Key issues on contributing to UTC and UTCr

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10h Meeting of laboratories contributing to UTC

Sèvres, 16 September 2015

Bureau
International des
Poids et
Mesures

Contribution to UTC

NMIs, DIs, other institutes, organizations
Equipped with:
- ✓ **Clocks**
- ✓ **Time transfer equipment**
- ✓ **Some maintaining PSFS**

CIRCULAR T 332
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BUREAU INTERNATIONAL DES POIDS ET MESURES
ORGANISATION INTERGOUVERNEMENTALE DE LA CONVENTION DU METRE
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1 - Coordinated Universal Time UTC and its local realizations UTC(k). Computed values of [UTC-UTC(k)]
    and uncertainties valid for the period of this Circular. From 2015 July 1, 0h UTC, TAI-UTC = 36 s.

| Date 2015 0h UTC | JUL 31 | AUG 5 | AUG 10 | AUG 15 | AUG 20 | AUG 25 | AUG 30 | Uncertainty/ns | | Notes |
Laboratory k MJD		57234	57239	57244	57249	57254	57259	57264 u_A	u_B	u
AOS (Borowiec)	-3.4	-1.5	0.5	2.0	1.5	1.1	-0.3	0.3	5.1	5.1
APL (Laurel)	2.0	-2.6	-3.0	-6.9	-7.8	-8.5	-4.8	0.3	4.9	4.9
AUS (Sydney)	-805.7	-792.0	-776.6	-759.5	-727.1	-699.2	-675.5	0.3	5.1	5.1
BEV (Wien)	27.3	33.6	26.6	14.6	5.4	3.9	0.8	0.3	3.1	3.1
BIM (Sofiya)	2537.7	2545.3	2585.0	2596.2	2631.5	2640.4	2693.2	1.5	7.0	7.2
BIRM (Beijing)	-40.5	-	-	-	-	-	-	1.5	20.0	20.1
BY (Minsk)	7.0	10.1	11.1	5.4	5.7	4.8	4.3	1.5	7.0	7.2
CAO (Cagliari)	-	-7114.4	-7209.4	-7313.7	-7412.4	-7502.9	-7595.2	8.0	7.0	10.7
CH (Bern-Wabern)	7.0	6.6	6.3	7.1	8.3	10.3	12.3	0.3	1.3	1.3
CNM (Queretaro)	-3.6	-4.8	-4.9	-3.2	-4.0	-0.5	-1.9	3.0	5.0	5.8
CNMP (Panama)	-90.5	-56.3	-31.1	-5.0	-11.4	-5.5	-16.1	3.5	5.1	6.2
DFNT (Tunis)	11741.1	11924.0	12093.4	12274.3	12462.4	12674.5	-	0.3	20.0	20.0
DMDM (Belgrade)	-5.0	-6.5	2.9	6.3	3.6	2.0	0.4	0.3	7.0	7.0
DTAG (Frankfurt/M)	49.2	53.5	59.7	63.9	68.3	77.1	79.5	0.3	10.0	10.0
EIM (Thessaloniki)	14.7	15.4	-	-	-	-	-	7.5	5.1	9.0
ESTC (Noordwijk)	-0.5	0.7	0.8	-0.6	-1.0	1.0	0.7	0.4	5.0	5.1
HKO (Hong Kong)	22.8	25.1	24.8	23.9	18.5	23.3	24.8	0.3	5.1	5.1
IFAG (Wettzell)	-899.5	-890.8	-886.3	-879.6	-872.0	-869.4	-862.4	0.3	5.0	5.0
IGNA (Buenos Aires)	-	-	-	-	-	-	-			
IMBH (Sarajevo)	-1.3	4.7	7.2	10.6	13.2	21.5	28.2	0.3	7.0	7.1

Participation to CCTF-K001.UTC NMIs, DIs

NMIs signatories of the CIPM MRA, DIs
- ✓ **Also participate to UTC**
- ✓ **Fullfil the conditions for declaring CMCs**

2

Paticipation to UTCr

Participants to UTC
With capacity of submitting
- ✓ **Daily clock data**
- ✓ **Daily time transfer files**

```
UTCr_1536
2015 SEPTEMBER 09, 12h UTC

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                    Computed values of [UTCr-UTC(k)]
```

