



ESA Scylight Workshop

Laser terminals and ground stations for LEO missions – Status, way forward and feedback to ScyLight Workplan

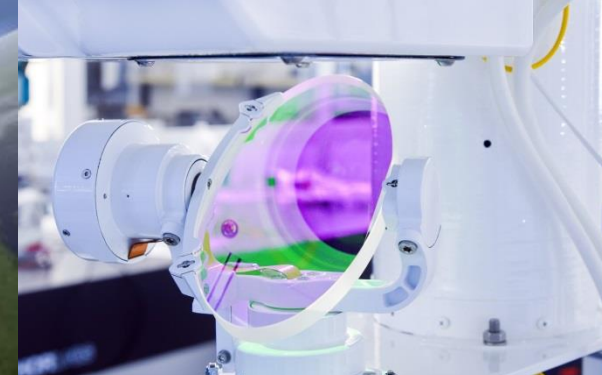
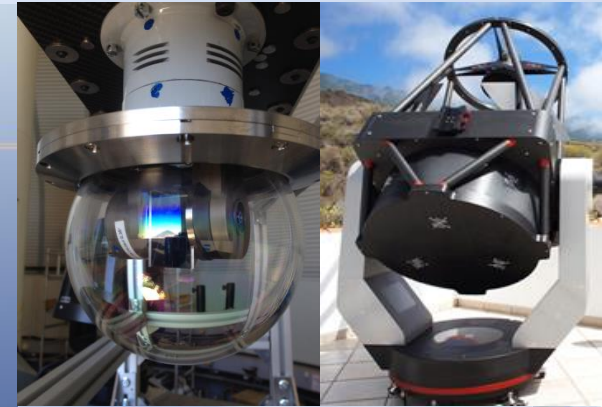
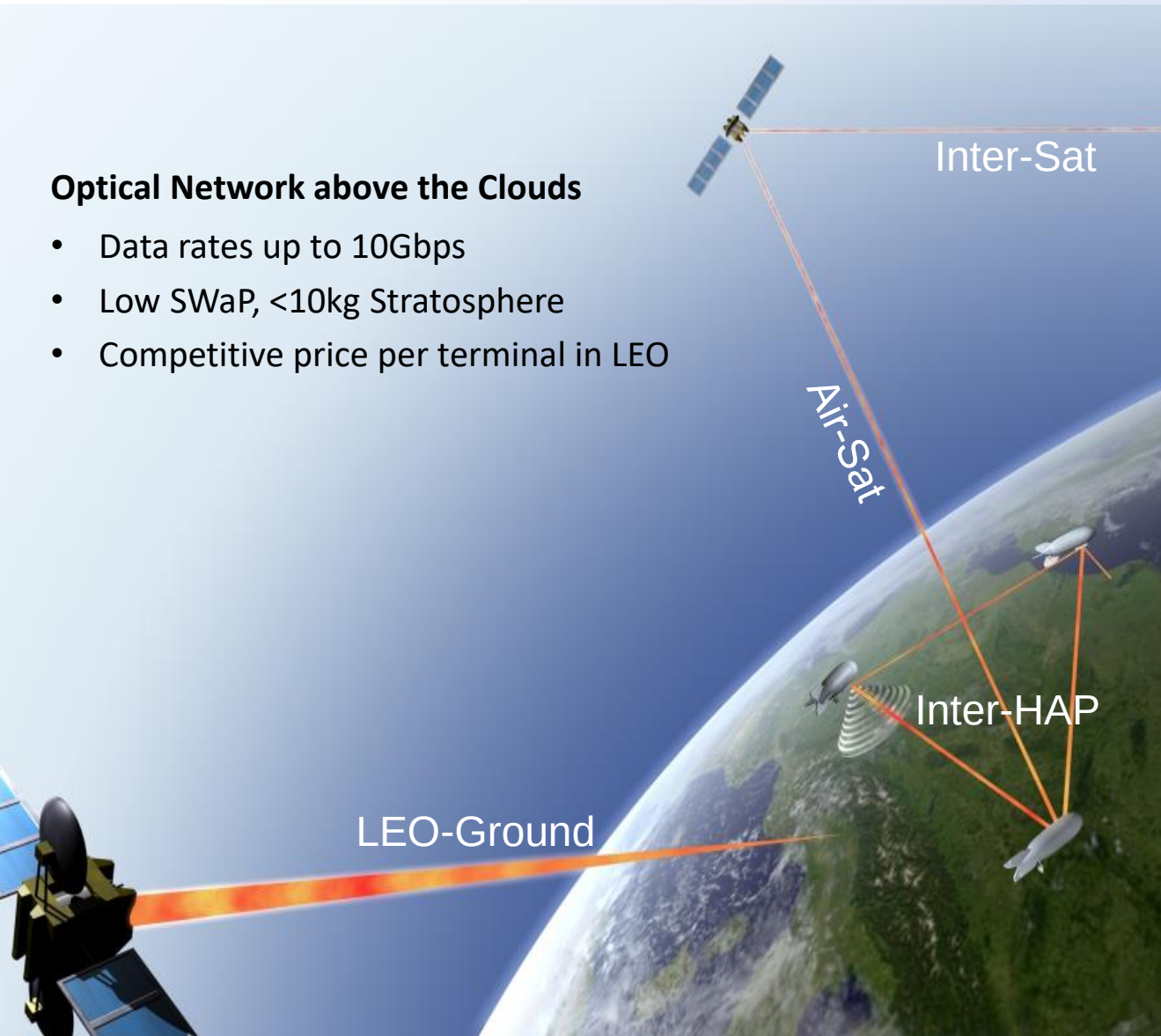
12.07.2017

