

GNSS calibration of EMI receiver with respect to PTB G1 (1019-2021)

Summary

In January 2022, the Physikalisch-Technische Bundesanstalt conducted a trip to calibrate GPS equipment owned by the Emirates Metrology Institute (United Arab Emirates, UTC code UAE). The trip started and finished at the PTB, providing closure with respect to the PTB Group1 reference receiver PT13.

The operations and report of measurements are described in the [report by PTB](#).

- **Final results for the calibrated system**

The INTDLY value of the receiver given in Table 1 has been computed by PTB based on the results of the Group 1 trip [1001-2020](#) for PT13 (GPS) and should not be updated to reflect later changes in the conventional INTDLY values of the reference receiver.

For a single frequency C1 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

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

where $U_{CAL0} = 2.5$ ns is the conventional Group 2 value, and where ΔU_{CAL} (generally zero) is specified for each system. U_{CAL0} could be complemented by an additional component to represent systematic errors in the ionospheric model.

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 INTDLY value from the 1019-2021 exercise. Values of REFDLY and CABDLY used to compute calibration results are also indicated for reference. All values are in ns. “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 P1	INTDLY P2	INTDLY C1	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
AE__	AE__	2022/01/19			86.0	0.0	127.0	(1)	3.5	59701

Notes:

(1) ΔU_{CAL} accounts for significant systematic effects in common clock measurements at UAE. REFDLY is 0.0 ns by construction, see the [report by PTB](#).

Version history

V1.0 2022/03/25: Publication of results from V1.1 of the PTB report.