Date 2015 0h UTC	AUG 31	SEP 1	SEP 2	SEP 3	SEP 4	SEP 5	SEP 6
MJD	57265	57266	57267	57268	57269	57270	57271
Laboratory k				[UTCr-UTC(k)]/ns			
AOS (Borowiec)	0.7	-1.1	-1.3	-0.9	-2.0	-1.6	-1.4
AUS (Sydney)	-662.4	-660.2	-655.7	-651.0	-647.2	-643.0	-640.5
BEV (Wien)	2.3	-4.8	-2.0	0.5	-2.3	-4.2	-7.2
CH (Bern-Wabern)	12.9	12.9	13.7	14.0	13.6	13.3	13.2
CNM (Queretaro)	-2.7	-3.8	-4.8	-2.5	-4.7	-4.3	-3.0
CNMP (Panama)	-15.9	-20.6	-27.4	-20.0	-20.9	-17.7	-20.0
DMDM (Belgrade)	1.6	4.1	5.9	12.1	12.8	11.2	7.9
DTAG (Frankfurt/M)	78.6	78.7	81.5	81.1	83.9	84.4	85.8
ESTC (Noordwijk)	0.4	0.2	0.8	1.1	1.2	1.7	2.1
IFAG (Wettzell)	-868.3	-851.4	36.0	-895.9	-591.8	-850.0	-319.5
IMBH (Sarajevo)	33.3	36.2	34.8	37.0	39.6	42.2	43.0
INTI (Buenos Aires)	33.7	35.5	33.1	30.9	33.5	30.7	27.1
INXE (Rio de Janeiro)	-23.0	-26.4	-29.0	-29.2	-31.5	-33.0	-30.0
IT (Torino)	-4.5	-5.5	-5.3	-5.4	-5.6	-5.8	-5.6
KRIS (Daejeon)	12.3	11.1	11.1	10.1	9.6	8.5	8.2
LT (Vilnius)	959.4	950.9	949.5	950.8	941.1	941.2	936.0
MTC (Makkah)	225.3	227.4	227.7	228.1	230.1	231.5	232.3
NAO (Mizusawa)	66.8	62.7	58.4	63.6	61.9	62.1	67.5
NICT (Tokyo)	13.1	12.6	13.1	13.1	13.4	13.8	14.0
NIM (Beijing)	2.3	1.8	1.7	1.8	1.5	1.7	1.8
NIMT (Pathumthani)	21.0	21.9	24.0	23.6	18.1	18.3	16.2
NIST (Boulder)	13.8	13.5	13.5	13.4	13.1	13.3	13.5
NMIJ (Tsukuba)	2.8	2.4	2.5	2.8	2.8	2.9	2.9
NMLS (Sepang)	-190.5	-189.5	-191.5	-190.2	-191.3	-188.2	-190.7

- ✓ **Weekly solution**
- ✓ **Calculated over four weeks of data**
- ✓ **Fully automated procedure**
- ✓ **« quasi » real time**

- ✓ **Different data submission is necessary for UTC and UTCr.**

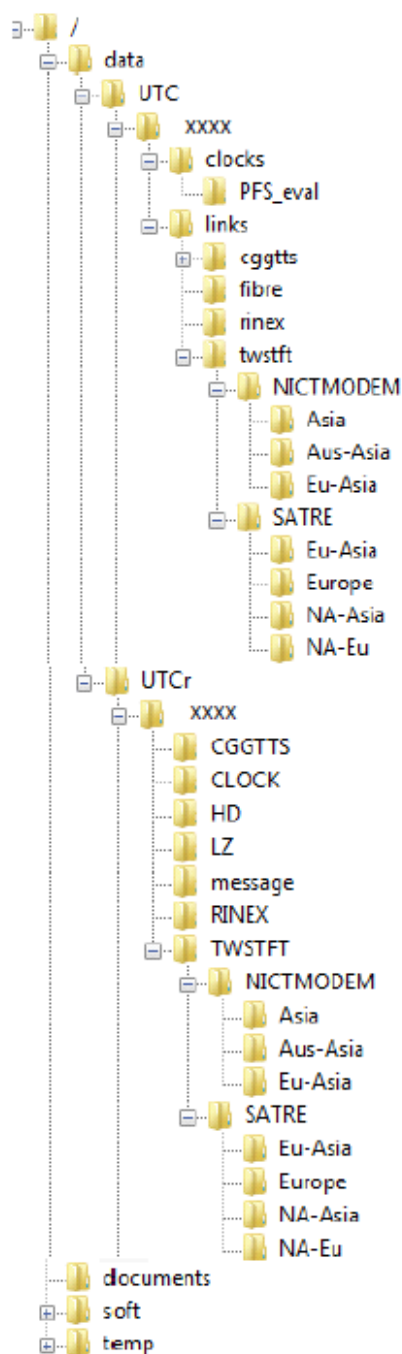- ✓ **There are no cross-checks between UTC and UTCr data.**

