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to make your job easier.


Il supporto logistico nelle missioni spaziali europee

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Galileo – Sistema Europeo di NAV e LOC



Copertura mondiale con precisione di qualche centimetro

The diagram illustrates the Galileo satellite constellation. It features a central Earth with the continents of Europe and Africa visible. Surrounding the Earth are three intersecting orbital planes, each containing several satellites. The satellites are connected by a network of lines, representing the global coverage of the system. Three callout boxes provide additional information: a green box at the top left, a brown box at the top right, and a purple box at the bottom left.

Open Service, Commercial Service, Public Regulated Service, Search & Rescue Service

Costellazione di satelliti sul piano Walker a 23000 km



Galileo – Presentazione (cortesemente CNES)

Galileo is Europe's own global navigation satellite system, providing a highly accurate, guaranteed global positioning service under civilian control.

Precision

With 6-8 Galileo satellites visible, and the combination with GPS, positioning within a few centimeters, depending on the service used.

VIDEO

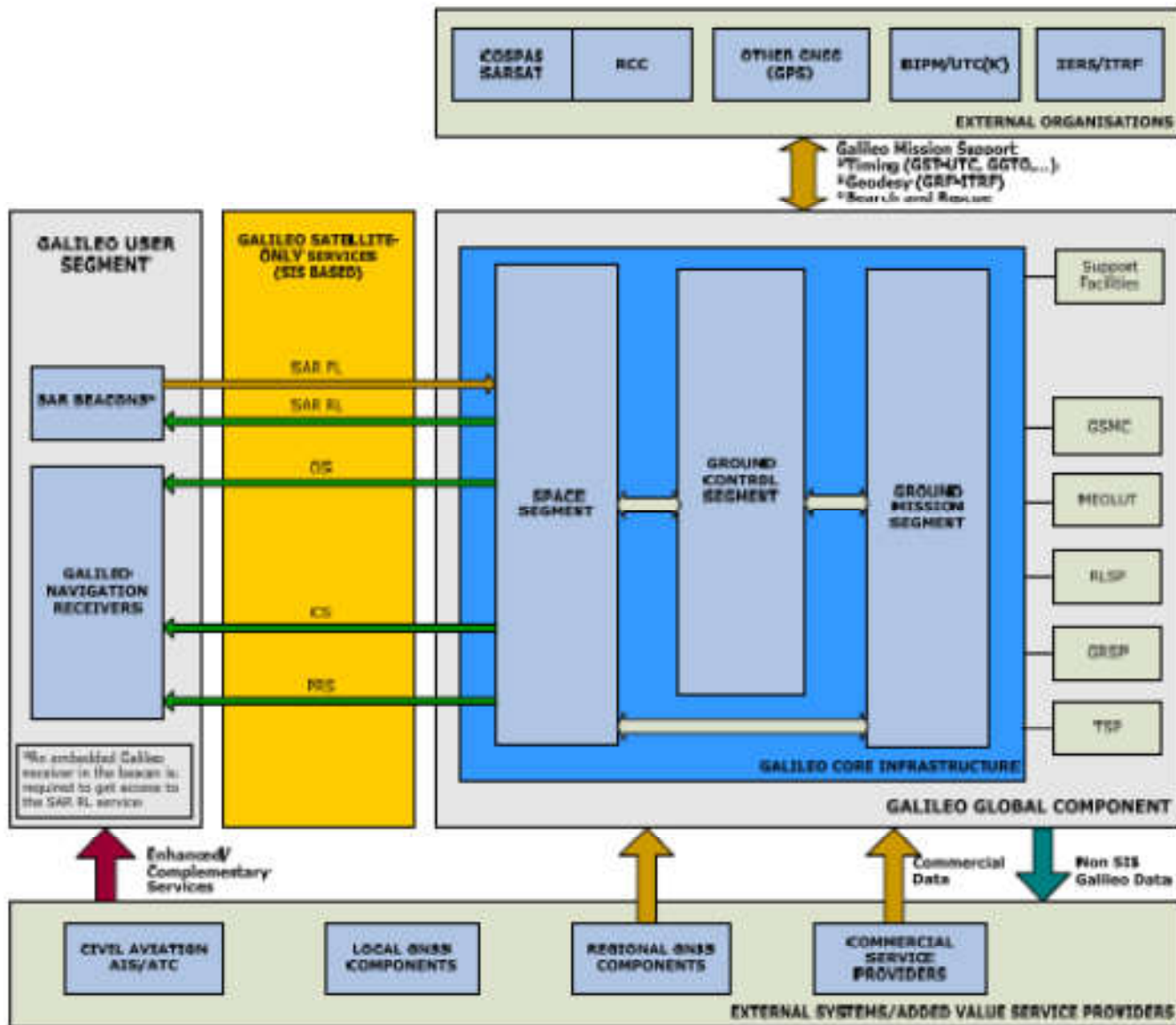
The Services

- Open Service
- Commercial Services
- Public Regulated Services
- Search & Rescue Services

