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TRANSMISSION LOSS PREDICTIONS FOR TROPOSPHERIC COMMUNICATION CIRCUITS

VOLUME I

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FOREWORD

A short history of the development of the prediction methods in this Technical Note will permit the reader to compare them with earlier procedures. Some of these methods were first reported by Norton, Rice and Vogler [1955]. Further development of forward scatter predictions and a better understanding of the refractive index structure of the atmosphere led to changes reported in an early unpublished NBS report and in NBS Technical Note 15 [Rice, Longley and Norton, 1959]. The methods of Technical Note 15 served as a basis for part of another unpublished NBS report which was incorporated in Air Force Technical Order T. O. 31Z-10-1 in 1961. A preliminary draft of the current technical note was submitted as a U. S. Study Group V contribution to the CCIR in 1962.

Technical Note 101 uses the metric system throughout. For most computations both a graphical method and formulas suitable for a digital computer are presented. These include simple and comprehensive formulas for computing diffraction over smooth earth and over irregular terrain, as well as methods for estimating diffraction over an isolated rounded obstacle. New empirical graphs are included for estimating long-term variability for several climatic regions, based on data that have been made available.

For paths in a continental temperate climate, these predictions are practically the same as those published in 1961. The reader will find that a number of graphs have been simplified and that many of the calculations are more readily adaptable to computer programming. The new material on time availability and service probability in several climatic regions should prove valuable for areas other than the U. S. A.

Changes in this revision concern mainly sections 2 and 10 of volume 1, annexes I, II and V of volume 2, and certain changes in notation and symbols. The latter changes make the notation more consistent with statistical practice.

Section 10, Long-Term Power Fading contains additional material on the effects of atmospheric stratification.

For convenience in using volume 2, those symbols which are found only in an annex are listed and explained at the end of the appropriate annex. Section 12 of volume 1 lists and explains only those symbols used in volume 1.

Note: This Technical Note consists of two volumes as indicated in the Table of Contents.

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TABLE OF CONTENTS

Volume 1

	PAGE NO.
1. INTRODUCTION	1-1
2. THE CONCEPTS OF SYSTEM LOSS, TRANSMISSION LOSS, PATH ANTENNA GAIN, AND PATH ANTENNA POWER GAIN	2-1
2.1 System Loss and Transmission Loss	2-1
2.2 Antenna Directive Gain and Power Gain	2-3
2.3 Polarization Coupling Loss and Multipath Coupling Loss	2-5
2.4 Path Loss, Basic Transmission Loss, Path Antenna Gain, and Attenuation Relative to Free Space	2-7
3. ATMOSPHERIC ABSORPTION	3-1
3.1 Absorption by Water Vapor and Oxygen	3-1
3.2 Sky-Noise Temperature	3-3
3.3 Attenuation by Rain	3-4
3.4 Attenuation in Clouds	3-6
4. DETERMINATION OF AN EFFECTIVE EARTH'S RADIUS	4-1
5. TRANSMISSION LOSS PREDICTION METHODS FOR WITHIN-THE-HORIZON PATHS	5-1
5.1 Line-of-Sight Propagation Over Irregular Terrain	5-1
5.2 Line-of-Sight Propagation Over a Smooth or Uniformly Rough Spherical Earth	5-3
5.2.1 A curve-fit to terrain	5-8
5.2.2 The terrain roughness factor, σ_h	5-9
5.3 Some Effects of Cluttered Terrain	5-10
5.4 Examples of Line-of-Sight Predictions	5-11
6. DETERMINATION OF ANGULAR DISTANCE FOR TRANSHORIZON PATHS	6-1
6.1 Plotting a Great Circle Path	6-1
6.2 Plotting a Terrain Profile and Determining the Location of Radio Horizon Obstacles	6-3
6.3 Calculation of Effective Antenna Heights for Transhorizon Paths	6-4
6.4 Calculation of the Angular Distance, θ	6-5
7. DIFFRACTION OVER A SINGLE ISOLATED OBSTACLE	7-1
7.1 Single Knife Edge, No Ground Reflections	7-1
7.2 Single Knife Edge with Ground Reflections	7-3
7.3 Isolated Rounded Obstacle, No Ground Reflections	7-4
7.4 Isolated Rounded Obstacle with Ground Reflections	7-6
7.5 An Example of Transmission Loss Prediction for a Rounded Isolated Obstacle	7-7

