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Working Group 2

PROPOSED MODIFICATIONS TO THE DRAFT CPM REPORT

CHAPTER 2, AGENDA ITEM 1.14

(**WP 7A/WP 6A**, (WP 6B))

*1.14 to consider the feasibility of achieving a continuous reference time-scale, whether by the modification of coordinated universal time (UTC) or some other method, and take appropriate action, in accordance with Resolution **653 (WRC-12)**;*

Resolution **653 (WRC-12):** *Future of the Coordinated Universal Time time-scale.*

2/1.14/1 Executive summary

Resolution **653 (WRC-12)** invites ITU-R to conduct necessary studies on the feasibility of achieving a continuous reference time-scale for dissemination by radiocommunication systems and issues related to possible implementation of a continuous reference time-scale (including technical and operation factors).

Coordinated Universal Time (UTC) is the international standard reference time-scale for all practical timekeeping in the modern world. The UTC time-scale is maintained by the International Bureau of Weights and Measures (BIPM). UTC and its use are defined in Recommendation ITU-R TF.460-6, which is incorporated by reference in the Radio Regulations. According to this Recommendation "The UTC is adjusted by insertion or deletion of seconds (positive or negative leap-seconds) to ensure approximate agreement with UT1"[20]. Adjustment of UTC is made whenever the difference between UTC and UT1 approaches the value of 0.9 second. A positive or negative leap-second should be the last second of a UTC month, but first preference should be given to the end of December and June, and second preference to the end of March and September. As UT1 is based on measurements the adjustments in UTC occur at irregular intervals and require manual intervention in systems using UTC for operation and synchronization.

Various aspects of the current situation and the advantages and disadvantages of introducing a continuous time-scale were analysed in ITU-R studies under WRC-15 agenda item 1.14.

Four methods are proposed to satisfy the agenda item:

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[20] UT1 (Universal Time 1) is a time based on the rotation of the Earth. This is the mean solar time of the prime meridian obtained from direct astronomical observations corrected taking into account the effects of small movements of the Earth relative to the axis of rotation (polar variations).

- Remove the leap second insertion or deletion from the definition of UTC in order to make it become a continuous time-scale and either retain the name UTC or adopt a new name.
- Keep the current definition of UTC, disseminate the UTC time-scale and also disseminate a continuous time-scale on an equal basis.
- Keep the current definition of UTC and enable the recovery of the International Atomic Time (TAI)[21] that is offset from UTC only by an integer number of seconds and can be reconstructed from the current implementation of UTC or use a continuous system time-scale
- No change to the definition of UTC in the Radio Regulations.

2/1.14/2 Background

UTC was originally approved by the International Radio Consultative Committee (CCIR) in Recommendation 374 of 1963 as the basis for the coordinated broadcast of standard frequency and time signals on allocated frequencies. At that time, frequency offsets and time steps in UTC were inserted as needed in broadcast time signals to closely match UTC with the observed rotational speed of the Earth. CCIR approved in 1970 a modified version of Recommendation 374 introducing one-second adjustments in UTC, which provides the basis for its current definition. These adjustments entered into force on 1 January1972. Later CCIR Recommendation 374 was converted into Recommendation ITU-R TF.460. Recommendation ITU-R TF.460-6, which is incorporated by reference in the Radio Regulations, provides the definition of UTC and its use. The UTC time-scale is maintained by the International Bureau of Weights and Measures (BIPM) from data provided by timing laboratories throughout the world that operate atomic clocks and data from the International Earth Rotation and Reference Systems Service (IERS) that determines the rotation angle of the Earth. UTC is based on the second of the International System of Units (SI). UTC is a critical part of the international infrastructure that requires accurate timing information.

A significant amount of telecommunication and information systems rely on UTC for synchronization with the introduction of leap seconds into UTC occurring more than 40 years ago. It should be highlighted that several of these systems are in use for safeguarding and rescue of human life.

In 2000 some administrations expressed concerns about the implementation of the leap second and proposed to carry out studies on the future of the UTC time-scale. The relevant studies were conducted by ITU-R during the 2003-2007 and 2007-2012 study cycles. Proposals were made to revise Recommendation ITU-R TF.460-6 by eliminating the leap second from the definition of UTC in order to achieve a continuous time-scale.

