GNSS calibration of NIMT receivers with respect to TL G1 (1016-2022)

Summary

From August to October 2022, the National Time and Frequency Standard Lab Telecommunication Laboratories, (TL) conducted a trip to calibrate GNSS equipment owned by the National Institute of Metrology, Thailand (NIMT). The trip started and finished at TL, providing closure with respect to the TL Group1 reference receiver TLT5.
The operations and report of measurements are described in the report by TL.

- **Final results for the calibrated systems**

The INTDLY values of the receivers given in Table 1 have been computed by TL based on the results of the Group 1 trip 1001-2020 for TLT5 and should not be updated to reflect later changes in the conventional INTDLY values of the reference receiver.

For a P3/E3/PPP UTC link A-B involving any Group 1 and any receiver in this trip, the uncertainty resulting from the calibration, U_B(A-B), is computed as

$$U_B(A\text{-}B) = (U_{CAL0}^2 + \Delta U_{CAL}(A)^2 + \Delta U_{CAL}(B)^2)^{1/2} \quad (1)$$

where U_{CAL0} = 2.5 ns is the conventional Group 2 value, and where ΔU_{CAL} (generally zero) is specified for each system.

Changes in the set-up of the receivers after the calibration must be accounted for as described in section A.3.6 of the most recent Calibration guidelines in https://webtai.bipm.org/ftp/pub/tai/publication/gnss-calibration/guidelines/.

Table 1. Final C1/P1/P2/E1/E5a INTDLY values from the 1016-2022 exercise. Values of REFDLY and CABDLY during the calibration are also indicated for reference. All values are in ns date in YYYY/MM/DD format. “Meas. Date” refers to the first day of the differential calibration, to which the calibration results can be applied. “Impl. Date” is the MJD when the results should be implemented in the receiver.

System	BIPM	Meas. date	INTDLY C1	INTDLY P1	INTDLY P2	INTDLY E1	INTDLY E5a	REF DLY	CABDLY	Note	ΔU_{CAL}	Impl. date
MTTI	MTTI	2022/9/16	12.4	12.2	9.8	12.6	12.4	23.9	214.7		0.0	59942
MTME	MTME	2022/9/16	16.0	13.6	8.2	16.9	10.9	24.6	214.5		0.0	59942

Notes:

- **Transfer of calibration performed in August 2023**

In August 2023, TL helped NIMT to conduct a Transfer of Calibration from the NIMT receiver MTTI (see preceding section) to the receiver MTTN, see the report.

The INTDLY values given in Table 2 have been computed by using INTDLY values for the receiver MTTI taken from Table 1.

Table 2. Final P1/P2 INTDLY values for MTTN. Values of REFDLY and CABDLY during the calibration are also indicated for reference. “Meas. Date” refers to the first day of the differential calibration, to which the calibration results can be applied. “Impl. Date” is the MJD when the results were implemented in the receiver.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	INTDLY C1	INTDLY E1	INTDLY E5a	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
MTTN	MTTN	2023/07/28	26.72	23.02	28.22	28.45	27.31	35.2	250.7		1	60173

Version history
V1.0 2023/01/06: Publication of results from V1.1c of the TL report.
V1.1 2023/08/18: Transfer if calibration added.