RECOMMENDATION

On improving Two-Way Satellite Time and Frequency Transfer (TWSTFT) for UTC Generation

The Consultative Committee for Time and Frequency (CCTF)

realizing

- that atomic frequency standards have achieved unprecedented precision and accuracy, and that further rapid advances in this field are underway,
- that time and frequency transfer data from the use of TWSTFT systems plays an important role in realization of UTC,
- that uncertainty of the current TWSTFT systems for the realization of UTC is limited by technical and financial constraints that can result in a daily variation (diurnal) in the time transfer results;

considering

- that the experiment of using Software Defined Radio (SDR) receivers in the Asia-Pacific region (SDR receivers measure the timing signals generated by the currently used TWSTFT equipment) showed the SDR TWSTFT significantly reduced the diurnal and measurement noise,
- that a pilot study on using the SDR TWSTFT for UTC was organized by the BIPM and the working group on TWSTFT in February 2016 to investigate the impact of SDR TWSTFT for the Asia-Asia, Asia-Europe, Europe-Europe, Europe-US and US-US links using different geostationary satellites,
- that all the UTC laboratories engaged in TWSTFT expressed interest in participating to the pilot study and twelve stations in the Asia, Europe and the USA have installed SDR systems and carried out measurements contributing to the pilot study,
- that the BIPM global validation of the SDR TWSTFT results has revealed a significant reduction of the diurnal and measurement noise in the inner-continental TWSTFT links with a gain factor of two to three in the time link stability as compared to the currently used TWSTFT results,
- that a few digital TWSTFT modems are under development in recent years, some of them capable of supporting both code-phase and carrier-phase measurements, which could further improve the uncertainty of TWSTFT;

recommends that the laboratories operating TWSTFT stations

- continue to study the SDR TWSTFT technique by maintaining SDR operation or installing SDR systems in stations, and providing SDR TWSTFT data to the BIPM in parallel to the data from the currently used TWSTFT equipment,
- support and participate in the test of new digital TWSTFT modems as they will be available;

recommends that the BIPM

- work towards implementing the use of SDR TWSTFT data in UTC generation;
- support studies of improving TWSTFT with redundant measurements in the TWSTFT network and with digital modems when data will be available.