

RECOMMENDATION ITU-R V.431-7*

**NOMENCLATURE OF THE FREQUENCY AND WAVELENGTH BANDS
USED IN TELECOMMUNICATIONS**

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

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.

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*, Publication 27);

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,

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 (SI);

2 that administrations should always 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 (RR), except in those cases where this would inevitably cause very serious difficulties.

TABLE 1

Band number	Symbols	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision	Metric abbreviations for the bands
3	ULF	300-3 000 Hz	Hectokilometric waves	B.hkm
4	VLF	3-30 kHz	Myriametric waves	B.Mam
5	LF	30-300 kHz	Kilometric waves	B.km
6	MF	300-3 000 kHz	Hectometric waves	B.hm
7	HF	3-30 MHz	Decametric waves	B.dam
8	VHF	30-300 MHz	Metric waves	B.m
9	UHF	300-3 000 MHz	Decimetric waves	B.dm
10	SHF	3-30 GHz	Centimetric waves	B.cm
11	EHF	30-300 GHz	Millimetric waves	B.mm
12		300-3 000 GHz	Decimillimetric waves	B.dmm
13		3-30 THz	Centimillimetric waves	B.cmm
14		30-300 THz	Micrometric waves	B.µm
15		300-3 000 THz	Decimicrometric waves	B.dµm

* This Recommendation was updated in 2005 for editorial reasons only.

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), Ma: myria (10^4).

NOTE 3 – This nomenclature, used for designating frequencies in the field of telecommunications, may be extended to cover the ranges shown below, as is proposed by the International Union of Radio Science (URSI) (see Table 2).

TABLE 2

Band number	Symbols	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision	Metric abbreviations for the bands
-1	ELF	0.03-0.3 Hz	Gigametric waves	B.Gm
0		0.3-3 Hz	Hectomegametric waves	B.hMm
1		3-30 Hz	Decamegametric	B.daMm
2		30-300 Hz	Megametric	B.Mm

NOTE 4 – In most countries the frequency ranges used for FM sound broadcasting and television are designated by the Roman numerals I to V. The frequency ranges are indicated in Table 3. It should be noted that these ranges are, in some cases, not exclusive to the broadcasting services.

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 authors, mainly in the field of radar and space communications, are indicated in Table 4.

TABLE 4

Letter symbols	Radar (GHz)		Space radiocommunications	
	Spectrum regions	Examples	Nominal designations	Examples (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
Ka ⁽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.
