GPS calibration of IFAG equipment with respect to PTB G1 (1016-2017)

Summary

Over October 2017- April 2018, the PTB conducted a trip to calibrate GNSS equipment owned by the Bundesamt für Kartografie und Geodäsie (UTC laboratory IFAG). The trip started and finished at PTB, providing closure with respect to PTB Group1 reference receiver PT02. The operations and report of measurements are described in the report by PTB.

In June 2020, the IFAG conducted a transfer of calibration from the receiver IF14, part of the original trip, to a new receiver IF20. The operations and report of measurements are described in the report by IFAG.

- **Final results for the equipment calibrated in the original trip**

The INTDLY values given in Table 1 have been computed by PTB based on the results of the 1001-2016 Group 1 trip for PT02. They should not be updated to reflect later changes in the conventional INTDLY values of PT02.
For a P3/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 at the time of calibration, as given conventionally to Group 2, and where ΔU_{CAL} is specified for each system. The value ΔU_{CAL} = 1.0 ns in Table 1 reflects the significant misclosure, see the PTB calibration report.

Changes in the set-up of the receivers after the calibration must be accounted for as described in section A.3.6 of the Calibration guidelines v3.2 in ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/.

Table 1. Final P1/P2 INTDLY values from the 1016-2017 trip. Values of REFDLY (with respect to the indicated REF) and of 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 should be implemented in the receiver.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	REF	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
WTZA	IF14	2017/11/29	**210.5**	**220.5**	UTC(IFAG)	221.4	122.0	(1)	1.0	58302
WTZS	IF19	2017/10/18	**57.7**	**56.4**	UTC(IFAG)	174.5	118.0	(1)	1.0	58302

Notes:
(1) REFDLY values were measured during the calibration.

- **Transfer of calibration performed by IFAG in June 2020**

In May2020, the IFAG installed a new GNSS receiver IF20 to replace IF19 after its failure and performed a transfer of calibration with respect to the receiver IF14, see the report by IFAG and the results in Table 2.

The value ΔU_{CAL} for use in equation (1) has been set by default from the original ΔU_{CAL} value. For UTC use, the ageing uncertainty will be based on the date of original calibration of IF14 i.e. 2017/11/29.

Table 2. Final P1/P2 INTDLY values for IF20. Values of REFDLY with respect to UTC(IFAG) 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 should be implemented in the receiver.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	REF	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
WTZS	IF20	2020/06/18	**27.9**	**28.0**	UTC(IFAG)	74.5	118.0		1.2	59121

Notes:
(1)

Version history
V1.0 2018/07/09: Final results from V1.2 of the PTB Calibration report, to be implemented in G2 receivers.
V1.1 2020/09/28: Transfer of calibration by IFAG to provide GPS results for IF20 (Table 2)