

RECOMMENDATION ITU-R TF.686-1*

GLOSSARY

(1990-1997)

The ITU Radiocommunication Assembly,

considering

- a) that it is essential for the work of the ITU that terms should be used in a clearly defined and uniform manner;
- b) that there is a need for a common terminology for the unambiguous specification and description of frequency and time standard systems;
- c) the need to promote a consistent use of terminology in a growing community of users of frequency and time standard systems,

recommends that the following terms be used:

accuracy; *exactitude*; *exactitud*

The degree of conformity of a measured or calculated value to its definition (see “uncertainty”).

ageing; *vieillessement*; *envejecimiento*

The systematic change in frequency with time due to internal changes in the oscillator.

NOTE – It is the frequency change with time when factors external to the oscillator (environment, power supply, etc.) are kept constant.

atomic time scale; *échelle de temps atomique*; *escala de tiempo atómico*

A time scale based on atomic or molecular resonance phenomena.

calibration**; *étalonnage*; *calibración*

The process of identifying and measuring offsets in instruments and/or procedures.

NOTE – In many cases, e.g. in a frequency generator, the calibration is related to the stability of the device and therefore its result is a function of time and of the averaging time.

clock; *horloge*; *reloj*

A device for time measurement and/or time display.

clock time difference; *différence entre temps d'horloge*; *diferencia de tiempo de reloj*

The difference between the readings of two clocks at the same instant.

NOTE – In order to avoid confusion in sign, algebraic quantities should be given, applying the following convention. At a time T of a reference time scale, let a denote the reading of a time scale A , and b the reading of a time scale B ; the time scale difference is expressed by $A - B = a - b$ at the instant T . The same convention applies to the case where A and B are clocks.

coherence of frequency; *cohérence de fréquence*; *coherencia de frecuencia*

See “coherence of phase”.

* This Recommendation should be brought to the attention of the Telecommunication Standardization Bureau (TSB) and the International Organization for Standardization (ISO).

** These definitions differ from those in the International Electrotechnical Vocabulary (IEV), but Radiocommunication Study Group 7 is of the opinion that they are more appropriate for the standard-frequency and time-signal service.

coherence of phase; *cohérence de phase; coherencia de fase*

Exists if two periodical signals of frequency M and N resume the same phase difference after M cycles of the first and N cycles of the second, M/N being a rational number, obtained through multiplication and/or division from the same fundamental frequency.

coordinated clock; *horloge coordonnée; reloj coordinado*

A clock synchronized within stated limits to a reference clock which is spatially separated.

coordinate time; *temps-coordonnée; tiempo-coordenada*

The concept of time in a specific coordinate frame, valid over a spatial region with varying gravitational potential.

NOTE – If a time scale is realized according to the coordinate time concept, it is called a coordinate time scale.

Example: TAI is a coordinate time scale. Its reference is the surface of the rotating geoid.

coordinated time scale; *échelle de temps coordonnée; escala de tiempo coordinada*

A time scale synchronized within stated limits to a reference time scale.

Coordinated Universal Time (UTC); *temps universel coordonné; Tiempo Universal Coordinado*

The time scale, maintained by the BIPM and the International Earth Rotation Service (IERS), which forms the basis of a coordinated dissemination of standard frequencies and time signals (see Recommendation ITU-R TF.460).

It corresponds exactly in rate with TAI, but differs from it by an integral number of seconds. The UTC scale is adjusted by the insertion or deletion of seconds (positive or negative leap seconds) to ensure approximate agreement with UT1.

date; *date; fecha*

The reading of a specified time scale.

NOTE – The date can be conventionally expressed in years, months, days, hours, minutes, seconds and fractions thereof. Also, “Julian Date” (JD) and “Modified Julian Date” (MJD) are useful dating measures (see “Julian Date” and “Modified Julian Date”).

drift (implying frequency drift); *dérive; deriva*

The systematic change in frequency with time of an oscillator.

NOTE – Drift is due to ageing plus changes in the environment and other factors external to the oscillator (see ageing).

