Future and Challenges of Optical Communication (Operator View)

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SpaceDataHighway – a new Service has started

- **EDRS-A commercial operations** with Sentinel 1A started in December 2016, after successful User Commissioning
- **User Commissioning** in 2017
  - Sentinel 2A
  - Sentinel 1B
- **Second GEO-Node to follow: EDRS-C**

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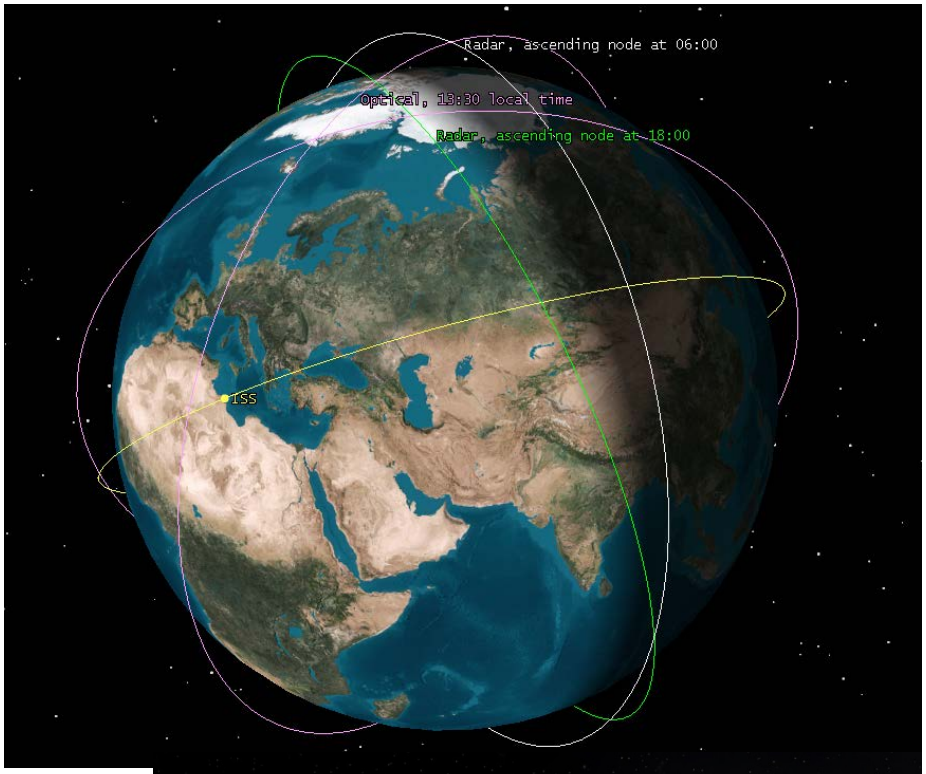
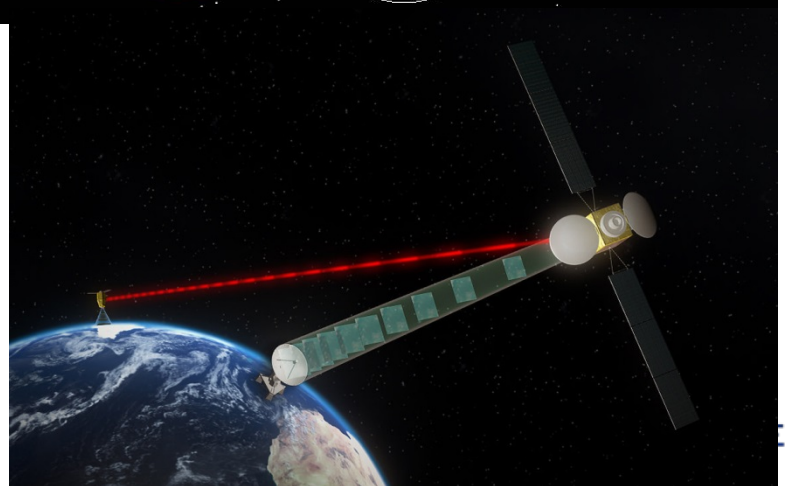
SpaceDataHighway Use Cases

Support LEO Spacecraft typically on polar Sun-synchronous orbits

- Optical missions: nodal crossing at 10:30 or 13:30 (e.g. Sentinel 2)
- Radar missions: Dawn/dusk orbits (e.g. Sentinel 1)
- Typically between 8 and 14 links per satellite and day, at 10´ duration