However, as there were conflicting views on the draft revision of Recommendation ITU-R TF.460-6, the draft was sent to the Radiocommunication Assembly 2012 (RA-12) with a description of the difficulties encountered during the studies. As RA-12 considered this draft the conflicting views remained and, a large number of administrations indicated they needed more time and information to form an opinion.

As a result, RA-12 agreed to return this draft to ITU-R for further study of other technical options in addition to those already considered. Moreover, it was noted that these additional studies should take account of broader implications and include consultations with appropriate external organizations. Further, RA-12 decided to raise this matter in its Report to WRC-12, with a view to

[21] Definition of TAI is provided in Recommendation ITU-R TF.460-6.

WRC-12 considering the development of an agenda item on this topic for WRC-15. As a result WRC-15 agenda item 1.14 was adopted and ITU-R is invited to carry out the relevant studies in accordance with Resolution **653 (WRC-12)**.

2/1.14/3 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

Recommendations: ITU-R TF.460-6, ITU-R TF.486-2, ITU-R TF.535-2, ITU-R TF.686-2, ITU-R TF.1876.

The International Telecommunication Union and the International Bureau of Weights and Measures jointly organized a workshop for giving background information on the possible redefinition of the international time-scale Coordinated Universal Time (UTC). This workshop was held in Geneva, Switzerland, 19-20 September 2013.

Information on the Workshop is available at http://www.itu.int/ITU-R/go/itu-bipm-workshop-13.

One of the original purposes of leap seconds was to make UTC an approximation to UT1 for celestial navigation. UTC time signals are disseminated to users by different systems of radiocommunication services. UT1, which is based on the rotation of the Earth, is not uniform due to the slowing down of the Earth rotation and its variable moment of inertia. At the same time UTC is based on TAI, having the (atomic) SI-second as its scale unit whose duration is constant. The original purpose of leap seconds was to make UTC an approximation to UT1 by inserting or deleting a second before the divergence between UT1 and UTC would become larger than 0.9 s. Taking into account that celestial navigation is rarely used today and that the difference between UTC and UT1 is readily available with greater precision than provided by the disseminated UTC values, it was proposed to revise Recommendation ITU-R TF.460-6 and make UTC a continuous time-scale by eliminating insertion or deletion of leap seconds.

Leap seconds, since their introduction, have been inserted into UTC 25 times as of April 2015. During 2003-2012 study cycles ITU-R invited the involved parties (administrations, agencies and institutions) to share their experience related to leap seconds insertion in December 2005 and December 2008.

Three surveys were conducted on this issue: one through the BR Director letter (2005) initiated by a note during relevant ITU-R studies to the involved parties and two by questionnaires submitted to the ITU-R Sector Members were published in Administrative Circulars(CACE/516 in 2010 and CACE/539 in 2011). The latest CACE/539 posed the following questions to the ITU Member States:

- 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?

The ITU-R received replies from 16 different Member States. The reasons generally given in favour of the elimination of the leap seconds were:

- Use of leap seconds is not suitable for new technologies.
- The value of the predicted difference DUT1=UT1-UTC is readily available from multiple sources at higher accuracy than is currently provided in radio broadcasts.
- Documented problems exist with the introduction of leap seconds including ambiguity about the date.

The reasons given for not modifying the current definition of UTC and retaining the concept of the leap seconds were:

- Historical justifications like not breaking the link between civil time derived from UTC and the Earth rotation.
- Not experiencing significant difficulties with the introduction of leap seconds.
- Insufficient evidence of any other technical problems.

As decided by WRC-12, Resolution **653 (WRC-12)** was brought to the attention of IMO, ICAO, CGPM, CCTF, BIPM, IERS, IUGG, URSI, ISO, WMO and IAU and their views and/or positions (if any) were considered by ITU-R and reflected in the relevant parts of this report.

2/1.14/4 Analysis of the results of studies

The main issues studied under WRC-15 agenda item 1.14 and conclusions related to these issues are provided in the following subsections.

2/1.14/4.1 Reported incidents

ITU-R was informed that introduction of leap seconds in December 1998, December 2005 and December 2008 created some difficulties including some irregularities in the dissemination of the leap second. In addition some administrations informed ITU-R about difficulties encountered in 2012 as the inevitable reliance on human factor in the implementation of the leap second in digital systems entails a risk.

