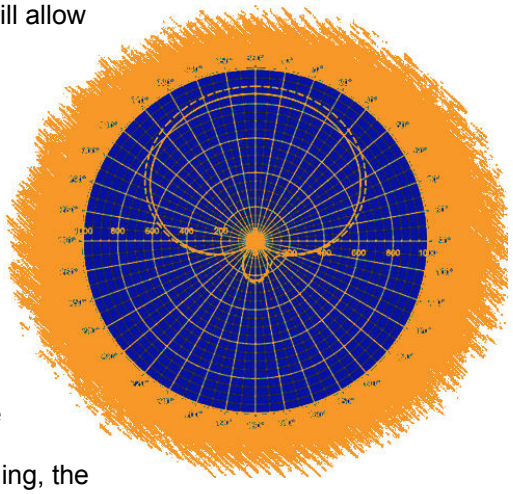
NAB Radio TechCheck

The Weekly NAB Newsletter for Radio Broadcast Engineers

October 6, 2008

Computer Modeling with Sampling System Verification Now Allowed for AM DAs

In a long-awaited move, on September 24, the FCC issued a *2nd Report & Order (R&O)* and *2nd Further Notice of Proposed Rulemaking (FNPRM)* which for the first time will allow AM broadcasters to use computer modeling (in conjunction with sampling system verification) for performance verification of AM directional antennas (DAs). This action is taken as part of the FCC's proceeding in MM Docket No. 93-177, *An Inquiry into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification*. A brief history of this proceeding is provided in the table below (see also the July 30, 2007 issue of *Radio TechCheck* for additional information).



These new rules are essentially those proposed in May 2007 by the *AM Directional Antenna Verification Coalition*, a self-described group of "...broadcasters, broadcast engineering consultants and broadcast equipment manufacturers, all of whom are experts in the science of AM DA design and have extensive experience in the adjustment and maintenance of AM DAs." Throughout this proceeding, the goal has been to allow broadcasters to take advantage of advances in antenna analysis methods, resulting in simpler, less expensive means of verifying AM DA performance. Some commenters maintain that as many as half of the approximately 1,900 AM DAs in service are in need of adjustment, and consequently the adoption of these modeling techniques will provide an overall benefit to the AM service by substantially reducing the cost of a proof of performance, and thereby encouraging AM licensees to properly maintain their directional arrays.

Some of the details of the now-modified §73.151, Directional Antenna Performance Verification, include the following:

- The performance of a DA may be verified either by field strength measurement or by computer modeling and sampling system verification;
- Each element of the directional array shall be modeled by use of a method of moments computer program. Only arrays consisting of series-fed elements may have their performance verified by computer modeling and sample system verification;
- A matrix of impedance measurements at the base and/or feed point of each element in the array, with all other elements shorted and/or open circuited at their respective measurement locations, shall be made. The physical model of the individual antenna elements used in the computer program may be varied to match the measured impedance matrix, but the actual spacings and orientations of the array elements must be used;
- The samples used to drive the antenna monitor may be current transformers or voltage sampling devices at the outputs of the antenna matching networks or sampling loops located on the towers. A complete description of the sampling system, including the results of the required measurements, shall be submitted with the application for license.

Date	Action	Description
1989 (Dec)	Joint Petition for Inquiry filed with FCC	Requested thorough examination of AM Directional Antenna (DA) rules and adoption of alternate means of directional antenna system verification
1991 (Jan)	FCC Public Notice on Joint Petition	
1993 (June)	FCC Notice of Inquiry (NOI)	
1999 (June)	FCC Notice of Proposed Rulemaking (NPRM)	Sought comments on new techniques for AM analysis, and on various FCC proposals to streamline existing requirements
1999-2000	NAB hosts ad-hoc forums on AM DAs	
2001 (March)	FCC Report and Order (R&O) and Further Notice of Proposed Rulemaking (FNPRM) released	R&O simplified traditional proof of performance requirements for AM DAs; FNPRM sought comment on the use of moment method modeling as a more efficient substitute for traditional field strength proofs
2006-07	2nd round NAB-hosted ad-hoc forums	
2007 (May)	AM Directional Antenna Performance Verification Coalition files proposed rules and rule modifications with FCC	Proposed rule changes to permit use of moment method computer modeling to demonstrate that AM DAs perform as authorized, and to assess the effects of tower construction in proximity to AM stations
2007 (May)	FCC Public Notice requesting comment on Coalition filing	Sought comment on the related issue of using moment method programs to assess the effects of nearby towers on AM antenna patterns
2008 (Sept)	**2nd R&O and 2nd FNPRM released**	*(subject of this Radio TechCheck)*

In the 2nd R&O, the FCC noted comments expressing concerns about differences between computer simulations and field measurements of antenna performance, but said that "...minor differences in pattern adjustment are [not] sufficient to disqualify moment method techniques," adding that "[t]he uncertainties in the AM assignment process, including short- and long-term variations in directional antenna performance, seasonal changes in ground conductivities, and variations in nighttime propagation caused by sunspot activity, are large enough to obscure any differences between two reasonable methods of directional antenna adjustment."

