

Engineering Exhibit

**REQUEST FOR  
SPECIAL TEMPORARY AUTHORIZATION**  
prepared for  
**Lincoln Financial Media Company Of Georgia**

WSTR(FM) Smyrna, Georgia

Facility ID 30822  
Ch. 231C0 100 kW 310 m (Analog)  
Ch. 231 1 kW 304 m (Digital)

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FCC Form – Engineering STA

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Engineering Statement	Request for Special Temporary Authorization
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*This material supplies a "hard copy" of the engineering portions of this application as entered September 12, 2006 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's name and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.*

<b>TECH BOX</b>											
7.0. STA is requested for use of <input checked="" type="radio"/> Licensed Antenna system with: <input type="radio"/> Reduced power <input type="radio"/> Reduced hours of operation <input type="radio"/> Required equipment out of service <input checked="" type="radio"/> Other variance [Exhibit 1]  <input type="radio"/> Antenna system authorized by Construction Permit: - Describe requested modes of operation [Exhibit 2]  <input type="radio"/> Other antenna system: (Complete Items 7.1 - 7.11)											
7.1. Channel Number: 231											
7.2. Antenna Location Coordinates: (NAD 27)  Latitude: Degrees 33 Minutes 45 Seconds 33 <input checked="" type="radio"/> North <input type="radio"/> South  Longitude: Degrees 84 Minutes 20 Seconds 5 <input checked="" type="radio"/> West <input type="radio"/> East											
7.3. Antenna Structure Registration Number: 1028278 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA											
7.4. Overall Tower Height Above Ground Level: 324meters											
7.5. Height of Radiation Center Above Mean Sea Level: 587.8 meters(H) 587.8 meters(V)											
7.6. Height of Radiation Center Above Ground Level: 286meters(H) 286meters(V)											
7.7. Height of Radiation Center Above Average Terrain: 304.4meters(H) 304.4meters(V)											
7.8. Effective Radiated Power: 1 kW(H) 1 kW(V)											
7.9. Maximum Effective Radiated Power: <input checked="" type="checkbox"/> Not Applicable (Beam-Tilt Antenna ONLY) kW(H) kW(V)											
7.10. Directional Antenna Relative Field Values: <input checked="" type="checkbox"/> Not applicable (Nondirectional) Rotation (Degrees): <input type="checkbox"/> No Rotation											
Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value
0		10		20		30		40		50	
60		70		80		90		100		110	
120		130		140		150		160		170	
180		190		200		210		220		230	
240		250		260		270		280		290	
300		310		320		330		340		350	
Additional Azimuths											
7.11. <b>Environmental Protection Act.</b> The proposed facility is excluded from environmental processing under 47. C.F.R. Section 1.1306 (i.e., The facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Appendix A, an <b>Exhibit is required.</b>  By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.										<input checked="" type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 3]	
8. Please explain in detail the "extraordinary circumstances" which warrant temporary operations at variance from the Commission's Rules. In addition, please specify 1) the specific rules and/or policies from which the applicant seeks temporary relief; 2) how the public interest will be furthered by grant; and 3) the expected duration of the STA and the licensee's plan for restoration of licensed operation. If requesting variance with other than authorized technical facilities, please specify the exact facilities sought.										[Exhibit 4]	
9. Anti-Drug Abuse Act Certification. Applicant certifies that neither applicant nor any party to the application is subject to denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862.										<input checked="" type="radio"/> Yes <input type="radio"/> No	

I certify that I have prepared Engineering Data on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name RICHARD H. MERTZ		Relationship to Applicant (e.g., Consulting Engineer) CONSULTANT	
Signature		Date (mm/dd/yyyy) 9/12/2006	
Mailing Address CAVELL, MERTZ & DAVIS, INC. 7839 ASHTON AVENUE			
City MANASSAS		State or Country (if foreign address) VA	Zip Code 20109 -
Telephone Number (No dashes or parentheses, include area code) 7033929090		E-Mail Address (if available) RMERTZ@CMDCONSULTING.COM	

I hereby 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. I acknowledge that all

certifications and attached Exhibits are considered material representations.

