

Report of the WG on MRA

Franco Cordara
Chairman

Istituto Nazionale di Ricerca Metrologica, Torino - Italy

Actions after the 18th CCTF meeting

- Adoption of new Terms of Reference for the WGMRA as agreed
- Definition of new WG membership, adding Experts from Time Laboratories and BIPM to the RMOs representatives (TCs T&F chairs)
- Collaboration with BIPM to develop 2 new guidelines related to the uncertainty in frequency, to clocks uncertainty prediction and revise the existing guidelines.
- Collaboration with JCRB Secretary on CMCs review matters

WG MRA membership (2012)

◆ **Time and Frequency Technical Committee Chairpersons**
of APMP, AFRIMETS, COOMET, EURAMET, SIM
(H.T.Lin, C.Matthee, V.Palchnikov, A.Bauch, J.M.Lopez)

◆ **Experts:** E. Dierikx (VSL), G.Panfilo (BIPM),
B.Warrington (NMIA)

Secretary: F.Arias (BIPM)

Chair: F. Cordara (INRIM, Italy).

New WGMRA Terms of Reference/1

- a) Authorization on a provisional basis for any action needed between meetings of the CCTF as indicated by the MRA, in consultation with the CCTF President;
- b) Perform coordination activities related to MRA between RMOs;
- c) Act as point of contact for BIPM and JCRB on MRA matters;
- d) Report actions to the next CCTF meeting, the CCTF revising the decisions as required;
- e) Identify areas where additional key comparisons and supplementary comparisons are needed and develop the necessary guidelines and procedures;

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New WGMRA Terms of Reference/2

- f) Provide guidance on the range of CMCs supported by particular key and supplementary comparisons;
- g) Establish and maintain a list of service categories, and where necessary rules for the preparation of CMC entries;
- h) Agree on detailed technical review criteria;
- i) Coordinate the review of existing CMCs in the context of new results of key and supplementary comparisons.

Status of the CMCs for Time and Frequency

At the beginning of 2012, NMIs and Dis of 45 countries were listed in the KCDB as suppliers of calibration services for Time and Frequency.

According to the service classification (upper level) of WGMRA Guideline 1:

- ◆ Time scale difference for 34 countries
- ◆ Frequency for 44 countries
- ◆ Time Interval for 34 countries

Dates of approval of these CMCs range from 2005 to 2011

No information about any periodical review from the RMOs is available

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New documents related to the MRA activities

New guidance documents related to MRA activities have been approved since the last CCTF and are available in the BIPM website under BIPM-CIPM MRA documents:

- ❖ CIPM-MRA-D-04 Calibration and Measurement Capabilities in the context of CIPM MRA, Jan 2011
- ❖ CIPM/2009-24 Traceability in the CIPM MRA, Oct 2009
- ❖ CIPM-MRA-G-02, JCRB guidelines for the monitoring and reporting of the operation of quality systems by RMOs, Jan 2011,
- ❖ CIPM MRA-D-05 Measurement comparisons in the CIPM-MRA, Jun 2012

Some of them were considered for the review of already existing guidelines

Implementation of CCTF-K001.UTC

Following the decision taken at the CCTF 2009, no degrees of equivalence between the key comparison results and the UTC(k) data is reported on the KCDB, the last table on the web being for MJD 55009 (2009 June 27).

In the KCDB there is a link instead to the BIPM Circular T where the results of the key comparison every 5 days can be found for the 69 laboratories contributing to TAI. (in 2012)

A note makes a reference to the CCTF 2009 decision and to the document “Guidelines for participation in the ongoing key comparison in time CCTF.K001.UTC”.

New WGMRA Guidelines/1

At the last CCTF the questions about the uncertainty in frequency calibration services and the uncertainty of the prediction of UTC-UTC(k) in the Time scale difference CMCs were left open.

After the studies of dr. G.Panfilo two new guidelines were prepared and agreed with the WGMRA chair in May 2012.

The Guideline “Uncertainty in Frequency” completes the existing Guideline 3 “The uncertainty interpolation for T&F CMC entries” suggesting a way to compute the uncertainty for frequency calibrations from the UTC-UTC(k) values and related uncertainties from Circular T.

New WGMRA Guidelines/2

The Guideline, “The prediction uncertainty”, is strictly related to the service category “Time scale difference – Local clock versus UTC” and gives a model to compute the uncertainty in predicting the time error of two types of reference clocks (caesium beam standard and hydrogen maser), commonly used in a UTC(k) generation, over a time span of 20 days, a parameter commonly found in the CMCs .

No review of WGMRA Guideline 1, related to the Time and Frequency services categories, was found necessary.

An editorial review of Guideline n.2 “The estimation of uncertainties for the T&F CMC entries” to update for the new types of time comparison links and for recent CIPM-MRA documents, and of Guideline n.3 for a more appropriate wording, was also done.

Proposed tasks by the WGMRA for the 19th CCTF

According to the duties assigned to the WGMRA and to the activities performed, the discussion and approval of the following documents is proposed:

- a) New Guideline “Uncertainty in Frequency”**
- b) New Guideline “The prediction Uncertainty”**
- c) Guideline 2 “The estimation of uncertainties for the T&F CMC entries” (Rev Dec2011-July2012),**
- d) Guideline 3 “The uncertainty interpolation for T&F CMC entries” (Rev Dec2011-July2012).**

The WG also proposes that all the guidelines related to the CMCs are made available on the web to users either on the KCDB or in the CCTF WGMRA.

WGMRA Open issues

Some suggested topics that need to be discussed during this meeting or to be faced in the next term by this WG:

- 1) How can be improved the effectiveness of communication between the RMOs representants and the other WGMRA members,**
- 2) Development of a guideline on the technical criteria for the CMCs review and their periodical evaluation,**
- 3) Regular collection of the information on regional time links calibration performed and agreement with BIPM on a common calibration protocol;**
- 4) Establishment of an operative principle for a periodical evaluation of the degree of equivalence of the CMCs claimed by the NMIs, available in the KCDB, versus the CCTF.K001.UTC results.**