CGPM

Introduction to Draft Resolution C:

On the technical actions needed to ensure the continuity of UTC

October 15, 2026

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CIPM Member, CCTF President

CGPM

Contents

- Major milestones towards a continuous UTC
- Objectives of Draft Resolution C
- Proposed implementation date
- Draft Resolution C



Continuity of UTC (over long durations) required by critical systems

→ The digital networks cannot cope with unpredictable leap seconds

WIRED

The Inside Story of the Extra Second That Crashed the W

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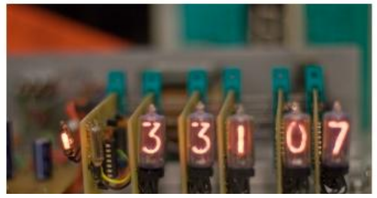
The Inside Story of the Extra Second That Crashed the Web



自由時報 Liberty Times Net

https://3c.ltn.com.tw/news/18985/2

61 seconds in a minute? Understand the computer and the stock market enemy "leap second"

2015/07/01 06:27

Text/Reporter Liu Jiqing

The impact of leap seconds-computer systems, financial market preparations

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NETWORKWORLD FROM IDG

'Leap second' snafu affects Oracle clusterware

By Chris Kanaracus

U.S. Correspondent, IDG News Service | JANUARY 06, 2009 12:00 AM PT

Leap second hits Qantas air bookings, while Reddit and Mozilla stutter

The addition of an extra second between Saturday and Sunday to account for the slowing rotation of the Earth affected flight check-ins in Australia, and hit popular websites including Yelp and Foursquare



More than 400 Qantas flights were delayed when the 'leap second' confused web servers on Sunday. Photograph: Mark Baker/AP

The Telegraph

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Leap Second confuses Twitter and Android

Users reported problems with Android and Twitter as the leap second was added to atomic time

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Reddit, LinkedIn and other sites were knocked offline by an extra second added to the official time



By Joab Jackson

U.S. Correspondent, IDG News Service | JULY 02, 2012 08:00 AM PT

→ An even more pressing requirement at present with the growing influence of IoT technologies, dispersed multi-sensor systems, smart grids, and virtual services.

→ Solution: allow |UT1-UTC| value beyond 1 second

Towards a continuous UTC: major milestones

- **CGPM 2022 (Resolution 4 - On the use and future development of UTC)**



Decided that **the maximum value for the difference (UT1-UTC) will be increased in, or before, 2035.**

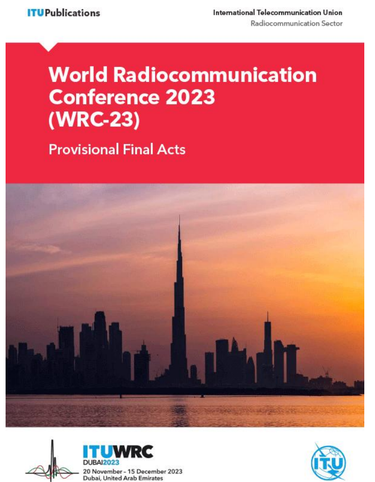
Requested that the CIPM:

- draft a resolution for agreement at the 28th meeting of the CGPM (2026),
- propose a new maximum value for the difference (UT1-UTC) that will ensure the continuity of UTC for at least a century,
- prepare a plan to implement by, or before, 2035 the proposed new maximum value for the difference (UT1-UTC).

CGPM 2026 Draft Resolution C

- **ITU World Radiocommunication Conference (WRC-2023)**

Endorsement by the ITU, with a new max value > 100 s and an implementation possibly in 2035; radio stations have time till 2040 to update their code if needed.