Typed or Printed Name of Person Signing LEON E. PORTER	Typed or Printed Title of Person Signing SENIOR VICE PRESIDENT AND GENERAL COUNSEL
Signature	Date (mm/dd/yyyy) 9/12/2006

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 PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

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**Exhibits****Exhibit 1**

**Description:** PLEASE SEE EXHIBIT 4

**Attachment 1****Exhibit 3**

**Description:** PLEASE SEE EXHIBIT 4

**Attachment 3****Exhibit 4**

**Description:** WSTR(FM) IBOC STA REQUEST EXHIBIT 4

EXHIBIT 4 CONTAINS THE ENGINEERING STATEMENT AND TABLES 1 AND 2.

**Attachment 4**

Description
<a href="#">WSTR(FM) IBOC STA Request – Exhibit 4</a>

Exhibit 4 -Engineering Statement  
**REQUEST FOR SPECIAL TEMPORARY AUTHORIZATION**  
prepared for  
**Lincoln Financial Media Company Of Georgia**  
WSTR(FM) Smyrna, Georgia  
Facility ID 30822

*Lincoln Financial Media Company Of Georgia* (“*Lincoln*”) is the licensee of station WSTR(FM), Smyrna, Georgia (BLH-20060523ADI). WSTR is licensed to operate with an effective radiated power (“ERP”) of 100 kW at an antenna height above average terrain (“HAAT”) of 310 meters. This statement supports a request for extension of the Special Temporary Authorization (“STA”, BDSTA-20060324ACA) for WSTR to continue digital FM transmissions with a portion of its authorized main antenna.

The WSTR operation is located at a multi-user transmitter site. Two other stations<sup>1</sup>, in addition to WSTR, share a common 8 bay panel antenna system. The common antenna system is divided into two sections, an upper section and a lower section, each consisting of 4 bays. Each 4 bay antenna section is fed by separate transmission lines connected to separate combining systems. Thus, each individual station’s transmitter plant consists of a common exciter with separate power amplifiers feeding the upper and lower sections of the antenna system.

WSTR has installed a Shively 7 dB high-level digital injector between the output of one power amplifier and the input of the antenna system feeding the lower 4 antenna bays. Since only a portion of the authorized WSTR antenna is employed for digital operation, the current configuration may be considered similar to using a separate, auxiliary antenna. Therefore, upon the recommendation of Commission Staff, the instant engineering statement has been prepared to support a request for an extension of the STA to continue digital operations for WSTR using the lower half of the authorized main antenna.

In a Public Notice<sup>2</sup> the FCC announced that separate antennas may be employed to implement digital FM transmissions (“IBOC”) and outlined certain parameters and filing requirements that must be met. As required in that Public Notice, the WSTR digital operation conforms to the iBiquity hybrid IBOC specifications.

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<sup>1</sup> The other stations are WSB-FM, Channel 253C0 and WVEE(FM), Channel 277C0, both Atlanta, Georgia.

<sup>2</sup> “*Use of Separate Antennas to Initiate Digital FM Transmissions Approved*”, MM Docket 99-325, DA 04-712, March 17, 2004.

#### Exhibit 4 -Engineering Statement

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As mentioned earlier, WSTR employs a Shively 7 dB high-level digital injector to combine the analog signal and digital signal feeding the lower 4 bay section of the main antenna. According to a technical representative of Shively Labs, the 7 dB high-level injector provides approximately 35 dB of isolation between the analog and digital transmitter. This aids in the prevention of spurious emissions in excess of the Commission's limits.

The use of a 7 dB coupler instead of the typical 10 dB coupler permits the use of a smaller digital transmitter. As a consequence, the loss to the analog power amplifier is greater. Each of the WSTR transmitter power amplifiers operate at a transmitter power output level of 15 kW into the respective combiner/antenna sections for the required 30 kW transmitter power output needed to achieve the authorized ERP of 100 kW. Operation of the power amplifier connected to the lower section of the antenna systems requires an increase in transmitter power to 18.7 kW to overcome the digital injector's loss. Each of the two power amplifiers in the WSTR transmitter is capable of operation to a power level of 30 kW according to information provided by a technical representative of *Lincoln*. Thus, the analog transmitter's reserve capacity is capable of achieving the required power level to overcome the losses caused by the high-level injector and, thus, maintain the authorized ERP of 100 kW for the analog signal.

The lower 4 bay section of the authorized WSTR antenna has an antenna radiation center of 286 meters above ground level ("AGL") and HAAT of 304.4<sup>3</sup> meters which is 98.1% of the HAAT of the main antenna. As such, the antenna HAAT is within the 70 to 100 percent height tolerance specified in the Public Notice. There is no difference in the IBOC antenna's site geographic coordinates from that of the main WSTR facility.

