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Innovation Needs Support: Two Examples of German Support Strategy in Satcom

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German Aerospace Center (DLR) –Space Administration

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Innovation needs Support

Two Examples of German Support Strategy in Satcom

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Knowledge for Tomorrow



A platform is needed to reach for the stars

Acquire and maintain know-how and resources on prime level

- Geostationary (satcom) service modul & satellites, satcom payload
-for own needs and as a strategic tool

Why satcom? ⇒ Know-how and resources are maintained by commercial business.



Photo: ESA

The SmallGEO service modul (platform):

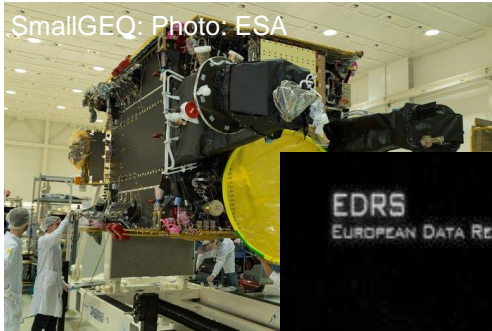
- 3,6 kW payload power, 400 kg payload
- 3,2 t launch mass
- Optimized for satcom needs
- Prime: OHB



2005: Study in German Nat. Space Progr.
2007: Start of development phase at ESA
2016: Launch with first customer Hispasat



Maintain, use and expand the know-how and capability



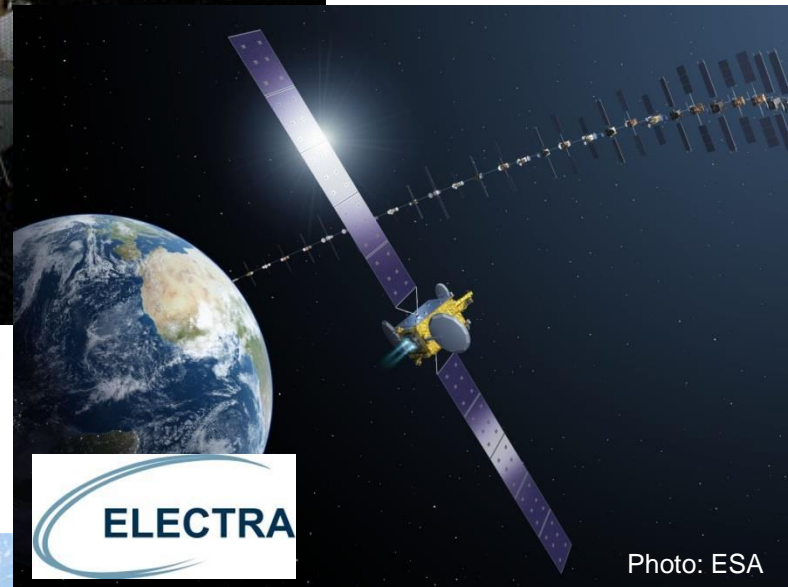
Launch: 2016



Launch 2017



Launch 2021



Launch 2021

Photo: ESA

- **EDRS-C:** a GEO node for the European Data Relay Satellite System
- **Heinrich Hertz Satellite:** a vehicle for testing and verification of innovative equipment, services
- **Electra:** expand capability, increase efficiency

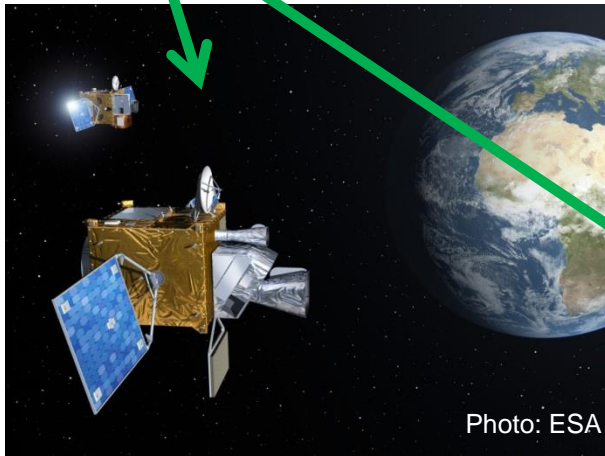


SmallGEO: a platform for exploration....