DUT1; *DUT1; DUT1*

The value of the predicted difference UT1 – UTC, as disseminated with the time signals. DUT1 may be regarded as a correction to be added to UTC to obtain a better approximation to UT1. The values of DUT1 are given by the International Earth Rotation Service (IERS) in integral multiples of 0.1 s (see Universal Time).

error*; *erreur; error*

The difference of a value from its assumed correct value.

frequency*; *fréquence; frecuencia*

If T is the period of a repetitive phenomenon, then the frequency $f = 1/T$. In SI units the period is expressed in seconds, and the frequency is expressed in hertz.

frequency deviation*; *écart de fréquence; desajuste de frecuencia*

The difference of the frequency from the nominal frequency value.

frequency difference; *différence de fréquence; diferencia de frecuencia*

The algebraic difference between two frequency values.

frequency drift*; *dérive de fréquence; deriva de frecuencia*

See “drift” and “ageing”.

* These definitions differ from those in the IEV, but Radiocommunication Study Group 7 is of the opinion that they are more appropriate for the standard-frequency and time-signal service.

frequency instability; *instabilité de fréquence; inestabilidad de frecuencia*

The spontaneous and/or environmentally caused frequency change within a given time interval.

NOTE – Generally one distinguishes between systematic effects such as frequency drift effects and stochastic frequency fluctuations. Special variances have been developed for the characterization of these fluctuations. Systematic instabilities may be caused by radiation, pressure, temperature, humidity, etc. It is typically dependent on the measurement system bandwidth and/or on the sample time or integration time. Random or stochastic instabilities are typically characterized in the time-domain and/or frequency-domain (Recommendation ITU-R TF.538).

In many contexts the expression “stability” instead of “instability” is used. This usage is acceptable.

frequency offset; *décalage de fréquence; separación de frecuencia*

The systematic frequency difference between the realized value and the nominal frequency value.

frequency shift; *déplacement de fréquence; desplazamiento de frecuencia*

An intentional frequency change.

frequency stability; *stabilité de fréquence; estabilidad de frecuencia*

See “frequency instability”.

frequency standard; *étalon de fréquence; patrón de frecuencia*

A generator, the output of which is used as a frequency reference.

NOTE – See “Primary frequency standard” and “Secondary frequency standard”.

instant; *instant; instante*

A point in time.

International Atomic Time (TAI); *temps atomique international; Tiempo Atómico Internacional*

The time scale established by the Bureau international des poids et mesures (BIPM) on the basis of data from atomic clocks operating in several establishments conforming to the definition of the second, the unit of time of the International System of Units (SI).

Julian Date (JD); *date julienne (DJ); Fecha Juliana (FJ)*

The Julian Day Number followed by the fraction of the day elapsed since the preceding noon (12h00 UT).

Example: The date 1900 January 0.5 d UT corresponds to JD = 2 415 020.0.

NOTE – The Julian Date is conventionally referred to UT1, but may be used in other contexts, if so stated.

Julian day number; *numéro de jour julien; número de día juliano*

The number of a specific day from a continuous day count having an initial origin of 12h00 UT on 1 January 4713 BC, Julian proleptic Calendar (start of Julian Day zero).

Example: The day extending from 1900 January 0.5 d UT to 1900 January 1.5 d UT has the number 2 415 020.

leap second; *seconde intercalaire; segundo intercalar*

An intentional time step of one second used to adjust UTC to ensure approximate agreement with UT1. An inserted second is called positive leap second and an omitted second is called negative leap second (see Recommendation ITU-R TF.460).

Modified Julian Date (MJD); *date julienne modifiée; Fecha Modificada del Calendario Juliano*

Julian Date less 2 400 000.5 days (see Recommendation ITU-R TF.457).

Modified Julian Day

Integer part of Modified Julian Date.

nominal value*; *valeur nominale; valor nominal*

A specified or intended value independent of any uncertainty in its realization.