**Sven Müncheberg / Dr. Ahmed Al-Mudhafar
ViaLight Communications GmbH**

Laser Communication at ViaLight

Optical Network above the Clouds

- Data rates up to 10Gbps
- Low SWaP, <10kg Stratosphere
- Competitive price per terminal in LEO



Proof of Concept under Extreme Test Conditions

ViaLight MLT-20 on a Jet-Fighter Platform

Secure link despite:

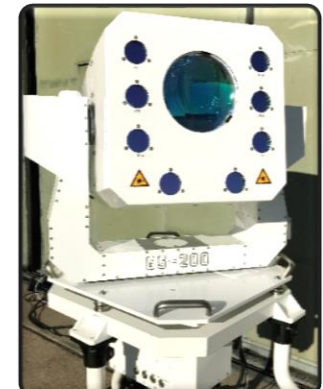
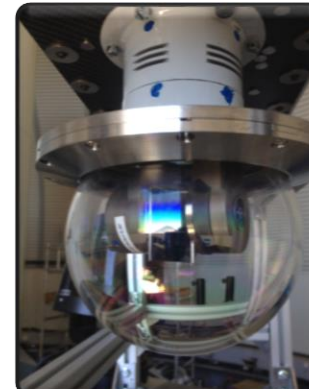
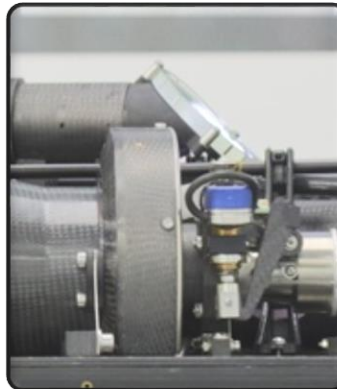
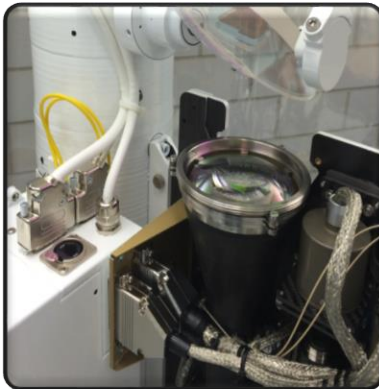
- Poor weather conditions
- 750km/h, 7km altitude, 60km range
- Extreme shocks with afterburner



