Time transfer via different GNSS systems

Kun Liang

Time and Frequency Metrology Division, National Institute of Metrology, Beijing, China

Email: liangk@nim.ac.cn

GNSS time transfer is the most popular method for time transfer with good accuracy and precision on ultra long distance over the world. In TAI generation, time transfer by GPS (Global Positioning System) and GLONASS (GLObal NAvigation Satellite System), especially GPS, have been employed regularly for remote comparison links between PTB and other TAI laboratories. At present, BeiDou navigation satellite system (BDS) and Galileo system are developing fast. Time transfer via BDS and Galileo are becoming the important redundant comparison links and having the potential combination of multiple GNSS(Global Navigation Satellite System) links come true. A new multi-GNSS version of GNSS time transfer receiver NIM-TF-GNSS-3, has been under development by NIM (National Institute of Metrology, Beijing, China) since 2016. It is the third generation of GNSS time transfer receiver developed by NIM following NIM-TF-GNSS-1[1] and NIM-TF-GNSS-2[2]. The receiver provides the code and carrier phase measurements from BDS , GPS , GLONASS and Galileo for precise time transfer. The receiver can generate measurement data of both single frequency and dual frequencies in CGGTTS (CCTF Group on GNSS Time Transfer Standards) V2E, RINEX (Receiver Independent Exchange Format) V3 files. The experiments of time transfer via different GNSS systems on multiple links have been implemented for the evaluation on the long-term stability and accuracy. The combination method of multiple GNSS measurements for time transfer has been studied and discussed.

References

[1] LIANG Kun, ZHANG Aimin, GAO Xiaoxun, WANG Weibo, NING Dayu，ZHANG Side, Study and Development of a New GNSS Receiver for Time and Frequency Transfer, EFTF 2012.

[2] Liang K, Zhang A, Yang Z, et al.
Developing of one time link calibrator with GNSS at NIM[C]//Frequency Control Symposium & the European Frequency and Time Forum (FCS), 2015 Joint Conference of the IEEE International. IEEE, 2015: 545-548.