

GPS calibration of DLR, METAS, VSL, BEV equipment with respect to PTB G1 (1012-2016)

Summary

In Spring 2016, the PTB conducted a trip to calibrate GNSS equipment owned by DLR, METAS, VSL and BEV. 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](#).

• Final results for the calibrated equipment

The INTDLY values given in Table 1 have been computed by PTB using INTDLY values of PT02 available at the time of the calibration. 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

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

where $U_{CAL0} = 2.5$ ns at the time of calibration, as given conventionally to Group 2, and where ΔU_{CAL} (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 Calibration guidelines v3.2 in [ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/](http://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/).

Table 1. Final P1/P2 INTDLY values from the 1012-2016 trip. Values of REFDLY and CABDLY during the calibration and the resulting P3 Total delay TOTDLY are also indicated for reference (all values in ns).

System	BIPM	Date	INTDLY P1	INTDLY P2	REFDLY	CABDLY	Note	TOTDLY P3	ΔU_{CAL}
OBET	DL05	2016.3	57.8	56.1	160.6	521.8	(1)	421.6	0.0
UTC1	DL01	2016.3	201.6	200.9	245.8	524.0	(1)	480.9	0.0
UTC2	DL02	2016.3	205.6	197.8	244.9	525.8	(1)	498.6	0.0
UTC3	DL03	2016.3	208.2	198.1	242.7	525.9	(4)	507.0	1.8
UTC4	DL04	2016.3	58.3	56.7	139.7	525.9	(1)	447.0	0.0
CH00	CH00	2016.4	50.7	53.3	206.4	220.1	(1)	60.4	0.0
WAB2	CH01	2016.4	298.9	315.6	44.2	213.4	(1)	442.3	0.0
VSLF	VS06	2016.4	52.5	61.1	187.3	124.7	(1,2)	-23.4	0.0
VSLG	VS07	2016.4	-51.1	-50.2	36.2	124.8	(1,2)	36.1	0.0
BE1_	BE1_	2016.5	-25.8	-28.0	15.4	404	(1,3)	366.2	0.0
BE3_	BE3_	2016.5	-37.7	-36.6	15.3	262.1	(1)	207.4	0.0

Notes:

(1) REFDLY value corresponding to the calibration setup and measured during the calibration.

(2) INTDLY and REFDLY values of VSL receivers correspond to the receivers housed in a 19" box, with redefined input and output connectors, see the [report](#).

(3) The REFDLY value of BE_1 has not been measured in full accordance with the Annex 1 of the [calibration guidelines](#), see the [report](#). Results are expressed as INTDLY for consistency with the CGGTTS V2 format but **care should be taken if the set-up is changed**: Only the "Total delay" (TOTDLY = INTDLY + CABDLY – REFDLY) is a strictly meaningful result.

(4) The REFDFLY value of DL03, used to compute the calibration results, has been found inconsistent by 1.8 ns with the measurements taken during the calibration. The value of ΔU_{CAL} reflects this.

Version history

V1.1 2016/09/14: Final results from V1.1 of the Calibration report, to be implemented in G2 receivers. DL03 results to be confirmed.

V1.2 2016/10/07: Corresponds to V1.2 of the Calibration report, with DL03 results.