54th CGSIC Meeting

Timing Subcommittee Report

Chair: Włodzimierz Lewandowski, BIPM
Co-Chair: Victor Zhang, NIST

Tampa, Florida, 9 September 2014

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AREAS BEING SERVED

- Coordinated Universal Time (UTC)
- International Timing Centers
- Global Navigation Satellite Systems
- Telecommunications Industries
- Two-Way Satellite Time Transfer (TWSTFT)
- Two-Way Optical Fiber Time Transfer (TW**O**TFT)
- Power Grids and other Industries
- As Research and Comparison Tool
- Other

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Tampa, Florida, 8 September 2014

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2:00 Introduction – *Włodzimierz Lewandowski, ESA PB-Nav*
2:10 Report from NIST – *Victor Zhang, NIST*
2:30 Report from USNO – *Stephen Mitchell, USNO*
3:00 Report from APL – *Mihran Miranian, APL*
3:20 Coffee Break
3:40 The NTSC contribution to BeiDou System Time – *LU Xiaochun, WU Haitao, NTSC*
4:00 Modelling the GPS+Galileo+Egnos Constellation – *Mathias Suess, DLR*
4:20 A Common Clock Reference For All GNSS – *Tom Stansell, Stansell Consulting*
4:40 Comments on the Debate over the Proposal to Redefine UTC – *Demetrios Matsakis, USNO*
5:10 Discussion
5:30 Session End

Yesterday meeting issues

- ✓ Time laboratories reports:

  US and China

- ✓ A composite GNSS clock for SBAS

- ✓ A common clock reference for all GNSSs

- ✓ Debate over the Proposal to Redefine UTC

- ✓ An opinion of CGSIC on redefinition of UTC

CGSIC opinion on the redefinition of UTC now under consideration by the International Telecommunications Union (ITU)

Prepared by Timing Subcommittee and endorsed by the CGSIC Excom

The Civil GPS Interface Committee,

Considering that

- In 1971, the ITU-R (formerly CCIR, International Consultative Committee for Radiocommunications) proposed the present form of Coordinated Universal Time (UTC), which is based upon the SI second but remains linked to the variable rotation of the Earth through the introduction of leap seconds, which are inserted preferentially at the end of December 31 or June 30 in such a manner that |UT1-UTC| will always be less than 0.9 second.
- This proposal was accepted after discussions with BIH (Bureau International
- de l'Heure), URSI, IAU, IUGG, and other bodies active in positioning and
- navigation.
- At the time of introduction, the future implementation of satellite and other systems which cannot easily incorporate the leap second was not foreseeable.
- A proposal on the redefinition of UTC is under consideration by ITU, about which the ITU has solicited the opinion of several international bodies

And further considering that

- leap second insertions have increasingly been associated with failures of navigational as well as timing systems, among them the ground, transmission, or accounting systems of GPS, LORAN, and commercial air travel,
- in one instance uncorrected mis-programming of a GPS receiver was responsible for a failure in mid-month, at a time when no leap second would have been expected,
- approximately 10% of the world's Network Time Protocol (NTP) servers, which provides an internet-based timing structure upon which many navigational systems depend, failed to correctly handle the leap second insertion of 2012,
- never as long as NTP servers have been monitored has every one correctly predicted the presence or absence of leap second on a December 31 or June 30,
- some systems have been mis-programmed to insert leap seconds after 23:59:59 local time instead of 23:59:59 UTC,
- many corporations, governments, providers of navigational systems, and other groups do not report failures as a matter of policy,-
- and in the interests of safety some systems cease operations at the time a leap second is to be introduced
- although navigational systems must and do continue operating through leap second insertions.

Concludes

- That many navigational and timing systems are at risk of failure due to possible leap second insertions,
- which although numerically few can pose an unacceptable danger to travelers

And is therefore of the opinion that

- Leap seconds should cease to be inserted in the near future,
- UTC should become a unique and continuous reference time scale,
- and that a period of at least 5 years be allowed so that operators of navigational systems can make adequate preparations.

And therefore requests that

- The co-chairs of the CGSIC Timing Subcommittee forward this opinion to the ITU.

Upcoming meetings

- ✓ ITU-R Worshop on UTC, 1-7 October 2014, Geneve
- ✓ 9th Meeting of the International Committee on GNSS (ICG-8)
  10-14 November 2014, Prague, Czech Republic
  - ✓ GPS, GLONASS, Galileo, BeiDou, IRNSS, QZSS
- ✓ PTTI 2014
  1-5 December 2014, Boston, Massachusetts
- ✓ Joint IEEE International FCS and 24th EFTF
  12-15 April, Denver, Colorado

Thank you
for your attention!