GPS calibration of TP receivers with respect to PTB G1 (1102-2017)

Summary

In November 2017, GNSS equipment owned by the Institute of Photonics and Electronics, Czech Academy of Sciences (UTC acronym TP) was installed at the PTB and calibrated against the Group1 reference station PT02. The method of calibration is the “golden system calibration” which comprises just one period of data taking at the PTB.

The operation and report of measurements at the PTB are described in the report by the PTB.

In February 2019 the IPE conducted a transfer of calibration from the receiver TP01, part of the original trip, to the receiver TP02, see the report by IPE. The exercise was repeated in April 2019 after a set-up change, see the report by IPE.

- **Final results for the originally calibrated system**

The INTDLY values of the TP01 receiver given in Table 1 have been computed by the PTB based on the results of the 1001-2016 Group 1 trip for PT02 and should not be updated to reflect later changes in the conventional INTDLY values of PT02.

The uncertainty for a P3/PPP link or a C1 link involving TP01 is U_{CAL0} = 4.0 ns at the time of calibration, as given conventionally to ”golden system calibrations”.

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 ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/.

Table 1. Final P1/P2/C1 INTDLY values from the 1102-2017 trip. Values of REFDLY and CABDLY during the calibration are also indicated for reference, see note 1 (all values 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	Impl. date
TP01	TP01	2017/11/20	**13.5**	**17.6**	**14.6**	28.5	205.0	(1)	58151

Notes:
(1) The REFDLY and CABDLY values represent the set-up during the measurements at the PTB.

- **Transfer of calibration performed by IPE in February and April 2019**

The receiver TP02 has been differentially calibrated with respect to TP01 in February 2019, see the report by IPE. After a change of antenna, a new differential calibration was performed in April 2019, see the report by IPE.
The values ΔU_{CAL} are to be added to compute the final calibration uncertainty for links including the receiver TP02. They have been adopted from uncertainties given in the reports by IPE.

Table 2. Final P1/P2/C1 INTDLY values for the TP02 receiver. 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 are implemented in the CGGTTS files.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	INTDLY C1	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
TP02	TP02	2019/01/28	**12.8**	**13.8**	**13.6**	11.9	154.7		0.5	58522
TP02	TP02	2019/03/29	**15.3**	**17.6**	**16.1**	11.9	154.7		0.5	58569

Notes:

Version history

V1.0 2018/01/30: Publication of results from V2 of the PTB calibration report, to be implemented in TP01 receiver: IMPLEMENTATION DATE = MJD 58151.

V1.1 2019/04/10: Two successive transfers of calibration from TP01 to TP02, corresponding to two different set-ups of TP02.