Constellation of 30 Satellites in a Walker plane at 23,000 Km

Currently 14 in orbit by Soyuz (two by two), in autumn 2016 4 more satellite by Ariane 5

Descrizione a blocchi del sistema Galileo





Galileo Ground Control Segment (GCS)

- Satellite and Constellation Control Facility
- GCS Key Management Facility
- Central Monitoring and Control Facility
- Flight Dynamics Facility
- Operations Preparation Facility
- Satellite Constellation Planning Facility
- Constellation Simulator
- Satellite Data Distribution Network
- External Data Distribution Network
- Telemetry Tracking and Control Facilities



Ground Mission Segment (GMS) - Processing

The Galileo Mission Segment (GMS) determines the navigation and timing data part of the navigation messages and transmits it to the Satellite via its C-Band ground stations. A Search & Rescue service is also provided.

- **Orbit and Synchronisation Processing Facility**, computing:
 - *Precise Clock model parameters*
 - *Signal In Space Accuracy (SISA)*
 - *Almanac*
 - Additional correction parameters such as *ionospheric corrections*, estimated *Broadcast Group Delay*.
- **Message Generation Facility** for generating and disseminating the messages to be up-linked to the satellites in C-Band
- **Precise Time Facility** for generating and maintaining the Galileo System Time (GST) for navigation applications and computing parameters such as:
 - o UTC-GST conversion models,
 - o Galileo to GPS Time Offset (GGTO)



GMS – Dissemination/Operations

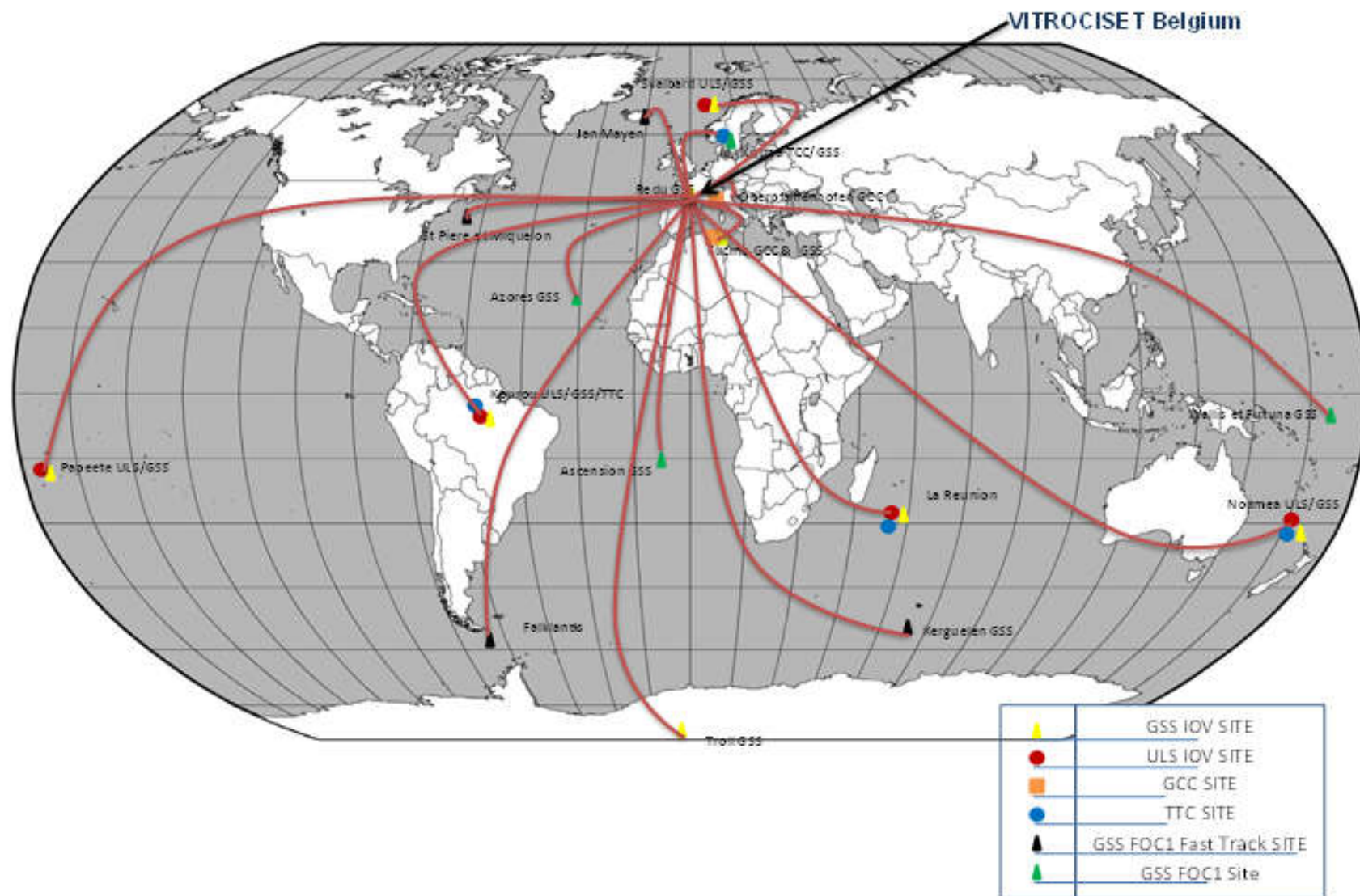
- **Dissemination**
 - Mission Data Dissemination Network
 - Service Products Facility
 - Mission Key Management Facility
 - PRS Key Management Facility
- **Operational**
 - *Mission and Uplink Control Facility responsible for the tasks related to:*
 - Planning management (Long Term, Mid-Term and GMS Short Term Plan)
 - Uplink Scheduling generation of the ULS to satellite tracking plan
 - On-line Mission Chain Monitoring.
 - Mission Performances Analysis
 - *Ground Asset Control Facility for the overall Monitoring and Control of the Ground segments including the maintenance management:*
 - Mission Support Facility.
 - Validation and Training Platform
 - MTPF: Maintenance and Training Platform.



