GNSS calibration of ORB equipment with respect to PTB G1 (1011-2020)

Summary

In Spring 2020, the PTB conducted a trip to calibrate GNSS equipment owned by ORB. The trip started and finished at the PTB, providing closure with respect to PTB Group1 reference receiver PT13.

GPS results were published in V1.0 of this summary.

After PT13 Galileo delays were determined, Galileo results were published in V2.0 of this summary.

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

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

The INTDLY values given in Table 1 have been computed by PTB using INTDLY values of PT13 from the Group 1 trip 1001-2018. These INTDLY values should not be updated to reflect later changes in the conventional INTDLY values of OP71.

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

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

where \( U_{CAL0} = 2.5 \) ns at the time of calibration, as given conventionally to Group 2, and where \( \Delta U_{CAL} \) (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/.

### Table 1. Final P1/P2/E1/E5a INTDLY values from the 1011-2020 trip.

<table>
<thead>
<tr>
<th>System</th>
<th>BIPM</th>
<th>Meas. date</th>
<th>INTDLY P1</th>
<th>INTDLY P2</th>
<th>INTDLY E1</th>
<th>INTDLY E5a</th>
<th>REF DLY</th>
<th>CAB DLY</th>
<th>Note</th>
<th>( \Delta U_{CAL} )</th>
<th>Impl. date</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRUX</td>
<td>OR5Z</td>
<td>2020/04/02</td>
<td>28.0</td>
<td>23.8</td>
<td>30.4</td>
<td>29.6</td>
<td>68.5</td>
<td>237.5</td>
<td>0.0</td>
<td>Note 2</td>
<td></td>
</tr>
<tr>
<td>ORBA</td>
<td>OR4Z</td>
<td>2020/04/02</td>
<td>55.1</td>
<td>55.1</td>
<td>56.2</td>
<td>65.6</td>
<td>158.4</td>
<td>149.2</td>
<td>0.0</td>
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<tr>
<td>GRCB</td>
<td>OR20</td>
<td>2020/04/02</td>
<td>33.0</td>
<td>27.8</td>
<td>35.8</td>
<td>33.7</td>
<td>70.2</td>
<td>96.3</td>
<td>0.0</td>
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<td></td>
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<tr>
<td>RTBS</td>
<td>OR21</td>
<td>2020/04/02</td>
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<td>240.6</td>
<td>248.0</td>
<td>247.6</td>
<td>69.9</td>
<td>N/A</td>
<td>(1)</td>
<td>0.0</td>
<td>Note 2</td>
</tr>
</tbody>
</table>

Notes:

1. Results are SYSDLY values.
2. MJD 59032 for GPS values; MJD 59122 for Galileo values.

Version history

V1.0 2020/06/10: Final GPS results from V1.1 of the PTB Calibration report, to be implemented in the receivers:

V2.0 2020/10/06: Galileo results added in Table 1 from V1.2 of the PTB Calibration report.