

CCTF President's Report

28th CGPM (2026)



Working together to
promote and advance
the global comparability
of measurement

Report by the President of the CCTF

Dr Noël Dimarcq, President of the Consultative Committee for Time and Frequency (*Comité consultatif du temps et des fréquences*, CCTF) presented the activities of the CCTF since the 27th meeting of the CGPM (2022).

CCTF Executive summary

In addition to its core activities dedicated to atomic frequency standards, time and frequency transfer techniques, atomic time scales, CIPM MRA and metrological traceability, the Consultative Committee for Time and Frequency (CCTF) has focused its recent activities on important cross-cutting topics, among which three are addressed by the Draft Resolutions B, C and D presented to the 27th CGPM (2026). These topics are the following:

- Roadmap towards the redefinition of the SI second targeted in 2030 (Draft Resolution B);
- Continuous UTC (Draft Resolution C);
- Lunar reference time (Draft Resolution D);
- Traceability to UTC through GNSS measures;
- Capacity building and resources-sharing to improve international timekeeping;
- Mutual benefits between Time-Frequency Metrology and Quantum Technologies;
- Digitalization.

Scope of the CCTF

CCTF activities concern matters in Time and Frequency (TF) metrology, namely the definition and *mise en pratique* of the SI second, TF transfer techniques, establishment and diffusion of International Atomic Time (TAI) and Coordinated Universal Time (UTC), metrological traceability and advice to the CIPM on matters related to time and time scales.

The CCTF vision is to be the recognized international focus for TF metrology, meeting the needs of the global community and society by providing a reliable measurement foundation for science, innovation in industry and emerging technologies, in a digital world in which time and synchronization challenges are underlying the operation of all critical systems.

Strategy

In order to meet the current and future needs in TF metrology, the CCTF updated its strategy in 2025 to address important cross-cutting themes (see the list above) that correspond to major challenges in TF Metrology, and that are addressed in dedicated CCTF task groups gathering more than 80 people working together with periodic meetings, dedicated workshops, presentations in fora, congresses, and online forum discussions.

Further details can be found in the updated document “*CCTF – Strategy 2025-2035*”¹ and in the introductory paper to the *Metrologia* special Focus issue on Challenges in Time and Frequency Metrology².

The overall coherence of the CCTF strategy, in synergy with the Work Programme of the BIPM Time Department, is ensured by the CCTF Working Group on Strategic Planning, composed of the chairs of all CCTF Working Groups extended to the co-chairs of the task groups on cross-cutting topics. This organization has proved its efficiency and agility to address and move forward on the horizontal core topics and the vertical cross-cutting themes. It will be pursued in the coming years.

¹ <https://www.bipm.org/documents/20126/35554894/CCTF+Strategy/7cf0f648-2afe-d15c-0909-1f03406bbb8f>

² <https://iopscience.iop.org/article/10.1088/1681-7575/ae78e0>

Activities and achievements

Since the last meeting of the CGPM in 2022, the momentum has been maintained on all the topics thanks to numerous meetings of all the Working Groups and transverse Task Groups, and the following annual meetings of the CCTF:

- Online Information Meeting in November 2023;
- 24th CCTF meeting (Session 1 online in November 2024 / Session 2 at the BIPM headquarters in September 2025).

Main activities and achievements

At its 24th meeting, the CCTF has approved:

- the updated CCTF Strategy for the period 2025-2035;
- the updated Roadmap towards the redefinition of the second;
- draft resolutions to be proposed at the 28th CGPM (2026):
 - o Draft Resolution B “On the future definition of the second”,
 - o Draft Resolution C “On the technical actions needed to ensure the continuity of UTC”,
 - o Draft Resolution D “On the definition of an international lunar reference time scale and its traceability to UTC”;
- several recommendations on the following topics, some of which include recommendations to other organizations to which the CCTF activities and recommendations were presented:
 - o Actions to progress the roadmap for the redefinition of the second,
 - o Development of a common Lunar reference time scale and its traceability to UTC,
 - o Updates to the CIPM list of recommended values of standard frequencies for the secondary representation of the SI second,
 - o Preparation for the possible discontinuation of GPS signals semi-codeless tracking,
 - o Monitoring of GNSS hardware delay variations.

The *Metrologia* special Focus issue on Challenges in Time and Frequency Metrology³ has been finalized, which includes five papers:

- Challenges in time and frequency metrology: accomplishments and overview of ongoing work;
- Roadmap towards the redefinition of the second;
- Achieving traceability to UTC through GNSS measurements;
- Towards a consensus on a continuous UTC;
- Lunar reference timescale.

Specific webpages on hot topics related to the Draft Resolutions of the 28th meeting of the CGPM have been realized: redefinition of the second⁴, continuous UTC⁵, Lunar reference time⁶. They include useful information and FAQs.

³ https://iopscience.iop.org/collections/0026-1394_challenges-in-time-and-frequency-metrology

⁴ <https://www.bipm.org/redefinition-second>

⁵ <https://www.bipm.org/continuous-utc>

⁶ <https://www.bipm.org/moon-timing>

Challenges and difficulties

The CCTF has worked in close cooperation with the liaison organizations and with all the CCTF members to build a consensus on the CGPM draft resolutions. This required numerous meetings, online discussions, participation to international fora, and congresses.