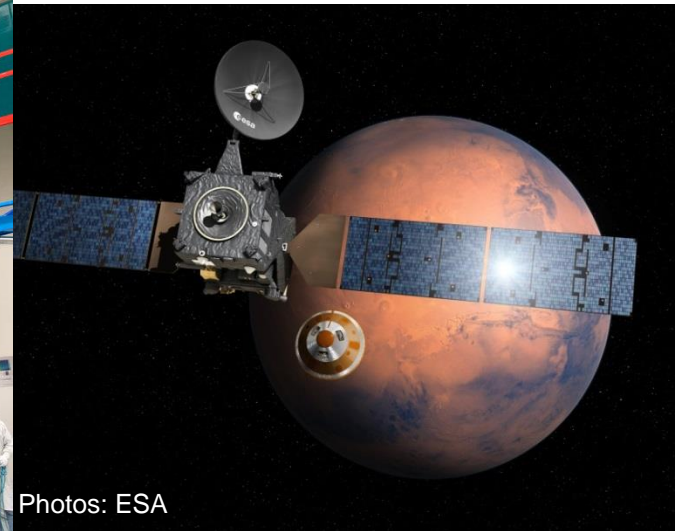


SmallGEO is the basis for

- **MTG**: Europe's third-generation geostationary weather satellites (6 satellites).
- **ExoMars**: Trace Gas Orbiter support module



MTG: 4 imaging satellites, 2 sounder; launch starting 2020

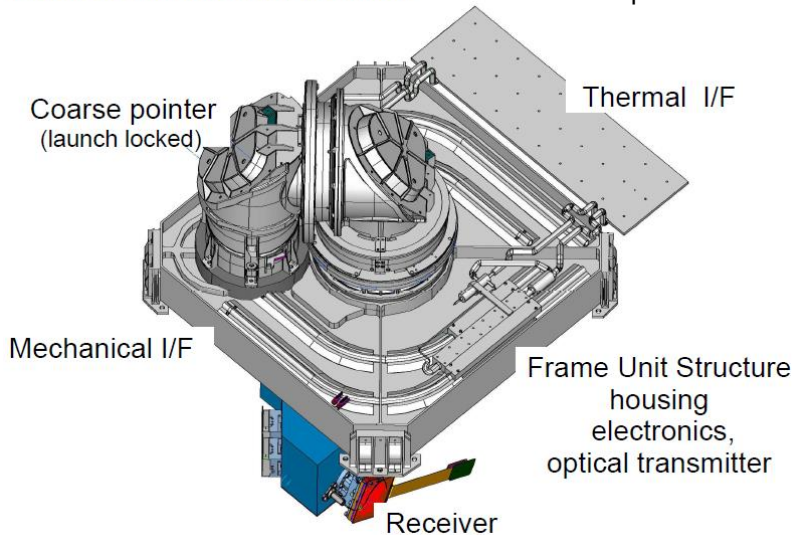


ExoMars: Trace Gas Orbiter; launched: March 14th 2016



Laser communication: Technology

Laser Communication Terminal Picture: Tesat Spacecom



Rationale:

- Open up new resources (radio → optical)
- Higher data rate
- Secure communication
- Commercial market & institutional needs

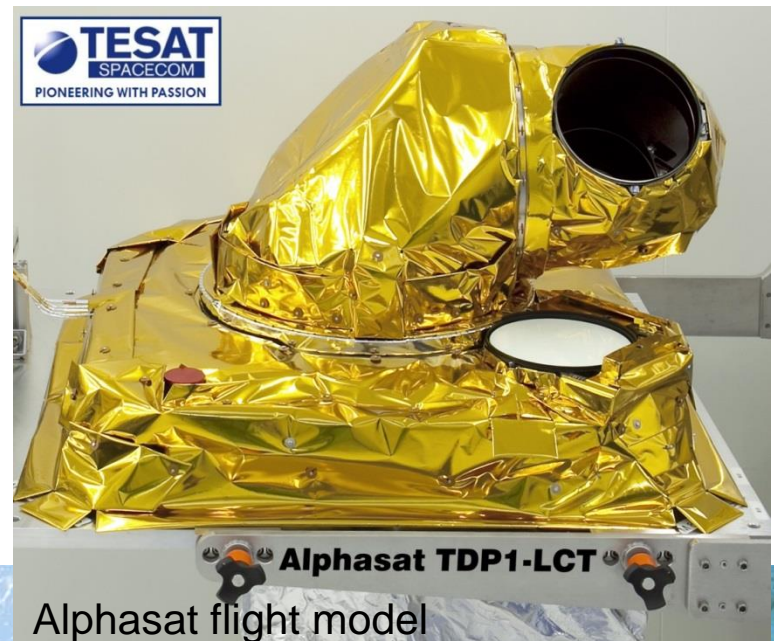
Development in German National Space Programme

2000+: technology development

2003+: flight programme

Industrial team led by Tesat Spacecom

A terminal for commercial application and standards (GEO, 15 years lifetime,...)



