**A: UNIVERSAL TIME SCALE (UTC)**

**Question: What does UTC stand for and what does it mean?**

**Coordinated Universal Time (UTC)** is the primary time standard or international time scale by which the world regulates clocks and time.

The international time scale used by distributed services throughout the world known as Coordinated Universal Time (UTC) is a stepped atomic time scale, which is defined by the [ITU](http://www.itu.int/) and determined by the International Bureau of Weights and Measures ([BIPM](http://www.bipm.org/)) in cooperation with the International Earth reference and Rotation Service ([IERS](http://www.iers.org/))

**Question: What is the Vocabulary of terms for UTC?**

**Universal time (UT)** is the general designation of time scales based on the rotation of the Earth.

In applications in which an imprecision of a few hundredths of a second cannot be tolerated, it is necessary to specify the form of UT which should be used:

UT0 is the mean solar time of the prime meridian obtained from direct astronomical observation;

UT1 is UT0 corrected for the effects of small movements of the Earth relative to the axis of rotation (polar variation);

UT2 is UT1 corrected for the effects of a small seasonal fluctuation in the rate of rotation of the Earth;

UT1 corresponds directly with the angular position of the Earth around its axis of diurnal rotation.

This Vocabulary is defined in Recommendation [ITU-R TF.460-6](http://www.itu.int/rec/R-REC-TF.460-6-200202-I/en) : Standard-frequency and time-signal emissions.

**International atomic time (TAI)**

The international reference scale of atomic time (TAI), based on the second (SI), as realized on the rotating geoid, is formed by the BIPM on the basis of clock data supplied by cooperating establishments. It is in the form of a continuous scale, e.g. in days, hours, minutes and seconds from the origin 1 January 1958 (adopted by the CGPM 1971).

**Coordinated universal time (UTC)**

UTC is the time-scale maintained by the [BIPM](http://www.bipm.org/), with assistance from the [IERS](http://www.iers.org/), which forms the basis of a coordinated dissemination of standard frequencies and time signals. It corresponds exactly in rate with TAI but differs from it by an integer 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.

**DUT1**

The value of the predicted difference UT1 – UTC, as disseminated with the time signals is denoted DUT1; thus DUT1  UT1 – UTC. 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 [IERS](http://www.iers.org/) in multiples of 0.1 s.

**B: THE LEAP SECOND**

**Why did the RA-12 decide to postpone the decision on the ‘Leap Second’?**

**See ITU** [**Press Release**](http://www.itu.int/net/pressoffice/press_releases/2012/03.aspx) **of 19 January 2012 – ‘ITU Radiocommunication Assembly defers decision to eliminate the leap second’.**

The [ITU Radiocommunication Assembly 2012 (RA-12)](http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=ra-12&lang=en) reached an important decision to defer the development of a continuous time standard in order to address the concerns of countries that use the current system of the leap second in Coordinated Universal Time (UTC).

This decision was reached to ensure that all the technical options have been fully addressed in further studies related to the issue. These studies will involve further discussions within the ITU membership and with other organizations that have an interest in this matter. The results of these studies will be considered at the next Radiocommunication Assembly and World Radiocommunication Conference scheduled for 2015.

Adjustments made in one second steps, known as ‘leap seconds’, have been implemented since 1972 to compensate for variations in the speed of the earth’s rotation within the framework of Coordinated Universal Time (UTC).

UTC is defined by ITU’s Radiocommunication Sector and is maintained by the International Bureau of Weights and Measures (BIPM) in cooperation with the International Earth Rotation and Reference Systems Service (IERS). Measurements from timing centres around the world are used in the determination of UTC, which is adjusted to within 0.9 seconds of Earth rotation time (UT1) by IERS-determined values of the Earth’s rotation.

The suppression of the leap second would make a continuous time scale available for all modern electronic navigation and computerized systems to operate with and eliminate the need for specialized ad hoc time systems. This however may have social and legal consequences when the accumulated difference between UT1 – Earth rotation time – would reach a perceivable level (2 to 3 minutes in 2100 and about 30 minutes in 2700).

ITU Secretary-General Hamadoun Touré considered the decision taken by the Radiocommunication Assembly will ensure that the views of all stakeholders have been adequately taken into consideration.