Among the events that happened during the introduction of the leap second the following ones were widely publicized:

- multiple network servers failed because of the leap second with economic implications for the companies;
- a major internet service avoided potential disruption caused by the leap second by gradually adding milliseconds to its system clocks over the course of the day rather than adding an entire second at one time;
- the application A-GPS (Assisted Global Positioning System) showed on July 1st an error in position by approximately 500 m roughly corresponding to the distance travelled by the Earth in 1 s. A simple update of the A-GPS software on July 1st solved the problem;
- some GPS receiving equipment reportedly experienced temporary failures.

It was emphasized that impacts of the leap second in regions of the East where it occurs during working hours can be particularly significant if it occurs on days other than 1 January and Sundays.

NASA's Jet Propulsion Laboratory estimated the cost of implementation of the 30 June 2012 leap second event at about four work months.

2/1.14/4.2 Negative impact of suppressing the leap second in UTC on systems

Some systems which have been designed to rely on the current definition of UTC will be adversely affected.

As the difference between UT1and UTC will be higher than the current limit of 0.9 s specified in Recommendation ITU-R TF.460-6 consequences caused by software failures or human factors could be greater.

Backward compatibility will not be ensured in cases where current equipment (for example, some earth stations of non-GSO satellite systems, some observatories and some radio-navigation systems) will not operate without update or replacement. This problem arises because these systems would

no longer be able to use UTC as an approximation of UT1 since they are not designed to use a value of DUT1 larger than 0.9 s. The message structure transmitted by the systems usually has finite register capacity. Since the DUT1 correction value will be continuously increasing, it will not be registered correctly. Therefore it will be necessary to change or update the software and possibly the hardware which will lead to costs.

It may be necessary to modify legal and technical documents on both the international and national levels where they refer to the UTC time-scale as currently defined.

Currently the Russian GLONASS radionavigation-satellite system implements leap seconds in its system time. This is done simultaneously with the UTC time-scale which is currently defined in Recommendation ITU-R TF.460-6. During 30 years of operation a large number of equipment has been designed for insertion of leap seconds. In addition some equipment such as the spaceborne receivers cannot be updated during its operational life. The design lifetime of these spacecraft is more than 10 years and the GLONASS system will need to keep the existing system time with leap second to ensure operation of the existing equipment.

For the purpose of celestial navigation ephemeris tables will need to take into account the fact that UTC will not be an adequate approximation of UT1 anymore.

2/1.14/4.3 Positive impact of suppressing the leap second in UTC on systems

Some systems requiring highly precise time and frequency applications and synchronization such as space geodesy, satellite launching, GNSSs, telecommunications and electric power distribution networks have requested continuous time-scales. The adoption of a continuous reference time-scale will discourage the use of different system times as a reference time.

Some GNSSs do not apply leap seconds to their individual system times in order to avoid potential disruption.

Discontinuing the insertion of leap seconds avoids a costly human intervention in preparing and testing of equipment involved, reduces the risk of operator error and increases the reliability of systems that depend upon time. For example, some systems such as time stamping will not need to be taken out of service several hours before and after the event to prevent operational mishaps.

2/1.14/4.4 Requirements for access to UT1

In the event of transition to a continuous time-scale access to UT1 or to an approximation would need to be continued. The growing offset between UT1 and UTC should be distributed and a process for correction implemented in systems that require it.

The predicted values of UT1-UTC that give continued access to time based on the Earth’s rotation angle, UT1, are provided by the IERS through its Bulletin services. These services will continue to provide this information even in event of stopping the insertion of the leap second in UTC. Some communities such as astronomers, geodesists or navigators will have continued access to UT1.

2/1.14/4.5 Impact on civil time

Discontinuing the insertion of leap second will mean that civil time-scales derived from UTC would deviate from UT1. However due to the elliptical orbit of the Earth around the Sun and the angle between the Earth’s equator and the ecliptic plane, the (apparent) solar time differs already today by some ±16 minutes from the mean solar time. Furthermore in most countries clock time may differ from mean solar time by up to one hour because of time zones and the introduction of Daylight Saving Time. In some cases an entire country uses a single time zone although its territory covers many, so the difference between solar and civil time can be even greater. These conventions are

considered acceptable and should remain so as it is expected that UT1 - UTC should be on the order of 1 min in the first hundred years. One study predicts a deviation of about 25 minutes in 500 years.

Views of administrations differ as to whether this will have any noticeable effect in the context of civil time-keeping in the next centuries.