Product Portfolio Air

Laser Terminals for Aircraft/Stratospheric Applications

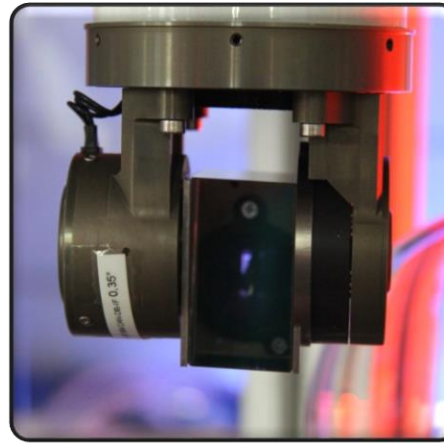
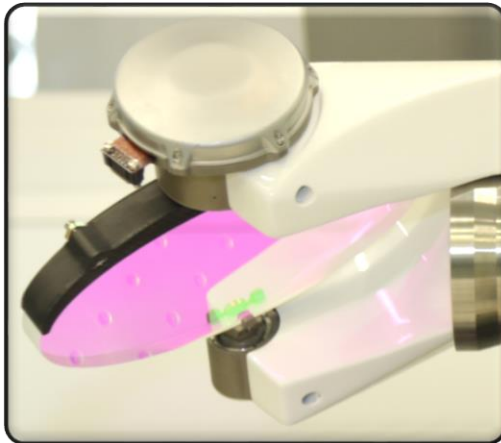
	MLT-70 IPL Inter-Platform	MLT-70 ATG Air-to-Ground	MLT-20 Air-to-Ground	GS-200 Ground Station
Link Type	Bidirectional	Bidirectional	Unidirectional/asymmetric	Bidirectional
Link Distance	>200km	>50km	>50km	>50km
Aperture Size	70mm	70mm	20mm	200mm
Data Rate	10 Gbps	10 Gbps	1 Gbps – 10 Gbps	10 Gbps



Product Portfolio Space

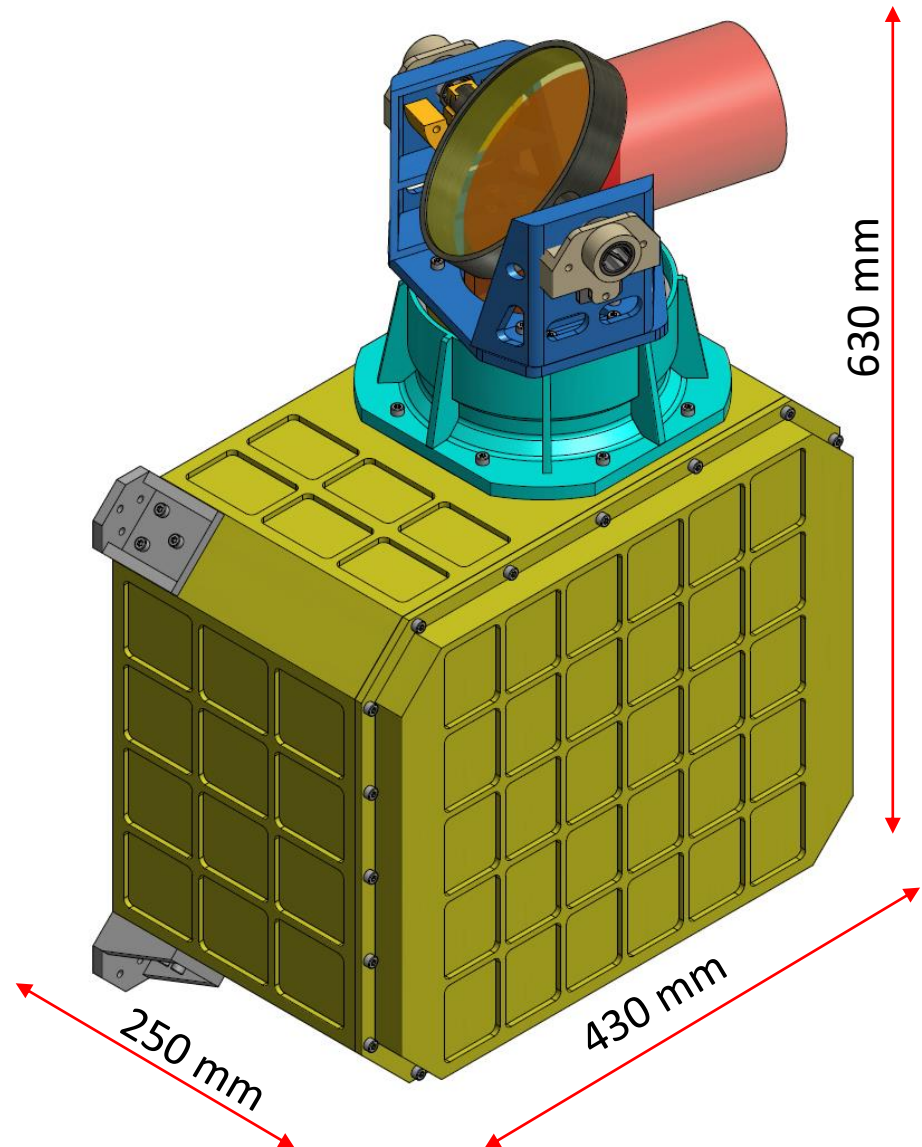
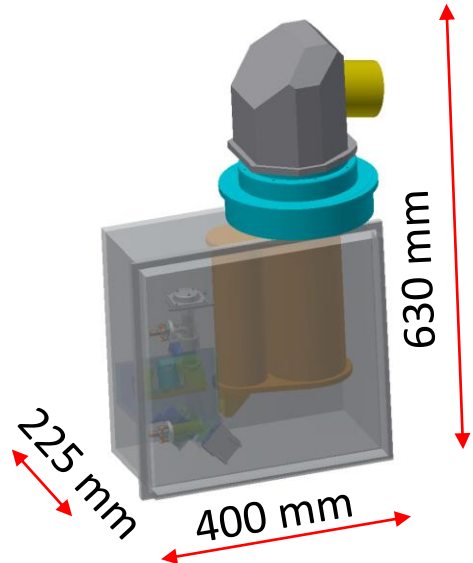
Laser Terminals for Space Applications