Laser communication: verification – LEO to LEO

NFIRE
Launched 2007



TerraSAR-X
Launched 2007

Photo: MDA



Photo: DLR



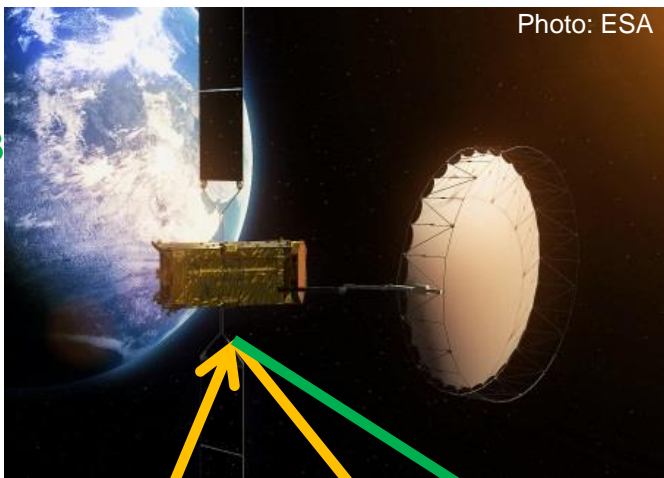
More than 7 years of tests in orbit:

- Data rate 5.6 Gbps (bi-directional)
- Acquisition time down to < 10 sec
- Distance up to 8.000 miles, 16.000 mph
- **7+ years of ISLs (> 500 links)**
- **3+ years of LEO to ground**



Laser communication: verification – GEO to LEO

**Alphasat
(Inmarsat XL)**
Launched 2013



More than 2 years of in orbit tests:



- GEO to LEO, GEO to ground;
- ~ 1000 links
- Data rate 1.8 Gbps (bi-directional), Ka-Band downlink
- Distance up to 28,000 miles (50,000 mi)
- 53 kg, power consumption 180 W max.



Copernicus
Europe's eyes on Earth



Sentinel 1A

Launched 2014



Knowledge is narrow



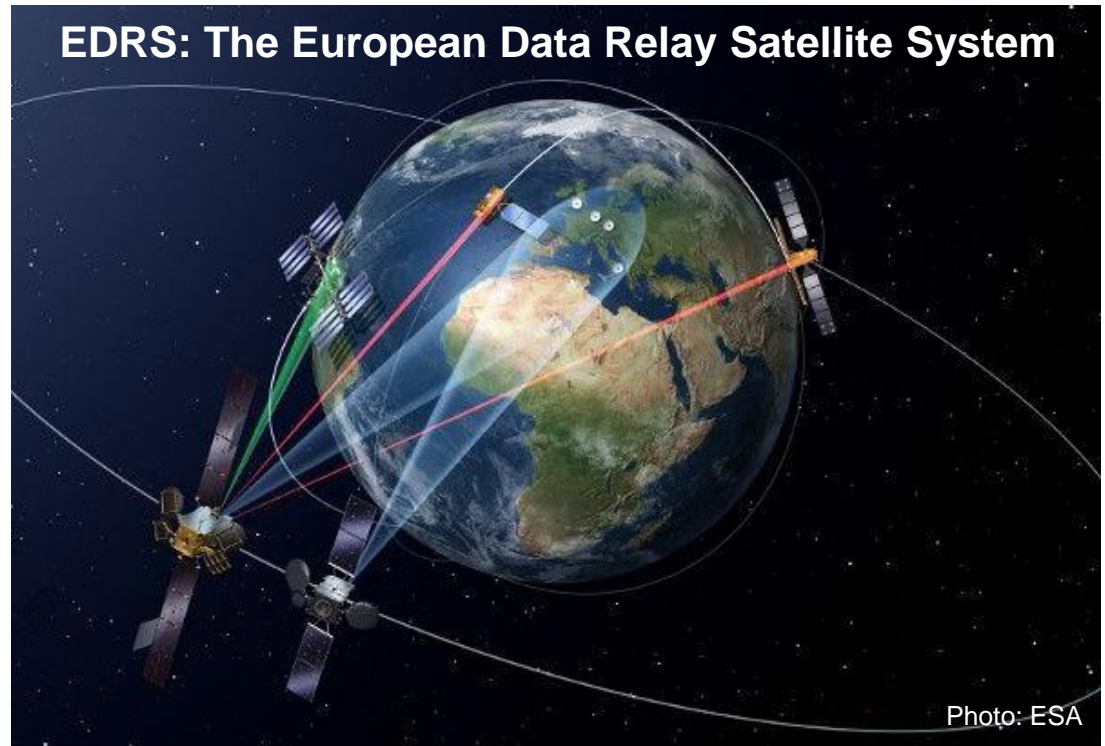
Laser communication: putting into service

