

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R P.1240-2 (07/2015)

ITU-R methods of basic MUF, operational MUF and ray-path prediction

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.1240-2

**ITU-R methods of basic MUF, operational MUF
and ray-path prediction***

(Question ITU-R 212/3)

(1997-2007-2015)

Scope

This Recommendation gives methods for the prediction of the maximum usable frequencies for the ionospheric layers.

The ITU Radiocommunication Assembly,

considering

- a) that long-term reference ionospheric data and propagation prediction methods are needed for HF radio-circuit design, service planning and frequency band selection;
- b) that maps of ionospheric characteristics are given in Recommendation ITU-R P.1239,

recommends

- 1 that for the prediction of basic and operational MUFs, use should be made of the formulations contained in Annex 1 (for definitions, see Recommendation ITU-R P.373);
- 2 that for the prediction of ray paths, use should be made of the formulations contained in Annex 2.

Annex 1**Prediction of basic and operational MUFs****1 Introduction**

Empirical formulae are presented for the evaluation of the monthly median basic MUF for the propagation path.

This MUF is estimated as the greatest of the basic MUF values for the propagation modes appropriate to the path length being considered.

The relationship between the operational MUF and basic MUF is given and a computer program is described leading to estimates of path basic MUF, operational MUF and optimum working frequency on a point-to-point propagation path of any length.

* Computer programs associated with the prediction procedures and data described in this Recommendation are available from that part of the ITU-R website dealing with Radiocommunication Study Group 3.