Group 1-2 calibrations for UTC
Update on guidelines, results and implementation plans

G. Petit
BIPM Time Department

GNSS WG Meeting
5 April 2016
Outline

- Calibration Guidelines: Updates
- Status of GPS Group 1 and Group 2 calibrations
- Implementation in BIPM Circular T
Covers evolution of a calibrated system between two calibration exercises

- Change in set-up (affecting only REFDLY)
- or change in some elements (antenna cable?)
- or replacement of a full system
- or ...

What should be done?

- If change affects only REFDLY AND if calibration results are expressed as INTDLY or SYSDLY, just measure and report the new REFDLY value. No change in Calibration Identifier (Cal_Id) nor in $u_{\text{CAL}}$.
- In all other cases, the laboratory should perform and report a “transfer of calibration”
Transfer of calibration

Transfer of calibration (TC)

- Typically done by simultaneous operation of two systems in common-clock;
  - Either the new receiver in parallel to the old one
  - Or using a backup receiver to bridge between the new system/set-up and the old one
- Short report to be transmitted to the BIPM;
- Cal_Id (znnn-YYYY) will be expanded to reflect the TC
  - Same system as was initially calibrated: New Cal_Id = znnn-YYYY-TC1
  - New system: New Cal_Id = znnn-YYYY-SSSS-TC1 where SSSS is the originally calibrated system
  - TC counter can be incremented (TC2, TC3 ...), each time with a report
  - BIPM will expand $u_{CAL}$ by 1 ns in quadrature.
Calibrations web page

http://www.bipm.org/jsp/en/TimeCalibrations.jsp

On line 09/04/2015

Intended to host all reports of UTC calibrations

WARNING: ftp contents have been moved from ftp://tai.bipm.org/TFG/.. to ftp://ftp2.bipm.org/pub/tai/.. on 24/03/2016.
- Display completed by « Last updated ».
- Eventually will be accessed through the future database.
Status of G1-2 calibrations

Status of planned and requested GPS calibration exercises

Information in these tables is provided on a best-effort basis and do not imply a commitment of the mentioned institutions or individuals. The tables will be updated as required, please send all updates to tai@bipm.org or gpetit@bipm.org.

The first table provides a summary of the planned calibration exercises and the attributed calibration identifiers.

<table>
<thead>
<tr>
<th>Cal_Id</th>
<th>Umbrella</th>
<th>Responsible</th>
<th>Planned_period</th>
<th>Visits</th>
<th>Type</th>
<th>Links to documents</th>
<th>Comments</th>
<th>Notes</th>
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<td>1001-2016</td>
<td>BIPM</td>
<td>02/2016 onwards</td>
<td>NIM, NICT, TL</td>
<td>GPS-P1/P2</td>
<td>C1R</td>
<td>Group-1-trip</td>
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<td>ROA/H.-Estebane</td>
<td>Start-02/2016</td>
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</table>

- **Group 1 (2016) started (9 visits total)**
- **Group 2: 13 visits planned so far**
Implementation for Circular T

- January 2016: New form of Circular T
- \( u_{\text{CAL}}(t) = (u_{\text{CAL0}}^2 + u_{\text{AG}}^2 + u_{\text{AL}}^2)^{1/2} \)
  - Typically \( u_{\text{CAL0}} \) is 1.7 ns for G1, 2.5 ns (default) for G2 trips (closure), 4 ns (default) for “golden system” (no closure).
Future training course

- The BIPM plans to organize (within 1 year) a training course on calibrations.
- Practical issues linked to calibration measurements, laboratory set-up etc...
- More details later.
THANK YOU

Thanks to all Group 1 and other participating laboratories