- ✓ **Data downloading from the server is automated**

- ✓ **In the process of calculation of Circular T laboratories are contacted if necessary (completing /correcting/clarifying).**
- ✓ **The objective is providing optimal, final results.**

- ✓ **The process of calculation of UTCr has been fully automated. Reminders are automatically sent.**
- ✓ **The objective is providing rapid results.**

```
⊟ 📁 /
   ⊟ 📁 data
      ⊟ 📁 UTC
         ⊟ 📁 XXXX
            ⊟ 📁 clocks
               └─ 📁 PFS_eval
            ⊟ 📁 links
               ├─ 📁 cggtts
               ├─ 📁 fibre
               ├─ 📁 rinex
               ⊟ 📁 twstft
                  ⊟ 📁 NICTMODEM
                     ├─ 📁 Asia
                     ├─ 📁 Aus-Asia
                     └─ 📁 Eu-Asia
                  ⊟ 📁 SATRE
                     ├─ 📁 Eu-Asia
                     ├─ 📁 Europe
                     ├─ 📁 NA-Asia
                     └─ 📁 NA-Eu
      ⊟ 📁 UTCr
         ⊟ 📁 XXXX
            ├─ 📁 CGGTTS
            ├─ 📁 CLOCK
            ├─ 📁 HD
            ├─ 📁 LZ
            ├─ 📁 message
            ├─ 📁 RINEX
            ⊟ 📁 TWSTFT
               ⊟ 📁 NICTMODEM
                  ├─ 📁 Asia
                  ├─ 📁 Aus-Asia
                  └─ 📁 Eu-Asia
               ⊟ 📁 SATRE
                  ├─ 📁 Eu-Asia
                  ├─ 📁 Europe
                  ├─ 📁 NA-Asia
                  └─ 📁 NA-Eu
   ├─ 📁 documents
   ⊞ 📁 soft
   ⊞ 📁 temp
```

Regarding files submission for UTC:

Put your data in the remote directory "/data/UTC/**XXXX**/" where "**XXXX**" is the BIPM acronym of your laboratory, as in Section 1 of Circular T (see laboratory list).

Use the FTP data structure and put the data files in the appropriate subdirectory (refer to "Names convention" for more details on file names):

/data/UTC/XXXX/clocks
The standard name for the clock data files is: **CDLL__yy.mm_** (see format and clock codes)

/data/UTC/XXXX/clocks/PFS_eval
The standard names for the PFS and SFS data files are respectively **XXXXyymm.PFS** and **XXXXyymm.SFS** where "**yymm**" is the Circular T interval corresponding to the period of evaluation (see PSFS format)

/data/UTC/XXXX/links(Daily data uploading is requested)

/data/UTC/XXXX/links/cggtts
files named as for example : **GMLLmodd.ddd, GSLLmodd.ddd, GZLLmodd.ddd, LZLLmodd.ddd, RMLLmodd.ddd**,etc… (see cggtts format v1 , cggtts format v2, CGGTTS headers). Check and update antenna coordinates in case of new values.

You may also create additional subdirectories in "/links/cggtts" if you have several receivers according to the name convention **LLmo**

/data/UTC/XXXX/links/fibre
files named **FBAABBdd.ddd**
where "**AA**" and "**BB**" are the two alphabetical character codes of the two laboratories under comparison.