Activities to prepare the draft Resolution C for the 28th CGPM (2026)

- **CCTF Task Group created in 2023, with membership to ensure an international/all RMOs point of view**
- **Fruitful contacts / interactions** with:
  - CCTF Liaisons: ITU (ITU-R,ITU-T), IAU, URSI, IGS, IERS
  - RMO TCTF Chairs
  - GNSS providers and receiver manufacturers
  - Stakeholders, users, industry, IEEE 1588, other IOs

Statements: A solution ensuring the continuity of UTC over a very long duration is required as soon a possible to avoid any (negative) leap second

- **Evaluation of the availability of the information on UT1-UTC** (GNSS, radio stations, internet services, industrial products) + **contact of radio stations** to get information on the future of the possible dissemination of UT1-UTC
- **Participation to user forums and international meetings** to disseminate the information
- **SWOT analysis on the different options for the new maximum value**
- **Calculation of probability of +/-/no leap second in the next decade**

Objectives of the draft Resolution C

1) Fix the new maximum value for |UT1-UTC|:

3600 s (1 hour)

→ Equivalent to daylight saving time/ time zone

→ UTC continuous over several millennia

2) Fix the date of implementation of the new limit (in or before 2035):

20 May 2027

Application date: expecting +/- leap seconds in the next years?

Methodology adopted by the TG:

- In collaboration with IERS, construction of a **global modelling** together with experts of Earth's rotation, considering all effects affecting the Earth's rotation, and combining deterministic and stochastic components → **Prediction of UT1-UTC and evaluation of the associated uncertainty**
- **Validation of the model** retrospectively by "time reversal"

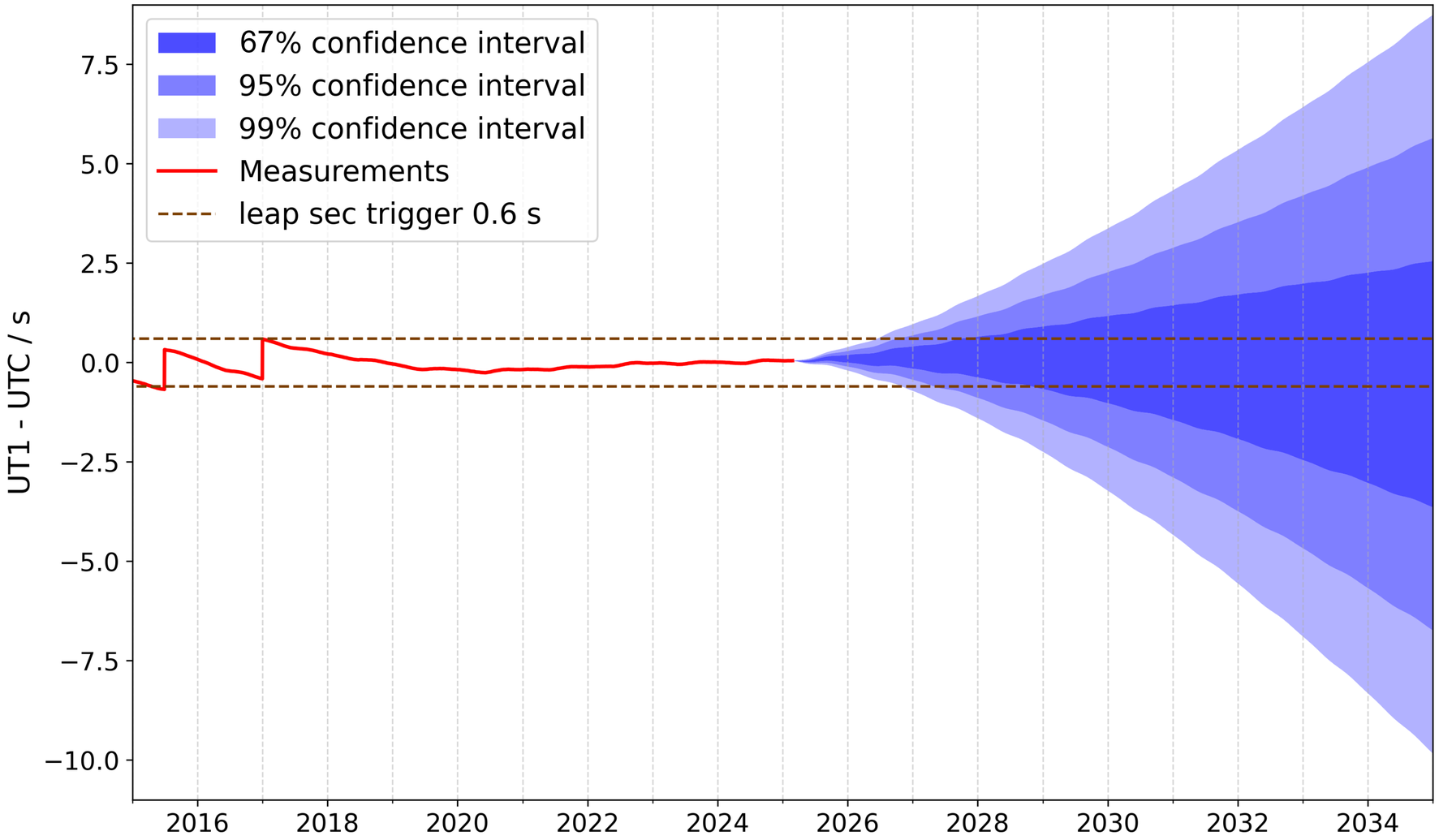
Main conclusions:

