The Galileo Time Validation Facility: One Year Of Real-Time Steering Of The Galileo System Time

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Since 1999 INRIM is involved in timing activities devoted to the development of the European Satellite Navigation System Galileo, in collaboration with the European metrological time laboratories and space industries, with the support of the European Commission and the European Space Agency.

In 2010-2013, INRIM designed and developed the Time Validation Facility (TVF), a key timing element to be used for the In Orbit Validation (IOV) Galileo phase carried out with the first 4 satellites in 2013.

This paper presents the TVF and the main results obtained in the IOV phase in the assessment of the Galileo timing system. The TVF had two major roles:

1. To support the validation of all the system clocks, both in space and on ground, and of the Galileo System Time (GST), showing the suitability of the Galileo clocks to the navigation aims.
2. To support the synchronization of the Galileo System Time versus the international reference time UTC. To this aim the TVF estimated and communicated to Galileo Precise Time Facility (PTF) the frequency steering correction to be applied to GST to maintain its time and frequency offset within the specified limits versus UTC. In addition, the difference UTC-GST was daily predicted and since April 2013 inserted in the transmitted Galileo navigation message to start the UTC dissemination service.

The main Galileo timing results of the IOV TVF are presented, addressing the Galileo System Time validation over one year of real-time steering and pointing out the most important contribution of time metrology to a navigation system.