Current status of the Galileo Terrestrial Reference Frame

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The realisation and maintenance of the Galileo Terrestrial Reference Frame (GTRF) is one of the components contributing to the Galileo system performance. The GTRF shall be compatible with the International Terrestrial Reference Frame (ITRF) within a precision level of 3 cm (2 sigma). To achieve this, a Galileo Geodetic Service Provider (GGSP) has been defined by the project already at the early stages of the programme.

A prototype system has been established since 2005 by a consortium composed of GFZ Potsdam, ESA/ESOC (Darmstadt), University of Bern, BKG (Frankfurt) and IGN (Saint-Mandé), processing data from the Galileo Experimental Sensor Stations (GESS) and stations of the International GNSS Service (IGS), allowing an accurate GTRF alignment to the ITRF.

The prototype system has delivered high-precision orbit and clock solutions and other key products like Earth orientation parameters, ionospheric corrections and system biases. It was later incorporated in the Galileo 'Time and Geodetic Validation Facility (TGVF)'. Renamed 'Orbit Validation Facility (OVF)' the prototype system has routinely processed data from GPS, the experimental Giove satellites and on an experimental basis also the first Galileo IOV satellites.

The GTRF is based on state of the art standards and conventions. The concept of the establishment and maintenance of the GTRF, based on product combination from three independent processing centres, was proven with GPS data processing through the involvement of the team in IGS and IERS activities. By introducing Giove and Galileo IOV data, it has been demonstrated that the GTRF produced by the TGVF-OVF can be maintained once Galileo reaches its operational stage.

This paper will present an overview of the GGSP and TGVF-OVF projects, describing the purpose of the activity, the consortium implementing it, the system architecture and the schedule to date, demonstrating that all milestones and requirements have been achieved. Selected results of GPS and Giove data analysis will be presented.