- **Earth rotation is very difficult to predict**, even on short term (< 10 years)
- The predicted behavior may **change significantly between two annual updates**
- The **prediction uncertainty increases very rapidly with time**
- It is not relevant to:
  - copy recent behavior to predict the future behavior because the result may be completely different depending on the considered past period
  - make a prediction of the Earth's orientation without any associated uncertainty

Predicted UT1-UTC value (sept. 2025)

IERS threshold to announce a leap second (6 months notice): |UT1-UTC| = 0.6 s

Start of prediction 01/09/2025 → End of prediction 01/01/2035



At least one <u>negative</u> leap second

No leap second

At least one <u>positive</u> leap second

Predicted UT1-UTC value (sept. 2026)

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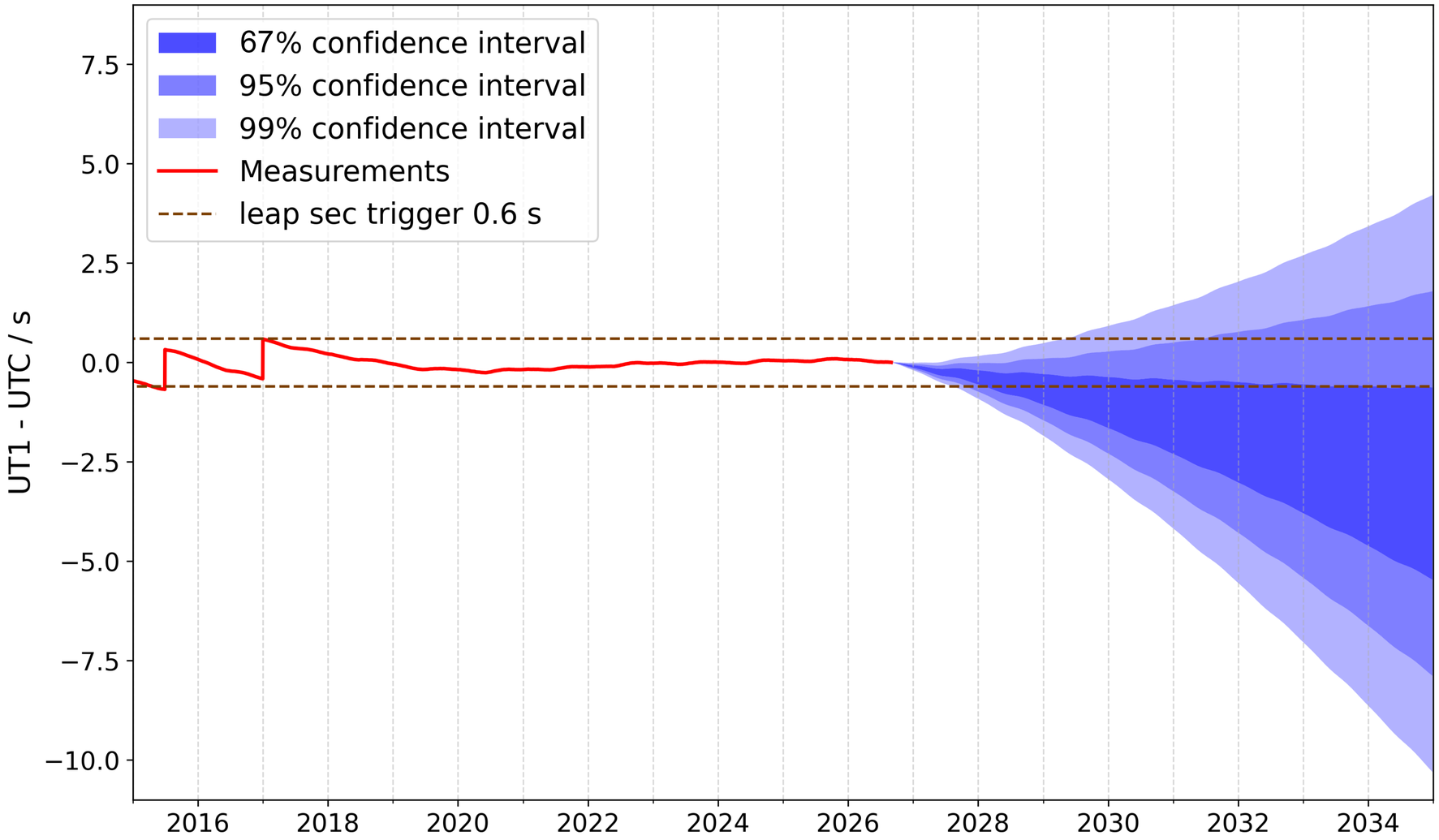
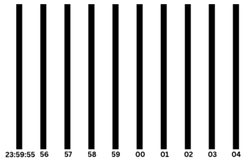
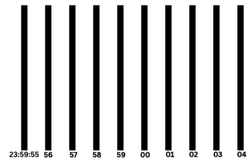


