ENGINEERING REPORT
EVALUATION OF ELECTROMAGNETIC EFFECTS OF
PROPOSED KGLY(FM) BRANCH PROPERTY TOWER ON
AM BROADCAST STATION KTBB
PREPARED FOR
RADIO STATION KGLY(FM)
TYLER, TEXAS

This Engineering Report was prepared to present the results of an analysis of the re-radiation electromagnetic effects of the proposed KGLY(FM) tower to be located on the 'Branch Property' location near Chapel Hill, Texas on the KTBB(AM) antenna array. This evaluation has been conducted in consideration of the new procedures regarding disturbance of AM broadcast station antenna patterns in Section 1.30000 of the FCC Rules.

Background

AM broadcast station KTBB is licensed for operation on 600 kHz with a power of 2.5 kW during nighttime hours and 5 kW during daytime hours, using different directional antenna patterns during daytime and nighttime hours. KTBB utilizes two towers in an "in-line" arrangement to produce its daytime pattern; and it utilizes four towers in a "parallelogram" arrangement to produce its nighttime pattern.

There is a proposal to construct a new guyed tower to be located at the 'Branch Property' approximately 2.3-km north-northwest of the KTBB antenna array. This tower is planned to have an overall height of 136.9 m AGL (449 ft). It is planned to support the KGLY main transmitting antenna and the KVNE auxiliary transmitting antenna.

It is noted that there is a 131-m AGL (429-ft) tower structure located 0.4 km southeast of the proposed KGLY tower. This tower supports the transmitting antenna of KISX(FM) (107.3 MHz). It is understood that a wire skirt arrangement is employed on this tower to detune the structure from significant re-radiation that could affect KTBB.

Compliance with Section 1.30002 of the FCC Rules

Section 1.30002 of the FCC Rules requires that proposed towers that would be located within the lesser of 10 wavelengths or 3 km from a directional AM broadcast station, and which would be taller than 36 electrical degrees at the subject AM station frequency notify the AM broadcast station at least 30 days in advance of construction. In addition, such situated cases the proponent is required to examine the potential impact of the construction using the method of moment analysis. If the proposed construction would result in radiation in excess of the AM station's licensed standard/augmented pattern, then the proponent shall be responsible for the installation and maintenance of a detuning apparatus to restore proper operation of the directional antenna.

In this instance, the proposed KGLY tower would fall within the 10 wavelength/3 km distance and it would exceed the 36-degree height limit, being over 98 electrical degrees in height at a frequency of 600 kHz.

The purpose of this report is to summarize the results of a method of moments evaluation of the potential for the proposed tower structure to cause re-radiation that would result in radiation in excess of the FCC described limits. A software tool known as MININEC, which stands for mini-Numerical Electromagnetics Code, was employed in the analysis.

Construction of MININEC Model

In order to estimate the effects of the proposed KGLY tower on the KTBB antenna patterns, the method of moments modeling technique was employed using the MININEC software tool. A wire model of the proposed tower and the KTBB directional antenna systems were developed using the MININEC software.

Physical and electrical data for the KTBB antenna systems were obtained from the FCC engineering database records for KTBB. A wire model was developed using cylindrical elements of varying radius to approximate the KTBB antenna system and the proposed KGLY tower.

Perspective views of the wire model construct, as output from the software tool are included herein as an attachment. Array synthesis functions in the MININEC software were employed to formulate the KTBB patterns.

Results

The attached tabulations show the results of the MININEC method of moments analysis for the KTBB daytime and nighttime antenna patterns. For both the daytime and nighttime patterns, the predicted theoretical pattern is shown by azimuth, followed by the predicted effect including the proposed KGLY tower. The absolute value of the percentage effect on each azimuth is shown in the last column. The absolute value is employed so as to gauge the magnitude of the potential effect. Because the phase can vary depending on the actual installation and environmental effects, it is much more difficult to accurately predict phase relationship as compared to the magnitude of the potential radiation change.

