



ANNUAL REPORT of the COOMET TC 1.11 "TIME AND FREQUENCY" (for the period from 2020 to 31.03.2021)

1. GENERAL FEATURES OF COOPERATION IN THIS SUBJECT FIELD

TC 1.11 includes representatives of 20 COOMET member countries: Azerbaijan, Armenia, Belarus, Bulgaria, Bosnia and Herzegovina, China, Germany, Georgia, Kazakhstan, Kyrgyzstan, DPR of Korea, Lithuania, Moldova, Romania, Russia, Slovakia, Tajikistan, Turkey, Uzbekistan and Ukraine.

TC 1.11 COOMET coordinates the work between COOMET member countries in the field of time and frequency, as well as in related fields, carried out at the regional and international levels and representing common interests in this field

2. RESULTS OF MEETING OF TC 1.11 FOR THE REPORTING PERIOD

The 13th online meeting of COOMET TC 1.11 "Time and Frequency" was held on November 27, 2020 using the Zoom platform.

The meeting was attended by representatives of 11 COOMET countries: Azerbaijan, Belarus, Germany, Kazakhstan, Lithuania, Moldova, Russia, Slovakia, Turkey, Uzbekistan and Ukraine, as well as invited specialists.

General issues (TC 1.11-2020 resolutions):

1) To take for appropriated to update in 2021-2022. the previously developed COOMET publications in the field of "Time and Frequency"

-COOMET Recommendation R/TF/2:1995 "Interstate Calibration Scheme for Time and Frequency Measuring Instruments";

- Recommendation COOMET R/TF/3:1995 "Requirements for time-frequency equipment produced by COOMET member countries, necessary for mutual recognition of the results of national metrological verifications and certifications".

To ask the TC Chair to appoint coordinators for the revision of each publication and to organize the preparation of the forms of the proposed COOMET topics by 01.07.2021.

2) Members of TC 1.11 to discuss the issue of monitoring the traceability of COOMET national measurement standards and the need to develop methods for transferring units of quantities. The opinion of the TC members is requested to be reflected in the Minutes of the next TC meeting and sent to TC 1.1.

3) Proposals on possible joint projects for the Plan for cooperation between COOMET and EURAMET for 2021 should be sent to COOMET Vice-President P.Neyezhnikov (coomet@metrology.kharkov.ua) and / or to the COOMET Secretariat (coomet@belgim.by).

4) To ask TC 1.11 members to study the activities provided by the COOMET Development Program for 2020-2022 in the area of responsibility of the TC, and send proposals to the Chair of TC 1.11 for their implementation.

5) Discuss the issue of implementing the COOMET Development Program for 2020-2022. in the area of responsibility of TC 1.11 at the next TC meeting

- 6) The current state of the COOMET topics is considered.
- 7) To ask TC 1.11 members to send to TC 1.11 Chair information on the interest of their NMIs in comparisons via fiber-optic communication links. The terms and conditions of the comparisons shall be discussed at the next TC meeting.
- 8) To ask the TC 1.11 Secretariat to organize among the TC 1.11 members a discussion of the issue of comparing the results of measurements of delays in cables of fiber-optic communication links; information on the results obtained should be presented at the next meeting of the TC.
- 9) Note that comparisons on theme 398/RU/07 "Comparisons of national time and frequency standards with the RF UTC (SU) scale" have the status of permanent work and do not fall under the JCRB requirement to complete comparisons lasting more than 5 years.
- 10) To ask the Chair of TC 1.11 to send to the COOMET Secretariat proposals on updating the list of technical experts on CMC expertise .
- 11) To ask the Chair of TC 1.11 to assign in KCDB the status "Technical expert for CMC examination" to COOMET NMI specialists indicated in the list of COOMET technical experts for CMC examination, for the effective organization of work on intra- and interregional CMC examination.
- 12) In 2021, update the COOMET Document D5.11 / 2006 "Regulation on the Technical Committee" Time and Frequency "(TC 1.11), taking into account the requirements of the COOMET Document D5 / 2020" Model Regulation on the COOMET Structural Body ".
- 13) Take into consideration the information of TC 1.11 members on the current state of time and frequency metrology in NMI

3. STATUS OF COOMET PROJECTS

The following COOMET projects were **actually completed** in 2020-2021:

- 1) project 17/RU-a/92 "Research of cesium frequency reference standards"

Study of cesium frequency references standards included in national standards in order to improve their accuracy"

Decisions taken on the 13th online meeting of TC 1.11: To exclude the topic from the COOMET Work Program due to the loss of relevance.

