

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R P.678-3 (07/2015)

Characterization of the variability of propagation phenomena and estimation of the risk associated with propagation margin

P Series
Radiowave propagation



Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

Policy on Intellectual Property Right (IPR)

ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Annex 1 of Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from <http://www.itu.int/ITU-R/go/patents/en> where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

Series of ITU-R Recommendations

(Also available online at <http://www.itu.int/publ/R-REC/en>)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R P.678-3

Characterization of the variability of propagation phenomena and estimation of the risk associated with propagation margin

(1990-1992-2013-2015)

Scope

This Recommendation provides three prediction methods of:

- the expected year-to-year variation of the worst-month time fraction of excess;
- the inter-annual variability of rainfall rate and rain attenuation statistics;
- risk parameters associated with the variation of rain attenuation statistics.

The ITU Radiocommunication Assembly,

considering

- a) that knowledge of the variability of propagation phenomena is required to allow proper cost and performance trade-offs to be made in the analysis of system reliability, availability and quality;
- b) that a prediction procedure to estimate risk parameters associated with the variation of propagation statistics is required for the formulation of performance criteria of radiocommunication system;
- c) that a prediction procedure exists for the estimation of the statistics of the year-to-year variations in the annual worst-month time fraction of excess as defined in Recommendation ITU-R P.581,

recommends

- 1 that Fig. 1 of Annex 1 be used for the estimation of the expected year-to-year variation of the annual worst-month time fraction of excess;
- 2 that the expected variation about a long-term average predicted value be reported as a function of return period;
- 3 that the inter-annual variability of rainfall rate and rain attenuation statistics around a long-term average statistics be computed from Annex 2;
- 4 that the risk parameters associated with the variation of propagation statistics be computed from Annex 3.

NOTE 1 – The return period is the average time interval between two consecutive occurrences of a defined stochastic event. For a long series of observation, the value of the return period is $1/P$ (times the average interval between all pairs of consecutive events) where P is the probability of occurrence of the event. For example, the median value of a long series of annual worst-month time fraction of excess values would have a two-year return period.

NOTE 2 – The risk is defined as the probability that the yearly guaranteed availability is not fulfilled.