EDRS System

- ESA programme with European partner nations
- Two GEO relay stations (optical and Ka ISL, downlink: Ka freq.)
- First node launched 1/2016
- Service start: summer 2016

Anchor Customer:

- Fleet of Sentinel earth observation satellites with opt. ISL: 3 in orbit; +1 (2017) + 4




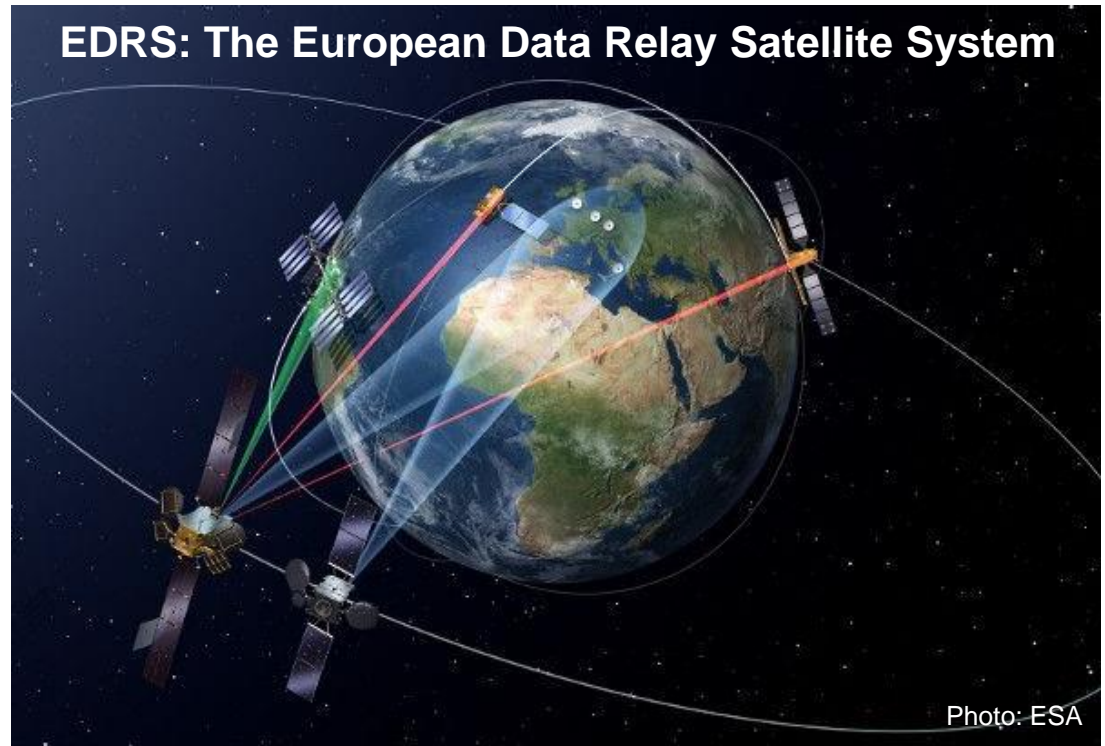
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EDRS: The European Data Relay Satellite System

