments per self-supporting tower were generated and the results compared to the 14 segment model used in this report.

The tower 2 base impedance was calculated using each of the three stability evaluation models. The bases of towers 1 and 3 were shorted. The results are tabulated below:

Segments Per Tower	Minimum Segment Length to Radius Ratio	Resistance	Difference	Reactance	Difference
10	7.208	60.783 Ω	-2.507 Ω	45.644 Ω	-0.744 Ω
14	3.604	63.29 Ω	Reference	46.388 Ω	Reference
18	2.403	64.925 Ω	+1.635 Ω	46.806 Ω	+0.418

The MININEC modeled base resistances and reactances remain within the +/-2 Ω and +/- 4% range required for matching measured and modeled resistance and reactance by the FCC rules. Remaining materially unchanged with segment lengths both greater and smaller than the number of segments used for the self-supporting towers in this report, the real and imaginary components indicate convergence of the results and validate the model with regard to the characteristics of the self-supporting towers of the WIBA (AM) antenna system.

Stability Analysis for 10 Segments Per Self-Supporting Tower

C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT2DAOS-10SEG 12-17-2012 15:55:51

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 22, sector 1							
1.31	60.783	45.644	76.013	36.9	2.2864	-8.147	-.72227

INPUT FILE

C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast Professional\Work\WIBA\WIBAT2DAOS-10SEG 12-17-2012 15:56:31

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.3638	21
		0	0	220.7		
2	none	90.	175.5	0	.6791	1
		90.	175.5	7.7		
3	none	90.	175.5	7.7	.3881	3
		90.	175.5	35.7		
4	none	90.	175.5	35.7	.3274	3
		90.	175.5	64.5		
5	none	90.	175.5	64.5	.2911	3
		90.	175.5	93.		
6	none	180.	175.5	0	.6791	1
		180.	175.5	7.7		
7	none	180.	175.5	7.7	.3881	3
		180.	175.5	35.7		
8	none	180.	175.5	35.7	.3274	3
		180.	175.5	64.5		
9	none	180.	175.5	64.5	.2911	3
		180.	175.5	93.		

Number of wires = 9
current nodes = 41

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	7.7	1	10.5095
radius	5	.2911	2	.6791

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.31	0	1	.0213889	.0291931

Sources

source	node	sector	magnitude	phase	type
1	22	1	1.	0	voltage

Stability Analysis for 18 Segments Per Self-SupportingTower

```
C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBAT2DAOS-18SEG  12-17-2012   15:58:20

IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR     S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)              dB        dB
source =  1; node 22, sector 1
1.31      64.925    46.806    80.037    35.8      2.3107   -8.0483   -.74037
```

INPUT FILE

```
C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast
Professional\Work\WIBA\WIBAT2DAOS-18SEG  12-17-2012   15:59:05

WIBA Night

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0            0            .3638         21
           0            0            220.7
 2    none 90.          175.5        0            .6791         3
           90.          175.5        7.7
 3    none 90.          175.5        7.7          .3881         5
           90.          175.5        35.7
 4    none 90.          175.5        35.7         .3274         5
           90.          175.5        64.5
 5    none 90.          175.5        64.5         .2911         5
           90.          175.5        93.
 6    none 180.         175.5        0            .6791         3
           180.         175.5        7.7
 7    none 180.         175.5        7.7          .3881         5
           180.         175.5        35.7
 8    none 180.         175.5        35.7         .3274         5
           180.         175.5        64.5
 9    none 180.         175.5        64.5         .2911         5
           180.         175.5        93.

Number of wires          =  9
          current nodes  =  57

                          minimum                  maximum
Individual wires      wire    value              wire  value
segment length         2      2.56667            1     10.5095
radius                 5      .2911              2     .6791


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   1.31         0             1      7.13E-03       .0291931

Sources
source node    sector  magnitude      phase          type
 1      22      1       1.             0              voltage
```

Measured and Calculated Sampling Line Characteristics

Measured open circuit resonant frequency at odd multiple of ¼ wavelength nearest to carrier frequency:

Tower 1	716.72 kHz	¾ λ (270°)
Tower 2	717.19 kHz	¾ λ (270°)
Tower 3	716.93 kHz	¾ λ (270°)

Measured impedance 1/8 wavelength above and below open circuit resonant frequency:

Tower 1	597.27 kHz	6.52 – j49.1 Ω	-1/8 λ
	836.17 kHz	9.57 + j48.9 Ω	+1/8 λ
Tower 2	597.66 kHz	6.58 – j49.4 Ω	-1/8 λ
	836.72 kHz	9.55 + j49.1 Ω	+1/8 λ
Tower 3	597.44 kHz	6.51 – j48.9 Ω	-1/8 λ
	836.42 kHz	9.46 + j48.5 Ω	+1/8 λ

