

## Research on Methods for BDS Wide area Real-time Precision Positioning and Results assessment

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**Abstract:** In recent years, the BDS wide-area differential positioning is a cutting-edge issues for application of satellite navigation system, which can provide decimeter even centimeter level precision real-time positioning. This paper introduces the construction and positioning testing of national BDS wide-area differential system using 210 national continuous operating reference stations that are able to receive data from GPS and BDS satellites. These observation data are processed in real time to obtain products including GPS&BDS satellites real-time precision orbits, clocks and ionospheric delay et.al. The accuracy of these products is assessed automatically, the results show that the 3D RMS of difference with IGS final orbit is better than 10cm for GPS real-time precise orbit products, and better than 30cm for BDS IGSO/MEO real-time orbit products and better than 2m for BDS GEO. The bias of real-time clock difference products is better than 1.3ns for GPS and better than 2ns for BDS. The precise is better than 7 TECU for real-time ionospheric delay products. Those products are broadcasted through the wireless communication network to users, and they that can obtain high-precision positioning by real-time PPP. We have conducted extensive real-time PPP testing in various regions of China using handheld terminal. After 15 minutes of convergence, the PPP precision in BDS-only mode is better than 15 cm in horizontal and better than 20 cm in vertical components. In BDS&GPS mode, the precision is better than 3 cm in horizontal and better than 4 cm in vertical components, respectively.

**Key words:** BDS wide-area differential, satellite orbit, satellite clock, ionospheric delay, positioning precision