

NAV

Time and Synchronisation

Time and Synchronisation Products and Services

GMV's solutions cover the complete Time and Frequency generation and distribution chain, including:

- Installation and operation of highly stable atomic clocks (e.g., hydrogen masers) and ancillary equipment for the generation of autonomous timescales aligned to UTC
- Metrological high-accuracy time transfer methods such as GNSS (GPS and Galileo) and Two Way Satellite Time and Frequency Transfer (TWSTFT), including their calibration.
- Clock steering to UTC with traceability to remote UTC(k) laboratories and eventually to the UTC published by the BIPM.
- Time distribution over network protocols such as NTP, PTP, and White Rabbit, including network security protocols (NTS).
- Resilient timing from GNSS including extended clock holdover, and time from Galileo Public Regulated Service (PRS) for synchronisation of Critical Infrastructure.

Time and Synchronisation: Showcasing Capability

Monitoring GNSS time

- Development of a new atomic timescale for the Galileo Reference Centre (GRC) v2
- “All European” hardware, including very first users of Safran’s new active hydrogen maser
- Main application is independent stability monitoring of Galileo System Time and broadcast UTC



GNSS-independent time transfer for eLoran

- GNSS-independent time transfer of UTC(NPL) to remote UK sites
- Uses latest European TWSTFT technology
- UTC(NPL) remote replicas are used as time basis to synchronise eLoran stations



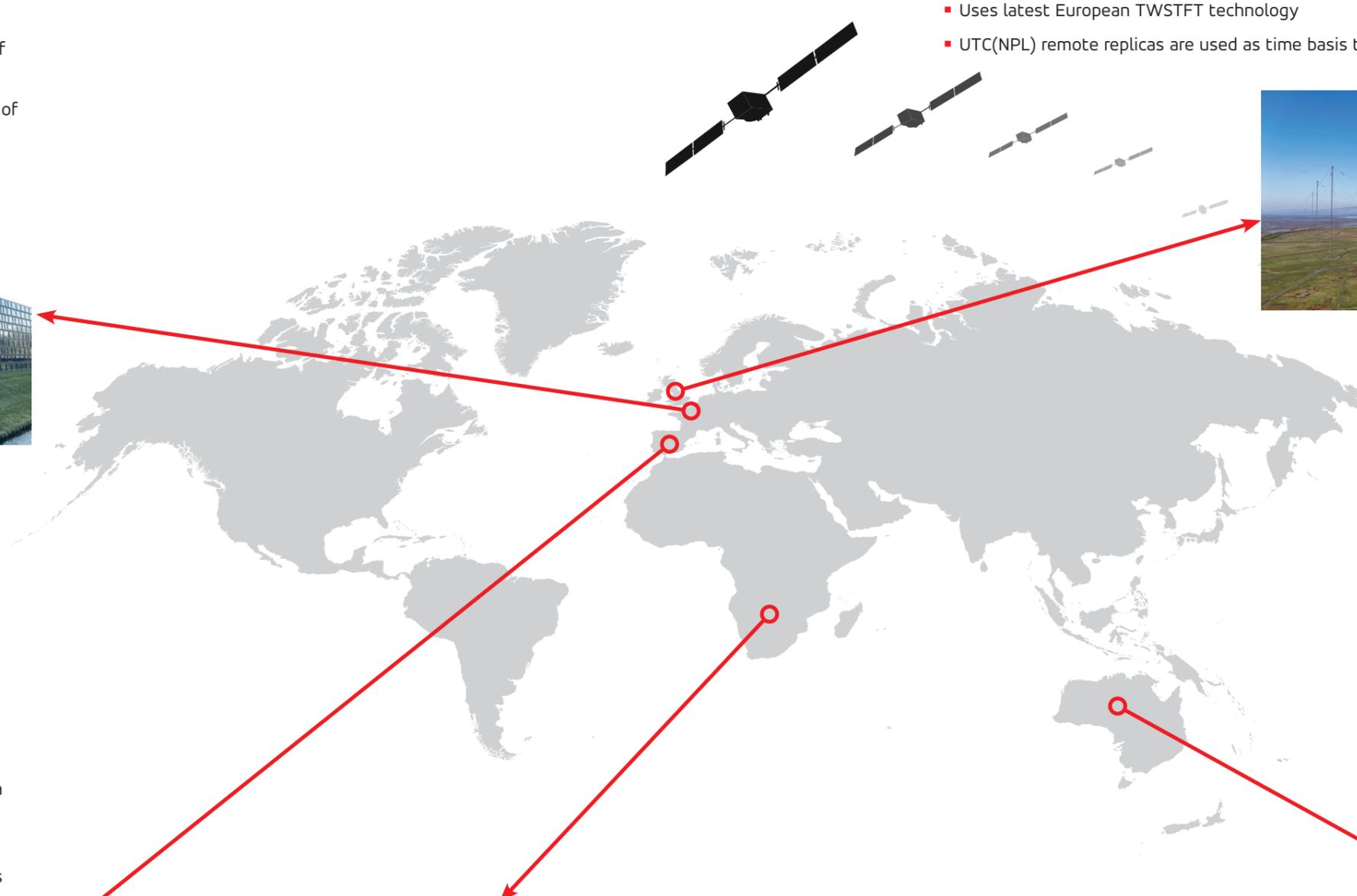
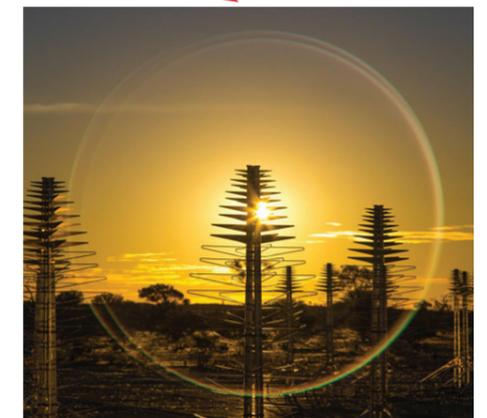
UTC_{GMV}

- UTC_{GMV} is a timescale running at GMV in Spain
- Based on two passive hydrogen masers
- Continuously operating without outages for nearly a decade
- Time distribution across the building using White Rabbit, as fiducial time reference for several projects



Synchronising the largest telescope arrays in the world

- GMV develops the two central timescales for the Square Kilometer Array radiotelescope (SKA)
- Two sites: South Africa and Western Australia
- Highly redundant systems, including three active hydrogen masers on each site
- High level of autonomy, automation and remote monitoring



Time and Synchronisation Products

Timescales and time transfer

- Installation and operation of passive and active hydrogen masers
- Expertise in time transfer equipment (GNSS and TWSTFT)
- World leaders in absolute calibration of time delays in GNSS receiving chains
- Early adopters of new European TWSTFT technology
- Development of new hardware and algorithms for clock combination and steering to UTC
- Key timescale projects ongoing for SKAO, Galileo, and eLoran



White Rabbit Switch v4

- Production of the new White Rabbit switch v4, in collaboration with CERN
- Includes a new expansion board hosting a holdover clock, in collaboration with IQD in the UK
- Development of White Rabbit authentication protocol based on NTS, in collaboration with PTB in Germany
- CE marking underway



WANtime receiver: resilient GNSS timing

- The GNSS **WANtime receiver** includes a holdover clock and PTP/NTP/NTS network protocols
- Calibrated, precise and accurate timing with ns-level uncertainty
- Mainly oriented to high-accuracy applications (e.g., space surveillance)
- Possibility to inject a PPS from an external Galileo PRS receiver developed by GMV
- CE marking underway