- 2) project 174/RU-a/99 "State of the reference base of COOMET member countries in the field of time and frequency"

Decisions taken on the 13th online meeting of TC 1.11: To be excluded from the COOMET Work Program in connection with the exchange of information on the reference base of the COOMET member countries within the framework of TC 1.11 on permanent basis.

At present the following COOMET projects are **UNDER DEVELOPMENT**:

- 1) **PROJECT 398/RU/07 "Comparisons of national time and frequency standards with the scale of the Russian Federation UTC (SU)"**

Coordinator: FSUE VNIIFTRI, Russia.

Partners: BelGIM, Republic of Belarus; RSE "KazStadard" (Nur-Sultan, Almaty), Republic of Kazakhstan; FSUE "VNIIFTRI", Russia; NSC "Institute of Metrology", Ukraine;

The results of comparisons of the Russian national time scale UTC (SU) with the time scales of Germany (PTB) and the United States (USNO) (relative to UTC) are presented in Fig. 1

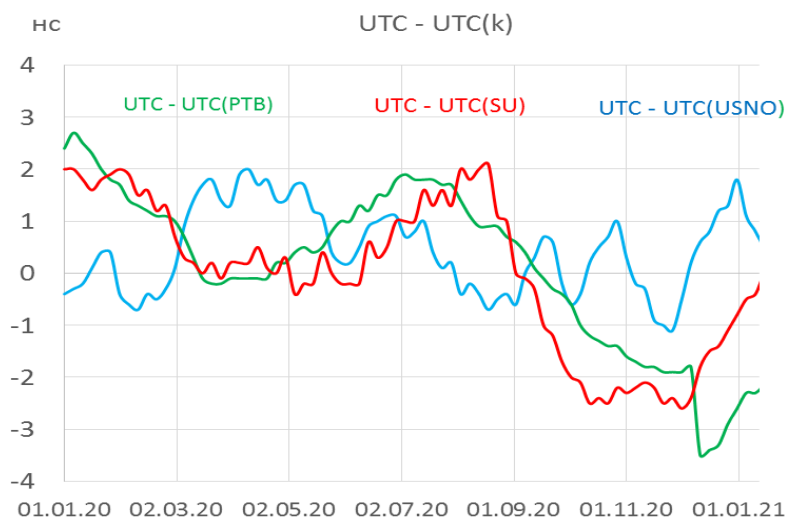


Figure 1. Results of comparisons of time scales of Russia, Germany and the USA.

The results of comparisons of the National Time Scales of Ukraine and Belarus relative to the National Time Scale of Russia UTC (SU) are presented in Fig. 2.

