clearchannel
MEDIA + ENTERTAINMENT

2625 South Memorial Drive, Suite A
Tulsa, OK 74129

Steve Davis
Senior Vice President
Engineering, Facilities &
Capital Management
918-388-5211
stevedavis@clearchannel.com

December 5, 2012

FILED/ACCEPTED

DEC 5 2012

Federal Communications Commission
Office of the Secretary

2012 DEC 11 A 7:53

BY HAND DELIVERY

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

RE: Clear Channel Broadcasting Licenses, Inc. (FRN No. 0001587971)
Application (Form 302-AM) for Amendment to pending application BMML-20120713AEL
KTOK (AM), 1000 kHz, Oklahoma City, OK; Facility ID No. 11925

Dear Ms. Dortch:

Clear Channel Broadcasting Licenses, Inc., the licensee of the above-referenced station, hereby submits an original and four copies of an amendment to pending application BMML-20120713AEL, submitted on FCC Form 302-AM.

Please stamp and return the additional copy of this submission in the enclosed Federal Express envelope. Please direct communications concerning this application to the undersigned.

Respectfully submitted,

CLEAR CHANNEL MEDIA + ENTERTAINMENT

By: _____
Stephen G. Davis
Senior Vice President of Engineering and Capital Management

cc: KTOK (AM) Public Inspection File

Troy Langham
FCC Engineering Supervisor
TroyLangham@clearchannel.com

FCCContact@clearchannel.com

Phone: (918) 664-4581

Billie Layman
FCC Administrator
BillieLayman@clearchannel.com

FILED/ACCEPTED

DEC 05 2012

Federal Communications Commission
Office of the Secretary

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY

FILE NO. BAL 20120713AEL

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

Clear Channel Broadcasting Licenses, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2625 S MEMORIAL DRIVE

MAILING ADDRESS (Line 2) (Maximum 35 characters)
SUITE A

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Tulsa	OK	74129

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
918-664-4581	KTOK	11925

2. A. Is a fee submitted with this application? ☐ Yes ☑ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☑ Other (Please explain):

C. If Yes, provide the following information: Amendment to pending application BMML-20120713AEL

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
	0001	$	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
	0001	$	

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
	$	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Clear Channel Broadcasting Licenses, Inc.		
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
KTOK	Oklahoma City, OK	BP-20100830ABU		12/15/2013

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	12-5-2012	9186644581

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
Clear Channel Broadcasting Licenses, Inc.

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
KTOK	BP-20100830ABU	1000	UNLIMITED	5.8	5.8

2. Station location

State	City or Town
OK	Oklahoma City

3. Transmitter location

State	County	City or Town	Street address (or other identification)
OK	Cleveland	Moore	1344 NE 27th Street

4. Main studio location

State	County	City or Town	Street address (or other identification)
OK	Oklahoma	Oklahoma City	1900 NW Expressway, Ste. 1000

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
OK	Oklahoma	Oklahoma City	1900 NW Expressway, Ste. 1000

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	RF common point or antenna current (in amperes) without modulation for day system
11.1	11.1
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50 Day: 50	Night: 0 Day: 0

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 1011486)	+109.0°	--	0.529	--		
2 (ASRN 1011485)	+53.9°	-2.5°	1.358	1.238		
3 (ASRN 1011484)	0°	0°	1.000	1.000		
4 (ASRN 1011483)	-66.8°	-102.9°	1.336	1.117		
5 (ASRN 1011482)	-123.4°	--	0.552	--		

Manufacturer and type of antenna monitor: Potomac Instruments AM1901 (FCC ID: IJ3PI1900)

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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	West Longitude
35 ° 21 ' 29 "	97 ° 27 ' 48 "

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. NA

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?

A post construction survey found the orientation of the towers as originally constructed in 1948 to be 61.7 degrees T instead of 62.0 degrees T as authorized.

Pursuant to Public Notice DA 09-2340, FCC Form 301 to modify the construction permit to correct the orientation is submitted concurrently with this license application.

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 11-26-2012 Telephone No. (Include Area Code) (918)-664-4581

☑ Technical Director ☑ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)

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Description of Radiators

ASRN	1011486	1011485	1011484	1011483	1011482
Type Radiator	uniform cross section, guyed steel tower	uniform cross section, guyed steel tower	uniform cross section, guyed steel tower	uniform cross section, guyed steel tower	uniform cross section, guyed steel tower
Overall height in meters of radiator above base insulator, or above base, if grounded	73.3m	73.3m	93.3m	73.3m	73.3m
Overall height in meters above ground (without obstruction lighting)	74.3m	74.3m	94.9m	74.3m	74.3m
Overall height in meters above ground (include obstruction lighting)	74.9m	74.9m	95.5m	74.9m	74.9m

ENGINEERING EXHIBIT

Application for Station License

KTOK (AM)

Oklahoma City, OK

Clear Channel Broadcasting Licenses, Inc.

FID 11925

1000 kHz

DA-2

Table of Contents

Engineering Statement

This application is being filed to request a station license for the KTOK (AM) transmitting facility authorized in construction permit BP-20100830ABU. Physical construction was limited to the shortening of the radiator designated as tower 3 in the existing antenna system and the installation of new phasing and sampling systems. The physical location of the radiators and the ground system remain unchanged. The requisite post construction survey revealed the orientation of the radiators as originally constructed in 1948 to be on a bearing of 61.7° T instead of 62° T as authorized in the construction permit. Public Notice DA 09-2340 "Media Bureau Clarifies Procedures for AM Directional Performance Verification Using Moment Method Modeling" issued on October 29, 2009 set a 1.5 electrical degree tolerance for the as-built location versus theoretical location of the radiators. The results of the post construction survey indicate the outer radiators fall outside the 1.5 electrical degree window due to this discrepancy. Pursuant to the Public Notice, the applicant has submitted, concurrently with this license application, FCC Form 301, to modify the construction permit to change the orientation of the radiators to 61.7° T. All other parameters remain as authorized in the construction permit. All calculations submitted in this report reflect the modified orientation of 61.7° T.

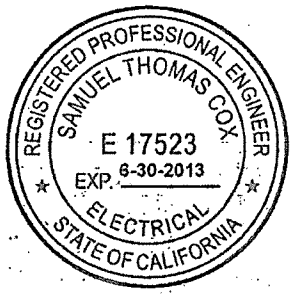
The following method of moments proof of performance is submitted as required by special operating condition number 1 of the aforementioned construction permit pursuant to the sections of 47 CFR 73.151 allowing performance verification by computer modeling and sampling system verification. All measurements included in this application were made by Mr. John F. Warner and the undersigned on March 26, 2012 and April 10, 2012 unless otherwise noted.

Analysis of the daytime and nighttime antenna systems 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 floating. 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 array synthesis module of the computer program was used to calculate the proper base drive voltages to generate the fields necessary to form the required patterns for daytime and nighttime operation. 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. The unused radiators were detuned for daytime operation by floating them at the tower base as is common practice for radiators of their electrical height.

Samuel T. Cox, P.E.

November 26, 2012



Description of Radiators

All references to tower numbers included within this report refer to the towers by their assigned number in the night pattern theoretical parameters shown on the construction permit unless otherwise noted.

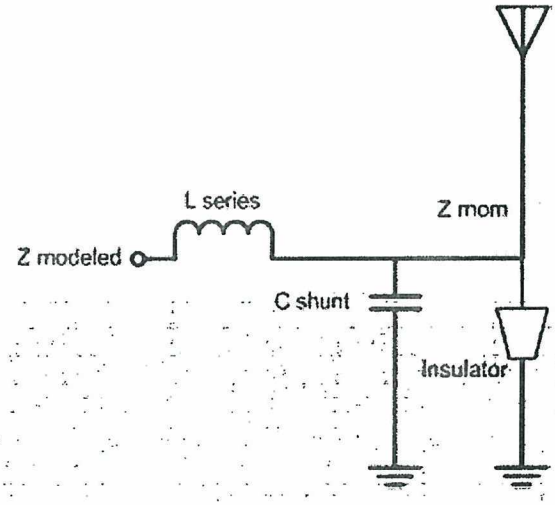
The KTOK (AM) radiators are all triangular, uniform cross section, guyed towers. The face width and electrical height of each radiator is shown below:

CP Theoretical Parameter Tower # Night	Day	ASRN	Face Width	Electrical Height
1	NA	ASRN 1011486	48.3 cm	88°
2	2	ASRN 1011485	48.3 cm	88°
3	1	ASRN 1011484	76.2 cm	112°
4	3	ASRN 1011483	48.3 cm	88°
5	NA	ASRN 1011482	48.3 cm	88°

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 was adjusted by varying the electrical height and effective radius 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 sample point. The modeled electrical heights used fall within the range of 75-125% of the physical height. The effective radii used fall 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 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:



Description of Sampling System

The sampling system consists of equal lengths of ½" solid outer jacket coaxial cable connected to a Delta Model TCT-3 toroidal current transformer located near the base of each radiator. The sampling lines are suspended on aerial supports and exposed to similar environmental conditions. The antenna monitor is a Potomac Instruments AM1901 (FCC ID: IJ3PI1900) last calibrated by the manufacturer on 10/12/2011.