Based on the results, the predicted maximum change in the KTBB daytime pattern is 10.4% and the predicted maximum change in the KTBB nighttime

pattern is 60.8%. These results indicate that the proposed tower structure is likely to have a significant effect on the KTBB daytime and nighttime patterns as to cause radiation to exceed the KTBB licensed standard/augmented patterns.

Conclusion

Based on the MININEC model method of moments analysis of the proposed KGLY tower, it appears likely that a detuning apparatus will be necessary to meet the FCC requirements for protection of the KTBB antenna system.

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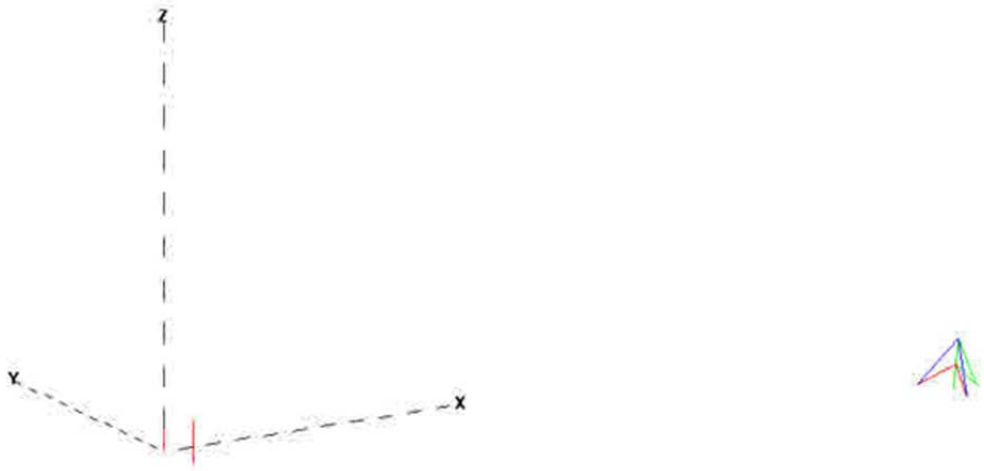
Perspective View of the MININEC Daytime Model



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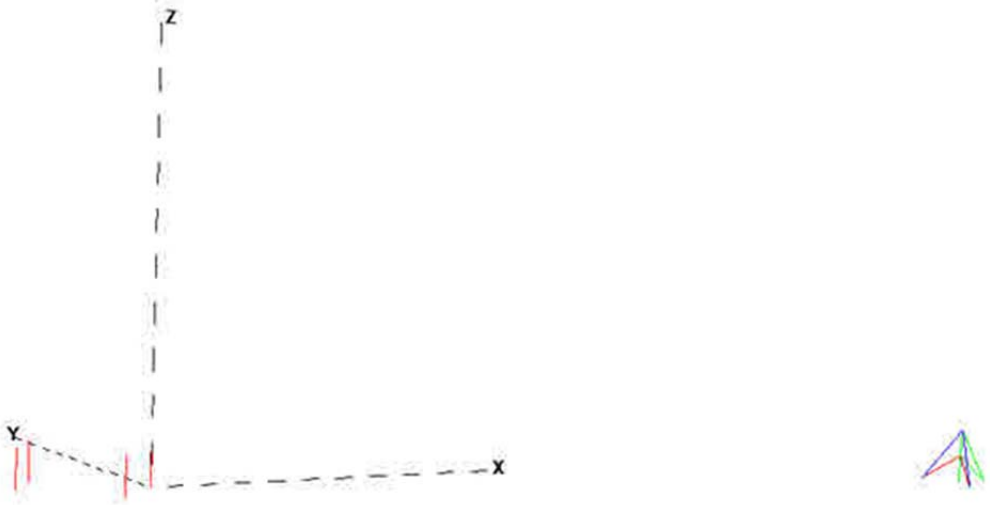
Perspective View of the MININEC Nighttime Model