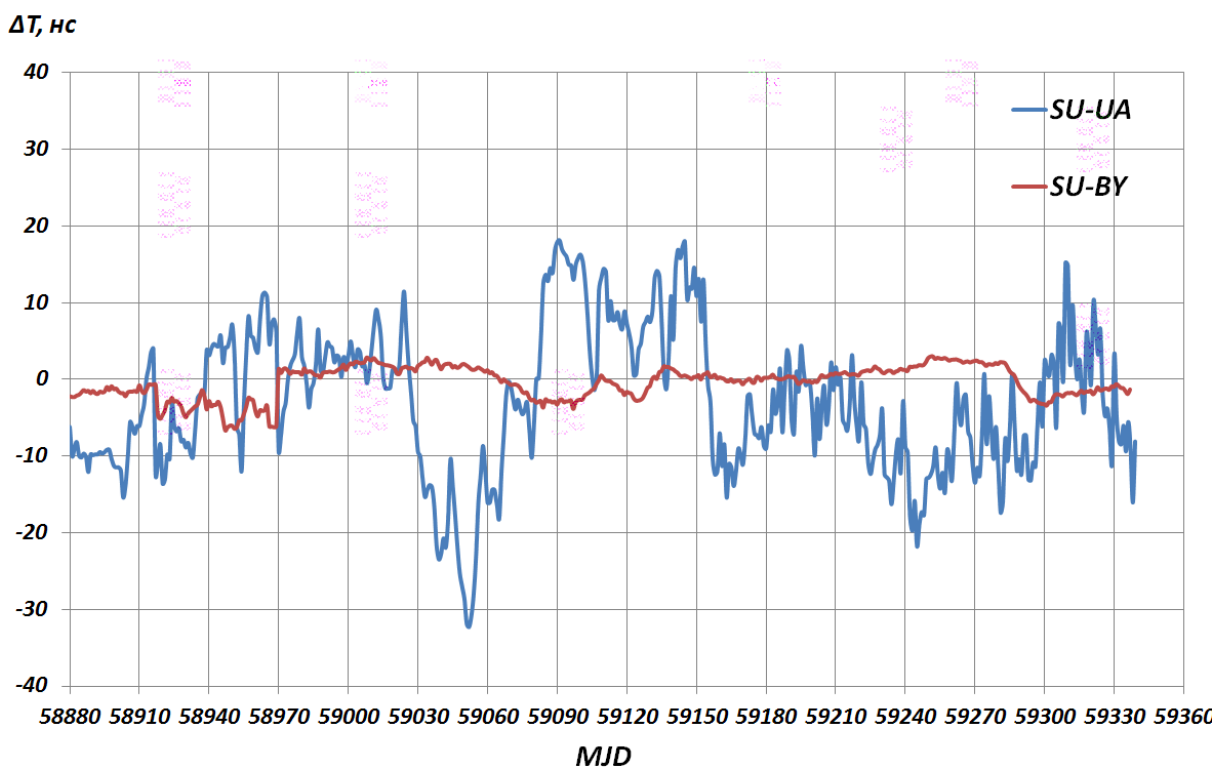


Figure 2. Results of comparisons of the national time scales of Russia, Ukraine and Belarus. Timescale data were not available from the Republic of Kazakhstan for the reporting period.

2) **PROJECT 605/RU/13 "Comparisons of time scales of NTP servers using the INTERNET network"**

Coordinator: FSUE VNIIFTRI, Russia.

Partners: BelGIM, Republic of Belarus; RSE "KazStadard" (Nur-Sultan, Almaty), Republic of Kazakhstan; FSUE "VNIIFTRI", Russia; NSC "Institute of Metrology", Ukraine; VMT / FTMC, Lithuania, National Institute of Metrology of Turkey

1. During the monitoring period from January 2020 to March 2021 inclusive, the average monthly values of the time scales discrepancies of the monitored remote NTP servers at the place of control (FSUE VNIIFTRI) relative to UTC (SU) did not exceed:

- for an NTP server in Kharkov - $(-0.86 \div 3.97)$ ms;
- for NTP server Turkey - $(-1.38 \div 5.69)$ ms).

2. Changes in the total delay in the communication channel between the consumer and the remote NTP server, leading to a change in the asymmetry of the delay in the communication channel in the forward and reverse directions, introduce an error in determining the real offset of the system time scale of the consumer's computer relative to the server time scale. The margin of error is about half the change in total delay.

4. COLLABORATION WITH INTERNATIONAL ORGANIZATIONS

Bureau Internationale on Poids et Mesures (BIPM)	- a regular data exchange to contribute to the TAI;
Comite Consultatif du Temps et des Frequences (CCTF),	- participation in the work of the CCTF and its Working Groups;
Consultative Committee on Length (CCL)	- participation in elaboration of recommendations on redefinition of a second;
International Telecommunication Union (ITU)	- participation in the work of 7A Group;
International Earth Rotation Service (IERS)	- a regular data exchange;
International Geodetic Service (IGS)	- observation and processed data exchange;
International Laser Ranging Service (ILRS)	- observation and processed data exchange.

5. NEXT MEETING OF TC 1.11

At the present time the place and dates of the 14th meeting of TC 1.11 "Time and frequency" are being specified (tentative dates - October 2021)

Vitaly Palchikov
TC 1.11Chair