	MLT-80-ISL Inter-Satellite	MLT-30-SGL Satellite-to-Ground	GS-400 Ground Station
Link Type	Bidirectional	Unidirectional/asymmetric	Unidirectional/asymmetric
Link Distance	>4000km	>1200km	>1200km
Aperture Size	80mm	30mm	400mm
Mass	<25kg	<8kg	
Data Rate	10 Gbps	10-40 Gbps	10 Gbps



LEO Terminal Preliminary Properties

Tx Power	1W
Divergence	12 μ rad
Link Distance	4000 km
Data Rate	10 Gbps
Lifetime	5 Years
Max Orbit Altitude	1400 km
FoR Elevation	+5/-25°
FoR Azimuth	$\pm$ 175°
Mass	25 kg



ViaLight's Goals and Interests

ViaLight's goals are

- Deliver ground station for LEO-ground links → 2017
- Develop and qualify the 10G LEO terminal for ISL → 2019
- Perform a ISL demo mission in LEO → 2020
- Develop space-to-ground and QKD terminal → 2021

ViaLight's ScyLight interests are in:

- Line 1 Common System and Technologies Activities
- Line 2 Optical Communication Terminals and components
- Line 4 Quantum Cryptography Technologies



Scylight Programme Lines

ViaLight interest in
Line 1 Common System and Technologies Activities

- ScyLight Technology Phase: Mass and cost reduction for larger series
- ScyLight Technology Phase: Next generation ISL: Multi-wavelength system for data rates up to 100 Gbps



Scylight Programme Lines

ViaLight interest in

Line 2 Optical Communication Terminals and components

- Scylight Demo Phase: Demo mission for ISL terminal in LEO
- ScyLight Technology Phase: Development of airborne laser terminal for link to GEO (EDRS – SpaceData Highway)



ViaLight interest in

Line 4 Quantum Cryptography Technologies

- Adaptation of space-to-ground terminal for use in QKD applications to allow parallel quantum and communication channels
 - Compatible telescope design
 - Interface between laser terminal and QKD system



Review of ScyLight Workplan

- Most Line 1 activities address applications in GEO (e.g. VHTS, optical feeder links, improved LEO-GEO and GEO-GEO links) or for deep space
- No activity is targeted towards ISL in LEO.
- No activity is targeted towards smaller, cheaper terminals for constellation applications.





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