GMS – Facilities at Remote Sites

- Facilities at remote sites:
 - ULS: Up-Link Station responsible for formatting and up-linking messages to the satellites in C-Band.
 - GSS: Galileo Sensor Station for tracking Galileo satellites, acquiring Galileo SIS, collecting and providing the SIS observables for Navigation and Integrity processing chains. Two GSSs are also collocated in the GMS PTF, accuracy synchronized to PTF time for satellite clock model calibration.
 - GDDN facilities (and services): Galileo Data Distribution Network equipment and services at each site (ULS and GSS) to provide the external and internal communications infrastructure via the GDDN, local LANs and special external links.

Que faisons-nous dans Galileo



Remote Sites

Ascension Island



Falklands



Jan Mayen



Papeete



Remote Sites

Kiruna



St. Pierre et Miquelon



Svalbard



Troll





Kerguelen – Montage de Vsat et Radome

VIDEO





- Some questions placed by Peter Gutierrez, Inside GNSS European Correspondent:
 - Is the Galileo technical infrastructure mature enough to provide committed services?
 - Have the European Commission, the GSA and the ESA invested enough in the organisational aspects of Galileo including logistics, and considered with due attention the meaning and implied responsibilities of service provision?

Assess the difference between developing a technology, procuring and integrating a system, operating a system and providing services continuously and reliably.



Driving for G2G

- Users are at the center of the evolution:
 - User-driven evolution
 - Quality of the service
 - Backward compatibility
 - Timeliness of introduction
 - Gradual introduction
- Positioning w.r.t competitive environment
 - GNSS
 - Other terrestrial and user terminal-based solutions
- A system optimized for service delivery
- Costs of development, deployment and operation shall be minimized:
 - Cost-effectiveness
 - Low complexity



Transition between two generations

VIDEO



Other Design Drivers

- Automation,
- Resilience, robustness
- State of the art technology
- External Services
- ILS & OPS core G2G function
- Inter-Satellite Links (ISL) for communication and ranging,
- precise time and frequency transfer concepts
- On board accelerometers on Galileo satellites.



Sistemi distribuiti Vs. Logistica

da GNSS alle Costellazioni

I programmi di posizionamento, come le costellazioni, sono caratterizzati da un segmento terrestre complesso e distribuito.

Ogni componente del sistema concorre alla missione del servizio: disponibilità e precisione.

Elementi distintivi della sfida

La **vita operativa** dichiarata e la **distribuzione geografica** degli assetti influenzano la gestione operativa e logistica nell'ottica del **mantenimento costante dei livelli di servizio**.

Restrizioni di budget indirizzano verso la gestione efficiente:

- dell'obsolescenza,
- della configurazione,
- della validazione della catena logistica,
- degli elementi logistici.

Il GILSC per la logistica di Galileo

- VITROCISSET all'interno del contratto delle operazioni di GALILEO che supererà il Miliardo di Euro, **gestisce l'hosting e la logistica dei siti remoti**. Il contratto per VITROCISSET vale oltre 13 M €/ anno per una durata di 4,5 + 5.5 anni.
- **Il GILSC è concepito per gestire le attività logistiche relative al programma Galileo;**
- È stato realizzato con fondi della Commissione Europea dal governo Belga.



Secondo la GSA, il **GILSC è il componente strategico per la gestione logistica del programma Galileo.**

In un'ottica di piena dualità potrà essere impiegato anche per programmi di complessità analoga che la Commissione Europea è in procinto di finanziare, come il GovSatCom .



Lo studio ILS per il GILSC

Configuration Management

to have at any time the snapshot of the system configuration as-maintained

Transport cost assessment,

to optimize replenishment shipment process and, in general, spare parts distribution from Central Warehouse to the other sites;

Supply Chain Management to guarantee that the restoration times for all Galileo subsystems fulfil the KPIs, ensuring the availability of the required storage capacity to store spare parts

