

Disciplined Oscillator System by UTC(NIM) for Remote Time and Frequency Traceability

LIANG Kun¹, ZUO Fei², ZHANG Side³, ZHONG Yuan²

¹Division of Time and Frequency Metrology, National Institute of Metrology, Beijing, China

²School of Electronics and Information Engineering, Beijing JiaoTong University, Beijing, China

³Beijing Trust GPS Science&Technology Development Co., Ltd, Beijing, China

Email: liangk@nim.ac.cn

Abstract: Based on GNSS time and frequency transfer receiver NIMTFGNSS-1¹, real-time and remote calibration system (RTRC)² by GNSS code based time and frequency transfer has been realized. Based on RTRC, NIM can provide one low-cost Rubidium oscillator disciplined by UTC(NIM) in real time (UTC(NIM) Disciplined Oscillator, NIMDO) that has the instant and direct traceability to UTC(NIM) as soon as powered on for the user who needs some time scale or frequency standard which time or frequency should be traced to UTC legally. NIMDO can exempt the user from operating ceaseless some kind atomic clock and periodically calibrating it reference to UTC, which leads to a lot of consuming of manpower, material resources and time. The time and frequency accuracy of NIMDO has been improved thanks to the high level reference time scale and time scale algorithm and its long stability has been ameliorated due to the real-time and short latency steering to UTC(NIM). Its performances have been verified and demonstrated at the two campuses of NIM. Referenced to UTC(NIM), we can acquired that the time and frequency accuracy of NIMDO could separately be better than 5 ns and 1e-13 averaging one day, and the time and frequency stability averaging one day could separately be better than 5 ns and 6e-14. Soon we would improve the steering algorithm by applying multiple system including BDS system and real time GNSS carrier phase time and frequency transfer and lay up four NIMTFGNSS-1 receivers at four different cities (Urumchi, Guiyang, Harbin, and Beijing) in China to verify longer baseline effects.

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," Proc. of EFTF 2012, pp. 529-536, 2012.
2. LIANG Kun, ZUO Fei, PEI Chao, ZHANG Side, ZHANG Aimin, "Real-Time Remote Calibration (RTRC) System for Time and Frequency," Proc. of IFCS-EFTF 2013, pp. 360-363, 2013.