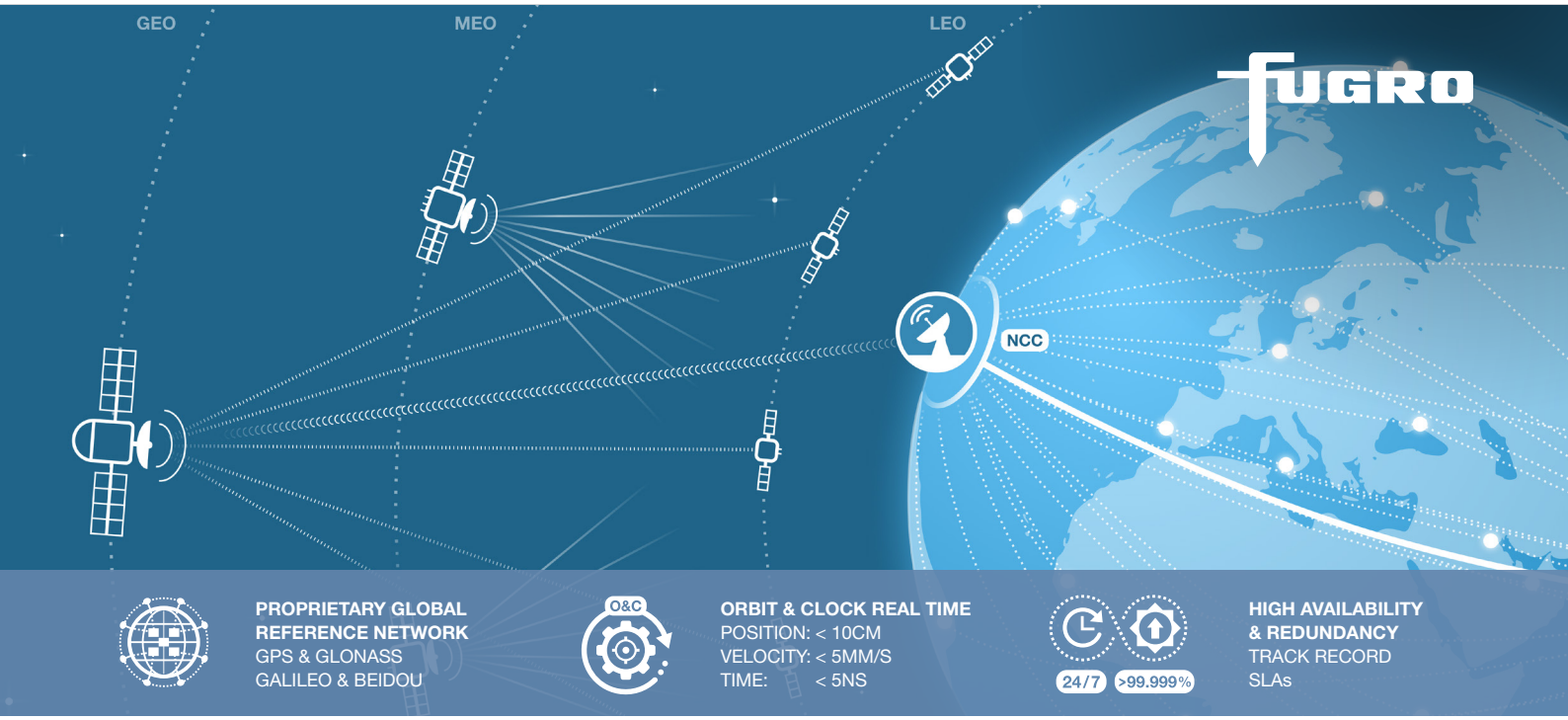
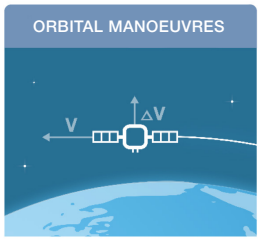


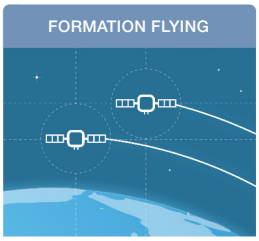
FUGRO SPACESTAR™

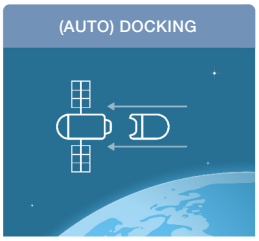
High accuracy real-time position, velocity and time in Low Earth Orbit (LEO)

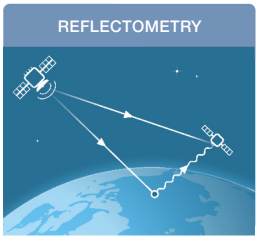
KEY CONCEPT

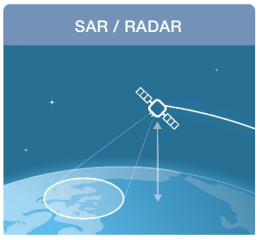
SpaceStar is the next generation technology for the provision of high-accuracy real-time navigation services in Low Earth Orbit (LEO), leveraging on the extensive Fugro expertise of delivering of GNSS (Global Navigation Satellite Systems) augmentation services for professional applications. SpaceStar allows to obtain sub-decimetre absolute positioning and nanosecond-level timing, on board a LEO satellite and in real-time without additional ground-infrastructure for the satellite operator. SpaceStar is based upon Fugro's proven Precise Point Positioning (PPP) technique, including multi-constellation and multi-frequency GNSS technology with real-time GNSS orbit/clock corrections delivered via L-band signal from geostationary (GEO) satellites.

