

Outcome of the 20th Meeting of the Consultative Committee on Time and Frequency (CCTF)

F. Arias, G. Petit

10th Meeting of the ICG



Bureau
International des
Poids et
Mesures

20th Meeting of the CCTF

- ◆ The 20th Meeting of the CCTF was on 17-18 September 2015 at the BIPM (Sèvres, France);
- ◆ CCTF Working Groups run formal meeting between 8 and 16 September 2015;
- ◆ The outcome of the CCTF WG on GNSS Time Transfer is of particular interest to the ICG. The objectives of the CCTF WG GNSS are:
 - to report to the CCTF on the state of the art in GNSS time and frequency transfer **and to provide recommendations concerning receiving systems, calibration and data processing;**
 - in collaboration with the BIPM, to gather and share the information and the experience on available equipment, characterization of the hardware delays, data processing and scientific results;
 - to maintain contacts with the receiver manufacturers in order to inform them about our needs;
 - to stimulate the collection and analysis of code and carrier phase data from all GNSS constellations;
 - to stimulate the development of calibration procedures in agreement with new GNSS receiving systems;
 - to establish contacts with the parallel scientific communities working on the definition of the receiver output standards;
 - to study the clock results formats in agreement with the user needs.
- ◆ Three CCTF Recommendations (# 3,4,5) originated from the CCTF WG on GNSS Time Transfer

CCTF (2015) recommendations and decisions /1

Seven recommendations have been adopted by the CCTF at its meeting, four of them relevant to the ICG activities:

- ◆ **CCTF 2 (2015): Predictions of UTC disseminated by Global Navigation Satellite Systems (GNSS)**
 - Refers to the new GNSS close to offering services (BeiDou and Galileo);
 - Recommends that BIPM Circular T adds the relations between UTC/TAI and the predictions of UTC disseminated by the upcoming GNSS as they become operational.
- ◆ **Relations between UTC/TAI and GNSS times until now published in BIPM Circular T will be moved to the ftp server of the BIPM Time Department; this information will be updated monthly and on open access.**
- ◆ **CCTF 3 (2015): On the GNSS time transfer equipment calibration**
 - Refers to the new strategy for the calibration of GNSS equipment in UTC laboratories put in place by the BIPM, with the cooperation on the Regional Metrology Organizations;
 - Recommends the periodical organization of calibration trips, and to follow the Guidelines published by the BIPM.

CCTF (2015) recommendations and decisions /2

- ◆ CCTF 4 (2015): On the Common Generic GNSS Time Transfer Standard (CGGTTS)
 - Refers to the common format and standard (CGGTTS) used by time laboratories to communicate GNSS time transfer data for UTC;
 - Notes that an extension of the CGGTTS format (version V2E) exists and is available in *Metrologia* 2015 **52** G1; it allows to include time transfer results from GPS, GLONASS, BeiDou, Galileo and QZSS satellites;
 - Recommends that the WG GNSS interacts with timing receivers manufacturers to request that they upgrade their firmware for the provision of the CGGTTS-V2E, and that time laboratories provide data for UTC also in this format version.

- ◆ CCTF 5 (2015): On the design of Global Navigation Satellite System (GNSS) receivers
 - Refers to the use of code and carrier phase GNSS combined measurements for achieving very precise time and frequency transfer, and to the need of accurate knowledge of the latching time (effective reception time) of each measurement;
 - Recommends that the WG GNSS interacts with manufacturers to request that they upgrade the design and firmware of receivers so that the latching time offset between the code and the carrier phase measurements provided in the observation files is less than 100 ns.