

GNSS time and frequency transfers

Thayathip Thongtan¹

¹Electrical Metrology, National Institute of Metrology Thailand, Pathumthani, Thailand

Email: thayathip@nimt.or.th

Precise time synchronisation is critical for various applications such as telecommunications, financial transactions, electric power distributions and scientific researches. Their operations need common time reference across the globe based on an international time keeping scale of UTC. National Institute of Metrology Thailand (NIMT) maintains UTC(NIMT) traceable to the SI seconds through GNSS signal observations. UTC(NIMT) realisation is measured based on three free-running atomic clocks (caesium beam clocks) and distributed to users through time and frequency calibration services, Internet time information distributions using the network time protocol (NTP) and GNSS time transfers; where time differences are determined at the GNSS receivers. Users have ability to guarantee the accuracy, stability, and traceability of their frequency standards to the international realisations.

GNSS signals are continuously monitored at NIMT and primarily for determining time and frequency transfers as well as positioning for the network of ground stations providing real-time precision positioning and timing information services throughout Thailand. GNSS observations are continuously compared with the GPS system time to calculate the time differences between UTC(NIMT) and UTC(PTB). Clock drift, trend, fractional frequency offsets and stabilities are then computed. GNSS time and frequency methods are common-view and precise point positioning using the multi-constellations and multi-frequency observables. NIMT have three GNSS timing receivers. Two of them have been calibrated under BIPM G1 and G2 calibration scheme and the remaining one has been calibrated using the BIPM receiver calibration transfer procedure.

This presentation shows the GNSS time and frequency transfer activities in Thailand, the GNSS receiver calibration results for the international time link and some clock comparisons for the remote clocks in the GNSS receiver network for precise positioning, navigation and timing infrastructure.