

Before the
Federal Communications Commission
Washington, D.C. 20554

MM Docket No. 88-56

In the matter of

Designation of a Standard Algorithm
for Propagation Prediction in the FM
and TV Broadcast Services.

REPORT AND ORDER
(Proceeding terminated)

Adopted: February 22, 1989; Released: May 16, 1989

By the Commission:

INTRODUCTION

1. The Commission has before it a *Notice of Proposed Rule Making ("Notice")*¹ in which it proposed to establish an algorithm used by the staff as the official standard for predicting field strengths for TV and FM stations in order to facilitate the resolution of disputes that may occur when visual readings or other algorithms are used to determine field strength values. Based upon the record, we have concluded that further consideration of this proposal does not appear fruitful at this time.

BACKGROUND

2. To facilitate the allotment and assignment of the radio stations under its jurisdiction, the Commission has, over the years, conducted propagation studies and published the resulting data in various reports. Generally, the data has been presented as families of curves drawn on graph paper. These curves are used to determine a station's signal strength as a function of transmitting power, antenna height, and distance from the transmitter site. Thus, the graphic curves have had the advantage of compactness, versatility, and the ability to readily depict relationships among the various factors that affect signal propagation. However, visually reading values from the curves is a laborious task that suffers from a relative lack of precision and speed compared to modern computerized methods. Experience has shown that two persons may read different values from the curves for the same set of circumstances, and that even the same person might obtain different values in subsequent readings.

3. In an effort to ensure more consistent results, the Commission, in 1976, developed a computer program that calculates predicted signal strength levels based on a table of propagation data points.² Programs using the Commission's propagation algorithm have now been in regular use for more than ten years and have demonstrated numerous advantages over visual methods. These include much faster computation speed, repeatability of calculations, interactive propagation analysis (real time solution of any one propagation variable when the others are

known) and the ability to order easily the presentation of data into various desired formats. To provide a substantial savings in human resources over manual methods, we proposed to evaluate TV and FM engineering applications using such computer programs.

SUMMARY OF THE COMMENTS

4. Commenters who filed in response to the *Notice* generally agree that computer techniques are preferable to visually reading the graphic curves but nevertheless express reservations regarding adoption of the Commission's algorithm as proposed in the *Notice*.³ We briefly describe those concerns below upon which our decision is based.⁴

5. *Algorithm complexity.* Although the algorithm used by the Commission is complex, its original selection in 1976 was based upon its ability to operate with far fewer basic reference data points than other algorithms and to maintain reasonable agreement with the graphic curves.⁵ Several commenters contend that its complexity, while not significant when implemented on large mainframe computers, is burdensome and generally impractical in the case of personal computers. In addition, they maintain that this complexity precludes the use of hand calculators.

6. *Program portability.* Many commenters argue that, under the Commission's proposal, the program code utilized by the Commission would require a major conversion effort before it can be compiled and run on typical small personal computers. They also contend that hardware and software variations among computers could produce different results in the case of seemingly equivalent programs.

7. *Reference data points.* Lahm, in his comments, expresses concerns about the quantity, spacing, and selection of the reference data points used by the Commission's program. For example, he points out that while the antenna height scale is logarithmic, the separations between the limited number of data points are mostly linear and are not always close to the critical antenna heights that establish coverage limits for various classes of stations. He argues that, as a consequence, different results would be obtained, depending upon the method of interpolation. As a remedy to this problem, he recommends that additional reference points be provided from the original measurement data.

8. *Selection of algorithm.* Many commenters expressing concerns regarding the proposed algorithm urge the Commission to adopt a much less complex algorithm with more reference data points. This, they believe, could reduce difficulties implementing the algorithm on small personal computers and should also permit results to be obtained using a hand calculator.

DISCUSSION

9. We have carefully reviewed the comments and reply comments filed in response to the *Notice*. They have served to heighten our awareness of the difficulties associated with implementing our propagation algorithm on personal computers. Clearly, many commenters would prefer adoption of a new and less complex algorithm based upon a greater number of reference propagation data points. However, consideration of an alternate computer algorithm is beyond the scope of our *Notice*, would