Matrix Impedance Measurements

Tower 1 driven with all others floated	50.7 + j52.2 Ω
Tower 2 driven with all others floated	47.0 + j48.3 Ω
Tower 3 driven with all others floated	149.2 + j197.4 Ω
Tower 4 driven with all others floated	53.3 + j53.9 Ω
Tower 5 driven with all others floated	48.9 + j47.4 Ω

All measurements above made with a Hewlett Packard 8753D 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	48.9+j41.8Ω	1.8 uH	25 pF	49.6+j53.0Ω	50.7+j52.2Ω
2	48.4+j35.4Ω	2.1 uH	25 pF	48.9+j48.4Ω	47.0+j48.3Ω
3	139.2+j183.9Ω	1.8 uH	25 pF	147.5+j197.4Ω	149.2+j197.4Ω
4	51.3+j43.8Ω	1.8 uH	25 pF	52.0+j55.0Ω	53.3+j53.9Ω
5	47.1+j36.2Ω	1.8 uH	25 pF	47.6+j47.4Ω	48.9+j47.4Ω

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

MoM Calculated Impedance Tower 1 Driven with Other Towers Floated

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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.	**48.86**	**41.834**	64.323	40.6	2.2779	-8.182	-.71596

INPUT FILE

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
3	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
4	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		
5	none	840.	61.7	0	.2304	15
		840.	61.7	93.		

Number of wires = 5
current nodes = 75

	minimum wire	minimum value	maximum wire	maximum value
Individual wires segment length	2	6.2	3	7.9
radius	1	.2304	3	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.	0	1	.0172222	.0219444

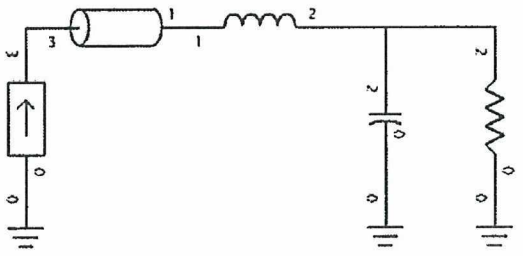
Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	16	0	-6,366.	0	0	0
2	46	0	-6,366.	0	0	0
3	61	0	-6,366.	0	0	0
4	31	0	-6,366.	0	0	0

WCAP - KTOK Tower 1 Base Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	72.5544 ∠	46.9306° V
Node:	2	64.7545 ∠	40.0806° V
Node:	3	72.5547 ∠	46.9308° 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	1.80000000	11.31 ∠	90.000° V	1.00 ∠	-0.000° A
C	2→0	0.00002500	64.75 ∠	40.081° V	0.01 ∠	130.081° A
R	2→0	48.90000000	64.75 ∠	40.081° V	1.01 ∠	-0.443° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	1.80000000	49.55 + j	53.003	49.55 + j	41.693
C	2→0	0.00002500	0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	**49.55 + j**	**53.003**	49.55 + j	53.003
R	2→0	48.90000000	**48.90 + j**	**41.800**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.7736

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	48.90000000	2	0	41.80000000		

MoM Calculated Impedance Tower 2 Driven with Other Towers Floated

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IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 16, sector 1							
1.	**48.44**	**35.358**	59.972	36.1	2.0228	-9.4122	-.52808

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
3	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
4	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		
5	none	840.	61.7	0	.2304	15
		840.	61.7	93.		

Number of wires = 5
current nodes = 75

	minimum wire	minimum value	maximum wire	maximum value
Individual wires				
segment length	2	6.2	3	7.9
radius	1	.2304	3	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.	0	1	.0172222	.0219444

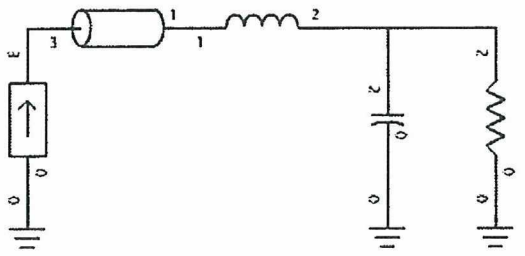
Sources

source	node	sector	magnitude	phase	type
1	16	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,366.	0	0	0
2	46	0	-6,366.	0	0	0
3	61	0	-6,366.	0	0	0
4	31	0	-6,366.	0	0	0

WCAP - KTOK Tower 2 Base Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	68.8442 ∠	44.6928° V
Node:	2	60.2982 ∠	35.7435° V
Node:	3	68.8444 ∠	44.6930° 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	2.10000000	13.19 ∠	90.000° V	1.00 ∠	-0.000° A
C	2→0	0.00002500	60.30 ∠	35.744° V	0.01 ∠	125.744° A
R	2→0	48.40000000	60.30 ∠	35.744° V	1.01 ∠	-0.438° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	2.10000000	48.94 + j	48.418	48.94 + j	35.224
C	2→0	0.00002500	0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	**48.94 + j**	**48.419**	48.94 + j	48.418
R	2→0	48.40000000	**48.40 + j**	**35.400**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.5693

WCAP INPUT DATA:

1	0.00000000	0				
L	2.10000000	1	2	0.00000000		
C	0.00002500	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	48.40000000	2	0	35.40000000		

MoM Calculated Impedance Tower 3 Driven with Other Towers Floated

C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux\KTOKT3DAOF 05-23-2012 09:28:41

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 31, sector 1							
1.	139.17	183.94	230.66	52.9	7.8781	-2.217	-3.9816

INPUT FILE

C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux\KTOKT3DAOF 05-23-2012 09:29:14

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
3	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
4	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		
5	none	840.	61.7	0	.2304	15
		840.	61.7	93.		

Number of wires = 5
current nodes = 75

	minimum wire	minimum value	maximum wire	maximum value
Individual wires				
segment length	2	6.2	3	7.9
radius	1	.2304	3	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.	0	1	.0172222	.0219444

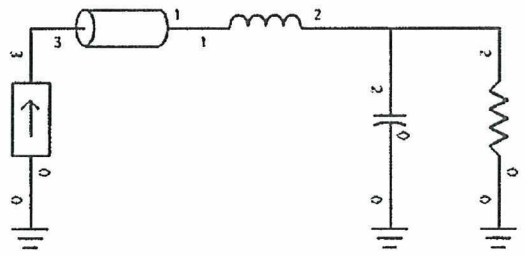
Sources

source	node	sector	magnitude	phase	type
1	31	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,366.	0	0	0
2	16	0	-6,366.	0	0	0
3	46	0	-6,366.	0	0	0
4	61	0	-6,366.	0	0	0

WCAP - KTOK Tower 3 Base Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	246.4110 ∠	53.2200° V
Node:	2	237.4488 ∠	51.5858° V
Node:	3	246.4113 ∠	53.2200° 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	1.80000000	11.31 ∠	89.999° V	1.00 ∠	-0.001° A
C	2→0	0.00002500	237.45 ∠	51.586° V	0.04 ∠	141.586° A
R	2→0	139.20000000	237.45 ∠	51.586° V	1.03 ∠	-1.291° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	1.80000000	147.53 + j	197.358	147.53 + j	186.049
C	2→0	0.00002500	0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	**147.54 + j**	**197.361**	147.53 + j	197.358
R	2→0	139.20000000	**139.20 + j**	**183.900**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	8.4515

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	139.20000000	2	0	183.90000000		

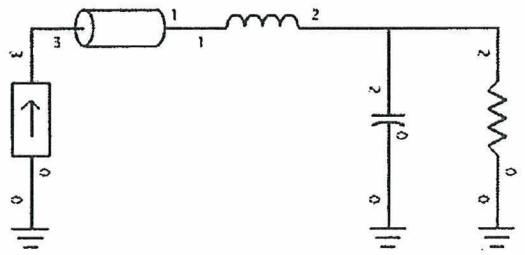
MoM Calculated Impedance Tower 4 Driven with Other Towers Floated

```
C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast
Professional\Work\KTOK Redux\KTOKT4DAOF  05-23-2012   09:33:42

IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR     S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)              dB        dB
source =  1; node 46, sector 1
1.        51.272    43.747    67.399    40.5      2.3152   -8.0302   -.74375
```

INPUT FILE

```
C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast
Professional\Work\KTOK Redux\KTOKT4DAOF  05-23-2012   09:34:58

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

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0            0            .2304         15
           0            0            94.
 2    none 210.         61.7         0            .2304         15
           210.         61.7         93.
 3    none 420.         61.7         0            .3638         15
           420.         61.7         118.5
 4    none 630.         61.7         0            .2304         15
           630.         61.7         94.5
 5    none 840.         61.7         0            .2304         15
           840.         61.7         93.

Number of wires        =  5
          current nodes  =  75

                          minimum              maximum
Individual wires      wire   value          wire   value
segment length        2      6.2            3      7.9
radius                1      .2304          3      .3638


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   1.           0            1       .0172222       .0219444

Sources
source node   sector  magnitude      phase          type
 1     46     1       1.             0              voltage

Lumped loads
                resistance     reactance      inductance  capacitance passive
load  node      (ohms)         (ohms)         (mH)        (uF)        circuit
 1     1        0              -6,366.        0           0           0
 2     16       0              -6,366.        0           0           0
 3     61       0              -6,366.        0           0           0
 4     31       0              -6,366.        0           0           0
```

WCAP - KTOK Tower 4 Base Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	75.6910 ∠	46.5956° V
Node:	2	67.9202 ∠	40.0255° V
Node:	3	75.6912 ∠	46.5958° 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	1.80000000	11.31 ∠	90.000° V	1.00 ∠	-0.000° A
C	2→0	0.00002500	67.92 ∠	40.025° V	0.01 ∠	130.025° A
R	2→0	51.30000000	67.92 ∠	40.025° V	1.01 ∠	-0.465° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	1.80000000	52.01 + j	54.991	52.01 + j	43.681
C	2→0	0.00002500	-0.01 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	**52.01 + j**	**54.992**	52.01 + j	54.991
R	2→0	51.30000000	**51.30 + j**	**43.800**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.8083

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	51.30000000	2	0	43.80000000		

MoM Calculated Impedance Tower 5 Driven with Other Towers Floated

C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux\KTOKT5DAOF 05-23-2012 09:40:01

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 61, sector 1							
1.	**47.056**	**36.211**	59.376	37.6	2.0803	-9.101	-.57

INPUT FILE

C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux\KTOKT5DAOF 05-23-2012 09:40:35

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
3	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
4	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		
5	none	840.	61.7	0.	.2304	15
		840.	61.7	93.		

