GNSS transfer of calibration at PTB (1104-2020)

Summary

In May 2019, the Physikalisch-Technische Bundesanstalt (Germany, UTC acronym PTB) conducted a transfer of calibration from its G1-calibrated GPS receivers PT07 to the receiver PT10 which calibration was lost after a change of firmware. In June 2020, the same exercise was conducted for Galileo delays from the G1-calibrated receiver PT09 to PT10.

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

- **Final results for the calibrated systems**

The INTDLY values of the receivers given in Table 1 have been computed by PTB based on the results of the Group 1 trip 1001-2018 for PT07 (GPS) and for PT09 (Galileo) 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} = 1.6 ns is composed of the conventional Group 1 value (1.5 ns) and the uncertainty of the transfer (0.5 ns), and where ΔU_{CAL} (generally zero) is specified for each system. For UTC use, the ageing uncertainty will be based on the date of original calibration of PT07 and PT09 i.e. 2018/11/20.

For single frequency C1 links, U_{CAL0} is 1.6 ns but 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 ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/.

Table 1. Final P1/P2/C1/E1/E5a INTDLY values from the 1104-2020 exercise. 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**	**INTDLY E1**	**INTDLY E5a**	Note	**ΔU_{CAL}**	Impl. date
PT10	PT10	2019/05/03	**31.9**	**25.3**	**34.0**				0.0	59032
PT10	PT10	2020/06/24				**35.1**	**23.8**		0.0	59032

Notes:

(1).

Version history
V1.0 2020/07/28: Publication of results from V1.0 of the PTB report on the transfer of calibration.