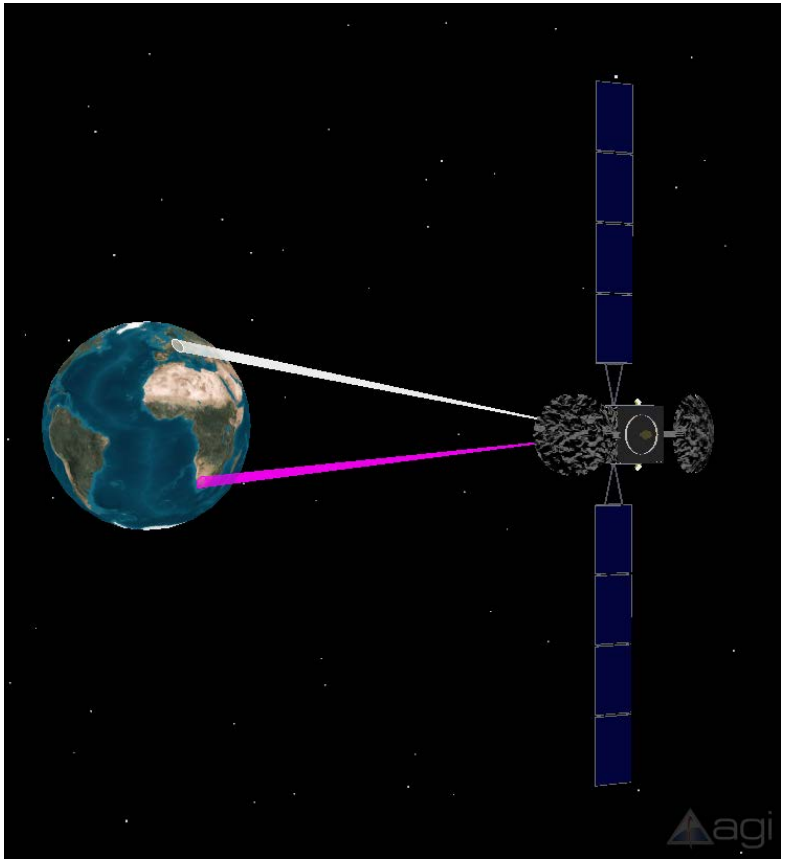




SpaceDataHighway Use Cases

Support radio astronomy research

- radio telescopes (SKA) located in remote areas to avoid RF noise
- huge amounts of raw data to be archived and repatriated for further analysis in centers
- GlobeNet / EDRS-D can add coverage for SKAs in Australia



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SpaceDataHighway Use Cases

- **Very different from the LEO case: bi-directional, link durations of hours to more than a day**
- **Support airborne network node (Joint Aerial Layer Network)**
- **Laser communications unique advantage to security-sensitive customers: impossible to detect, intercept or jam**

Standard turret, used as basis for terminal

Capability demo → prototyping → Operational demo → certification → operational service

2019 2020 +

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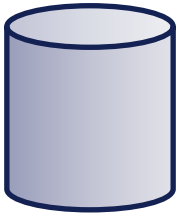
SpaceDataHighway Utility

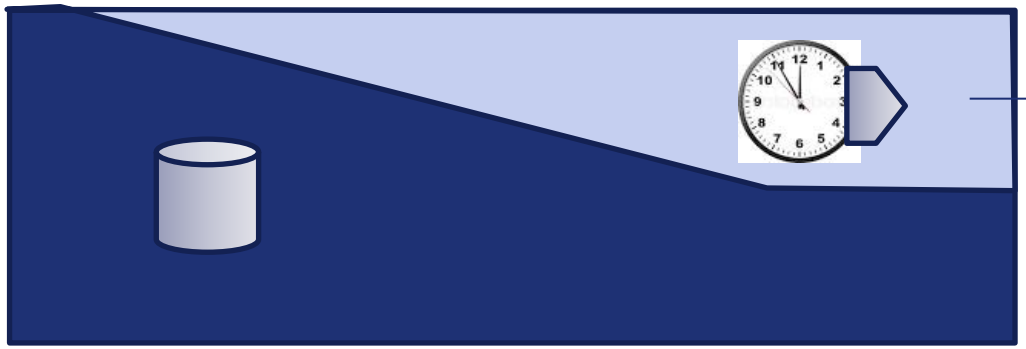
Data Volume



Latency

- Capacity service: Transmition of high data volume from user source/platform to ground to increase data collection capacity per orbit to simplify operation and complex network management.
- Near-Real-Time service: Ad-hoc service for urgent capture of specific area out of reach from existing ground station to obtain actionable information.

