**Status of Coordinated Universal Time (UTC) study in ITU-R**

**4 October 2011**

The International Telecommunications Union (ITU)[[1]](#footnote-1) is the leading United Nations agency for

radiocommunication and telecommunication coordination worldwide. The process of managing overall frequency spectrum utilization is through ITU World Radiocommunication Conferences (WRCs) [[2]](#footnote-2) and Regional Radiocommunication conferences and through the activities of the Radiocommunication Study Groups (ITU-R) and the Radiocommunication Assembies (RAs).
The ITU-R Study Groups (SGs) and their Working Parties (WPs), devoted to specialized technical areas, provide the mechanism for the ITU-R Membership[[3]](#footnote-3) to participate, study and recommend standards and practices to ensure equitable utilization and interference-free operation within the radio spectrum.

**What is Coordinated Universal Time (UTC)**

An important underlying aspect of spectrum utilization is the facilitation of the determination and coordination of the international time scale. The international time scale is

an atomic time scale used by broadcast services throughout the world known as Coordinated

Universal Time (UTC). UTC is defined by the International Telecommunication Union

(ITU-R) [[4]](#footnote-4) and is maintained by the International Bureau of Weights and Measures (BIPM) in

cooperation with the International Earth reference and Rotation Service (IERS). Contributed

measurements from timing centres around the world are used in the determination of UTC,

which is adjusted to within 0.9 s of Earth rotation time (UT1) by IERS-determined values of

the Earth rotation. The adjustments, made in one second steps known as leap seconds, were

implemented in 1972 to permit UT1 to be recovered from broadcast values of UTC for

celestial navigation. Current telecommunication and navigation systems utilize continuous

timing for their data transmissions; consequently, deliberations have been ongoing within the

ITU-R on the issue of modifying the definition of UTC to a continuous time scale.

The leap second issue is being raised within some scientific organizations. The primary issue is to make UTC a continuous time scale rather than the stepped atomic time scale that it is now.  The result of the process would be to stop applying leap seconds at an agreed point and permit the difference with UT1 to increase at a rate of approximately one second per year.  The projection by the BIPM for the (UT1 - UTC) difference to accumulate to one hour is approximately 550 years.  Knowledge of the precise difference between UTC and UT1 would continue to be monitored so that any user desiring UT1 would have the information to correct his readings of UTC to UT1 should he choose to do so.  The benefits of the change would be a continuous time scale available for all the modern electronic navigation and computerized systems to operate with and eliminate the need for specialized ad hoc time systems.

From issues raised within the ITU-R and a letter on behalf of the CCTF from the Director of the BIPM, a new question, [ITU-R 236*/*7](http://www.itu.int/pub/R-QUE-SG07.236) (2000) ‘The Future of the UTC Timescale’, was established by [ITU-R Working Party (WP)7A](http://www.itu.int/ITU-R/index.asp?category=study-groups&rlink=rwp7a&lang=en). The question considers the future definition and use of UTC. With a possible significant change to the definition of the UTC timescale there could be a significant impact on synchronization of communications networks, navigation systems and time distribution performance. Consideration of preliminary draft revised [Recommendation ITU-R TF.460-6](http://www.itu.int/rec/R-REC-TF.460/en) ‘Standard-frequency and time-signal emissions’ during the WP 7A meetings did not result in consensus. This document had been extensively discussed over a number of years, a number of contributions were received and were incorporated into the proposed revision but there were no specific requests for textual revision in the past 4 years. After all debate, Study Group (SG) 7 decided to send the Recommendation to the Radiocommunication Assembly 2012 (RA-12)[[5]](#footnote-5).

RA-12 will consider at its January 2012 meeting in Geneva, revisions to Recommendation ITU-R TF.460-6 ‘Standard-frequency and time-signal emissions’ that has been the subject of special studies and outreach by WP7A since 2000.  The proposed revision eliminates the use of leap seconds in the UTC time scale on approximately January 1, 2018 (five years after the bringing into force of the Final Acts of WRC-12, should WRC-12 elect to incorporate the revised Recommendation into the Radio Regulations (RR)).

In order to support a decision on the future of this Recommendation at the Radiocommunication Assembly 2012 (RA-12), Study Group 7 submitted surveys to Administrations on the use of leap seconds and their proposed elimination. Therefore surveys were posted on the ITU web site, [CACE 516](http://www.itu.int/md/R00-CACE-CIR-0516/en) in 2010 and [CACE 539](http://www.itu.int/md/R00-CACE-CIR-0539/en) in 2011, for Member States to respond. The latest CACE 539 posed the following questions:

* Do you support maintaining the current arrangement of linking UT1 and UTC (to provide an approximate celestial time reference by the use of a stepped atomic time scale)?
* Would you support the revision of Recommendation ITU-R TF.460-6 to provide a continuous time scale?

To date, the BR received replies from 16 different Member States for the latest survey (out of a total of 192 Member States, 55 of which participate in the formation of UTC) - 13 being in favor of the change, 3 being contrary.

For more information, the 2010 edition of the [ITU-R Handbook on ‘Satellite Time and Frequency Transfer and Dissemination’](http://www.itu.int/pub/R-HDB-55) is also available - http://www.itu.int/pub/R-HDB-55.

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1. http://www.itu.int/en/about/Pages/overview.aspx [↑](#footnote-ref-1)
2. http://www.itu.int/ITU-R/go/WRC-12/ [↑](#footnote-ref-2)
3. <http://www.itu.int/members/index.html> [↑](#footnote-ref-3)
4. http://www.itu.int/ITU-R/ [↑](#footnote-ref-4)
5. http://www.itu.int/ITU-R/go/RA-12/ [↑](#footnote-ref-5)