**What are some of the different points of view of ITU member administrations for and against abolition of the Leap Second?**

Over 500 participants from 102 ITU member countries attended the [ITU Radiocommunication Assembly 2012 (RA-12)](http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=ra-12&lang=en) from 16 to 20 January in Geneva, Switzerland to deliberate on this issue (amongst others).

For more information regarding different points of view for and against abolition of the Leap Second, you may view the following ITU videos:

**The RA-12 Plenary Session discussions: ITU Video -** **RA-12 Plenary 19th January 2012 – ‘The Leap Second’ -** <http://www.youtube.com/watch?v=C-2UqYW9SEs&list=PLE917DC934F8E41DD&index=8>

and,

**ITU INTERVIEWS @ RA-12: The Leap Second" by-** [**Vincent MEENS**](http://www.itu.int/online/compass/cvc.v2.sh?topic=SG7&head_title=List%20of%20Study%20Groups%20Chairmen%20and%20Vice-Chairmen)**, Chairman,** [**ITU-R Study Group 7**](http://www.itu.int/ITU-R/index.asp?category=study-groups&rlink=rsg7&lang=en)**-** <http://www.youtube.com/watch?v=RtxIVoo_5I0&list=PLE917DC934F8E41DD&index=12>

**C: ITU’S ROLE WITH UNIVERSAL TIME SCALE (UTC)**

**Question: Where are the studies on the Leap Second and UTC conducted in ITU?**

The studies are conducted in [ITU-R Study Group 7 (Science services)](http://www.itu.int/ITU-R/index.asp?category=study-groups&rlink=rsg7&lang=en) and its [Working Party 7A](http://www.itu.int/ITU-R/index.asp?category=study-groups&rlink=rwp7a&lang=en) (Time signals and frequency standard emissions). Topics to be studied are provided in [Question (SG07.236/7)](http://www.itu.int/pub/R-QUE-SG07.236) ‘The Future of the UTC Timescale’ and the results of the studies are included in Recommenation [ITU-R TF.460-6](http://www.itu.int/rec/R-REC-TF.460-6-200202-I/en) ‘Standard-frequency and time-signal emissions’. The framework for the consideration requested by the World Radicommunication Conference 2012 is provided in Resolution 653 ‘Future of the Coordinated Universal Time time-scale’.

**Question: What Specifications for UTC are available in ITU-R Recommendations?**

The procedures for maintaining the Coordinated Universal Time (UTC) time scale are described in [Recommendation ITU-R TF.460-6](http://www.itu.int/rec/R-REC-TF.460/en)on **’Standard-frequency and time-signal emissions’.**

Since 2000, an ITU-R Study Group 7 (Science services) Question ([236/7](http://www.itu.int/pub/R-QUE-SG07.236)) on ‘[**The Future of the UTC Timescale’**](http://www.itu.int/pub/R-QUE-SG07.236), was established in ITU Radiocommunication Sector.  With a change to the definition of the UTC timescale there could be a major improvement in synchronization of communications networks, navigation systems and time distribution performance. A proposed revision of Recommendation ITU-R TF.460-6 that proposed changing from UTC to a continuous time scale did not result in consensus among the ITU membership in the last years. Finally, it was decided to send the text for consideration by the [ITU Radiocommunication Assembly 2012 (RA-12](http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=ra-12&lang=en) RA-12 decided to postpone a decision on this proposal and requsted ITU-R to conduct further studies.

**Question: When will a decision on the Leap Second, be taken?**

Over 500 participants from 102 countries attended the [ITU Radiocommunication Assembly (RA-12)](http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=ra-12&lang=en) from 16 to 20 January 2012 in Geneva, Switzerland to deliberate on this issue (amongst others) and decided to conduct further studies related to the development of a continuous time standard in order to address the concerns of countries that use the current system of the leap second in Coordinated Universal Time (UTC). The decision was reached to ensure that all the technical options related to the issue are fully addressed. These studies will involve further discussions within the ITU membership and with other organizations that have an interest in the matter related to the suppression of the leap second and will be referred to the next [ITU Radiocommunication Assembly (RA-15)](http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=ra&lang=en) and [World Radiocommunication Conference (WRC-15)](http://www.itu.int/en/ITU-R/conferences/wrc/2015/Pages/default.aspx) scheduled for 2015.

Further information articles are available online at [ITU News Magazine](https://itunews.itu.int/en/) No. 7, September 2013 **‘The future of time – To abolish or not to abolish the leap second’**.

For further information you may contact:

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