Number of wires = 5
current nodes = 75

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	6.2	3	7.9
radius	1	.2304	3	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.	0	1	.0172222	.0219444

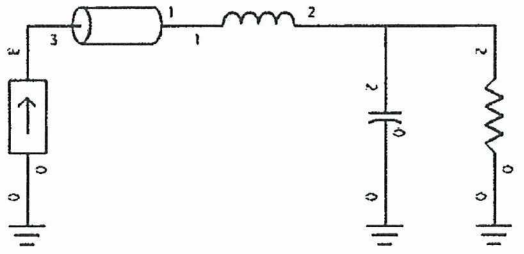
Sources

source	node	sector	magnitude	phase	type
1	61	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,366.	0	0	0
2	16	0	-6,366.	0	0	0
3	46	0	-6,366.	0	0	0
4	31	0	-6,366.	0	0	0

WCAP - KTOK Tower 5 Base Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	67.1758 ∠	44.8336° V
Node:	2	59.7426 ∠	37.1184° V
Node:	3	67.1760 ∠	44.8338° V

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

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	1.80000000	11.31 ∠	90.000° V	1.00 ∠	-0.000° A
C	2→0	0.00002500	59.74 ∠	37.118° V	0.01 ∠	127.118° A
R	2→0	47.10000000	59.74 ∠	37.118° V	1.01 ∠	-0.427° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	1.80000000	47.64 + j	47.362	47.64 + j	36.053
C	2→0	0.00002500	0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	**47.64 + j**	**47.363**	47.64 + j	47.362
R	2→0	47.10000000	**47.10 + j**	**36.200**	0.00 + j	0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.5523

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I	1.00000000	0	3	0.00000000		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	47.10000000	2	0	36.20000000		

MoM Calculated Base Drive Voltages and Currents for Day Pattern

NOTE: The order of the towers in the model and thus the node numbers at the base of each tower have been modified for analysis of the daytime operation to place the unused, floated towers first in the geometry point list. Expert Mininec Broadcast Professional v 14.6 produces anomalous results when unused radiators that are not precisely detuned are placed after driven radiators in the model geometry.

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux II\KTOKCPDAY2 11-26-2012 08:33:40

MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1 MHz

tower	field ratio magnitude	phase (deg)
1	.633	5.7
2	1.	0
3	.599	-99.3

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
31	174.45	45.8	6.37077	7.9
46	1,230.7	74.2	5.30483	9.7
61	405.857	293.1	5.76034	267.2

Sum of square of source currents = 203.819
Total power = 5,800. Watts

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux II\KTOKCPDAY2 11-26-2012 08:34:30

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	840.	61.7	0	.2304	15
		840.	61.7	93.		
3	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
4	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
5	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		

Number of wires = 5
current nodes = 75

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	6.2	4	7.9
radius	1	.2304	4	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.	0	1	.0172222	.0219444

Sources

source	node	sector	magnitude	phase	type
1	31	1	246.71	45.8	voltage
2	46	1	1,740.47	74.2	voltage
3	61	1	573.969	293.1	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,366.	0	0	0
2	16	0	-6,366.	0	0	0

MoM Calculated Current Distribution for Day Pattern

C:\Users\ccrsdilstc\Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux II\KTOKCPDAY2 11-26-2012 08:36:06

CURRENT rms
Frequency = 1 MHz
Input power = 5,800. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	4.69E-03	236.4	-2.59E-03	-3.91E-03
2	0	0	6.26667	.0229933	236.6	-.0126627	-.0191924
3	0	0	12.5333	.0345104	236.8	-.0188822	-.0288866
4	0	0	18.8	.0433403	237.1	-.0235258	-.0363994
5	0	0	25.0667	.0499953	237.5	-.0268906	-.0421477
6	0	0	31.3333	.0546693	237.8	-.029103	-.046279
7	0	0	37.6	.0574507	238.2	-.030236	-.0488505
8	0	0	43.8667	.05839	238.7	-.0303467	-.0498846
9	0	0	50.1333	.0575242	239.2	-.0294895	-.0493903
10	0	0	56.4	.0548857	239.7	-.0277207	-.0473709
11	0	0	62.6667	.0505044	240.2	-.0250992	-.043826
12	0	0	68.9333	.0444036	240.8	-.0216851	-.0387483
13	0	0	75.2	.0365872	241.4	-.0175336	-.0321123
14	0	0	81.4667	.0270044	242.	-.0126792	-.0238427
15	0	0	87.7333	.0154411	242.7	-7.09E-03	-.0137175
END	0	0	94.	0	0	0	0
GND	398.234	-739.601	0	.0192509	356.6	.0192177	-1.13E-03
17	398.234	-739.601	6.2	.0938383	356.6	.0936711	-5.6E-03
18	398.234	-739.601	12.4	.140641	356.5	.140376	-8.62E-03
19	398.234	-739.601	18.6	.176444	356.4	.176091	-.0111602
20	398.234	-739.601	24.8	.203346	356.2	.20291	-.0133172
21	398.234	-739.601	31.	.222147	356.1	.221633	-.0151022
22	398.234	-739.601	37.2	.233213	355.9	.23263	-.0164918
23	398.234	-739.601	43.4	.236764	355.8	.236121	-.0174447
24	398.234	-739.601	49.6	.232964	355.6	.232275	-.0179087
25	398.234	-739.601	55.8	.221965	355.4	.221248	-.0178231
26	398.234	-739.601	62.	.203916	355.2	.203196	-.0171196
27	398.234	-739.601	68.2	.17895	355.	.178258	-.0157211
28	398.234	-739.601	74.4	.147135	354.7	.146511	-.0135368
29	398.234	-739.601	80.6	.108334	354.5	.107829	-.0104464
30	398.234	-739.601	86.8	.061776	354.2	.0614588	-6.25E-03
END	398.234	-739.601	93.	0	0	0	0
GND	**99.5585**	**-184.9**	**0**	**6.37076**	**7.9**	**6.30985**	**.878842**
32	99.5585	-184.9	6.2	6.40399	7.2	6.35378	.80036
33	99.5585	-184.9	12.4	6.34861	6.7	6.30527	.740574
34	99.5585	-184.9	18.6	6.22002	6.3	6.18242	.682945
35	99.5585	-184.9	24.8	6.02149	6.	5.98891	.625569
36	99.5585	-184.9	31.	5.7558	5.7	5.72771	.567908
37	99.5585	-184.9	37.2	5.42588	5.4	5.40187	.509913
38	99.5585	-184.9	43.4	5.03506	5.1	5.01475	.451738
39	99.5585	-184.9	49.6	4.58699	4.9	4.57007	.393631
40	99.5585	-184.9	55.8	4.0856	4.7	4.07177	.335879
41	99.5585	-184.9	62.	3.53489	4.5	3.52388	.278766
42	99.5585	-184.9	68.2	2.93853	4.3	2.93009	.222541
43	99.5585	-184.9	74.4	2.29922	4.2	2.29312	.167364
44	99.5585	-184.9	80.6	1.61677	4.	1.6128	.113191
45	99.5585	-184.9	86.8	.882656	3.9	.880652	.0594403
END	99.5585	-184.9	93.	0	0	0	0
GND	**199.117**	**-369.801**	**0**	**5.30482**	**9.7**	**5.22846**	**.896873**