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## Tabulation and Analysis of KTBB Daytime Pattern

| Azimuth (deg. true) | KTBB Undisturbed Daytime Pattern (mV/m at 1 km) | KTBB with Proposed KGLY Tower (mV/m at 1 km) | Change in Daytime Pattern (dB) | Percent Change Relative to Undisturbed Pattern |
|---|---|---|---|---|
| 0 | 728.7 | 691.4 | -0.46 | 5.1% |
| 5 | 754.2 | 732.4 | -0.26 | 2.9% |
| 10 | 777.3 | 765.7 | -0.13 | 1.5% |
| 15 | 797.8 | 787.1 | -0.12 | 1.3% |
| 20 | 815.4 | 796.3 | -0.21 | 2.3% |
| 25 | 830.2 | 796.1 | -0.36 | 4.1% |
| 30 | 842.2 | 797.8 | -0.47 | 5.3% |
| 35 | 851.6 | 821.4 | -0.31 | 3.5% |
| 40 | 858.7 | 872.4 | 0.14 | 1.6% |
| 45 | 863.7 | 908.6 | 0.44 | 5.2% |
| 50 | 867.0 | 876.6 | 0.10 | 1.1% |
| 55 | 868.9 | 825.7 | -0.44 | 5.0% |
| 60 | 869.9 | 874.6 | 0.05 | 0.5% |
| 65 | 870.2 | 911.4 | 0.40 | 4.7% |
| 70 | 870.1 | 836.3 | -0.34 | 3.9% |
| 75 | 869.9 | 869.9 | 0.00 | 0.0% |
| 80 | 869.7 | 905.3 | 0.35 | 4.1% |
| 85 | 869.6 | 826.6 | -0.44 | 4.9% |
| 90 | 869.7 | 901.8 | 0.32 | 3.7% |
| 95 | 869.9 | 866.3 | -0.04 | 0.4% |
| 100 | 870.1 | 850.6 | -0.20 | 2.2% |
| 105 | 870.2 | 910.7 | 0.39 | 4.7% |
| 110 | 869.9 | 827.1 | -0.44 | 4.9% |
| 115 | 868.9 | 900.3 | 0.31 | 3.6% |
| 120 | 867.0 | 866.5 | -0.01 | 0.1% |
| 125 | 863.7 | 835.7 | -0.29 | 3.2% |
| 130 | 858.7 | 903.4 | 0.44 | 5.2% |

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|---|---|---|---|---|
| 135 | 851.6 | 827.0 | -0.25 | 2.9% |
| 140 | 842.2 | 823.8 | -0.19 | 2.2% |
| 145 | 830.2 | 874.7 | 0.45 | 5.4% |
| 150 | 815.4 | 811.0 | -0.05 | 0.5% |
| 155 | 797.8 | 754.0 | -0.49 | 5.5% |
| 160 | 777.3 | 781.7 | 0.05 | 0.6% |
| 165 | 754.2 | 797.7 | 0.49 | 5.8% |
| 170 | 728.7 | 758.4 | 0.35 | 4.1% |
| 175 | 701.3 | 694.5 | -0.08 | 1.0% |
| 180 | 672.3 | 638.8 | -0.44 | 5.0% |
| 185 | 642.5 | 598.9 | -0.61 | 6.8% |
| 190 | 612.5 | 567.6 | -0.66 | 7.3% |
| 195 | 583.0 | 538.4 | -0.69 | 7.7% |
| 200 | 554.9 | 510.4 | -0.73 | 8.0% |
| 205 | 528.7 | 489.3 | -0.67 | 7.5% |
| 210 | 505.0 | 484.4 | -0.36 | 4.1% |
| 215 | 484.4 | 497.9 | 0.24 | 2.8% |
| 220 | 467.0 | 508.9 | 0.75 | 9.0% |
| 225 | 452.9 | 481.8 | 0.54 | 6.4% |
| 230 | 442.0 | 415.7 | -0.53 | 6.0% |
| 235 | 434.0 | 401.5 | -0.68 | 7.5% |
| 240 | 428.4 | 462.1 | 0.66 | 7.9% |
| 245 | 424.7 | 444.4 | 0.39 | 4.6% |
| 250 | 422.4 | 379.7 | -0.93 | 10.1% |
| 255 | 421.1 | 448.9 | 0.55 | 6.6% |
| 260 | 420.5 | 433.1 | 0.26 | 3.0% |
| 265 | 420.3 | 385.2 | -0.76 | 8.4% |
| 270 | 420.5 | 464.1 | 0.86 | 10.4% |
| 275 | 421.1 | 391.7 | -0.63 | 7.0% |