	<u>PAGE NO.</u>
8. DIFFRACTION OVER SMOOTH EARTH AND OVER IRREGULAR TERRAIN	8-1
8.1 Diffraction Attenuation Over a Smooth Earth	8-1
8.2 Diffraction Over Irregular Terrain	8-3
8.2.1 Diffraction over paths where $d_{st} \cong d_{sr}$	8-4
8.2.2 For horizontal polarization	8-4
8.3 Single-Horizon Paths, Obstacle not Isolated	8-5
9. FORWARD SCATTER	9-1
9.1 The Attenuation Function, $F(\theta d)$	9-2
9.2 The Frequency Gain Function, H_o	9-3
9.3 The Scattering Efficiency Correction, F_o	9-5
9.4 Expected Values of Forward Scatter Multipath Coupling Loss	9-6
9.5 Combination of Diffraction and Scatter Transmission Loss	9-7
9.6 An Example of Transmission Loss Predictions for a Transhorizon Path. . .	9-8
10. LONG-TERM POWER FADING	10-1
10.1 Effects of Atmospheric Stratification	10-4
10.2 Climatic Regions	10-6
10.3 The Effective Distance, d_e	10-8
10.4 The Functions $V(0.5, d_e)$ and $Y(q, d_e)$	10-9
10.5 Continental Temperate Climate	10-10
10.6 Maritime Temperate Climate	10-12
10.7 Other Climates	10-13
10.8 Variability for Knife-Edge Diffraction Paths	10-13
11. REFERENCES	11-1
12. LIST OF SYMBOLS AND ABBREVIATIONS	12-1

TABLE OF CONTENTS

Volume 2

	<u>PAGE NO.</u>
ANNEX I: AVAILABLE DATA, STANDARD CURVES, AND A SIMPLE PREDICTION MODEL	I-1
I. 1 Available Data as a Function of Path Length	I-1
I. 2 Standard Point-to-Point Transmission Loss Curves	I-2
I. 3 Preliminary Reference Values of Attenuation Relative to Free Space A_{cr}	I-29
I. 3. 1 Introduction	I-29
I. 3. 2 The Terrain Roughness Factor Δh	I-29
I. 3. 3 The Diffraction Attenuation, A_d	I-30
I. 3. 4 The Forward Scatter Attenuation, A_g	I-31
I. 3. 5 Radio Line-of-Sight Paths	I-32
I. 3. 6 Ranges of the Prediction Parameters	I-34
I. 3. 7 Sample Calculations	I-35
ANNEX II: AVAILABLE POWER, FIELD STRENGTH, AND MULTIPATH COUPLING LOSS	II-1
II. 1 Available Power from the Receiving Antenna	II-1
II. 2 Propagation Loss and Field Strength	II-4
II. 3 Beam Orientation, Polarization, and Multipath Coupling Loss	II-9
II. 3. 1 Representation of Complex Vector Fields	II-9
II. 3. 2 Principal and Cross-Polarization Components	II-12
II. 3. 3 Unit Complex Polarization Vectors	II-14
II. 3. 4 Power Flux Densities	II-16
II. 3. 5 Polarization Efficiency	II-18
II. 3. 6 Multipath Coupling Loss	II-20
II. 3. 7 Idealized Theoretical Antenna Patterns	II-23
II. 3. 8 Conclusions	II-31
II. 4 List of Special Symbols Used in Annex II	II-34
ANNEX III: SUPPLEMENTARY INFORMATION AND FORMULAS USEFUL FOR PROGRAMMING	III-1
III. 1 Line-of-Sight	III-2
III. 2 Diffraction Over a Single Isolated Obstacle	III-15
III. 3 Diffraction Over a Single Isolated Obstacle with Ground Reflections	III-17
III. 4 Parameters K and b^* for Smooth Earth Diffraction	III-23
III. 5 Forward Scatter	III-24
III. 6 Transmission Loss with Antenna Beams Elevated or Directed Out of the Great Circle Plane	III-37

	<u>PAGE NO.</u>
III. 7	Long-Term Power Fading III-44
III. 7.1	Diurnal and seasonal variability in a continental temperate climate III-45
III. 7.2	To mix distributions III-54
III. 8	List of Special Symbols Used in Annex III III-73
ANNEX IV:	FORWARD SCATTER IV-1
IV. 1	General Discussion IV-1
IV. 2	Models for Forward Scattering IV-2
IV. 3	List of Special Symbols Used in Annex IV IV-11
ANNEX V:	PHASE INTERFERENCE FADING AND SERVICE PROBABILITY . . V-1
V. 1	The Two Components of Fading V-3
V. 2	The Nakagami-Rice Distribution V-5
V. 3	Noise-Limited Service V-13
V. 4	Interference-Limited Service V-15
V. 5	The Joint Effect of Several Sources of Interference Present Simultaneously V-19
V. 6	The System Equation for Noise-Limited Service V-20
V. 7	The Time Availability of Interference-Limited Service V-22
V. 8	The Estimation of Prediction Error V-23
V. 9	The Calculation of Service Probability Q for a Given Time Availability q V-25
V. 10	Optimum Use of the Radio Frequency Spectrum V-31
V. 11	List of Special Symbols Used in Annex V V-35