Calculated characteristic impedance using the formula $Z_o = ((R_1^2 + X_1^2)^{1/2} * (R_2^2 + X_2^2)^{1/2})^{1/2}$:

Tower 1	49.7 Ω
Tower 2	49.9 Ω
Tower 3	49.4 Ω

Calculated electrical length at $f_{carrier}$:

Tower 1	$L = (f_{carrier} / f_{resonant}) * 270° = (1310 \text{ kHz} / 716.72 \text{ kHz}) * 270° = 493.50°$
Tower 2	$L = (f_{carrier} / f_{resonant}) * 270° = (1310 \text{ kHz} / 717.19 \text{ kHz}) * 270° = 493.18°$
Tower 3	$L = (f_{carrier} / f_{resonant}) * 270° = (1310 \text{ kHz} / 716.93 \text{ kHz}) * 270° = 493.35°$

Measured impedance at $f_{carrier}$ at the input of the sampling line with the sampling device connected:

Tower 1	48.8 – j1.6 Ω
Tower 2	49.0 – j2.0 Ω
Tower 3	49.0 – j1.5 Ω

All measurements above made with a Hewlett Packard 8753E vector network analyzer and directional coupler in a calibrated measurement system.

Sampling Transformer Calibration

The toroidal current transformers were set up adjacent to each other on a common conductor as shown in Figure 1. The Hewlett Packard 8753E vector network analyzer system was properly calibrated for a response measurement. The common conductor was driven by the swept RF output of the vector network analyzer system. The sampled output from the tower 1 toroid was fed to the reference receiver of the vector network analyzer system and the sampled outputs of the tower 2 and 3 toroids were alternately fed to the A receiver. The relative phase and magnitude of the outputs of the tower 2 and 3 toroids as compared to the output of the tower 1 toroid at the carrier frequency were noted and the results shown below.

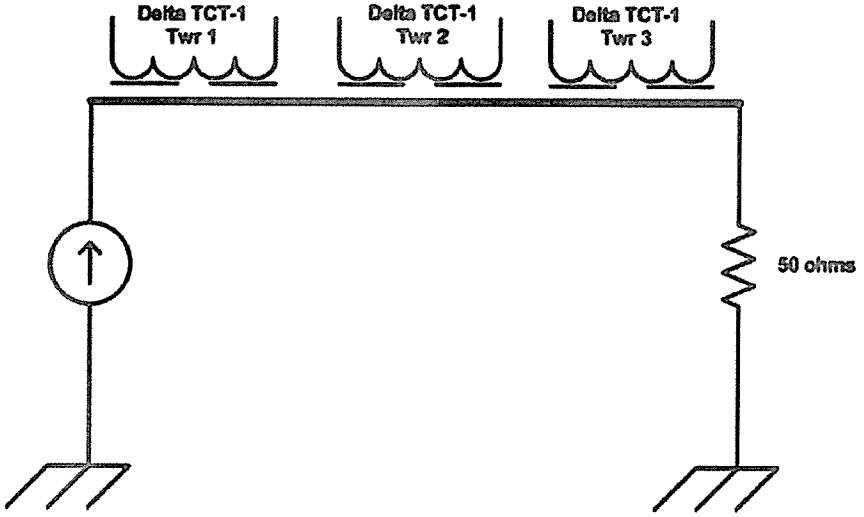


Figure 1

	Indicated Ratio	Indicated Phase
Tower 1 (SN 18138)	1.000	+0.0°
Tower 2 (SN 18136)	1.008	-0.21°
Tower 3 (SN 18137)	1.009	-0.37°

The manufacturer specifies these devices to be accurate to within +/- 2% absolute magnitude and +/- 2° absolute phase.

Reference Point Measurements

Reference point measurements were made on the radials corresponding to the pattern maxima and minima. The measured data is included as a part of this report. The radials measured are:

Minima:	Maxima:
87.0°	114.0°
169.0°	175.5°
182.0°	237.0°
264.0°	355.5°

Environmental Statement

The WIBA (AM) radiators are surrounded by a secured fence restricting access by unauthorized personnel. Based on the charts and graphs supplied in Supplement A, Edition 97-01 to OET Bulletin 65, Edition 97-01 the applicant certifies that the distance to the fences from the radiators complies with FCC OET65 regarding human exposure to non-ionizing electromagnetic radiation.

