


Review Paper

Recent Development and Utilization of Two-Way Satellite Time and Frequency Transfer

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Abstract

TWSTFT (Two Way Satellite Time and Frequency Transfer) has been developed for a long time, and has become one of the most precise and accurate techniques for comparison of the frequency standards located at remote sites. Since 1999, TWSTFT has been used in TAI (International Atomic Time) generation. More than two-thirds of TAI clocks and almost all the primary frequency standards are transferred using TWSTFT. To increase the time transfer precision and stability, several calibration methods were developed and the possible instability sources were investigated. Due to the high redundancy of the time transfer links and quick developments of independent time transfer techniques (e.g. GPS), much utilization was proposed to enhance the robustness, to reduce the uncertainty, and to reduce the diurnal effect of TWSTFT. For example, one can adopt the concept of network time transfer to improve the short term stability, or combine the data of different time transfer techniques to take their advantages. The numerical results of network time transfer are very promising. For the future development, a newly developed DPN-based TWSTFT method shows competitive performance with the GPS PPP and much less diurnals than the conventional TWSTFT. It is a very promising method for the next-generation TWSTFT. This paper will give an overview of the above topics.

Keywords

TWSTFT – SATSIM – DPN – Multi-technique-network