Outlook in the short and long term

The CCTF strategy will continue to follow its core activities, to trigger and foster reflection, studies and collaborations on:

- Primary and secondary standards, with a connection to the CCL;
- TF transfer techniques (GNSS, TWSTFT, advanced techniques such as optical fibres, ACES MWL, optical links in space);
- Time scales (TAI, UTC, UTCr, UTC(k)) and the associated algorithms;
- CIPM MRA and metrological traceability.

The CCTF will maintain the momentum created by its working groups and task groups, with the objective to tackle the main issues and to progress the final stages of the most important cross-cutting topics:

- Redefinition of the second – The CCTF will follow the updated roadmap underlying the 28th CGPM Draft Resolution B, with a redefinition targeted in 2030. It will pursue its intense activities to be ready to present the preferred option for the new definition of the second and a proposal for the date of its implementation to the 29th meeting of the CGPM in 2030. It will monitor annually the fulfilment of all mandatory criteria and valorize the progress and achievements from NMIs to push the limits of Optical Frequency Standards and TF transfer techniques.
- Continuous UTC – The CCTF will continue to:
 - o Work with the Regional Metrology Organizations, the NMIs and users to provide information about the CGPM decision on Draft Resolution C and to promote understanding of the importance of a continuous UTC and its prompt and efficient provision to users,
 - o Work with relevant International Organizations that may be impacted by the implementation of CGPM Draft Resolution C, and especially with:
 - The International Telecommunication Union (ITU) to prepare for the World Radio Conference in 2027,
 - The International Earth Rotation and Reference Systems Service (IERS) to monitor the value of UT1-UTC, its estimated evolution and its modelling.
- Lunar Reference Time – The CCTF will continue to work with relevant International Organizations and NMIs, in collaboration with concerned space agencies, to consider the results of pioneering Lunar projects and to support realizations of the lunar reference time scale, with the aim to converge towards a unique Lunar reference time scale traceable to UTC, ensuring interoperability and comparability of measurements on the Moon.
- Traceability to UTC from GNSS measurements – The CCTF will reinforce the collaboration with its stakeholders and regional and national accreditation bodies, to enhance the awareness so that correct information can be provided to users about traceability when using GNSS signals.
- Resource sharing for capacity building – The CCTF will continue to organize regular technical exchanges and training materials on topics related to laboratories' performance improvement opportunities and on topics under study by various CCTF working groups and task groups.
- Digitalization – In the framework of the CIPM Forum on Metrology and Digitalization (FORUM-MD), the CCTF will continue to support the development and the improvement of digital methods related to:

- The continuous key comparison CCTF-K001.UTC, including security and proof of authenticity aspects,
 - Provision of products that are more machine readable to offer access to a coherent representation of UTC and UTC(k) in combination with the digital SI-reference,
 - Digital access to CMCs, calibrations and calibration certificates, in respect of FAIR principles.
- Quantum technologies – In the framework of the CIPM Task Group on Quantum for Metrology, the CCTF will continue to support the cross-fertilization between TF metrology and quantum technologies in a long-term vision of a global network of interconnected quantum clocks, operating with unprecedented accuracy and stability and a common technological basis between atomic clocks and quantum computers based on atomic platforms.

CCTF Data

CCTF set up as the CCDS in 1956, renamed CCTF in 1997

President: N. Dimarcq

Executive secretary: P. Tavella

Membership: 27 members, five liaisons, five official observers

List of CCTF members and observers: <https://www.bipm.org/en/committees/cc/cctf/members>

Meetings since the 27th CGPM meeting (2022):

- CCTF Information Meeting (November 2023; online)
- 24th CCTF meeting: Session 1 (November 2024; online)
Session 2 (September 2025; at the BIPM headquarters / hybrid participation)
- 18 meetings of the CCTF WG Strategic Planning

Full reports of the CCTF meetings: <https://www.bipm.org/en/committees/cc/cctf/publications>

Current CCTF Working Groups⁷: <https://www.bipm.org/en/committees/cc/cctf/>

- CCL-CCTF Frequency Standards (WGFS)
- CIPM MRA (WGMRA)
- Coordination of the Development of Advanced Time and Frequency Transfer Techniques (WGATFT)
- GNSS Time Transfer (WGGNSS)
- Primary and Secondary Frequency Standards (WGPSFS)
- Strategic Planning (WGSP)
- TAI (WGTAI)
- Two-way Satellite Time and Frequency Transfer (WGTWSTFT)

CCTF transverse Task Groups on cross-cutting topics:

- Task Force on the Redefinition of the SI second, with 3 subgroups dedicated to options, criteria and education / communication
- Continuous UTC
- Lunar reference time
- Quantum Technologies
- Digitalization
- Coordination of Capacity Building and Resources Sharing

CCTF Comparison	Completed	In	Planned
CCTF key comparisons (and supplementary)	1, monthly	Ongoing	Ongoing
BIPM comparisons	-	-	-
CC pilot studies	-	-	-
CMCs	776 CMCs in 19 service categories registered in the KCDB		

⁷ The working group on Time Scale Algorithms (WG-ALGO) has been closed in 2025, but its activities concerning mainly education and training are addressed in WGTAI and TG Capacity Building. They are also carried out by BIPM Time department.