Questions concerning this exhibit should be directed to:
Tom Cox, P.E.
760-743-2937 office
619-606-8760 cell
tomcox@clearchannel.com

WIBA Night Reference Points

Engineer: Scott Schimmele
FIM: FIM-21 S/N 172 Cal Date: 2/25/2010

Night Field Measurements							
Azimuth	Description	Distance (km)	Latitude (NAD 27)	Longitude (NAD 27)	Date	Time	Field (mV/m)
87° T							
Pt. 1	West side of street forty feet south of driveway of 2676 MC Gaw Road	2.22	N43-0.0291'	W89-24.1413'	10/9/2012	12:25	51
Pt. 2	West side of street three Hundred feet south of Lacy Road on Blaney Road	2.85	N43-0.0485'	W89-23.6722'	10/9/2012	12:35	52
Pt. 3	North east corner of intersection of Lacey Road and CTH MM	4.35	N43-0.0884'	W89-22.5617'	10/9/2012	12:45	19
114°T							
Pt. 1	West side of street in front of house located at 2461 South Syene Road	2.92	N42-59.3236'	W89-23.8061'	10/9/2012	13:00	78
Pt. 2	North side of street eighty feet east of driveway of 5075 Irish Lane	3.48	N42-59.2039	W89-23.4374'	10/9/2012	13:05	35
Pt. 3	West side of street one hundred seventy feet south of driveway at 2337 CTH MM	5.15	N42-58.8350'	W89-22.3087'	10/9/2012	13:15	21.5
169°T							
Pt. 1	South side of street across from driveway at 5454 Whalen Road	2.32	N42-58.7723'	W89-25.2290'	10/9/2012	13:50	28.5
Pt. 2	Byrne Road three tenths of a mile southwest of the intersection of Cane Road and Byrne Road on west side of street at entrance to farm field	3.71	N42-58.0670'	W89-24.9048'	10/9/2012	14:00	12.8
Pt. 3	North side of street at property line fence three hundred seventy five feet south of driveway at 5286 CR M	5.76	N42-57.0223'	W89-24.4264'	10/9/2012	14:10	5.8
175.5°T							
Pt. 1	South side of street one hundred feet east of driveway of 5558 Whalen Road	2.22	N42-58.7681'	W89-25.6470'	10/9/2012	13:45	30.5
Pt. 2	North side of street three hundred twenty five feet east of driveway at 5526 CR M	5.47	N42-57.0248'	W89-25.4598'	10/9/2012	14:15	8.2
Pt. 3	South side of street one hundred fifty feet west of driveway at property line at 5469 West Netherwood Drive	7.04	N42-56.1764'	W89-25.3718'	10/9/2012	14:25	4.4
182°T							
Pt. 1	Seventy five feet east of second high voltage power line pole on Whalen Road west of the intersection of Whalen Road and South Fish Hatchery Road	2.22	N42-58.7668'	W89-25.8419'	10/9/2012	13:30	21
Pt. 2	West side of street at intersection of South Fish Hatchery Road and Branson Road	2.77	N42-58.4842'	W89-25.8559'	10/9/2012	13:40	20
Pt. 3	North side of street eighty five feet west of the intersection CR M and Barry Drive on CR M	5.45	N42-57.0247'	W89-25.9325'	10/9/2012	14:20	7.4
237°T							
Pt. 1	East side of South Seminole Hwy at the intersection of South Seminole Hwy and Vroman Road	3.14	N42-59.0410'	W89-27.7268'	10/10/2012	12:00	50
Pt. 2	North side of street on Whalen Road two hundred feet west of the intersection of Fitchburg Road and Whalen Road	4.05	N42-58.7797'	W89-28.2767'	10/10/2012	12:10	30

Pt. 3	North side of street four tenths of a mile south of Whalen Road two hundred twenty feet north of farm field access road on Fitchrona Road	5.35	N42-58.3947'	W89-29.0787'	10/10/2012	12:20	28
264°T							
Pt. 1	East side of street across from the driveway at 2627 South Seminole Hwy	2.47	N42-59.8283	W89-27.5824'	10/10/2012	12:30	57
Pt. 2	Driveway at 2591 Fitchrona Road	4.48	N42-59.7131'	W89-29.0593'	10/10/2012	12:40	22.5
Pt. 3	East side of street Old PB across from driveway entrance to Military Ridge State Park Trail parking lot	6.82	N42-59.5805	W89-30.7778'	10/10/2012	12:50	10.5
355.5°T							
Pt. 1	South side of street across from 3020 Kinsale Drive	2.1	N43-1.0990'	W89-25.9006'	10/10/2012	13:00	630
Pt. 2	On street in front of house at 3222 Knollwood Way	2.89	N43-1.5194'	W89-25.9437'	10/10/2012	13:10	305
Pt. 3	Twenty feet east of driveway at 3404 Nottingtom Way	3.59	N43-1.8941'	W89-25.9846'	10/10/2012	13:20	240