/data/UTC/XXXX/links/rinex
Files named **ssssdoy0.yyc.Z** (for IGS receivers) or **LLomdoy0.yyc.Z** (for non IGS receivers)
"**ssss**" is a 4-character acronym for the receiver: IGS acronym in the case of IGS receivers
"**doy**" is the day of year number
"**yy**" are the last two digits of the year number (see details).

/data/UTC/XXXX/links/twstft(Daily data upload is requested) files named **TWLABdd.ddd** (see TW header, and twstft directory structure)

Data submission, instructions and deadlines

Directory tree (left sidebar):
```
/
 data
  UTC
   xxxx
    clocks
     PFS_eval
    links
     cggtts
     fibre
     rinex
     twstft
      NICTMODEM
       Asia
       Aus-Asia
       Eu-Asia
      SATRE
       Eu-Asia
       Europe
       NA-Asia
       NA-Eu
  UTCr
   xxxx
    CGGTTS
    CLOCK
    HD
    LZ
    message
    RINEX
    TWSTFT
     NICTMODEM
      Asia
      Aus-Asia
      Eu-Asia
     SATRE
      Eu-Asia
      Europe
      NA-Asia
      NA-Eu
 documents
 soft
 temp
```

Data submission is via ftp ONLY

Messages with information, requests, etc. should be addressed to tai@bipm.org

UTC

UTCr

Clock file
[UTC(k) – clock]
at standard MJDs
0 h UTC
Clock steps (jumps)

Clock file
[UTC(k) – clock]
Every day
at 0 h UTC
Clock steps (jumps)

Time Transfer files
daily/weekly/monthly

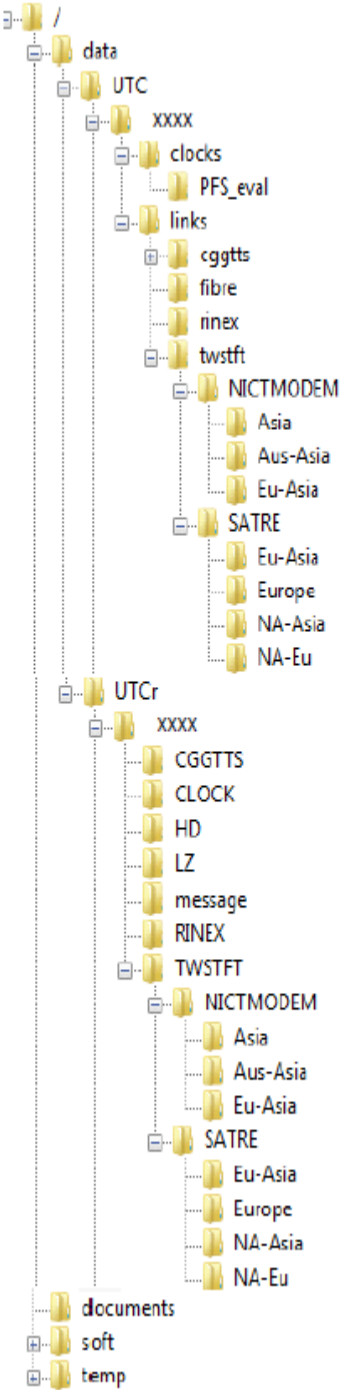**Time Transfer files**
daily (data), daily submission

Deadline
4 of the month

FINAL deadline Sunday
midnight UTC

Deadline PSFS
4 of the month

Reminders (autom)
Pre-calculation Tue. 12 h UTC
Final results / Publication
Wednesday 18 h UTC (latest)

Publication
8 to 10 month

The Time Department «wish list»

- If you have a master (unique) clock , send a data file (filled with zeros); in 2016 we will stop the creation of master files with T-Soft;

- Daily files can be extracted from TTS-2 receivers (contact a colleague who could!);

- Backup receiver is welcome;

- If you plan to operate a new «master receiver», submit at least one month of overlapping data old-new, we need to check their alignment;

- Submit RINEX files whenever possible (TTS-4 data, for ex.);

- Guidelines for contribution, data submission, formats, etc. are available on the web, consult them when necessary.

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Web Visit

THANKS FOR YOUR CONTRIBUTION!

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