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5. Various Attenuation Models and Other Effects of Troposphere

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LIST OF SYMBOLS

Symbol	Description
D_{ir}	Directivity of antenna.
Z	Radar reflectivity
R	Rain rate (mm/hr).
$N_v(D)$	Mean number of rain drops present per unit volume of rain.
N_o	Drop size distribution for D=0
Λ	Slope factor
V (D)	Terminal fall velocity of the rain drop
θ	Elevation angle of the earth station
D_o	Mean drop diameter
N_w	Normalized gamma intercept parameter.
μ	Distribution shape parameter.
D	Drop diameter(mm).
β	Thunder storm ratio.
σ	Standard deviation.
λ	Wavelength
$m_n(t)$	Movement of the rain drop size distribution
Φ	Earth station latitude (degrees)
k	Propagation constant
E_i	Incident electric field
R	Distance from origin of the observation point
$\sum Q_t$	Sum of the total cross sections of all rain drops in a unit volume in the space
Q_s	Scattering cross section.

Q_a	Absorption cross section
a_n, b_n	Scattering coefficients of spherical elements.
k	Propagation constant.
e_o	Unit polarization vector.
H_s	Height of the earth station above the mean sea level (km).
k, α	Parameters for estimation of specific attenuation dependent on frequency and polarization
$R_{0.01}$	0.01% of point rainfall rate(mm/hr)of the average year for the location
h_R	Height of the rain.
Γ	Specific attenuation (dB/km).
L_s	Slant path length through the rain.
L_G	Horizontal projection of slant path length $L_{s.}$
$r_{0.01}$	Horizontal reduction factor for 0.01% of time.
$v_{0.01}$	Vertical adjustment factor for 0.01% of time.
M	Average annual accumulation of rain fall (mm).
M_m	Highest monthly rain fall observed.
U	Average thunder storm days expected in an average year.
e	Pressure due water vapour.
e_s	Saturation vapour pressure at the temperature of air .
m_v	Mass of the water vapour.
m_d	Mass of dry air.
h_c	Height from the cloud base.
w	Liquid water content.
$p_w(t)$	Liquid water fraction with respect to temperature.

T_{ve}	Virtual temperature of environment.
N_{wet}	Wet term of radio refractivity.
N_{dry}	Dry term of refractivity index.
P	Pressure of atmosphere.
T_{vp}	Virtual temperature of parcel.

LIST OF ABBREVIATIONS

ULF	Ultra High Frequency
VLF	Very Low Frequency
LF	Low Frequency
MF	Medium Frequency
HF	High Frequency
EHF	Extended High Frequency
UHF	Ultra High Frequency
SHF	Super High Frequency
VHF	Very High Frequency
BER	Bit Error Rate
ITU-R	International Telecommunication Union Recommendation
INSAT	Indian National Satellite System
AEHF	Advanced Extremely High Frequency
EIRP	Effective Isotropically Radiated power
LNB	Low Noise Block
VI	Virtual Instrument
GPIB	General Purpose Interface Bus
LO	Local Oscillator
ODU	Out Door Unit
DAQ	Data Acquisition
A/D	Analog To Digital
D/A	Digital To Analog

NI	National Instruments
USB	Universal Synchronous Bus
CAPE	Convective Available Potential Energy(J/Kg)
IMD	Indian Meteorological Department