The 2nd FNPRM portion of the document deals with issues raised in the FCC's May 2007 Public Notice, responding to comments from the *AM Directional Antenna Verification Coalition* on the use of moment method programs to assess the effects of nearby towers on AM antenna patterns. The Commission is requesting comment on rules proposed by the *Coalition* which are attached to the 2nd FNPRM as Appendix E. Some of the specific questions being asked include the following:

- Should the proposed rules apply to construction of all communications towers above a specified height, not just towers requiring notice to the Federal Aviation Administration and tower registration under Part 17?
- Should the Commission apply the proposed rules to the owners of structures that are not otherwise subject to Commission licensing processes, i.e., with regard to structures such as towers that do not require registration and which no Commission licensee or applicant uses or proposes to use?
- Should the Commission prohibit applicants from proposing and licensees from using a tower when the owner has not complied with notice and detuning requirements?
- Regarding the proposed rule's exclusion of short towers from consideration, should the Commission reduce the proposed threshold height of 45 electrical degrees to 36 degrees (this based on a technical filing provided by the Association of Federal Communications Consulting Engineers)?
- Comments are sought on the types of structures, such as buildings, that should be categorically excluded from the proposed rules;
- Should any final rule on this issue, if adopted, include a provision requiring tower proponents to protect the AM station upon submission of a credible demonstration that the tower affects the AM pattern?

The new AM DA rules established in the 2nd R&O will not become effective until they are published in the Federal Register. The full text of the 2nd R&O and 2nd FNPRM are available on the FCC Web site at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-228A1.pdf. Comments and Reply Comments for the 2nd FNPRM will be due 30 days and 60 days after publication in the Federal Register, respectively.

NAB AM Antenna Computer Modeling Seminar
November 20-21, 2008
NAB Headquarters
Washington D.C.

Computer modeling for AM Antenna proof of performance was adopted by the FCC on September 24. To learn the basics needed to utilize modeling software, such as MININEC and nodal analysis – used for designing performance-optimized AM directional antenna phasing and coupling systems and proving the performance of directional antenna patterns –- plan on attending NAB's AM Antenna Computer Modeling Seminar in Washington, D.C. November 20 and 21.

You will learn about:

- Moment Method Modeling Basics
- DA Proofing Using Moment Method Modeling
- Overcoming Limitations of Using Field Strength Measurements for DA Proofs
- State of the Art in Phasing System Design Nodal Analysis of AM DA Phasing and Coupling Systems
- Pattern Design Considerations for Optimum Performance

AM antenna experts Ron Rackley and Ben Dawson, along with antenna modeling software specialist Jerry Westberg, will lead the seminar demonstrating how moment method modeling makes analysis of actual tower current distributions possible and how a model can be used to proof an array provided the proper criteria are considered. All instructors are well known in the radio industry as experts in the field of directional antenna design and maintenance. Their decades of experience offer station engineers an opportunity to learn techniques, tips and tricks that can be immediately useful.

Seminar fee: $395.00 (NAB members) and $495.00 (non-members). For more information on the curriculum, how to register or housing go to AM DA Seminar on the NAB Web site or call Sharon Devine at (202)-429-5338. Register now for the NAB AM Antenna Computer Modeling Seminar!

DEADLINE EXTENDED FOR 63rd NAB BROADCAST ENGINEERING CONFERENCE CALL FOR PAPERS

NAB Show will host the 63rd NAB Broadcast Engineering Conference on April 18 – 23 at the Las Vegas Convention Center in Las Vegas, Nevada.

The NAB Broadcast Engineering Conference is a highly technical conference where presenters deliver technical papers ranging over a variety of topics relevant to the broadcast and allied industries. We invite you to submit a proposal to present a technical paper at our conference. The deadline for submitting your proposal is **October 27, 2008**.

To submit a technical paper proposal, click here and complete the electronic form. If you have questions regarding the NAB Broadcast Engineering Conference, please contact John Marino.

The IEEE Broadcast Technology Society
58th ANNUAL IEEE BROADCAST SYMPOSIUM
Managing the Transitions
15 - 17 October 2008
The Westin Alexandria
Alexandria, VA, USA

Keynote Speakers to include: Richard E. Wiley, Wiley Rein, LLP and Peter Fannon, Panasonic Corporation. Please visit the Registration page for additional information.