Impact of leap second insertion in UTC on Astronomy and the discussion in the IAU working group on the redefinition of UTC

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Abstract

The International Astronomical Union (IAU) is the international organization of researchers in the field of astronomy; this community has deep and strong relations with the international timescale. Extensive studies and discussions on a possible redefinition of the UTC were carried on in the IAU working group on the redefinition of UTC. We will show the recent discussion on the impact of leap second in UTC on astronomy and the activities of the IAU working group.

1. Introduction

The discussion on the future of Coordinated Universal Time (UTC) and the leap second started at the Radiocommunication Sector of the International Telecommunication Union (ITU-R) in 2000. Various actions were conducted since then, and in particular the establishment of the Special Rapporteur Group (SRG) of the ITU-R. In response to the request from the SRG in 2000, extensive studies and discussions on a possible redefinition of the UTC were carried on in the community represented by the International Astronomical Union (IAU).

The IAU is the international organization of researchers in the field of astronomy; this community has deep and strong relations with the international timescale [1]. To give input to the ITU-R the IAU established a first working group (WG) on the future UTC which conducted a survey among astronomers whose activities relate to time references, and produced a final report in 2006. The report explains that no consensus was reached at the WG on supporting or rejecting a change in the definition of UTC due to the many pros and cons arising from the different points of view. However there was agreement on one practical request; that is to allow sufficient time for adapting software and procedures before implementing any changes to the definition. The work at the ITU continued, and the future of UTC was discussed at the Radiocommunication Assembly of the ITU-R in 2012 (RA 2012). Administration delegates at RA 2012 concluded that more information was necessary for coming to a conclusion, and that additional studies were required. RA 2012 decided that the issue should be discussed at the World Radiocommunication Conference in 2015 (WRC 2015), where a decision is to be taken.

As part of the actions for providing ITU member administrations with documents supporting the proposal of modification of UTC, relevant organizations were requested to provide opinions on the feasibility of a continuous reference time scale and methods for achieving it. Considering this request, the IAU established another working group on the redefinition of UTC in 2012.

2. Discussion in the new WG

In the working group, much discussion has been made for nearly two years. There various opinions and facts were expressed [2]. Though many pros and cons have been expressed, gathering all the opinions, the final report of this working group is in preparation as of early 2014. There are agreements on the facts that the measure of the Earth-rotation angle UT1 is necessary for observational astronomy, and that UTC has been the way of accessing this parameter until now. It was also expressed that any change in the definition of UTC that could relax the constraint on the value of UT1-UTC would require the amendment of the observation system procedures, especially the control software. On the other hand, it has been accepted that leap second insertion sometimes cause troubles in precise measurement or digitally controlled systems. An example of the latter is that pulsar timing observation experienced some troubles in the leap second insertion.

Consensus on a proposal to the ITU has not yet been reached, and there is still in the working group matter for discussion. In its present status, it is highly probable that the report of the working group to the IAU will present the

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variety of opinions of its members, and will request the ITU to keep the IAU aware of the progress in the decision process.

The presentation will show the evolution of the discussions on the future UTC at the IAU WG, in the frame of a contribution to a wider discussion in national and international contexts.

3. References

1. D. McCarthy, "Evolution of timescales from astronomy to physical metrology," *Metrologia* ***48,*** 2011, pp. S132-S144
2. M. Hosokawa, "The International Astronomical Union and Coordinated Universal Time – Blue sky thinking," *ITU NEWS,* **No. 7**, September 2013, pp. 22-24.