

Recommendation ITU-R V.431-9

(10/2025)

V Series: Vocabulary and related subjects

Nomenclature of the frequency and wavelength bands used in telecommunications

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 Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from <https://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 <https://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	Radio-wave 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, 2025

© ITU 2025

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without written permission of ITU.

RECOMMENDATION ITU-R V.431-9

**Nomenclature of the frequency and wavelength bands
used in telecommunications**

(1953-1956-1959-1963-1966-1974-1978-1982-1986-1993-2000-2015-2025)

Scope

This text recommends the use of the hertz (Hz) as the unit of frequency, and the nomenclature to be used for the description of frequency and wavelength bands. It also provides extended information on nomenclature used in some applications.

Keywords

Frequency bands, hertz, wavelength bands

Related ITU-R Recommendations

Recommendation ITU-R V.430 – Use of the international system of units (SI)

Recommendation ITU-R V.573 – Radiocommunication vocabulary

The ITU Radiocommunication Assembly,

considering

- a)* that the merits of Heinrich Hertz (1857-1897) as a research worker on the basic phenomena of radio waves, are universally recognized, as was confirmed at the centenary of his birth; and that as early as 1937 the International Electrotechnical Commission (IEC) adopted the hertz (symbol: Hz) as a name for the unit of frequency (see *inter alia*, International Standard IEC 60027);
- b)* that the nomenclature in this Recommendation should be as synoptic as possible and that the designation of frequency bands should be as concise as possible;
- c)* the need for units and prefixes to be consistent with those defined in the International System of Units (SI),

recommends

- 1 that the hertz (Hz) be accepted for use in publications of the ITU, as the name for the unit of frequency in accordance with Recommendation ITU-R V.430 on the use of the International System of Units;
- 2 that administrations should use the nomenclature of the frequency and wavelength bands given in Table 1 and Notes 1 and 2, which take account of No. **2.1** of the Radio Regulations.

TABLE 1

Band number	Symbols	Designations	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision
3	ULF	Ultra low frequency	300-3 000 Hz	sub-megametric waves
4	VLF	Very low frequency	3-30 kHz	super-kilometric waves
5	LF	Low frequency	30-300 kHz	kilometric waves
6	MF	Medium frequency	300-3 000 kHz	hectometric waves
7	HF	High frequency	3-30 MHz	decametric waves
8	VHF	Very high frequency	30-300 MHz	metric waves
9	UHF	Ultra high frequency	300-3 000 MHz	decimetric waves
10	SHF	Super high frequency	3-30 GHz	centimetric waves
11	EHF	Extremely high frequency	30-300 GHz	millimetric waves
12	THF	Tremendously high frequency	300-3 000 GHz	sub-millimetric waves
13			3-30 THz	super-micrometric waves
14			30-300 THz	micrometric waves
15			300-3 000 THz	sub-micrometric waves

NOTE 1 – “Band number N” extends from 0.3×10^N to 3×10^N Hz.

NOTE 2 – Symbols: Hz: hertz
k: kilo (10^3), M: mega (10^6), G: giga (10^9), T: tera (10^{12})
 μ : micro (10^{-6}), m: milli (10^{-3}), c: centi (10^{-2}), d: deci (10^{-1})
da: deca (10), h: hecto (10^2).

NOTE 3 – This nomenclature, used for designating frequencies in the field of telecommunications, may be extended to cover the ranges shown below (see Table 2).

TABLE 2

Band number	Symbols	Designations	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision
-1			0.03-0.3 Hz	gigametric waves
0	TLF	Tremendously low frequency	0.3-3 Hz	sub-gigametric waves
1	ELF	Extremely low frequency	3-30 Hz	super-megametric waves
2	SLF	Super low frequency	30-300 Hz	megametric waves

NOTE 4 – Table 3 provides designations of some frequency bands allocated to the broadcasting service. It should be noted that these ranges are, in some cases, not exclusive to the broadcasting service.

TABLE 3

Designation	Frequency range (MHz)		
	Region 1	Region 2	Region 3
I	47-68	54-68	47-68
II	87.5-108	88-108	87-108
III	174-230	174-216	174-230
IV	470-582	470-582	470-582
V	582-960	582-890	582-960

NOTE 5 – Certain frequency bands are sometimes designated by letter other than the symbols and abbreviations recommended in Tables 1 and 2. The symbols in question consist of capital letters which may be accompanied by an index (usually a small letter). There is at present no standard correspondence between the letters and the frequency bands concerned, and the same letter may be used to designate a number of different bands. It is not advisable to use these symbols in ITU publications. If, however, a letter symbol is used, reference should be made to the corresponding frequency band limits or at least to a frequency in the band, if that information is sufficient in itself, the first time the symbol appears in the text. For information, letter designations used by some international organizations, mainly in the field of radar and space radiocommunications, are indicated in Table 4.

TABLE 4

Letter symbols	Radar		Space radiocommunications	
	Frequency ranges (GHz)	Examples of frequency ranges (GHz)	Nominal designations of frequency bands/ ranges	Examples of frequency ranges (GHz)
L	1-2	1.215-1.4	1.5 GHz band	1.525-1.710
S	2-4	2.3-2.5 2.7-3.4	2.5 GHz band	2.5-2.690
C	4-8	5.25-5.85	4/6 GHz band	3.4-4.2 4.5-4.8 5.85-7.075
X	8-12	8.5-10.5	–	–
Ku	12-18	13.4-14.0 15.3-17.3	11/14 GHz band 12/14 GHz band	10.7-13.25 14.0-14.5
K ⁽¹⁾	18-27	24.05-24.25	20 GHz band	17.7-20.2
K _a ⁽¹⁾	27-40	33.4-36.0	30 GHz band	27.5-30.0
V	–	–	40 GHz band	37.5-42.5 47.2-50.2

⁽¹⁾ For space radiocommunications, K and Ka bands are often designated by the single symbol K_a.