International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R P.373-9

(09/2013)

Definitions of maximum and minimum transmission frequencies

P Series

Radiowave propagation

International Telecommunication Union

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.*

Electronic Publication
Geneva, 2013

RECOMMENDATION ITU-R P.373-9

Definitions of maximum and minimum transmission frequencies

(Question ITU-R 212/3)

(1959-1963-1966-1970-1974-1978-1982-1990-1995-2007-2013)

Scope

This Recommendation provides definitions of the maximum and minimum transmission frequencies. These definitions are being employed in ITU-R Recommendations related to propagation prediction methods and operational matters and they are also used by scientists and radiocommunication operators.

The ITU Radiocommunication Assembly,

considering

that prediction services, scientists and operators have different requirements for definitions of the maximum and minimum transmission frequency,

recommends

1 that the following definitions should be used for maximum usable frequency (MUF):

operational MUF, is the highest frequency that would permit acceptable performance of a radio circuit by signal propagation via the ionosphere between given terminals at a given time under specified working conditions.

NOTE 1 – Acceptable performance may for example be quoted in terms of maximum error ratio or required signal/noise ratio.

NOTE 2 – Specified working conditions may include such factors as antenna types, transmitter power, class of emission and required performance;

basic MUF is the highest frequency by which a radiowave can propagate between given terminals, on a specified occasion, by ionospheric refraction alone;

2 that the additional terms and extended descriptions, given in Annex 1, may also be used.

Annex 1

Additional definitions

Optimum working frequency (OWF) or Optimum traffic frequency (FOT): the lower decile of the daily values of operational MUF at a given time over a specified period, usually a month. That is, it is the frequency that is exceeded by the operational MUF during 90% of the specified period.

Highest probable frequency (HPF): the upper decile of the daily values of operational MUF at a given time over a specified period, usually a month. That is, it is the frequency that is exceeded by the operational MUF during 10% of the specified period.

Lowest usable frequency (LUF): the lowest frequency that would permit acceptable performance of a radio circuit by signal propagation via the ionosphere between given terminals at a given time under specified working conditions.

NOTE 1 – Where the basic MUF is restricted to a particular ionospheric propagation mode, the values may be quoted together with an indication of that mode (for example, 1E MUF, 2F2 MUF).

NOTE 2 – If the extraordinary component of the wave is involved, then this is noted (for example, 1F2 MUF(X)). Absence of a specific reference to the magnetoionic component implies that the quoted value relates to the ordinary wave.

NOTE 3 – It is sometimes useful to quote the ground range for which the basic MUF applies. This is indicated in kilometres following the indication of the mode type (for example, 1F2 (4 000) MUF(X)).

NOTE 4 – Where the basic MUF term refers to the median value, or some other percentile (x), of a month or season, this may be indicated by giving the percentile value following the term (for example, MUF(50), for a median value).