



Time Transfer receiver for NPLI-Disciplined Oscillator

Bharath Vattikonda*^{1,2}, Chandra Bhanu ¹, Vishal Yadav¹, Ashish Agarwal^{1,2}.

¹*Time & Frequency Metrology, National Physical Laboratory, New Delhi, India.* Bharath.v@nplindia.org, bhanu199400@gmail.com, 06vishalyadav@gmail.com, ashish@nplindia.org

²Academy of Scientific and Innovative Research (AcSIR), Ghaziabad- 201002, India

Common View Time Transfer (CVTT) technique is commonly used to compare two geo- graphically separated clocks via Navigation Satellites Systems (NSS) either Global NSS or Regional NSS. A full-fledged multi GNSS receiver used for time transfer is costly as they provide all the required data formats by processing the raw data with a computer and Time Interval Counter (TIC) embedded in them. Whereas multi constellation dual frequency low-cost chipsets/ GNSS engines are also available in the market but, they provide only the raw measurement data in ASCII formats. For time transfer applications to use such low-cost chipsets we additionally need a TIC and data processing capabilities to use it for time transfer applications.

National Physical Laboratory India - Disciplined Oscillator (NPLI-DO) is a remotely steered Rubidium oscillator with respect to UTC(NPLI) which requires such low-cost chipsets for CVTT. The Rubidium frequency standard in the NPLI-DO is steered with respect to UTC(NPLI) via CVTT. For time transfer to this remote oscillator, we used one such GNSS chipset. The raw data in ASCII format is processed to generate required data formats of time transfer. It is configured in 3 different modes. Mode 1: Generation of Rinex data from the raw data output of the chipset to perform PPP (Precise Point Positioning) at a new location. Mode 2: To generate the CGGTTS files from GNSS (GPS, GLONASS, Beidou) raw data for CVTT between NPLI and the user location. Mode 3: To generate directly NavIC CGGTTS files for CVTT via only NavIC constellation.

The results of the testing of the various GNSS chipsets for their timing accuracy with respect to UTC(NPLI). Processing the NavIC L5 data for the Ionospheric corrections, tropospheric corrections, satellite clock corrections etc., to evaluate the uncertainty in the time transfer shall be presented. Processing the raw data (ASCII) to the required CGGTTS & RINEX data formats from the raw data shall be presented in this paper.

References:

1. IRNSS Signal in Space ICD for Standard Positioning Service, Version 1.1
2. CGGTTS version 2E and extended standard for GNSS Time Transfer, P. Defraigne, G.Petit