47	199.117	-369.801	7.9	6.22785	5.6	6.19809	.608028
48	199.117	-369.801	15.8	6.74262	3.5	6.72975	.416355
49	199.117	-369.801	23.7	7.06785	2.1	7.06327	.254418
50	199.117	-369.801	31.6	7.22685	.9	7.22592	.115509
51	199.117	-369.801	39.5	7.22953	360.	7.22953	-2.29E-03
52	199.117	-369.801	47.4	7.08202	359.2	7.08132	-.099294
53	199.117	-369.801	55.3	6.79049	358.5	6.78822	-.175335
54	199.117	-369.801	63.2	6.36158	357.9	6.35742	-.230142
55	199.117	-369.801	71.1	5.80324	357.4	5.79725	-.263533
56	199.117	-369.801	79.	5.12433	356.9	5.11692	-.275488
57	199.117	-369.801	86.9	4.33424	356.5	4.32606	-.266142
58	199.117	-369.801	94.8	3.44165	356.1	3.43357	-.235706
59	199.117	-369.801	102.7	2.45152	355.7	2.4446	-.184186
60	199.117	-369.801	110.6	1.35664	355.3	1.35212	-.110569
END	199.117	-369.801	118.5	0	0	0	0
GND	298.676	-554.701	0	5.76036	267.2	-.277739	-5.75366
62	298.676	-554.701	6.3	5.84389	265.	-.506122	-5.82193
63	298.676	-554.701	12.6	5.831	263.6	-.646785	-5.79502
64	298.676	-554.701	18.9	5.74503	262.5	-.751103	-5.69572
65	298.676	-554.701	25.2	5.58955	261.5	-.825597	-5.52824
66	298.676	-554.701	31.5	5.36712	260.6	-.872803	-5.29568
67	298.676	-554.701	37.8	5.08035	259.9	-.89403	-5.00107
68	298.676	-554.701	44.1	4.7322	259.2	-.89012	-4.64773
69	298.676	-554.701	50.4	4.32597	258.5	-.861815	-4.23926
70	298.676	-554.701	56.7	3.86532	257.9	-.809849	-3.77953
71	298.676	-554.701	63.	3.354	257.3	-.734981	-3.27248
72	298.676	-554.701	69.3	2.79556	256.8	-.637906	-2.7218
73	298.676	-554.701	75.6	2.1926	256.3	-.519147	-2.13026
74	298.676	-554.701	81.9	1.5451	255.8	-.378532	-1.49801
75	298.676	-554.701	88.2	.845002	255.3	-.213773	-.817514
END	298.676	-554.701	94.5	0	0	0	0

MoM Calculated Drive Impedances for Day Pattern

C:\Users\ccrsdi1stc\Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux II\KTOKCPDAY2 11-26-2012 08:37:07

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 31, sector 1							
1.	**21.616**	**16.809**	27.383	37.9	2.626	-6.9661	-.97501
source = 2; node 46, sector 1							
1.	**100.16**	**209.26**	232.	64.4	11.157	-1.5612	-5.2004
source = 3; node 61, sector 1							
1.	**63.411**	**30.711**	70.457	25.8	1.7981	-10.897	-.36849

MoM Calculated Current Moments for Day Pattern

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CURRENT MOMENTS(amp-degrees) rms

Frequency = 1 MHz
Input power = 5,800. watts

			vertical current moment	
wire	magnitude	phase (deg)	magnitude	phase (deg)
1	4.5006	239.	4.5006	239.
2	18.0423	355.7	18.0423	355.7
3	469.732	5.7	469.732	5.7
4	742.074	0.0	742.074	0.0
5	444.501	260.7	444.501	260.7

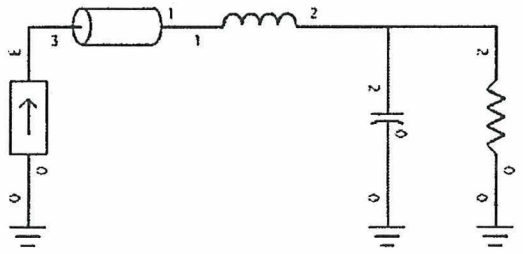
Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	469.732	5.7
2	742.074	0.0
3	444.501	260.7

Sum of current moments normalized to tower 3, towers 1 and 5 floated
Tower numbering reflects night pattern theoretical assignment

tower	wire	magnitude	phase (deg)
2	3	0.633	+5.7
3	4	1.000	+0.0
4	5	0.599	-99.3

WCAP - KTOK DAY Tower 2 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	235.2397 ∠	62.1539° V
Node:	2	174.4465 ∠	45.7691° V
Node:	3	235.2413 ∠	62.1542° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	6.35 ∠	8.095° A	6.35 ∠	8.095° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	2.10000000	83.84 ∠	98.095° V	6.35 ∠	8.095° A
C	2→0	0.00002500	174.45 ∠	45.769° V	0.03 ∠	135.769° A
R	2→0	21.61600000	174.45 ∠	45.769° V	**6.37 ∠**	**7.900° A**

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	2.10000000	21.73 + j	29.974	21.73 + j	16.780
C	2→0	0.00002500	-0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	21.73 + j	29.975	21.73 + j	29.974
R	2→0	21.61600000	**21.62 + j**	**16.809**	0.00 + j	0.000

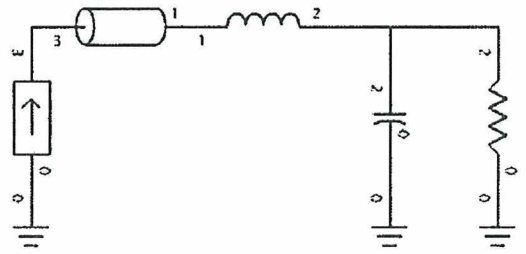
	WCAP PART		VSWR
TL	3→1	50.00000000	3.2553

WCAP INPUT DATA:

	1	0.00000000	0			
L		2.10000000	1	2	0.00000000	
C		0.00002500	2	0		
I*		**6.35395100**	0	3	**8.09500000**	
TL		50.00000000	3	1	100.00000000	0.00100000	0.00000000
R		**21.61600000**	2	0	**16.80900000**	

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

WCAP - KTOK DAY Tower 3 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	1282.8846 ∠	75.2795° V
Node:	2	1230.6928 ∠	74.1226° V
Node:	3	1282.8860 ∠	75.2796° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**5.13 ∠ 10.633° A**	5.13 ∠ 10.632° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	58.03 ∠ 100.632° V	5.13 ∠ 10.632° A
C	2→0	0.00002500	1230.69 ∠ 74.123° V	0.19 ∠ 164.123° A
R	2→0	100.16000000	1230.69 ∠ 74.123° V	**5.30 ∠ 9.700° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	107.06 + j 225.940	107.06 + j 214.631
C	2→0	0.00002500	0.00 - j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	107.06 + j 225.946	107.06 + j 225.940
R	2→0	100.16000000	**100.16 + j 209.260**	0.00 + j 0.000

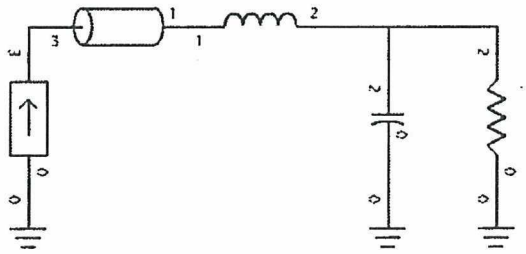
	WCAP PART		VSWR
TL	3→1	50.00000000	12.0622

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I*	**5.13097900**	0	3	**10.63300000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	**100.16000000**	2	0	**209.26000000**		

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

WCAP - KTOK DAY Tower 4 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES
Node: 1 437.4780 ∠ -59.2559° V
Node: 2 405.8549 ∠ -66.9582° V
Node: 3 437.4790 ∠ -59.2557° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**5.73 ∠ -92.226° A**	5.73 ∠ -92.226° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	64.84 ∠ -2.226° V	5.73 ∠ -92.226° A
C	2→0	0.00002500	405.85 ∠ -66.958° V	0.06 ∠ 23.042° A
R	2→0	63.41100000	405.85 ∠ -66.958° V	**5.76 ∠ -92.800° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	64.02 + j 41.529	64.02 + j 30.219
C	2→0	0.00002500	-0.00 - j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	64.02 + j 41.529	64.02 + j 41.529
R	2→0	63.41100000	**63.41 + j 30.711**	0.00 + j 0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	2.1309

WCAP INPUT DATA:

	1	0.00000000	0			
L		1.80000000	1	2	0.00000000	
C		0.00002500	2	0		
I*		**5.73282800**	0	3	**267.77400000**	
TL		50.00000000	3	1	100.00000000	0.00100000 0.00000000
R		**63.41100000**	2	0	**30.71100000**	

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

MoM Calculated Base Drive Voltages and Currents for Night Pattern

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1 MHz

tower	field ratio magnitude	phase (deg)
1	.298	117.5
2	.76	61.1
3	1.	0
4	.76	-61.1
5	.298	-117.5

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	88.9274	185.4	2.68558	118.9
16	281.081	114.9	6.89657	63.7
31	1,038.91	72.4	5.1978	9.2
46	338.732	342.5	6.78231	302.8
61	108.275	265.	2.79665	246.3

Sum of square of source currents = 271.226
Total power = 5,800. watts

INPUT FILE

C:\Documents and Settings\stcox\My Documents\Expert MININEC Broadcast Professional\Work\KTOK Redux\KTOKNITE 05-23-2012 10:27:46

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.2304	15
		0	0	94.		
2	none	210.	61.7	0	.2304	15
		210.	61.7	93.		
3	none	420.	61.7	0	.3638	15
		420.	61.7	118.5		
4	none	630.	61.7	0	.2304	15
		630.	61.7	94.5		
5	none	840.	61.7	0	.2304	15
		840.	61.7	93.		

