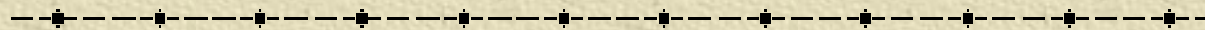
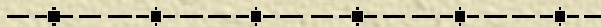




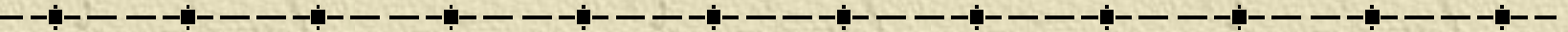
The ITRF/Galileo interface



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Overview



- ✦ The Galileo Terrestrial Reference Frame (GTRF)
- ✦ Use of Galileo for ITRF
- ✦ Organisational aspects
- ✦ Liability of ITRF

Galileo Terrestrial Reference Frame (GTRF)

✦ Reference documents:

- ◆ Mission High Level Document 2002
- ◆ Mission Requirement Document 2002
- ◆ ESA specifications ESTEC 2002

✦ Specifications

- ◆ Definition of GTRF
- ◆ GTRF and Galileo Sensor Station Network

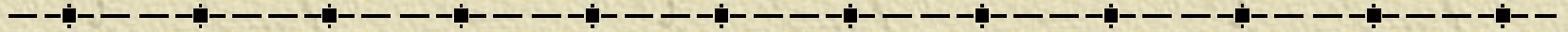
Mission High Level Document (HLD) p 15

-
- ✦ The Galileo services can be referred back to the latest publicised and accepted realisation of the international terrestrial reference frame (ITRF) and the universal time coordinate (UTC). This is important for interoperability with other GNSS, most notably GPS.

Galileo Sensor Stations (HLD p 32)

-
- ✦ Galileo Sensor Stations collect(ing) navigation data from the Galileo satellites as well as meteorological and other required environmental information. This information is passed to the Galileo Control Centre for processing.

Mission Requirement Document



- **1.1.1 Terrestrial Reference Frame**

- ◆ **1.1.1.1 Terrestrial Reference Frame Definition**

- ✱ The GTRF shall be an independent realisation of the ITRS

- ◆ **1.1.1.2 Terrestrial Reference Frame Compatibility**

- ✱ MR-381. The Galileo Terrestrial Reference Frame (GTRF) shall be compatible with ITRS.

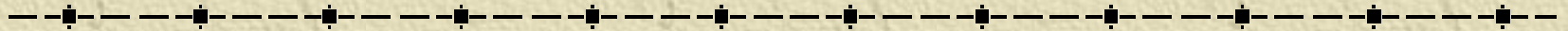
- ◆ **1.1.1.3 Terrestrial Reference Frame Limitation**

- ✱ The maximum difference between the GTRF and the ITRS (ITRF-96 latest realisation - RD TBD) shall be limited to within 3 cm.

- **1.1.2 Time Reference Frame**

- ✱ MR-391. Galileo System Time (GST) shall be a continuous co-ordinate time scale in a geocentric reference frame, steered towards TAI.

ESA specifications (ESTEC 18 jan 2002)



Geodetic Reference Frame Issues

- ✦ Definition and establishment of a Galileo Terrestrial Reference Frame (GTRF), closely aligned with ITRF
- ✦ • Relation of GTRF with existing reference frames (e.g. WGS 84, PZ 90, ITRF 2000)
- ✦ • Maintenance of the GTRF
- ✦ • Determination of OSS station coordinates (e.g. strategy for initial coordinates, operational re-calibration, achievable accuracy, equipment to be used).

Specifications of GTRF

✦ Definition of GTRF

- ◆ Realization of ITRS by a network including GSSN

✦ Strategy

- ◆ For the network
 - Permanent or temporary colocations
- ◆ Data availability
 - Campaigns with GPS or GNSS receivers
 - Availability of data from GSS
- ◆ Processing centers
- ◆ Schedule
 - Specifications
 - Initial determination of GTRF
 - Maintenance of GTRF

Use of Galileo for ITRF

-
- ✦ Full parallelism with GPS, and GLONASS
 - ✦ This task should be ensured by IGS in the present organisational scheme
 - ✦ The IAG/IGS WG on GNSS should establish an implementation plan
 - ✦ An opportunity to investigate and promulgate the concept of GNSS as the combinedus of the individual systems (GPS, GLONASS, Galileo, ...)
 - ✦ One open question: status of GSSN wrt ITRF Network

Organisational aspects

-
- ✠ On Galileo side
 - ◆ EC
 - ◆ ESA
 - ◆ Galileo Joint Undertaking #
 - ◆ Future operator
 - ✠ On IAG side
 - ◆ IGS#
 - ◆ IERS
 - ◆ IGGOS
 - ✠ European or national bodies
 - ◆ EPIGGOS
 - ◆ National organisations

Opportunities

- ✦ Expertise for the Galileo JU (cf letter from IAG)
- ✦ Answer to call for tenders by the JU (6th Framework)
- ✦ A unique interface for ITRF/Galileo: to be investigated by the WG on GNSS
- ✦ Think about mid and long term strategy

Liability of ITRF

-
- ✦ ITRF under the responsibility of IERS, a non governmental international cooperative service
 - ✦ Need to ensure long term availability and reliability of ITRF (not only for Galileo)
 - ✦ A issue investigated by the IAG SC 1.2
 - ✦ A possible option is to find an intergovernmental umbrella
 - ◆ IGOS, GEO, UN, BIPM/CGPM...

Summary

✦ Objectives

- ◆ Specify the realization of GTRF
- ◆ Implementation plan for the use of Galileo by IGS

✦ Organization

- ◆ Galileo JU/IGS interface
- ◆ WG on GNSS in charge for IGS

✦ Short term actions

- ◆ Expertise
- ◆ Call for tenders from Galileo JU

✦ More liable umbrella for ITRF