**Interview with Vincent Meens, Head Frequency Bureau, CNES**

1. **What is the leap second and what is going to happen on 30 June?**

Until the middle of the 20th century the Earth was considered as the most precise clock and the second was defined in relation to the mean solar day. In the 1960’s came the atomic clocks and a new definition of the second as the duration of a number of transitions in the atom of Cesium. What we call the SI second, SI for Système International.

We knew at that time that the rotation of the Earth was irregular so we choose the second as a mean value. It just happened that from the introduction of the SI second the Earth rotation started to slow down probably more that it was anticipated implying that time measured with atomic clocks (what we call UTC) started to drift away from mean solar time.

In the 1970’s the mean solar day was about 1 ms longer that the UTC day. It’s a very short time but after a year the difference is about 1 s.

In 1972 it was decided to implement a procedure to adjust UTC with mean solar time. Any time the difference between UTC and UT1 or mean solar time was going to approach 0.9 s there would be either the insertion or the deletion of a second. What we call the leap second.

The last adjustment was in June 2012, as of today the difference between UTC and UT1 is 0.6 s and it was decided to make a further adjustment this year so the last day of June will be 1 s longer than usual and a leap second will be inserted at midnight UTC.

1. **How does the addition of the leap second affect us?**

As our conception of time is concerned this will not affect us, adding a leap second in a way is similar to the extra hour for daylight saving except that if you can sense the difference between the 24 hours day and the next 23 or 25 hours just as we had this last week-end but you won’t feel any difference with a day lasting 86400 seconds and the next one lasting 86401 s.

However the matter is different for digital systems. As you know all these systems are highly dependent on very precise time synchronization based on UTC so any time there is a leap second you have to make sure that it is inserted correctly and accepted worldwide. As leap seconds are only announced a few months in advance this cannot be done automatically, you need manual intervention and verification to make sure things are done properly and there won’t be any mishaps in the process. There were some problems in 2012 with internet sites and aircraft booking to name a few so I am sure people will be more prudent this year.

1. **What is the debate about abolishing the leap second?**

As I told you UTC time as we know it today is quite a recent invention dating from the middle of the 20th century and as the second is constant it is not linked any more to the Earth rotation. In fact before 1967 we adjusted our clocks with solar time and now we need to do the opposite adjust the Earth rotation with UTC. Unfortunately as there is no way to make the Earth rotate quicker or slower we decided maintain an artificial link to the Earth rotation through the implementation of the leap second.

If we stop inserting leap seconds we break that link and UTC and UT1 will start to diverge from each other. There were 25 leap seconds inserted in 40 years so we can expect that divergence to be at least 1 mn per century. That is causing some concerns for some administrations.

Another concern is for systems that require UTC close to UT1 such as astronomical observatories or celestial navigation, they will need to be updated to adapt to the new time and been able to recover UT1.

Finally another group of administrations is of the opinion that stopping the insertion of the leap second will be beneficial for the digital world where we live. You have to realize that there were problems with almost every leap second in the last 40 years although not as important and publicized as in 2012. Stopping the insertion of the leap second will mean saving time and money on the software update and removing the risks associated with inserting the leap second.

1. **Will this matter come up at the World Radiocommunication Conference next November?**

Yes it will, in 2012 when it was proposed to modify UTC by removing the leap second many administrations were of the opinion they needed more time to understand the implications and take a decision. So it was agreed to make it an agenda item for the World Radiocommunications Conference that will be held in Geneva this fall.

This is agenda item 1.14 on the feasibility to achieve a continuous time scale. There are 4 proposed methods

* Stopping the insertion of the leap second into UTC
* Broadcast UTC as it stands today along with another continuous time scale based on the atomic time
* Keep UTC as we know it but at the same time broadcast the difference with atomic time to reconstruct a continuous time.
* Or do nothing

As you can see this is quite a wide range of options so I expect vivid discussions at WRC-15. I would like to emphasize that it is important we do take a decision on this issue in November