Number of wires = 5
current nodes = 75

	minimum wire	minimum value	maximum wire	maximum value
Individual wires				
segment length	2	6.2	3	7.9
radius	1	.2304	3	.3638

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.	0	1	.0172222	.0219444

Sources - Peak voltage

source	node	sector	magnitude	phase	type
1	1	1	125.762	185.4	voltage
2	16	1	397.509	114.9	voltage
3	31	1	1,469.24	72.4	voltage
4	46	1	479.039	342.5	voltage
5	61	1	153.124	265.	voltage

MoM Calculated Current Distribution for Night Pattern

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CURRENT rms
Frequency = 1 MHz
Input power = 5,800. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**2.68558**	**118.9**	-1.29647	2.35191
2	0	0	6.26667	2.72191	118.4	-1.29493	2.39415
3	0	0	12.5333	2.7124	118.1	-1.27824	2.39232
4	0	0	18.8	2.66861	117.9	-1.24778	2.35892
5	0	0	25.0667	2.5926	117.7	-1.204	2.29608
6	0	0	31.3333	2.48581	117.5	-1.14739	2.20516
7	0	0	37.6	2.34966	117.3	-1.07857	2.08748
8	0	0	43.8667	2.18564	117.2	-.998188	1.94438
9	0	0	50.1333	1.9954	117.	-.907013	1.77734
10	0	0	56.4	1.78069	116.9	-.80584	1.58792
11	0	0	62.6667	1.54332	116.8	-.695507	1.37771
12	0	0	68.9333	1.28492	116.7	-.576766	1.1482
13	0	0	75.2	1.00674	116.6	-.450187	.90048
14	0	0	81.4667	.708767	116.5	-.315781	.634534
15	0	0	87.7333	.387298	116.4	-.171937	.347041
END	0	0	94.	0	0	0	0
GND	98.589	-185.419	0	**6.89657**	**63.7**	3.05639	6.18233
17	98.589	-185.419	6.2	6.99555	62.8	3.19608	6.22276
18	98.589	-185.419	12.4	6.97553	62.3	3.24706	6.1737
19	98.589	-185.419	18.6	6.86717	61.8	3.24473	6.05226
20	98.589	-185.419	24.8	6.67576	61.4	3.19423	5.86197
21	98.589	-185.419	31.	6.40491	61.1	3.09826	5.60568
22	98.589	-185.419	37.2	6.05811	60.8	2.95893	5.28635
23	98.589	-185.419	43.4	5.63913	60.5	2.77825	4.90725
24	98.589	-185.419	49.6	5.15203	60.2	2.55831	4.47196
25	98.589	-185.419	55.8	4.60121	60.	2.30132	3.98435
26	98.589	-185.419	62.	3.99108	59.8	2.0095	3.44828
27	98.589	-185.419	68.2	3.32577	59.6	1.68494	2.86735
28	98.589	-185.419	74.4	2.60823	59.4	1.32914	2.24416
29	98.589	-185.419	80.6	1.83817	59.2	.941902	1.57851
30	98.589	-185.419	86.8	1.00574	59.	.518095	.862027
END	98.589	-185.419	93.	0	0	0	0
GND	197.178	-370.838	0	**5.1978**	**9.2**	5.13129	.828899
32	197.178	-370.838	7.9	5.96411	5.4	5.93786	.558888
33	197.178	-370.838	15.8	6.3808	3.4	6.36945	.380366
34	197.178	-370.838	23.7	6.63083	2.	6.62684	.230185
35	197.178	-370.838	31.6	6.73397	.9	6.73319	.101996
36	197.178	-370.838	39.5	6.69882	359.9	6.69881	-6.09E-03
37	197.178	-370.838	47.4	6.53112	359.2	6.53044	-.0945098
38	197.178	-370.838	55.3	6.23652	358.5	6.23438	-.16323
39	197.178	-370.838	63.2	5.82138	357.9	5.81751	-.212166
40	197.178	-370.838	71.1	5.2931	357.4	5.2876	-.241325
41	197.178	-370.838	79.	4.65997	356.9	4.65321	-.250873
42	197.178	-370.838	86.9	3.93065	356.5	3.92324	-.241136
43	197.178	-370.838	94.8	3.11315	356.1	3.10589	-.212519
44	197.178	-370.838	102.7	2.21213	355.7	2.20595	-.165261
45	197.178	-370.838	110.6	1.22127	355.4	1.21728	-.0987114
END	197.178	-370.838	118.5	0	0	0	0

GND	295.767	-556.257	0	6.7823	302.8	3.67882	-5.69788
47	295.767	-556.257	6.3	6.88239	301.5	3.5973	-5.86743
48	295.767	-556.257	12.6	6.8652	300.7	3.50135	-5.90521
49	295.767	-556.257	18.9	6.76067	300.	3.37754	-5.85652
50	295.767	-556.257	25.2	6.57383	299.4	3.22503	-5.72839
51	295.767	-556.257	31.5	6.3082	298.9	3.04443	-5.52493
52	295.767	-556.257	37.8	5.9672	298.4	2.837	-5.24966
53	295.767	-556.257	44.1	5.55456	298.	2.60442	-4.90613
54	295.767	-556.257	50.4	5.07438	297.6	2.34865	-4.49813
55	295.767	-556.257	56.7	4.5311	297.2	2.07177	-4.02971
56	295.767	-556.257	63.	3.92922	296.9	1.77594	-3.50497
57	295.767	-556.257	69.3	3.27298	296.6	1.46312	-2.92775
58	295.767	-556.257	75.6	2.56555	296.3	1.13481	-2.30093
59	295.767	-556.257	81.9	1.80688	296.	.79109	-1.62449
60	295.767	-556.257	88.2	.987615	295.7	.428072	-.890021
END	295.767	-556.257	94.5	0	0	0	0
GND	394.356	-741.676	0	2.79665	246.3	-1.12316	-2.56121
62	394.356	-741.676	6.2	2.80421	245.	-1.18308	-2.54242
63	394.356	-741.676	12.4	2.77601	244.2	-1.20715	-2.49981
64	394.356	-741.676	18.6	2.71691	243.5	-1.21031	-2.43243
65	394.356	-741.676	24.8	2.62803	243.	-1.19471	-2.34077
66	394.356	-741.676	31.	2.51042	242.4	-1.16145	-2.22559
67	394.356	-741.676	37.2	2.36529	242.	-1.11137	-2.08793
68	394.356	-741.676	43.4	2.19399	241.5	-1.04523	-1.92901
69	394.356	-741.676	49.6	1.99807	241.2	-.963865	-1.75022
70	394.356	-741.676	55.8	1.77921	240.8	-.868122	-1.55304
71	394.356	-741.676	62.	1.53906	240.5	-.75886	-1.33897
72	394.356	-741.676	68.2	1.27922	240.1	-.636893	-1.1094
73	394.356	-741.676	74.4	1.00081	239.8	-.502811	-.865336
74	394.356	-741.676	80.6	.703713	239.6	-.356571	-.606687
75	394.356	-741.676	86.8	.384178	239.3	-.196253	-.330269
END	394.356	-741.676	93.	0	0	0	0

MoM Calculated Drive Impedances for Night Pattern

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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.	13.2	30.368	33.113	66.5	5.2589	-3.344	-2.7004
source = 2; node 16, sector 1							
1.	25.554	31.751	40.757	51.2	2.9135	-6.2146	-1.1866
source = 3; node 31, sector 1							
1.	90.096	178.42	199.87	63.2	9.3158	-1.872	-4.5573
source = 4; node 46, sector 1							
1.	38.444	31.881	49.944	39.7	2.1284	-8.857	-.60533
source = 5; node 61, sector 1							
1.	36.675	12.404	38.716	18.7	1.525	-13.642	-.19191

MoM Calculated Current Moments for Night Pattern

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CURRENT MOMENTS(amp-degrees) rms

Frequency = 1 MHz
Input power = 5,800. watts

			vertical current moment	
wire	magnitude	phase (deg)	magnitude	phase (deg)
1	204.916	117.5	204.916	117.5
2	522.603	61.1	522.603	61.1
3	687.636	0.0	687.636	0.0
4	522.604	298.9	522.604	298.9
5	204.916	242.5	204.916	242.5

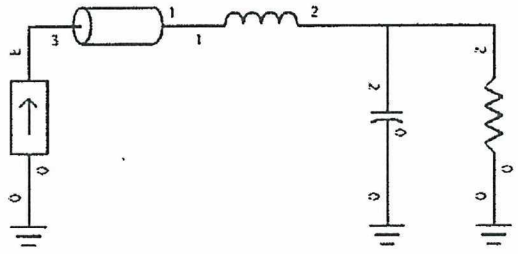
Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	204.916	117.5
2	522.603	61.1
3	687.636	0.0
4	522.604	298.9
5	204.916	242.5

Medium wave array vertical current moment
Normalized to tower 3

tower	magnitude	phase (deg)
1	0.298	+117.5
2	0.760	+61.1
3	1.000	+0.0
4	0.760	-61.1
5	0.298	-117.5

WCAP - KTOK NIGHT Tower 1 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES
Node: 1 117.3355 ∠ -168.6537° V
Node: 2 89.0076 ∠ -174.5715° V
Node: 3 117.3363 ∠ -168.6536° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**2.67 ∠ 119.019° A**	2.67 ∠ 119.019° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	30.23 ∠ -150.981° V	2.67 ∠ 119.019° A
C	2→0	0.00002500	89.01 ∠ -174.571° V	0.01 ∠ -84.571° A
R	2→0	13.20000000	89.01 ∠ -174.571° V	**2.69 ∠ 118.900° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	13.33 + j 41.828	13.33 + j 30.518
C	2→0	0.00002500	0.00 - j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	13.33 + j 41.828	13.33 + j 41.828
R	2→0	13.20000000	**13.20 + j 30.400**	0.00 + j 0.000