2/1.14/4.6 Considerations on retaining the name of UTC if a modified definition is adopted

The term “Coordinated” in the name “Coordinated Universal Time (UTC)” refers to the fact that this time-scale is “coordinated” among national timing agencies.

Some administrations consider that the term “Universal” in the name refers to the fact that the UTC time-scale is the same everywhere on Earth and that in this context use of the term “Universal” does not imply “solar” time. Other administrations consider that the term Universal Time in the name UTC does imply solar time and that the name should be changed if the insertion of leap seconds in UTC is ended.

UTC has been in existence since 1961 with corrections in the form of rate offsets and time steps. In 1972, when the current definition of UTC was adopted in favour of one-second steps, the name of the time-scale was not changed.

Some administrations indicate that a new name should be adopted in order to avoid confusion. They also note that ISO TC 37 has stated that retaining the name UTC with a new definition would result in polysemy, i.e. having multiple meanings and therefore being ambiguous. They consider that contravenes the principles of standards making.

Other administrations indicate that if leap seconds are eliminated from UTC, the name UTC should be retained to avoid confusion in particular since the term UTC has legal implications in many countries. They consider retaining the name as consistent with metrological standards and accepted practice.

2/1.14/4.7 Considerations for achieving a continuous reference time-scale

One possible approach would be to broadcast a continuous atomic time-scale as a reference along with the current UTC. This could be a solution for systems requiring a continuous time-scale and for systems requiring UTC as it is currently defined.

It should be noted however that the feasibility of disseminating two reference time-scales in parallel still needs to be assessed. It would be critical to distinguish between the two reference time-scales in a truly fail-safe manner in order to avoid confusion. This will require the modification of application software and hardware in order to differentiate between the two time-scales and may be cumbersome.

It should be noted that a continuous reference time-scale can be computed currently by making use of the published difference between TAI and UTC.

2/1.14/5 Methods to satisfy the agenda item

2/1.14/5.1 Method A

2/1.14/5.1.1 Method A1

A continuous reference time-scale is feasible and it can be achieved by stopping the insertion of leap seconds in UTC. To allow for an adequate period of time for those legacy systems reliant on the use of leap seconds to adapt to the change in UTC, the application of the suppression of leap second adjustments to UTC will be effective not earlier than five years after the date of entry into force of the Final Acts of the WRC-15.

For applications requiring knowledge of UT1 the difference between UT1 and UTC will continue to be provided by IERS with a much higher precision than that available from present broadcast UTC.

The name of UTC will be retained.

Advantages

UTC without leap seconds will represent a continuous reference time-scale and will encourage the use of only one continuous reference time-scale making it truly universal. This will avoid the proliferation of other time-scales that may cause serious confusion, and contribute to the interoperability between systems.

Suppression of the use of leap seconds in UTC eliminates software, protocols, and coordination necessary to accommodate leap seconds in systems.

As the definition of UTC was changed in the past and the name UTC was kept unchanged, some administrations consider that the continued use of the name "Coordinated Universal Time" will avoid confusion and maintain consistency, as UTC will continue to be "universally" used and "coordinated" worldwide.

Disadvantages

The time difference between UTC without further insertion or deletion of leap seconds and UT1 will increase beyond the current limit of 0.9 s.

Some legacy systems currently relying on the use of leap seconds in UTC will not be able to adapt to the new definition of UTC without manual intervention to insert corrections regularly. For example data formats that assume that UT1-UTC will never be greater than one second will need to be changed to comply with the increasing difference between UT1 and UTC.

For legacy systems relying on the use of leap seconds in UTC it will be necessary to change or update the software and in some cases also the hardware operating these systems (backward compatibility is not ensured) which will lead to costs. Failure of these systems and some new systems relying on UT1 caused by inadequate software or human factors could increase.

Keeping the name UTC for the revised time-scale would result in apparent polysemy (ambiguity). It could become unclear whether the term UTC refers to the old definition with leap seconds or the new definition without further insertion of leap seconds.

Some administrations consider that the name Coordinated Universal Time should not be retained for a time-scale without leap seconds that would no longer be aligned closely with Universal Time.

Some technical documents will need to be amended to reflect the change in the definition of UTC.

A view was expressed that deletion of reference in RR No**. 1.14** to Recommendation ITU-R TF.460-6 as presented in section 6.1.1 on regulatory and procedural considerations for Method A1 will create confusion in the definition of UTC.