Trend



Link Efficiency!
For many short links

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Trends through Uer Requirements for Lasercom Links

- Efficient multi-head solutions for GEO
- High availability,
  reliability under maximized loads
- High link efficiency (acquisition time)
- Cross link capability (GEO-GEO)
- Evolve useful bandwidths (0.6 … 1.8 … 3.6)
- Compatibility with security context
- Standards and interoperability

- Customized evolution of user terminals
  (compactness, operational robustness: LEO, AIR, GRD)

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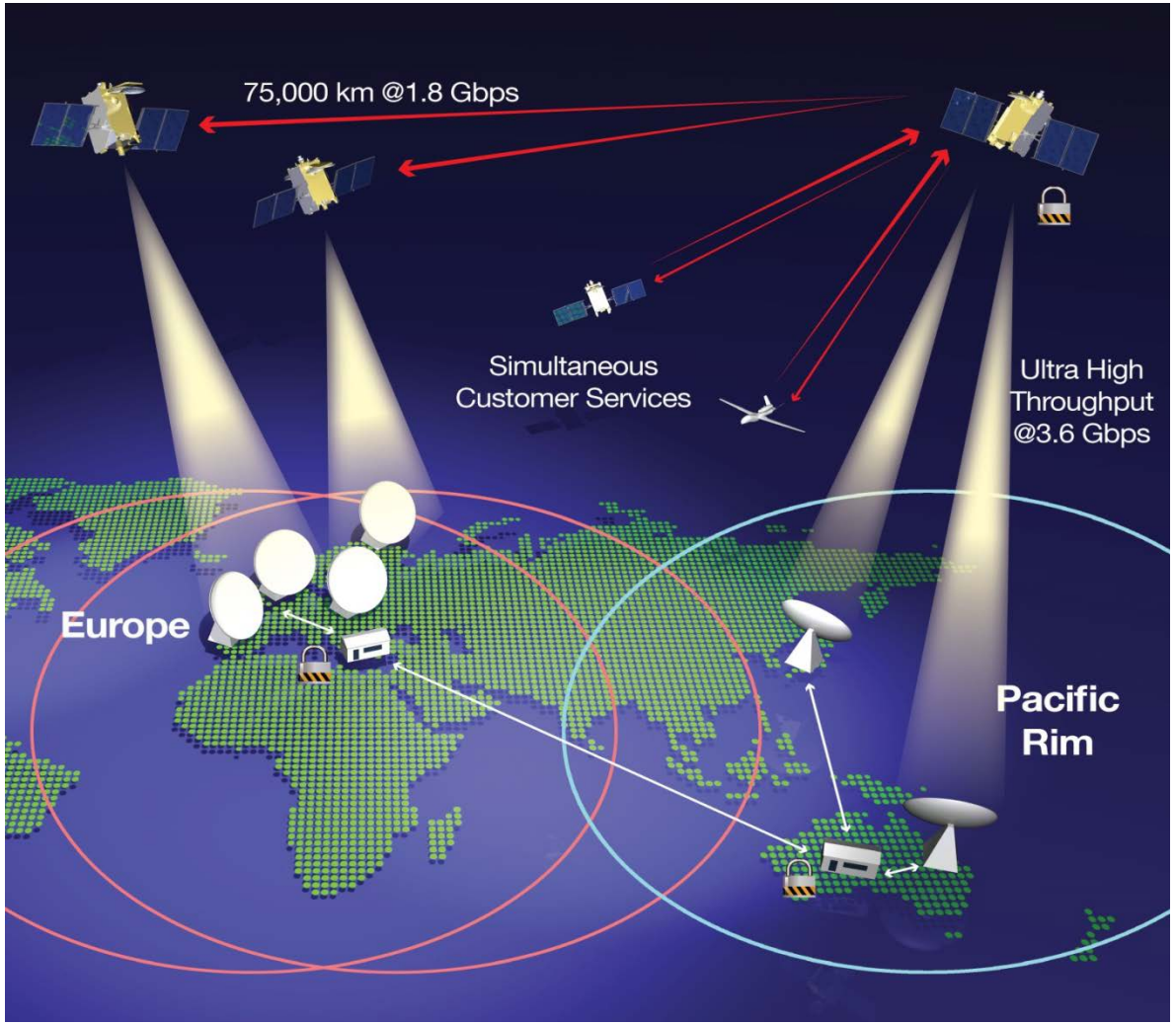
GlobeNet Programme

