The European DEMETRA Project: demonstrating time services based on the European GNSS

Extended abstract


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1. Introduction

DEMETRA (DEMonstrator of EGNSS services based on Time Reference Architecture) is a project funded by the European Union in the frame of the Horizon 2020 program, in which were involved 15 scientific and industrial partners from Belgium, Finland, France, Italy, Poland, Spain, UK. The project started in January 2015 and finished in December 2016 [1,2]. DEMETRA is a demonstrator capable to prove time services from ‘end to end’, based on the timing signal of the European Galileo system, adding particular features like certification, calibration, or integrity could be of interest in different fields such as traffic control, power distribution, finance, telecommunication, and scientific institutions. The concept of timing and synchronisation is a crucial point in different fields of application. The market analysis carried out in the Demetra project reported the finance, telecommunication, and energy to be the main strategic markets.

2. The Time Services

The demonstrator contains a core infrastructure and 9 different time services, integrated in a single modular demonstrator at INRIM in Torino, which was tested for 6 months, also involving possible future users in trial campaign and in different user workshops and interviews organized to catch the user needs. The list of the 9 time services is as follows:

Service 01: Time broadcasting over TV/Radio links: to test a mass market service with an acoustic signal distributing time from the radio-broadcasting transmission

Service 02: Certified Trusted Time Distribution using NTP: a novel NTP allowing audit to the client and issuing a certificate of VALID or INVALID time that can be available also a posteriori for any legal need.

Service 03: Time and Frequency Distribution over Optical link: the most accurate, stable, and reliable way to transmit standard time and frequency on an optical fiber to special and important users.

Service 04: Time and Frequency Distribution via GEO Satellite: one master and three ancillary stations allow to transmit time code on a Geostationary satellite estimating its position and transmitting time to the users with 100 ns accuracy.

Service 05: User GNSS Receiver Calibration: to measure the internal delays of GNSS receivers allowing precise time transfer.

Service 06: Certified Time Steering: a user GNSS receiver is sending in real time its measures to a master station receiving information on its clock offset, the necessary steering correction, and a certificate on the time and frequency offset.

Service 07: Time Monitoring and Steering: a Web page able to monitor the status of a user time scale connected to a GNSS receiver and the GNSS measures, and providing information to the user on the time scale steering to match UTC.

Service 08: Time Integrity: information on the GNSS clock status and on the quality of the timing parameters, GGTO and UTC, transmitted in the navigation message.

Service 09: All-in-one Time Synchronization Solution: a scalable and customized network of GNSS receivers continuously monitored by a master station and kept in strict synchronization agreement. The results of the experimentation and the main lesson learned will be presented.

3. References