2/1.14/5.1.2 Method A2

This method is similar to Method A1 but it is proposed to change the name of UTC.

Advantages

The same as for Method A1. In addition changing the name of the revised time-scale avoids the apparent polysemy, which would result from Method A1. Changing the name of the revised time-scale ensures that it is always clear which time-scale is being referred to.

As UTC would no longer be aligned closely with UT1, some administrations consider that changing the name of the revised time-scale avoids a nomenclature/consistency problem.

Disadvantages

Similar to those described in Method A1 except polysemy. It will also be necessary to modify official documents when they refer to the UTC time-scale as defined today.

2/1.14/5.2 Method B

Retain UTC as currently defined and introduce a continuous reference atomic time-scale based on TAI with an offset with respect to UTC to be broadcasted on an equal basis.

Advantages

Provided the broadcasting of UTC is unchanged, the backward compatibility principle is ensured for existing equipment without updates and replacements including non-radio equipment such as celestial navigation. Furthermore no change is required in technical documents for equipment in using UTC.

Users may choose between UTC time-scale and the continuous reference time-scale appropriate for their applications subject to regulatory considerations.

This method will discourage the use of continuous system times (such as some GNSS times) as a reference time-scale for systems requiring a continuous time-scale.

Disadvantages

The need for adjustment of UTC by the insertion or deletion of leap seconds is continued with all the associated risks and consequences.

In order to disseminate and receive the two reference time-scales on an equal basis, the system of standard frequency and time signal emissions must be modified. Systems will need to find a viable means to interface with other systems that select the opposite time-scale. This will lead to cost. The dissemination of two “standard” time-scales would bring a risk of confusion, and it would be critical for the two scales to be differentiated in a truly fail-safe manner.

If civil time were defined on the basis of a different one of the two disseminated reference time-scales in different countries there would be consequences in particular for activities requiring international time coordination.

2/1.14/5.3 Method C

2/1.14/5.3.1 Method C1

No change in definition of UTC as specified in Recommendation ITU-R TF.460-6, which will remain the only time-scale which is broadcast in order to avoid any confusion.

Under this method Recommendation ITU-R TF.460-6 would be amended to make clear that use of TAI is an acceptable alternative for those requiring a continuous time-scale and that it can be derived from UTC using a difference figure, which is also being broadcasted.

Advantages

The proposed method does not affect radiocommunication systems and documentation that are using the existing definition of UTC specified in Recommendation ITU-R TF.460-6.

The backward compatibility principle is ensured for existing equipment without update and replacement including non-radio equipment such as celestial navigation.

Systems that require a continuous time-scale can obtain their time from broadcasted UTC by making use of the disseminated difference between TAI and UTC.

Disadvantages

The need for adjustment of UTC by the non-periodical insertion or deletion of leap seconds is continued with all the associated risks and consequences.

2/1.14/5.3.2 Method C2

This method is similar to Method C1 except that Recommendation ITU-R TF.460-6 would be amended to include additional definitions, corrections and/or materials with respect to the feasibility of using continuous system time-scales for radiocommunication systems.

Advantages

The same as for Method C1.

Disadvantages

Similar to those described in Method C1. In addition the use of multiple system time-scales would create confusion.

2/1.14/5.4 Method D

No change to the Radio Regulations as the results of the studies are inconclusive.

Advantages

The operation of existing equipment is ensured without updates and replacements including non-radio equipment such as celestial navigation. Furthermore no change is required in technical documents for equipment in using UTC.

Disadvantages

The adjustment of UTC by the non-periodical insertion or deletion of leap seconds is continued with all the associated risks and consequences.

2/1.14/6 Regulatory and procedural considerations

2/1.14/6.1 Method A

2/1.14/6.1.1 Method A1

ARTICLE 1

Terms and definitions

Section I – General terms

MOD

1.14 *Coordinated Universal Time (UTC):* Time scale, based on the second (SI) and maintained by the Bureau International des Poids et Mesures (BIPM), that forms the basis for the coordinated dissemination of standard frequencies and time signals. (15)**Reasons**: To remove the incorporation by reference of Recommendation ITU-R TF.460-6, which defines the use of leap seconds in UTC, add a reference to the international organization responsible for the maintenance of the UTC time-scale, and remove the equivalence between UTC and the mean solar time at the prime meridian.