NOTE – In a device that realizes a physical quantity, it is the specified value of such a quantity. It is an ideal value and thus it is free from tolerance.

normalized frequency; *fréquence normée; frecuencia normalizada*

The ratio between the actual frequency and its nominal value.

normalized frequency deviation; *écart de fréquence normé; desajuste de frecuencia normalizado*

See “normalized value”.

normalized frequency offset; *décalage de fréquence normé; separación de frecuencia normalizada*

See “normalized value”.

normalized frequency difference; *différence de fréquence normée; diferencia de frecuencia normalizada*

See “normalized value”.

normalized frequency drift; *dérive de fréquence normée; deriva normalizada de frecuencia*

See “normalized value”.

normalized offset; *décalage normé; separación normalizada*

See “normalized value”.

normalized value; *valeur normée; valor normalizado*

The ratio of a value to its nominal value.

NOTE 1 – This definition can be used in connection with: frequency, frequency deviation, frequency difference, frequency drift, frequency offset, etc.

NOTE 2 – In place of the term “normalized”, the term “relative” is acceptable but the term “fractional” is to be avoided.

offset*; *décalage; separación*

The systematic difference between the realized value and the nominal value. (See also “Normalized offset”.)

phase; *phase; fase*

Generally in a periodic phenomenon, analytically described by a function of time (or space), the phase is any possible and distinguishable state of the phenomenon itself.

It can be identified through the time of its occurrence, elapsed from a specified reference, to be called correctly “phase time” (frequently abbreviated to “phase”). Particularly, if the phenomenon is sinusoidal, the phase can be identified either by the angle or by the time, both measured from an assigned reference, depending on the dimensions assigned to the reference period (namely 2π or T).

In the standard-frequency and time-signal service, phase-time differences are mainly considered, i.e. time differences between two identified phases of the same phenomenon or of two different phenomena.

phase shift; *déphasage; desplazamiento de fase*

An intentional change in phase from a reference.

phase deviation; *décalage de phase; desviación de fase*

The difference of the phase from a reference.

precision; *précision; precisión*

The degree of mutual agreement among a series of individual measurements; often, but not necessarily, expressed by the standard deviation.

* These definitions differ from those in the IEV, but Radiocommunication Study Group 7 is of the opinion that they are more appropriate for the standard-frequency and time-signal service.

primary frequency standard; *étalon primaire de fréquence; patrón primario de frecuencia*

A frequency standard whose frequency corresponds to the adopted definition of the second, with its specified accuracy achieved without external calibration of the device.

NOTE – The second is defined as follows:

“the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium atom-133.” (XIII^e Conférence générale des poids et mesures, 1967.)

primary clock; *horloge primaire; reloj primario*

A time standard which operates without external calibration (see “time standard”).

proper time; *temps propre; tiempo propio*

The local time, as indicated by an ideal clock, in a relativistic sense.

NOTE – This is distinguished from a coordinate time, which involves theory and computations.

If a time scale is realized according to the proper time concept, it is called a proper time scale.

Examples:

- a) for proper time: the second is defined in the proper time of the caesium atom;
- b) for proper time scale: a time scale produced in a laboratory, not transmitted outside the laboratory.

reproducibility; *reproductibilité; reproductibilidad*

- a) With respect to a set of independent devices of the same design, it is the ability of these devices, to produce the same value.
- b) With respect to a single device, put into operation repeatedly without adjustments, it is the ability to produce the same value.

NOTE – A usual measure of the lack of reproducibility is the standard deviation.

resetability*; *fidélité; reposicionabilidad*

It is the ability of a device to produce the same value when specified parameters are independently adjusted under stated condition of use.

NOTE – A usual measure of the lack of resetability is the standard deviation.

secondary frequency standard; *étalon secondaire de fréquence; patrón secundario de frecuencia*

A frequency standard which requires external calibration.

standard frequency; *fréquence étalon; frecuencia patrón*

A frequency with a known relationship to a frequency standard.

NOTE – The term standard frequency is often used for the signal whose frequency is a standard frequency.

standard frequency and/or time-signal station; *station de fréquence étalon et/ou de signaux horaires; estación de frecuencias patrón y/o de señales horarias*

A station which provides a standard-frequency and/or time-signal emissions.

standard-frequency emission; *émission de fréquences étalon; emisión de frecuencias patrón*

An emission which disseminates a standard frequency at regular intervals with a specified frequency accuracy.