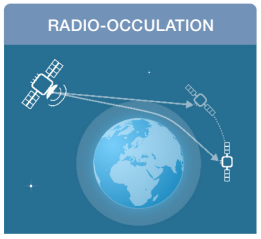










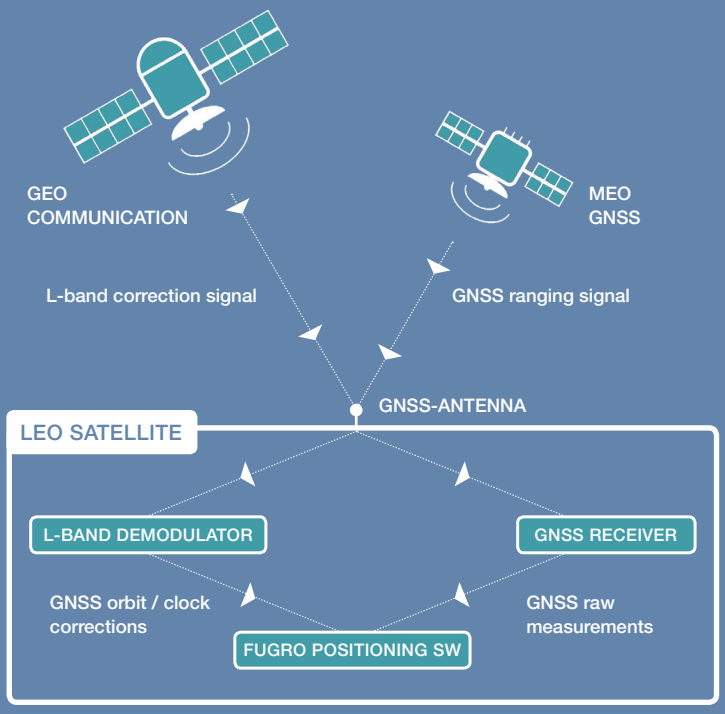


BENEFITS

- Enhanced knowledge of onboard real-time position/velocity increases quality and safety of in-orbit maneuver, by reducing collision risks and optimising fuel consumption leading to extended mission lifetimes.
- SpaceStar is a software-based technology allowing replacement of other expensive technologies such as Laser / Vision / High RF inter-satellite links reducing overall costs.
- The onboard positioning software can be upgraded while LEO satellite is in orbit, allowing access to the latest state-of-the-art positioning technology even after launch.
- Fugro's software solution works with standard, off-the-shelf components so no additional payload is required.
- Unprecedented PVT accuracy in real-time enables onboard and real time processing and reduced latency. This can (partly) reduce the need of post-processing and related architecture, therefore reducing cost for the satellite operator.

SPACESTAR
Software-based navigation solution in LEO for delivering enhanced GPS/GNSS performance:

Main features:
- GNSS receiver agnostic
- High-accuracy real-time GNSS corrections delivered via GEO satellites to LEO
- Unprecedented on-board real-time positioning accuracy (better than 10 cm RMS 3D)



Onboard architecture

ABOUT FUGRO SATELLITE SERVICES

Fugro provides GNSS software solutions to support best-in-class high-accuracy positioning by using high quality raw-data, proprietary technology and services based on Fugro's own proprietary global GNSS reference receiver network. Fugro's ground infrastructure has been designed to meet the requirements of the most demanding applications in terms of performance, accuracy and availability .

PROPRIETARY GNSS GLOBAL REFERENCE NETWORK

Fugro operates its proprietary reference station network receiving real-time raw data from all Global Navigation Satellite Systems (GNSS), including GPS, Glonass, BeiDou, Galileo and QZSS. The network is composed of over 100 geodetic receivers, worldwide distributed, and dual Network Control Centers (NCCs) which guarantee the highest levels of quality.

ORBIT & CLOCK REAL TIME

In real time SpaceStar computes precise orbit/clock/hardware errors for all GNSS satellites, which are delivered to LEO users via 7 GEO satellites with global coverage. With these precise corrections and Fugro's onboard software, SpaceStar delivers position and timing accuracy for LEO satellites, with the following nominal perfomances in real time:
- Position: better than 10 cm RMS 3D
- Velocity: better than 5 mm/s
- Time: better than 5 ns

HIGH AVAILABILITY & REDUNDANCY

With dual primary network control centres and dual shadow control centres that are all interconnected via trunk lines, we have proven uptime of over 99.999% to ensure clients have continuous operation.

spacestar@fugro.com

WWW.FUGRO.COM