At least one negative leap second



No leap second

At least one positive leap second



Proposed application date (20 May 2027) to mitigate the risks linked to:

1) The first negative leap second

→ Situation that has never been experimented

→ Major impact on critical infrastructures (Telecom, Energy distribution, Transport, Finance, Space activities)

2) Positive leap seconds

→ Problems encountered in the past every time a leap second was inserted

→ Last leap second in 2016 => Loss of know-how and experience in many institutes and users to manage such an event, compounded by a consequent growing of digital network complexity and number of synchronized objects

3) The use of inconsistent mitigation methods to avoid time steps or the use of continuous time scales provided by specific systems instead of UTC

→ Inconsistencies between different system timings leading to malfunction / critical errors

→ UTC abandoned as the unique international reference time scale

What will happen concretely on 20 May 2027?

For the NMIs realizing UTC and users applying UTC:

→ **Nothing -** Just less problems due to leap seconds

For the knowledge of UT1-UTC:

→ **Nothing - The IERS will continue to provide UT1-UTC to users, just adapting its procedure** accordingly to the CGPM resolution to provide values of UT1-UTC possibly larger than 1 s

For the dissemination of UT1-UTC:

- **As long as UT1-UTC < 1 s → Nothing**
- **When UT1-UTC > 1 s**
  - → **Nothing for GNSS** (already capable to correctly deal with this evolution for many decades before any update) and for **internet services** (already exist: IERS, NASA, VNIIFTRI, NTSC)
  - → **Need of code update for some radio stations:** the ITU-R WP7A is progressing well and ITU WRC 2023 gave time till 2040 for this update

Draft resolution C

The CGPM 2026, at its 28th meeting,

decides that

- continuous UTC will become effective on **20 May 2027**
- the maximum value for the difference |UT1-UTC| will be **3600 seconds** (1 hour), ensuring the long-term continuity for UTC for several centuries

Risk mitigation

UTC continuous over several millennia

requests the BIPM

Information for users
Monitoring and CIPM information

- **to continue to work together with the ITU, International Astronomical Union, International Union of Geodesy and Geophysics, IERS, and other organizations** that may be impacted by this decision in order to
  - inform users and support the application of this decision
  - continue to monitor the value of UT1-UTC, its estimated evolution and modelling as determined by IERS
  - inform the CIPM regularly on the evolution of the value of UT1-UTC.

- and to **continue to work with the RMOs, the NMIs, and the users** to promote the understanding of the importance of a continuous UTC and its prompt and efficient provision to the user need

Draft resolution C

Thanks to MS for the numerous received statement letters (>30)



After 30 years of debates, we are ready
for an important decision to ensure that

(continuous) UTC remains the unique international reference time scale
"for all times, for all people - à tous les temps, à tous les peuples"

CGPM

Thank you
for your attention