The analog WSTR operation will continue to employ an ERP of 100 kW as licensed, and the (average) IBOC ERP will continue to be 1 kW (20 dB reduced from the 100 kW analog operation). Since only a portion of the main WSTR antenna is employed, the gain of the lower 4 antenna bays is different from the overall antenna gain. The Alan Dick Company, manufacturer of the antenna system, was consulted and provided a gain figure of 3.1 dB for the

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<sup>3</sup> Site HAAT was determined using 3 second digitized terrain data.

## Exhibit 4 -Engineering Statement

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lower half of the main WSTR antenna system. This antenna gain figure was employed to determine the required transmitter power output level for the digital transmitter. See the attached **Exhibit 4 - Table 1** for complete engineering data for the WSTR IBOC operation. **Exhibit 4 - Table 2** provides the antenna system gains and losses employed for the digital transmitter power output calculations.

### **Environmental Considerations – Exposure to Radiofrequency Electromagnetic Field**

The STA operation was evaluated for human exposure to radiofrequency (“RF”) energy using the procedures outlined in the Commission’s OET Bulletin No. 65 (“OET 65”). The licensed analog main 8 bay antenna facility is considered plus the additional contribution to RF exposure by the added IBOC transmissions. The digital antenna is comprised of the bottom 4 bays of the WSTR authorized main antenna. The bottom 4 bays of the antenna operating as a digital antenna has a radiation center 286 meters above ground level (see **Exhibit 4 - Table 1**). The main 8 bay analog antenna has a radiation center 292 meters above ground level. Both the analog and digital antennas are circularly polarized. Based on a typical elevation pattern for an 8 bay 0.942 wavelength spaced antenna, the antenna has a maximum vertical plane (elevation) relative field value of less than 33% (from 10° to 90° below the horizontal). Thus, a conservative value of 33% was employed for the analog calculation. For the IBOC calculation, a maximum vertical plane (elevation) relative field value of 100% is assumed. The “uncontrolled/general population” maximum permissible exposure (“MPE”) limit specified in §1.1310 for the FM band is 200  $\mu\text{W}/\text{cm}^2$ .

The formula used for calculating FM signal density in this analysis is essentially the same as equation (9) in OET-65.

$$S = (33.4098) (F^2) (ERP) / D^2$$

Where:

$S$	=	power density in microwatts/cm <sup>2</sup>
$ERP$	=	total (average) ERP in Watts
$F$	=	relative field factor
$D$	=	distance in meters

Using this formula, the WSTR IBOC facility contributes an RF power density of

#### Exhibit 4 -Engineering Statement

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0.83  $\mu\text{W}/\text{cm}^2$  at two meters above ground level near the antenna support structure, or 0.42 percent of the “uncontrolled/general public” limit. Similarly, the WSTR(FM) analog facility contributes an RF power density of 8.65  $\mu\text{W}/\text{cm}^2$  at two meters above ground level near the antenna support structure, or 4.33 percent of the “uncontrolled/general public” limit. The analog and IBOC facilities combined contribute an RF power density of 9.48  $\mu\text{W}/\text{cm}^2$  at two meters above ground level near the antenna support structure, or 4.75 percent of the “uncontrolled/general public” limit. At ground level locations away from the base of the tower, the calculated RF power density attributable to WSTR is even lower, due to the increasing distance from the transmitting antenna.

§1.1307(b)(3) states that facilities contributing less than five percent of the exposure limit at locations with multiple transmitters (such as the case at hand) are categorically excluded from responsibility for taking any corrective action in the areas where their contribution is less than five percent. Since the instant situation meets the five percent exclusion test at all ground level areas, the impact of the any other facilities using this site may be considered independently from this proposal. Accordingly, it is believed that the impact of the STA digital operation should not be considered to be a factor at or near ground level as defined under §1.1307(b).

As demonstrated herein, excessive levels of RF energy attributable to the digital facility will not be caused at publicly accessible areas at ground level near the antenna supporting structure. Consequently, members of the general public will not be exposed to RF levels in excess of the Commission’s guidelines. Nevertheless, tower access will continue to be restricted and controlled through the use of a locked fence. Additionally, appropriate RF exposure warning signs will continue to be posted.

