

## RECOMMENDATION ITU-R P.373-8

**Definitions of maximum and minimum transmission frequencies**

(Question ITU-R 212/3)

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

**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*

a) 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)*: 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).

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