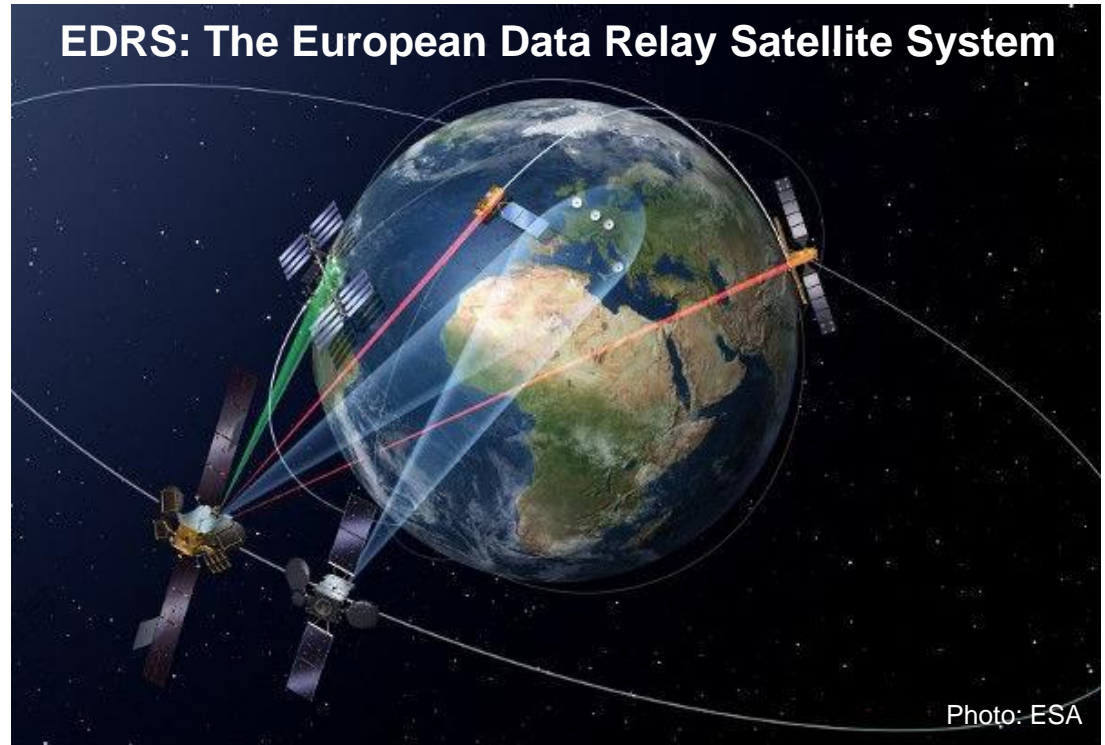


Photo: ESA



Photo: ESA

Optical communication terminals in orbit:

- **Right now: 6 terminals (2 GEO, 4 LEO)**
- 2 to be launched in 2017 (1 LEO, 1 GEO)
- 4 under contract (LEO, Sentinel EO Satellites)
- ISS/Columbus to be served starting 2018 (Ka Band)



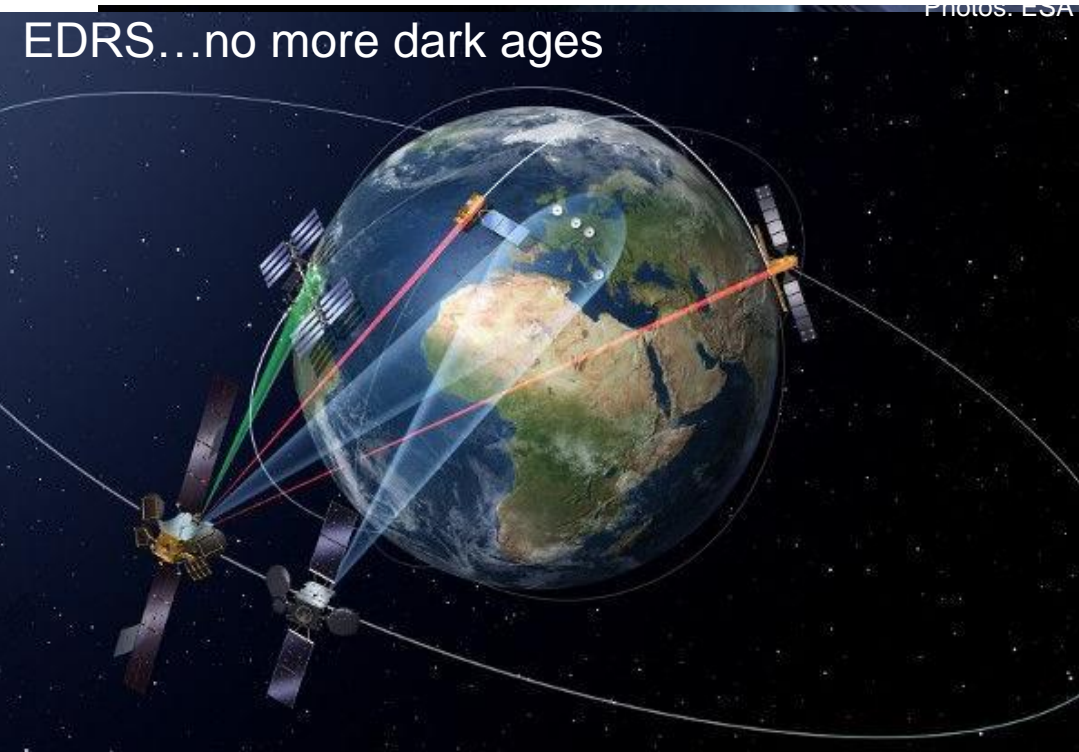
Laser communication....

...it's not science fiction



Laser communication....

EDRS...no more dark ages



...it's not science fiction

It is here

and it is ready for service

into darkness