Meet Market Expectations

- Serve
  - Airborne & LEO Markets
  - multiple customers
  - Copernicus (continuity: 600 Mbps, encryption)
- Interoperability with 1550 nm Laser
- Security Concept for Defence & Security Users
  - autonomuous utilisation
  - ‘National Eyes Only’ User Stations
- Geo-Geo Laser Cross Link to repatriate data from Asia-Pacific to EU



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SpaceDataHighway CHALLENGE

- Crowd-intelligence to identify new areas of application
- Industries of Member States and globally invited

➢ www.edrs-spacedatahighway.com

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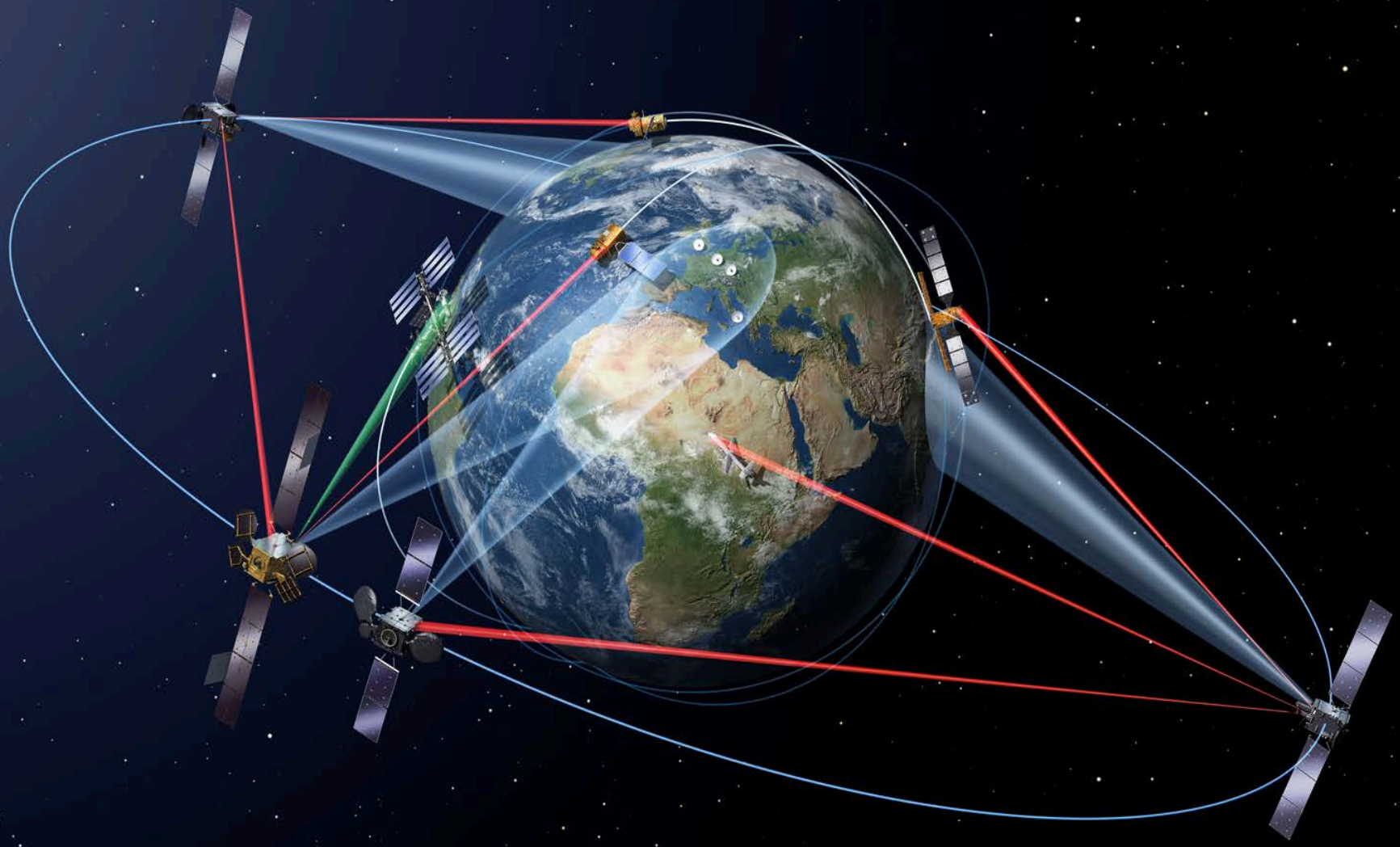

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