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| Azimuth (deg. true) | KTBB Undisturbed Daytime Pattern (mV/m at 1 km) | KTBB with Proposed KGLY Tower (mV/m at 1 km) | Change in Daytime Pattern (dB) | Percent Change Relative to Undisturbed Pattern |
|---|---|---|---|---|
| 280 | 422.4 | 433.9 | 0.23 | 2.7% |
| 285 | 424.7 | 443.0 | 0.37 | 4.3% |
| 290 | 428.4 | 393.9 | -0.73 | 8.0% |
| 295 | 434.0 | 478.0 | 0.84 | 10.1% |
| 300 | 442.0 | 408.0 | -0.70 | 7.7% |
| 305 | 452.9 | 464.4 | 0.22 | 2.5% |
| 310 | 467.0 | 492.4 | 0.46 | 5.4% |
| 315 | 484.4 | 440.3 | -0.83 | 9.1% |
| 320 | 505.0 | 532.6 | 0.46 | 5.5% |
| 325 | 528.7 | 551.3 | 0.36 | 4.3% |
| 330 | 554.9 | 511.5 | -0.71 | 7.8% |
| 335 | 583.0 | 577.5 | -0.08 | 0.9% |
| 340 | 612.5 | 655.6 | 0.59 | 7.0% |
| 345 | 642.5 | 665.2 | 0.30 | 3.5% |
| 350 | 672.3 | 648.4 | -0.31 | 3.6% |
| 355 | 701.3 | 656.3 | -0.58 | 6.4% |

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| Azimuth (deg. true) | KTBB Undisturbed Nighttime Pattern (mV/m at 1 km) | KTBB with Proposed KGLY Tower (mV/m at 1 km) | Change in Nighttime Pattern (dB) | Percent Change Relative to Undisturbed Pattern |
|---|---|---|---|---|
| 0 | 249.4 | 248.2 | -0.04 | 0.5% |
| 5 | 167.3 | 168.7 | 0.07 | 0.9% |
| 10 | 106.7 | 108.3 | 0.13 | 1.5% |
| 15 | 72.5 | 71.4 | -0.13 | 1.5% |
| 20 | 62.8 | 57.6 | -0.75 | 8.2% |
| 25 | 62.6 | 55.8 | -1.00 | 10.8% |
| 30 | 60.4 | 56.1 | -0.65 | 7.2% |
| 35 | 54.2 | 55.5 | 0.20 | 2.3% |
| 40 | 46.6 | 53.0 | 1.11 | 13.7% |
| 45 | 40.4 | 47.1 | 1.32 | 16.5% |
| 50 | 35.2 | 34.8 | -0.09 | 1.0% |
| 55 | 26.6 | 20.3 | -2.34 | 23.7% |
| 60 | 11.2 | 18.0 | 4.13 | 60.8% |
| 65 | 27.1 | 20.4 | -2.47 | 24.7% |
| 70 | 74.7 | 80.4 | 0.64 | 7.7% |
| 75 | 140.1 | 139.1 | -0.07 | 0.8% |
| 80 | 221.9 | 218.8 | -0.12 | 1.4% |
| 85 | 317.1 | 323.2 | 0.17 | 1.9% |
| 90 | 421.2 | 414.3 | -0.14 | 1.6% |
| 95 | 528.4 | 534.6 | 0.10 | 1.2% |
| 100 | 632.2 | 628.0 | -0.06 | 0.7% |
| 105 | 725.6 | 727.5 | 0.02 | 0.3% |
| 110 | 802.0 | 803.1 | 0.01 | 0.1% |
| 115 | 855.6 | 851.7 | -0.04 | 0.5% |
| 120 | 882.2 | 888.4 | 0.06 | 0.7% |
| 125 | 879.6 | 872.6 | -0.07 | 0.8% |