NOTE – In Recommendation ITU-R TF.460, the ITU-R recommends a normalized frequency deviation of less than 1×10^{-10} .

standard frequency-satellite service; *service des fréquences étalon par satellite; servicio de frecuencias patrón por satélite*

A radiocommunication service using earth satellites for the same purpose as those of the terrestrial standard frequency service.

* This term replaces the previous term “repeatability”, considered as not pertinent to frequency generators, but to measuring procedures.

standard-time-signal emission; *émission de signaux horaires; emisión de señales horarias*

An emission which disseminates a sequence of time signals at regular intervals with a specified accuracy.

NOTE – In Recommendation ITU-R TF.460, the ITU-R recommends standard time-signals to be emitted within 1 ms with reference to UTC and to contain DUT1 information in a specified code.

synchronism; *synchronisme; sincronismo*

See “time scales in synchronism”.

time; *temps; tiempo*

NOTE – In English “time” is used to specify an instant (time of day) or as a measure of time interval.

time comparison; *comparaison de temps; comparación de tiempos*

The determination of a time scale difference.

time code; *code horaire; código horario*

An information format used to convey time information.

time interval; *intervalle de temps; intervalo de tiempo*

The duration between two instants.

time marker; *repère de temps; marca de tiempo*

A reference signal enabling the assignment of dates on a time scale.

time scale; *échelle de temps; escala de tiempo*

A system of unambiguous ordering of events.

time scale difference; *différence entre échelles de temps; diferencia entre escalas de tiempo*

The difference between the readings of two time scales at the same instant.

NOTE – In order to avoid confusion in sign, algebraic quantities should be given, applying the following convention. At a time T of a reference time scale, let a denote the reading of a time scale A , and b the reading of a time scale B ; the time scale difference is expressed by $A - B = a - b$ at the instant T . The same convention applies to the case where A and B are clocks.

time scales in synchronism; *échelles de temps en synchronisme; escalas de tiempo en sincronismo*

Two time scales are in synchronism, when they assign the same date to an instant.

NOTE – If the time scales are produced in spatially separated locations, the propagation time of transmitted time signals and relativistic effects – including the reference coordinate frame – are to be taken into account.

time scale reading; *lecture d'une échelle de temps; lectura de una escala de tiempo*

The value read on a time scale at a specific instant.

NOTE – The reading of a time scale should be qualified by giving the time scale name (see Recommendation ITU-R TF.536).

time scale unit; *unité d'une échelle de temps; unidad de escala de tiempo*

The defining basic time interval in a time scale.

NOTE – This is to be distinguished from the realized time scale unit.

time-signal satellite service; *service des signaux horaires par satellite; servicio de señales horarias por satélite*

A radiocommunication service using earth satellites for the same purpose as those of the time-signal service.

time standard; *étalon de temps; patrón de tiempo*

- a) A device used for the realization of the time unit.
- b) A continuously operating device used for the realization of a time scale in accordance with the definition of the second and with an appropriately chosen origin.

time step; *saut de temps; salto de tiempo*

A discontinuity in a time scale at some instant.

NOTE – A time step is positive (+) if the time scale reading is increased, and negative (–) if the reading is decreased at that instant.

uncertainty; *incertitude; incertidumbre*

The limits of the confidence interval of a measured or calculated quantity.

NOTE – The probability of the confidence limits should be specified, preferably by the one sigma value.

Universal Time (UT); *temps universel; Tiempo Universal*

Universal Time (UT) is the general designation of time scales based on the rotation of the Earth. In applications in which a precision of a few tenths of a second cannot be tolerated, it is necessary to specify the form of UT such as UT1, which is directly related to the rotation of the Earth as explained in Recommendation ITU-R TF.460.

Universal Time Coordinated (UTC); *temps universel coordonné; tiempo universal coordinado*

See “Coordinated Universal Time”, which is an equivalent expression.