With respect to worker safety, it is believed that based on the preceding analysis, excessive exposure would not occur in areas at ground level. A site exposure policy will continue to be employed protecting maintenance workers from excessive exposure when work must be performed on the tower in areas where high RF levels may be present. Such protective measures may include, but will not be limited to, restriction of access to areas where levels in excess of the guidelines may be expected, power reduction, or the complete shutdown of

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facilities when work or inspections must be performed in areas where the exposure guidelines will be exceeded. On-site RF exposure measurements may also be undertaken to establish the bounds of safe working areas. *Lincoln* will coordinate exposure procedures with all pertinent stations.

Based on the preceding, it is believed that the instant proposal may be categorically excluded from environmental processing under Section 1.1306 of the Rules, hence preparation of an Environmental Assessment is not required.

### **Conclusion**

Based on the foregoing and associated attachments, it is believed that the current IBOC operation authorized in the STA is in compliance with the Public Notice. Therefore, an extension of the current STA to permit continued IBOC operations by WSTR for an additional 180 days is hereby respectfully requested on behalf of the applicant.

### **Certification**

The foregoing statement was prepared by the undersigned and is believed to be true and correct to his knowledge and belief. Mr. Mertz is a Principal Engineer in the firm of Cavell, Mertz, and Davis, Inc. and has filed numerous submissions with the Federal Communications Commission. His qualifications are a matter of record with that agency.



Richard H. Mertz  
September 12, 2006

Cavell, Mertz & Davis, Inc.  
7839 Ashton Avenue  
Manassas, VA 20109  
(703) 392-9090

### List of Attachments

Exhibit 4 - Table 1  
Exhibit 4 - Table 2

Engineering Data  
Antenna / Line System Gains and Losses



Exhibit 4 - Table 1  
**ENGINEERING DATA**  
**Request for Special Temporary Authorization**  
 Prepared September 2006 for  
**Lincoln Financial Media Company Of Georgia**  
 WSTR(FM) Smyrna, Georgia  
 Facility ID 30822

Description	Licensed Analog Operation Main Antenna	STA IBOC Operation (Bottom 4 Bays of Main Antenna)
File Number	BLH-20060523ADI	BLH-20060523ADI
Site Coordinates (NAD-27)	N-Lat 33° 45' 33" W-Lon 84° 20' 05"	N-Lat 33° 45' 33" W-Lon 84° 20' 05"
Antenna Structure Registration	1028278	1028278
Antenna Radiation Center Height		
Above ground	292 m	286 m
Above mean sea level	593.8 m	587.8 m
Above average terrain	310.4 <sup>1</sup> m	304.4 <sup>3</sup> m (98.1% of main)
Antenna type	Non-directional	Non-directional
Effective Radiated Power	100 kW	1 kW
Transmitter Power Output	PA Cabinet 1 – 18.7 kW <sup>2</sup> PA Cabinet 2 – 15.0 kW	3.02 kW

Station Technical Representative:

Mr. Scott Trask  
 (404) 238-9485

<sup>1</sup> Site HAAT was determined using 3 second digitized terrain data.

<sup>2</sup> See Engineering Statement for description of split antenna operation.

Exhibit 4 - Table 2  
**ANTENNA / LINE SYSTEM GAINS AND LOSSES**  
prepared September 2006 for  
**Lincoln Financial Media Company Of Georgia**  
WSTR(FM) Smyrna, Georgia  
Facility ID 30822

Digital STA Operation

<b>IBOC Effective Radiated Power (avg):</b>	<b>1 kW</b>	<b>0.00 dBk</b>
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**Antenna System**

Alan Dick	Max Power Gain:	2.04	3.10 dB
FC8.3SH140ND			
	<b>Antenna Input Power:</b>	<b>0.5 kW</b>	

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**Line and Other Losses**

6 1/8" Rigid Line	Efficiency:	0.871	
Length 1,150 ft	Loss:		0.60 dB

Transmitter Combiner	Efficiency:	0.933	
	Loss:		0.30 dB

High Level Injector	Efficiency:	0.200	
Shively Model 5656	Loss:		7.00 dB

<b>Total Losses:</b>		<b>7.90 dB</b>
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<b><u>Transmitter Power Output:</u></b>	<b>3.02 kW</b>	<b>4.80 dBk</b>
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