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|---|---|---|---|---|
| 130 | 847.4 | 852.3 | 0.05 | 0.6% |
| 135 | 787.8 | 787.7 | 0.00 | 0.0% |
| 140 | 704.9 | 699.3 | -0.07 | 0.8% |
| 145 | 604.6 | 610.9 | 0.09 | 1.0% |
| 150 | 494.5 | 495.1 | 0.01 | 0.1% |
| 155 | 383.3 | 376.1 | -0.17 | 1.9% |
| 160 | 282.2 | 280.6 | -0.05 | 0.6% |
| 165 | 205.7 | 210.6 | 0.20 | 2.4% |
| 170 | 170.8 | 177.2 | 0.32 | 3.8% |
| 175 | 177.4 | 182.9 | 0.27 | 3.1% |
| 180 | 199.9 | 203.4 | 0.15 | 1.7% |
| 185 | 217.9 | 218.9 | 0.04 | 0.5% |
| 190 | 223.2 | 222.7 | -0.02 | 0.2% |
| 195 | 215.3 | 214.4 | -0.04 | 0.4% |
| 200 | 197.5 | 197.3 | -0.01 | 0.1% |
| 205 | 176.7 | 178.2 | 0.07 | 0.8% |
| 210 | 162.9 | 166.7 | 0.20 | 2.3% |
| 215 | 165.7 | 171.8 | 0.31 | 3.7% |
| 220 | 186.2 | 192.0 | 0.27 | 3.1% |
| 225 | 216.2 | 215.8 | -0.01 | 0.2% |
| 230 | 245.6 | 238.6 | -0.25 | 2.9% |
| 235 | 266.5 | 266.1 | -0.01 | 0.2% |
| 240 | 273.0 | 279.6 | 0.21 | 2.4% |
| 245 | 260.7 | 256.2 | -0.15 | 1.8% |
| 250 | 227.1 | 226.0 | -0.04 | 0.5% |
| 255 | 171.5 | 176.8 | 0.27 | 3.1% |
| 260 | 98.8 | 92.3 | -0.59 | 6.5% |
| 265 | 63.9 | 67.7 | 0.49 | 5.8% |

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|---|---|---|---|---|
| 270 | 157.7 | 156.0 | -0.09 | 1.0% |
| 275 | 287.4 | 290.7 | 0.10 | 1.2% |
| 280 | 427.5 | 422.1 | -0.11 | 1.3% |
| 285 | 568.6 | 574.9 | 0.10 | 1.1% |
| 290 | 702.6 | 695.5 | -0.09 | 1.0% |
| 295 | 822.2 | 828.1 | 0.06 | 0.7% |
| 300 | 920.7 | 916.6 | -0.04 | 0.4% |
| 305 | 992.9 | 993.1 | 0.00 | 0.0% |
| 310 | 1035.2 | 1039.0 | 0.03 | 0.4% |
| 315 | 1045.7 | 1038.8 | -0.06 | 0.7% |
| 320 | 1024.8 | 1030.2 | 0.04 | 0.5% |
| 325 | 974.6 | 975.5 | 0.01 | 0.1% |
| 330 | 898.9 | 892.0 | -0.07 | 0.8% |
| 335 | 803.0 | 805.9 | 0.03 | 0.4% |
| 340 | 693.2 | 699.6 | 0.08 | 0.9% |
| 345 | 576.4 | 574.8 | -0.02 | 0.3% |
| 350 | 459.3 | 452.4 | -0.13 | 1.5% |
| 355 | 348.4 | 343.2 | -0.13 | 1.5% |