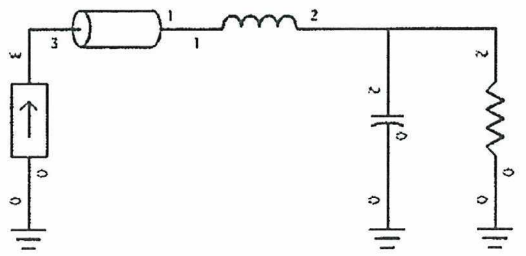
	WCAP PART		VSWR
TL	3→1	50.00000000	6.4899

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I*	**2.67280000**	**0**	**3**	**119.01900000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	13.20000000	2	0	30.40000000		

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

WCAP - KTOK NIGHT Tower 2 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	356.4408 ∠	124.0773° V
Node:	2	281.5441 ∠	114.8651° V
Node:	3	356.4427 ∠	124.0774° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	3→1	50.00000000	**6.86 ∠**	**63.932° A**	6.86 ∠	63.932° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
L	1→2	2.10000000	90.54 ∠	153.932° V	6.86 ∠	63.932° A
C	2→0	0.00002500	281.54 ∠	114.865° V	0.04 ∠	-155.135° A
R	2→0	25.60000000	281.54 ∠	114.865° V	**6.90 ∠**	**63.700° A**

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
L	1→2	2.10000000	25.86 + j	45.050	25.86 + j	31.855
C	2→0	0.00002500	0.00 - j	6366.198	0.00 + j	0.000
TL	3→1	50.00000000	25.86 + j	45.050	25.86 + j	45.050
R	2→0	25.60000000	**25.60 + j**	**31.800**	0.00 + j	0.000

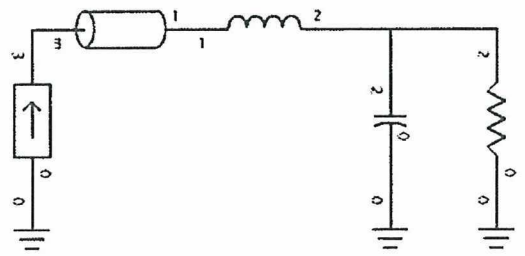
	WCAP PART		VSWR
TL	3→1	50.00000000	3.7542

WCAP INPUT DATA:

1	0.00000000	0				
L	2.10000000	1	2	0.00000000		
C	0.00002500	2	0			
I*	**6.86210000**	**0**	**3**	**63.93200000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	25.60000000	2	0	31.80000000		

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

WCAP - KTOK NIGHT Tower 3 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES

Node:	1	1089.7781 ∠	73.7977° V
Node:	2	1038.8286 ∠	72.4043° V
Node:	3	1089.7795 ∠	73.7977° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**5.05 ∠ 10.035° A**	5.05 ∠ 10.034° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	57.14 ∠ 100.034° V	5.05 ∠ 10.034° A
C	2→0	0.00002500	1038.83 ∠ 72.404° V	0.16 ∠ 162.404° A
R	2→0	90.10000000	1038.83 ∠ 72.404° V	**5.20 ∠ 9.200° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	95.35 + j 193.465	95.35 + j 182.155
C	2→0	0.00002500	0.00 − j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	95.35 + j 193.469	95.35 + j 193.465
R	2→0	90.10000000	**90.10 + j 178.400**	0.00 + j 0.000

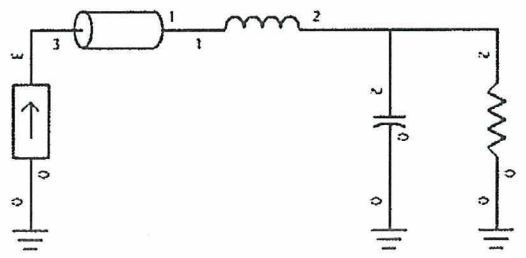
	WCAP PART		VSWR
TL	3→1	50.00000000	10.1840

WCAP INPUT DATA:

1	0.00000000	0				
L	1.80000000	1	2	0.00000000		
C	0.00002500	2	0			
I*	**5.05250000**	**0**	**3**	**10.03500000**		
TL	50.00000000	3	1	100.00000000	0.00100000	0.00000000
R	90.10000000	2	0	178.40000000		

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

WCAP - KTOK NIGHT Tower 4 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES
Node: 1 391.4692 ∠ -8.8135° V
Node: 2 338.5834 ∠ -17.4822° V
Node: 3 391.4708 ∠ -8.8133° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**6.75 ∠ -56.852° A**	6.75 ∠ -56.852° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	76.32 ∠ 33.148° V	6.75 ∠ -56.852° A
C	2→0	0.00002500	338.58 ∠ -17.482° V	0.05 ∠ 72.518° A
R	2→0	38.40000000	338.58 ∠ -17.482° V	**6.78 ∠ -57.200° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	38.79 + j 43.135	38.79 + j 31.826
C	2→0	0.00002500	-0.00 - j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	38.79 + j 43.136	38.79 + j 43.135
R	2→0	38.40000000	**38.40 + j 31.900**	0.00 + j 0.000

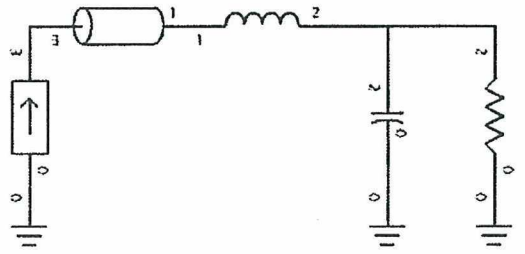
	WCAP PART		VSWR
TL	3→1	50.00000000	2.6464

WCAP INPUT DATA:

	1	0.00000000	0			
L		1.80000000	1	2	0.00000000	
C		0.00002500	2	0		
I*		**6.74840000**	**0**	**3**	**303.14800000**	
TL		50.00000000	3	1	100.00000000	0.00100000 0.00000000
R		38.40000000	2	0	31.90000000	

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

WCAP - KTOK NIGHT Tower 5 Operating Model



WCAP OUTPUT AT FREQUENCY: 1.000 MHz

NODE VOLTAGES
Node: 1 122.0045 ∠ -80.8139° V
Node: 2 108.3357 ∠ -95.0314° V
Node: 3 122.0050 ∠ -80.8135° V

	WCAP PART		CURRENT IN	CURRENT OUT
TL	3→1	50.00000000	**2.79 ∠ -113.369° A**	2.79 ∠ -113.369° A

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
L	1→2	1.80000000	31.57 ∠ -23.369° V	2.79 ∠ -113.369° A
C	2→0	0.00002500	108.34 ∠ -95.031° V	0.02 ∠ -5.031° A
R	2→0	36.70000000	108.34 ∠ -95.031° V	**2.80 ∠ -113.700° A**

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
L	1→2	1.80000000	36.84 + j 23.521	36.84 + j 12.211
C	2→0	0.00002500	0.00 - j 6366.198	0.00 + j 0.000
TL	3→1	50.00000000	36.84 + j 23.521	36.84 + j 23.521
R	2→0	36.70000000	**36.70 + j 12.400**	0.00 + j 0.000

	WCAP PART		VSWR
TL	3→1	50.00000000	1.8553

WCAP INPUT DATA:

	1	0.00000000	0			
L		1.80000000	1	2	0.00000000	
C		0.00002500	2	0		
I*		**2.79120000**	**0**	**3**	**246.63100000**	
TL		50.00000000	3	1	100.00000000	0.00100000 0.00000000
R		36.70000000	2	0	12.40000000	

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

Calculated Operating Parameters from Modeled Currents at Sampling Point

	Current	Phase	Ratio	Phase
Day				
Tower 2	6.353951 A	+8.095°	1.238	-2.5°
Tower 3	5.130979 A	+10.63°	1.000	+0.0°
Tower 4	5.732828 A	+267.77°	1.117	-102.9°
Night				
Tower 1	2.6728 A	+119.0°	0.529	+109.0°
Tower 2	6.8621 A	+63.9°	1.358	+53.9°
Tower 3	5.0525 A	+10.0°	1.000	+0.0°
Tower 4	6.7484 A	+303.2°	1.336	-66.8°
Tower 5	2.7912 A	+246.6°	0.552	-123.4°

Measured and Calculated Sampling Line Characteristics

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

Tower 1	**895.16 kHz**	7/4 λ (630°)
Tower 2	**895.06 kHz**	7/4 λ (630°)
Tower 3	**895.42 kHz**	7/4 λ (630°)
Tower 4	**895.24 kHz**	7/4 λ (630°)
Tower 5	**896.02 kHz**	7/4 λ (630°)

Calculated electrical length at $f_{carrier}$:

