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PRECISE CARRIER PHASE TIME TRANSFER BASED ON BDS REGIONAL NAVIGATION SYSTEM

Abstract

The GNSSCPTT (GNSS Carrier Phase Time Transfer) can provide 0.1 0.2 ns accuracy and a frequency stability of 1e-15 2e-15 for averaging times of half-day, which is equivalent to the two-way satellite time/frequency transfer (TWSTFT). The BDS constellation composed of 14 GEO satellites has deployed by 2012 and begins to provide positioning services for Asia-Pacific region. In order to provide services of GNSS performance monitoring, promote service assurance, improve service performance, ensure the interoperability of OS signals for four systems, GPS/GLONASS/GALILEO/BDS, the iGMAS (international GNSS Monitoring and Assessment Service) is established. BACC is doing the work about operation and maintenance the iGMAS Analysis Center (BAC), and producing the precision products to the users with equivalent accuracy to well-known institutes, such as IGS and CODE, including precise satellite orbit and clock, tracking station coordinate and receiver clock, Zenith Total Delay (ZTD), Earth Orientation Parameter (EOP) parameters, global statistical integrity and Ionospheric map. This paper first describes a prototype of GNSSCPTT involved geodetic Multi-GNSS receiver, choke antenna, reference atomic clock, and other assistant equipment. On the basis of above prototype, we carry out the zero baseline experiment to calibrate the external delay including antenna delay (AE), low noise amplifier delay (LNA), and power splitter delay (PS), and receiver internal delay (RE) using two geodetic Multi-GNSS receivers with the same choke antenna and reference atomic clock. The long baseline experiment is also established to validate the long distance BDS time transfer accuracy with several long baselines from a network of BDS-capable receivers from the IGS Multi-GNSS EXperiment (MGEX) and a regional BDS station network operated by China. Then, in order to analyse the characteristic of BDS carrier phase based time transfer, the observation data from zero and long baselines is processed in network solution mode and PPP solution mode using the precise BDS orbit and clock from BAC analysis center. At last, the time transfer accuracy and frequency stability of PPP and baseline are concluded, which are also evaluated by comparing with simultaneous GPS carrier phase based time transfer results. The preliminary research shows that the prototype of GNSSCPTT and processing stragies at BACC is feasible and builds up a good basis for BDS carrier phase time transfer application for future China deep space mission tracking.