ARTICLE 2

Nomenclature

Section II – Dates and times

MOD

2.5 Whenever a date is used in connection with Coordinated Universal Time (UTC), this date is that at the prime meridian, the prime meridian corresponding to zero degrees geographical longitude.

MOD

2.6 Whenever a specified time is used in international radiocommunication activities, UTC shall be applied, and it shall be presented as a four-digit group (0000-2359). The abbreviation UTC shall be used in all languages.

Reasons: Consequential changes resulting from the MOD to RR No. **1.14**.

ARTICLE 59

Entry into force and provisional application of the Radio Regulations (WRC-12)

MOD

59.1 **These Regulations, which complement the provisions of the Constitution and Convention of the International Telecommunication Union, and as revised and contained in the Final Acts of WRC-95, WRC-97, WRC-2000, WRC-03, WRC-07, WRC-12 and WRC-15, shall be applied, pursuant to Article 54 of the Constitution, on the following basis. (WRC-15)ADD**

59.A114 The other provisions of these Regulations, as revised by WRC-15, shall enter into force on 1 January 2017, with the following exceptions: (WRC-15)

ADD

59.B114 – the revised provisions for which other effective dates of application are stipulated in Resolution:

[A114-UTC] (WRC-15) (WRC-15)

ADD

RESOLUTION [A114-UTC] (WRC-15)

Provisional application of certain provisions of the Radio Regulations as revised by WRC-15 and abrogation of certain Resolutions and Recommendations

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that this Conference has, in accordance with its terms of reference adopted a partial revision to the Radio Regulations, which will enter into force on 1 January 2017;

b) that some of the provisions, as amended by this Conference, need to apply provisionally before that date;

c) that some of the provisions, as amended by this Conference, need to apply after that date;

d) that, as a general rule, new and revised Resolutions and Recommendations enter into force at the time of the signing of the Final Acts of a Conference;

e) that, as a general rule, Resolutions and Recommendations which a WRC has decided to suppress are abrogated at the time of the signing of the Final Acts of a Conference,

resolves

1 that, as of 1 January [TBD by WRC-15], Nos. **1.14**, **2.5** and **2.6**, as revised or established by WRC-15, shall apply.

Reasons: To ensure sufficient time for legacy systems to update hardware and/or software to accommodate the elimination of leap seconds from UTC.

SUP

RESOLUTION 653 (WRC-12)

Future of the Coordinated Universal Time time-scale

Reasons: No need for Resolution **653 (WRC-12)**.

2/1.14/6.1.2 Method A2

The same modifications as for Method A1 to be used except that “UTC” should be replaced by a different reference time-scale name/abbreviation.

2/1.14/6.2 Method B

SUP

RESOLUTION 653 (WRC-12)

Future of the Coordinated Universal Time time-scale

Reasons: Under implementation of this method it is proposed to supress Resolution **653 (WRC-12)** as it is not needed any more. No changes to the Radio Regulations and the current definition of UTC is retained. Recommendation ITU-R TF.460-6 would be amended to make clear that a continuous time-scale would be disseminated on an equal basis. The need to make changes to Recommendation ITU-R TF.460-6 can be reflected in a new or existing Resolution.

2/1.14/6.3 Method C

2/1.14/6.3.1 Methods C1 and C2

ARTICLE 1

Terms and definitions

Section I – General terms

NOC

1.14 *Coordinated Universal Time (UTC):* Time-scale, based on the second (SI), as defined in Recommendation ITU-R TF.460-6. (WRC-03)

For most practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT.

Reasons: Under implementation of Methods of C group it is possible to make modifications to Recommendation ITU-R TF.460-6 and to this effect:

– under Method C1 Recommendation ITU-R TF.460-6 would be amended to make clear that use of TAI is an acceptable alternative for those requiring a continuous time-scale and that it can be derived from UTC using a difference figure, which is also being broadcasted;

– under Method C2 Recommendation ITU-R TF.460-6 would be amended to include additional definitions, corrections and/or materials with respect to the feasibility of using continuous system time-scales for radiocommunication systems.

The need to make changes to Recommendation ITU-R TF.460-6 can be reflected in a new or existing Resolution.

SUP

RESOLUTION 653 (WRC-12)

Future of the Coordinated Universal Time time-scale

Reasons: No need for Resolution **653 (WRC-12)**.

2/1.14/6.4 Method D

NOC