6. REFERENCES

[1]   J.F. Mastrangelo and W.R. Rust, "Subcarrier traffic information channel testing and evaluation," NTIA Report 96-333, Jul. 1996.

[2]   G. Klein, "Digital traffic information using the radio data system," PhD Thesis, University of Nottingham, Nottingham, United Kingdom, pp. 170-209, May 1995.

[3]   International Telecommunications Union (ITU-R), "System for automatic tuning and other applications in FM radio receivers for use with the pilot-tone system," vol. X-1, ITU-R Recommendation 643-1 (Dusseldorf, Germany), 1990.

APPENDIX: COMMUNICATION SYSTEM PERFORMANCE MODEL

The Communication System Performance Model (CSPM) program creates detailed shaded or contour plots of basic transmission loss, field strength, power density, available power, or signal-to-interference ratios from one or more transmitters in a given geographical area. CSPM allows the user to select the propagation model desired for predictions. The default model is the Institute for Telecommunication Sciences Irregular Terrain Model (ITM) in the point-to-point mode. The model chosen by the user determines path loss along radials of about one degree azimuthal intervals around each transmitter. The ITM is applicable to analyze mobile, broadcast, or radar coverage and interference problems in the 20-MHz to 20-GHz band. The model uses the U.S. Geological Survey 3-arc second terrain database and the Defense Mapping Agency terrain database. These databases provide an elevation point approximately every 90 m. The model also uses the 1990 U.S. Census information and frequently updated FCC databases.

CSPM calculates path losses in a user-defined geographic area. This area is divided into a grid of up to 200 x 200 points for a maximum number of calculated values of 40,000. These path losses are used in the generation of a plot and are converted to the desired output type (e.g., field strength and power) at plot time. The user either imports station information directly from the FCC database or hand enters information about the station. This information includes: transmitter location, power, antenna pattern, tower height, gains and losses of the system, and desired contours of signal coverage. The model plots the desired contours of signal strength and determines the number of households and population that lie within the specified contours. CSPM plots can be combined to produce predicted area coverage of a group of stations. Each cell value of the 200 x 200 grid is set to the maximum signal strength from the group of stations. A sample of the summary of input data is shown in the following table.

Communications System Performance Model Input Summary
21 Nov 95 - 15:43:52

Process Filename: CS000Nov2195E.ques

1)	Model:		Point-to-point irregular terrain model		
2)	Output option:		Field intensity		
3)	Length units:		English (mi and ft)		
4)	Service application:		Broadcast		
5)	Results option:		Mail only		
	FAX number:		000-000-0000		
6)	Location variability:		50.00 %		
7)	Time availability:		50.00 %		
8)	Situation variability:		50.00 %		
10)	Frequency:		89.30 MHz		
11)	Polarization:		Vertical		
12)	Conductivity:		.005 S/m		
13)	Dielectric constant:		15.00		
14)	Climate zone:		Continental temperate		
20)	Transmitter name:		WRFG		
21)	Transmitter location:	Latitude		Longitude	
		Deg N		Deg W	
		33.7489	33,44,56.00	84.4072	84,24,26.00
22)	Xmtr site elevation:		309.70 m	1016.00 ft	
23)	Xmtr ant ht AMSL:		361.00 m	1184.38 ft	
23)	Xmtr ant ht AGL:		51.33 m	168.41 ft	
24)	Transmitter radiation option:		ERP		
24)	Effective radiated power:		24500.00 W		
	Effective isotropic radiated power:		40196.90 W		
30)	Transmitter ant horiz pattern:		Omnidirectional		
32)	Transmitter ant vert pattern:		Omnidirectional		
40)	Rcvr ant ht above ground:		9.10 m	29.86 ft	
56)	Corporate name:		ITS-TA Services		
57)	Color option:		Color		
58)	Scale option:		No Scale		
59)	Quality option:		High		
60)	Plot name:		Atlanta, GA		
62)	Plot center:	Latitude		Longitude	
		Deg N		Deg W	
		33.7489	33,44,56.00	84.4072	84,24,26.00
63)	Plot size:		350.00 km	217.48 mi	
64)	Plot Roads option:		No Roads		

66) Field intensity contour levels:
   1) 54.00 dBuV/m
   2) 74.00 dBuV/m

66) Contour legend label: Field Intensity (dBuV/m)

66) Contour labels and colors:

Contour levels	Labels	Colors
1 Less than 54.00	Less than 54.00	Blue
2 54.00 to 74.00	54.0000 to 74.00	Green
3 Greater than 74.00	Greater than 74.00	Clear

67)	Political boundaries:		County and State
68)	Landmarks:		None