Tower 1 L = ($f_{carrier}$ / $f_{resonant}$)*630° = (1000 kHz / 895.16 kHz)*630° = **703.79°**
Tower 2 L = ($f_{carrier}$ / $f_{resonant}$)*630° = (1000 kHz / 895.06 kHz)*630° = **703.86°**
Tower 3 L = ($f_{carrier}$ / $f_{resonant}$)*630° = (1000 kHz / 895.42 kHz)*630° = **703.58°**
Tower 4 L = ($f_{carrier}$ / $f_{resonant}$)*630° = (1000 kHz / 895.24 kHz)*630° = **703.72°**
Tower 5 L = ($f_{carrier}$ / $f_{resonant}$)*630° = (1000 kHz / 896.02 kHz)*630° = **703.11°**

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

Tower 1	**831.22 kHz**	**10.2 – j47.1 Ω**	-1/8 λ
	959.10 kHz	**13.0 + j49.6 Ω**	+1/8 λ
Tower 2	**831.13 kHz**	**10.3 - j47.1 Ω**	-1/8 λ
	958.99 kHz	**13.0 + j49.8 Ω**	+1/8 λ
Tower 3	**831.46 kHz**	**10.2 – j46.4 Ω**	-1/8 λ
	959.38 kHz	**13.2 + j50.5 Ω**	+1/8 λ
Tower 4	**831.29 kHz**	**10.3 – j47.1 Ω**	-1/8 λ
	959.19 kHz	**13.1 + j50.2 Ω**	+1/8 λ
Tower 5	**832.02 kHz**	**10.4 – j46.7 Ω**	-1/8 λ
	960.02 kHz	**13.3 + 50.0 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	**49.8 Ω**
Tower 3	**49.8 Ω**
Tower 4	**50.0 Ω**
Tower 5	**49.7 Ω**

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

Tower 1	**48.4 + j0.7 Ω**
Tower 2	**48.6 + j0.6 Ω**
Tower 3	**48.7 + j0.8 Ω**
Tower 4	**48.4 + j0.4 Ω**
Tower 5	**48.5 + j0.7 Ω**

All measurements above made with a Hewlett Packard 8753D 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 8753D 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 3 toroid was fed to the reference receiver of the vector network analyzer system and the sampled outputs of the tower 1, 2, 4 and 5 toroids were alternately fed to the A receiver. The relative phase and magnitude of the outputs of the tower 1, 2, 4 and 5 toroids as compared to the output of the tower 1 toroid at the carrier frequency were noted and the results shown below.

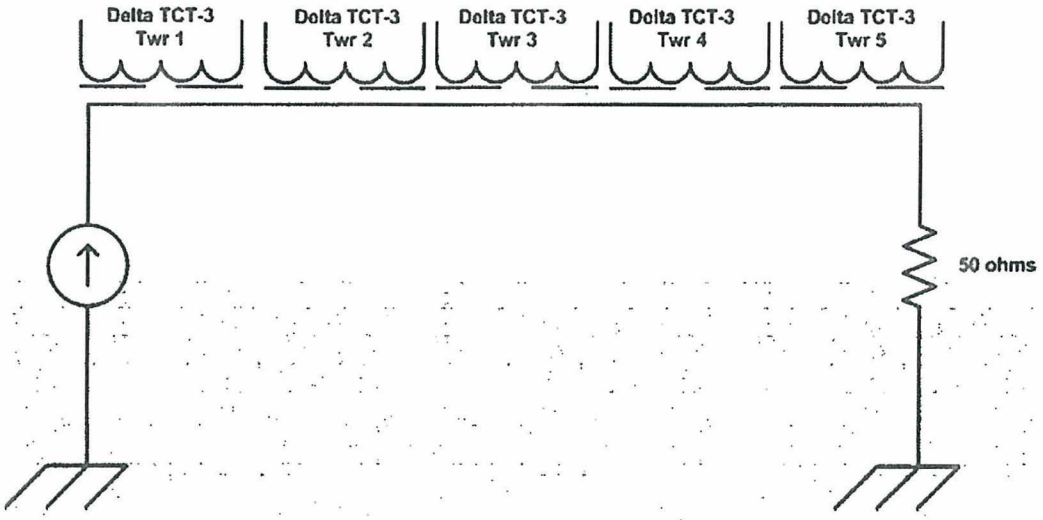


Figure 1

	Indicated Ratio	Indicated Phase
Tower 1 (SN 18063)	0.99463	+0.12°
Tower 2 (SN 18061)	0.99457	+0.14°
Tower 3 (SN 10860)	1.00000	+0.00°
Tower 4 (SN 10859)	0.99518	-0.01°
Tower 5 (SN 10858)	0.99500	-0.10°

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

Verification of Radiator Locations*

	Theoretical	Surveyed	Magnitude of Difference Vector
$T_1 - T_3$	420° (1147.49') @ 61.7°T	419.91° (1147.25') @ 61.72°T	0.17° (0.46')
$T_2 - T_3$	210° (573.75') @ 61.7°T	209.96° (573.63') @ 61.70°T	0.04° (0.11')
T_3		Reference point	
$T_3 - T_4$	210° (573.75') @ 61.7°T	210.21° (574.32') @ 61.69°T	0.21° (0.57')
$T_3 - T_5$	420° (1147.49') @ 61.7°T	420.34° (1148.43') @ 61.69°T	0.35° (0.96')

Survey attached as part of this exhibit.

*c = 2.99792458 * 10^8 m/s used for all electrical length calculations. Distances are shown in electrical degrees at 1000 kHz.

Environmental Statement

The KTOK (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.

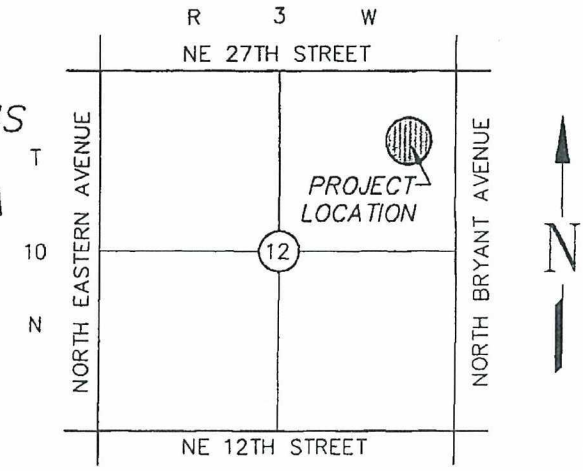
Reference Point Measurements

The applicant respectfully requests a waiver of provisions of 47 CFR 73.151 requiring that reference field strength measurement locations be established in all directions of pattern minima and maxima. The KTOK (AM) directional patterns are very complex and the resulting field work required to be repeated every two years is particularly onerous in this case. After informal discussions with the FCC staff, the applicant proposes measurements on the two major lobes in each pattern and on each minima specified in the underlying construction permit where a material protection toward another radio station is located. This results in six measured radials in the day pattern and eleven measured radials in the night pattern. Those measurements are attached to this report.

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

COMMUNICATION TOWER LOCATIONS FOR CLEAR CHANNEL COMMUNICATIONS IN CITY OF MOORE, CLEVELAND COUNTY, OKLAHOMA

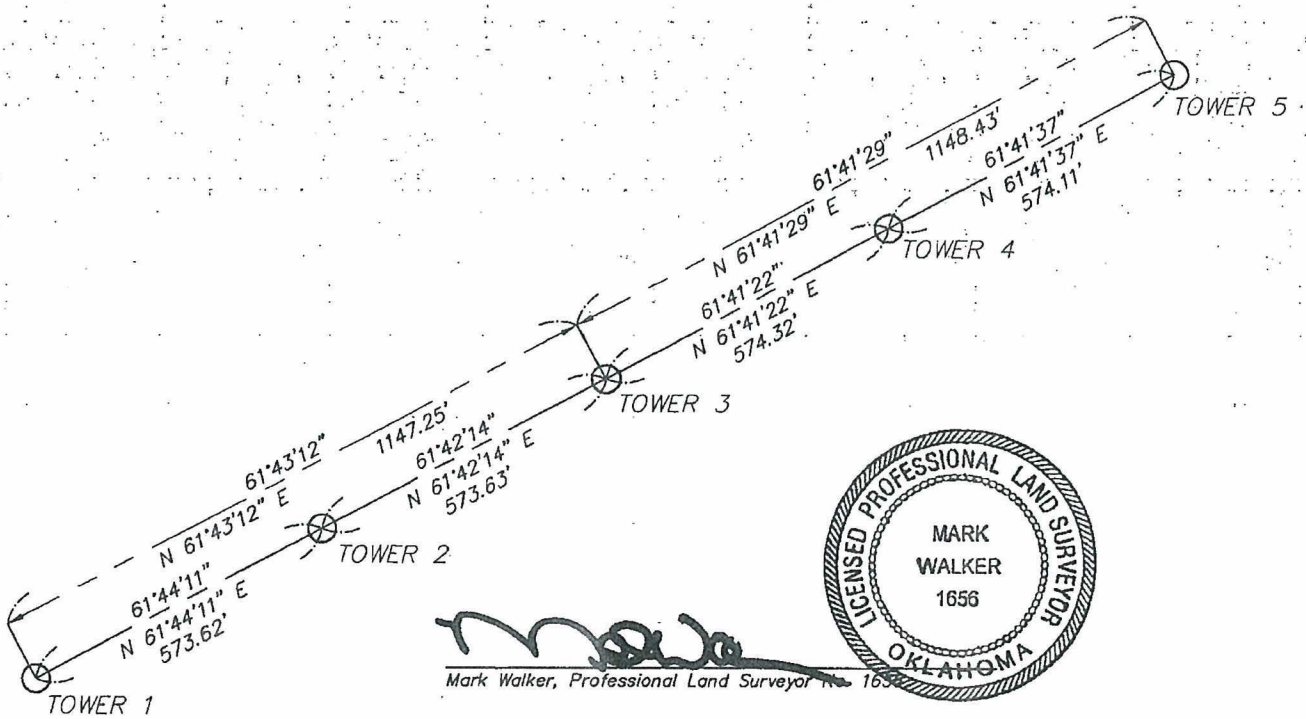
SCALE
1"=300'



LOCATION MAP
NOT TO SCALE

DATUMS:
THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1927 (NAD27) AND IS EXPRESSED AS DEGREES, MINUTES, SECONDS TO THE NEAREST HUNDRED-THOUSANDTHS OF A SECOND.

THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND ARE DETERMINED TO THE NEAREST HUNDREDTH OF A FOOT.



LICENSED PROFESSIONAL LAND SURVEYOR
MARK WALKER 1656
OKLAHOMA

Mark Walker, Professional Land Surveyor No. 1656

Date of Signature: MAY 2, 2012

ENGINEERS SURVEYORS PLANNERS
SMITH ROBERTS BALDISCHWILER, LLC
100 NE 5th STREET – OKLAHOMA CITY, OKLAHOMA 73104
TELEPHONE (405) 840-7094

KTOK (AM) Reference Points

Engineer: **CHUCK DEPAEPE** **FIM :** FIM-21 POTOMAC **FIM S/N:** 1078 **FIM Cal Date** Nov-09

DAY FIELD MEASUREMENTS							
Azimuth	**Description**	**Distance (km)**	**Latitude (NAD27)**	**Longitude (NAD27)**	**Date**	**Time**	**Field (mV/m)**
28.5°T							
	S. end of Interpace st., by gate	5.4	35 24 3.4	97 26 5.7	6/25/2012	10:15am	57
	5417 Embers E. of house on curb	7.3	35 24 57.7	97 25 29.3	6/25/2012	10:25am	55
	804 W. Curtiss dr., by manhole cover	10	35 26 14.7	97 24 38.1	6/25/2012	10:45am	41
137.5°T							
	13701 Alicia Springs ct. N of house	3.9	35 19 56.8	97 26 40	7/2/2012	1:55pm	120
	S. Sooner rd. by pasture gate	5.4	35 19 21.2	97 25 24.3	7/2/2012	2:05pm	110
	6900 S.E. 162nd by inside corner	7.6	35 18 28.1	97 24 24.6	7/2/2012	2:25pm	94
182°T							
	1524 S.E. 6th by mailbox	3	35 19 54.0	97 27 52.2	6/25/2012	12:40pm	120
	1701 January pl. & 16th by manhole cover	3.9	35 19 23.8	97 27 53.5	6/25/2012	12:55pm	110
	3717 country Club dr. center of house	6.1	35 18 11.0	97 27 56.6	6/25/2012	1:10pm	96
213.5°T							
	507 E. Main, N.E. corner of lot	2.6	35 20 20.4	97 28 44.2	6/25/2012	155:pm	110
	N.E. corner of Home Depot bldg. on median	5.4	35 19 4.6	97 29 45.6	6/25/2012	1:35pm	90
	1601 S.E. 31st, E. side of house	6.7	35 18 29.9	97 30 13.2	6/25/2012	1:20pm	64
270.5°T							
	10900 S. Walker, center of house	5.2	35 21 30.6	97 31 14.7	6/25/2012	3:15pm	96
	10901 Grennbriar Chase S.E. corner	7.8	35 21 31.5	97 32 59.2	6/25/2012	3:35pm	60
	10901 Winelake dr. N of house on earlywine	9.5	35 21 32.1	97 34 5.0	6/25/2012	4:00pm	40
346.5°T							
	S.E. 59th st. by J&E Supply, E of bldg, S. curb	5.5	35 24 22.1	97 28 39.1	7/2/2012	4:40pm	130
	S.E. Grand, W. of Oklahoma Archery	8	35 25 40.8	97 29 2.2	7/2/2012	4:25pm	78
	1400 S.E. 25th by S. curb	9.2	35 26 20.3	97 29 13.8	7/2/2012	4:15pm	72

Engineer: CHUCK DEPAEPE FIM : FIM-21 POTOMAC FIM S/N: 1078 IM Cal Date Nov-09

NIGHT FIELD MEASUREMENTS							
Azimuth	Description	Distance (km)	Latitude (NAD27)	Longitude (NAD27)	Date	Time	Field (mV/m)
30°T							
	1/2 way on Wellington Lake dr. fr.86th to 87th	3.6	35 22 45.8	97 25 58.4	6/27/112	11:45am	16
	200ft. E. of Sooner rd. on 48th	7.4	35 24 57.2	97 25 20.8	6/27/2012	12:10pm	14
	S.W. corner of Boing dr. & Wheeler pl.	10.1	35 26 11.7	97 24 27.9	6/27/2012	12:20pm	9.8
49.5°T							
	87th and Wellington Lakes dr. E. curb	3.6	35 22 45.8	97 25 58.4	6/27/2012	2:45pm	15
	75ft. E. of bridge on I-240 dervice rd.	5.4	35 23 23.3	97 25 4.3	6/27/2012	2:20pm	7
	1000ft W. of S. Air Depot on W. bound service rd	6.6	35 23 48.6	97 24 28.4	6/27/2012	2:10pm	4
74.5°T							
	10201 Southern Creek dr. on street	3.2	35 21 57.2	97 25 45.4	6/27/2012	3:05pm	23
	10120 S. Sooner rd.	3.8	35 21 1.6	97 25 24.3	6/27/2012	3:25pm	20.5
	S. Midwest blvd. 300ft S. of Stanley Draper dr.	7.1	35 22 30.7	97 23 16.5	6/27/2012	3:50pm	14
135.5°T							
	S.E. 134th & Alicia Springs ct. S.W. corner	3.8	35 20 3.0	97 26 4.1	7/2/2012	3:10pm	150
	S.E. 152nd and Elm Creek	6.4	35 19 2.1	97 24 51.0	7/2/2012	3:00pm	110
	S.E. 179th & Silver Chase	10.5	35 17 26 4	97 22 55.8	7/2/2012	2:45pm	66
180.5°T							
	1609 S.E. 8th by driveway	3.2	35 19 46.0	97 27 49.2	6/26/2012	5:30pm	17.5
	612 S.E. 38th ,W. of house	6.3	35 18 7.0	97 27 50.2	6/26/2012	5:45pm	14
	5835 N. Willowbrook in front of house	7.7	35 17 19.8	97 27 50.8	6/26/2012	6:15pm	6.4
199.5°T							
	304 S. Silverleaf dr. N. of driveway	2.6	35 20 9.6	97 28 22.8	6/26/2012	5:10pm	50
	600 Williams dr. on Glenwood W. of house	4.4	35 19 14.9	97 28 46.5	6/26/2012	4:20pm	28.5
	3621 N.W. Pioneer st.,center of house	8.5	35 17 8.8	97 29 41.1	6/26/2012	3:20pm	13
212°T							
	108 Barbour st.	2.7	35 20 15.7	97 28 44.5	6/26/2012	4:45pm	39
	136 S.W. 14th & Howard, center of driveway	4.3	35 19 31.2	97 29 18.5	6/26/2012	3:40pm	17
	3228 Nighthawk ln., center of driveway	6.9	35 18 20.9	97 30 12.2	6/26/2012	3:05pm	4.4
284.5°T							
	116 S. Brentwood dr.	4.8	35 22 8.2	97 30 52.9	6/26/2012	2:05pm	13
	9501 Winston way,across the street on E. side	6.7	35 22 23.5	97 32 5.2	6/26/2012	2:20pm	10
	S.W. 86th & Drexel on S.E corner	10	35 22 49.9	97 34 11.3	6/26/2012	2:45pm	3
303.5°T							
	8320 Woodfield in front of house	5	35 22 58.2	97 30 32.8	6/26/2012	1:45pm	14
	7105 S. Klein ave. in front of driveway	7.4	35 23 41.9	97 31 54.1	6/26/2012	1:20pm	15
	1612 S.W. 61st terr. W. of house	9.1	35 24 10.9	97 32 47.8	6/26/2012	1:10pm	10
318.5°T							
	S.W. 62nd & Santa fe,30ft W. of N.W. corner	6.7	35 24 11.9	97 30 44.8	6/26/2012	12:10pm	10
	611 S.W. 51st in front of house	8.3	35 24 50.1	97 31 26.0	6/26/2012	12:35pm	6
	1105 S.W. 40th at driveway	9.8	35 25 26.2	97 32 5.2	6/26/2012	12:55pm	3
348.5°T							
	300ft E. of Eastern on S.E.59th	5.4	35 24 21.9	97 28 31.2	7/2/2012	3:40pm	140
	E. of 1540 S.E. 29th	8.8	35 26 6.8	97 28 57.3	7/2/2012	3:50pm	90
	1540 S.E. 25th, middle of back lot	9.1	35 26 18.0	97 29 0.2	7/2/2012	4:05pm	90