



TNO innovation
for life

FSO
INSTRUMENTS

Symposium Innovatie en Onderzoek voor Defensie – Laser Communication

WILL CROWCOMBE

FSO Instruments – Technical Director

8 June 2023

Image Credit: NOAA

PRESENTATION OVERVIEW

How can PPS projects help you realize your product ambitions? Worked example – Laser communication.

Overview:

- Introduction to laser communication
- Role of PPS in satcom
- FSO instruments
- DTE activities
- Roadmap conclusion

Presentation prepared by:

TNO innovation
for life

FSO
INSTRUMENTS

Supported by wider ECO system



CONNECTIVITY TRENDS

Exponential growth data traffic:

- World population increases exponentially
- New technologies (autonomous cars, IOT)

Security more and more an issue:

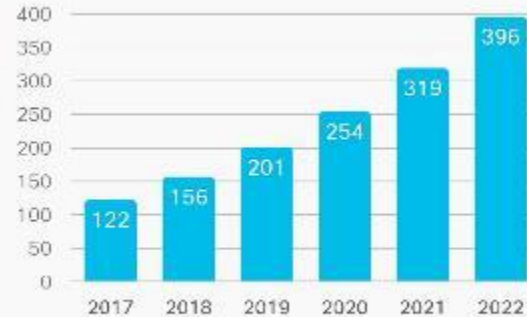
- Quantum computer
- Jamming/interception



Figure 1. Cisco VNI forecasts 396 EB per month of IP traffic by 2022

26% CAGR
2017 - 2022

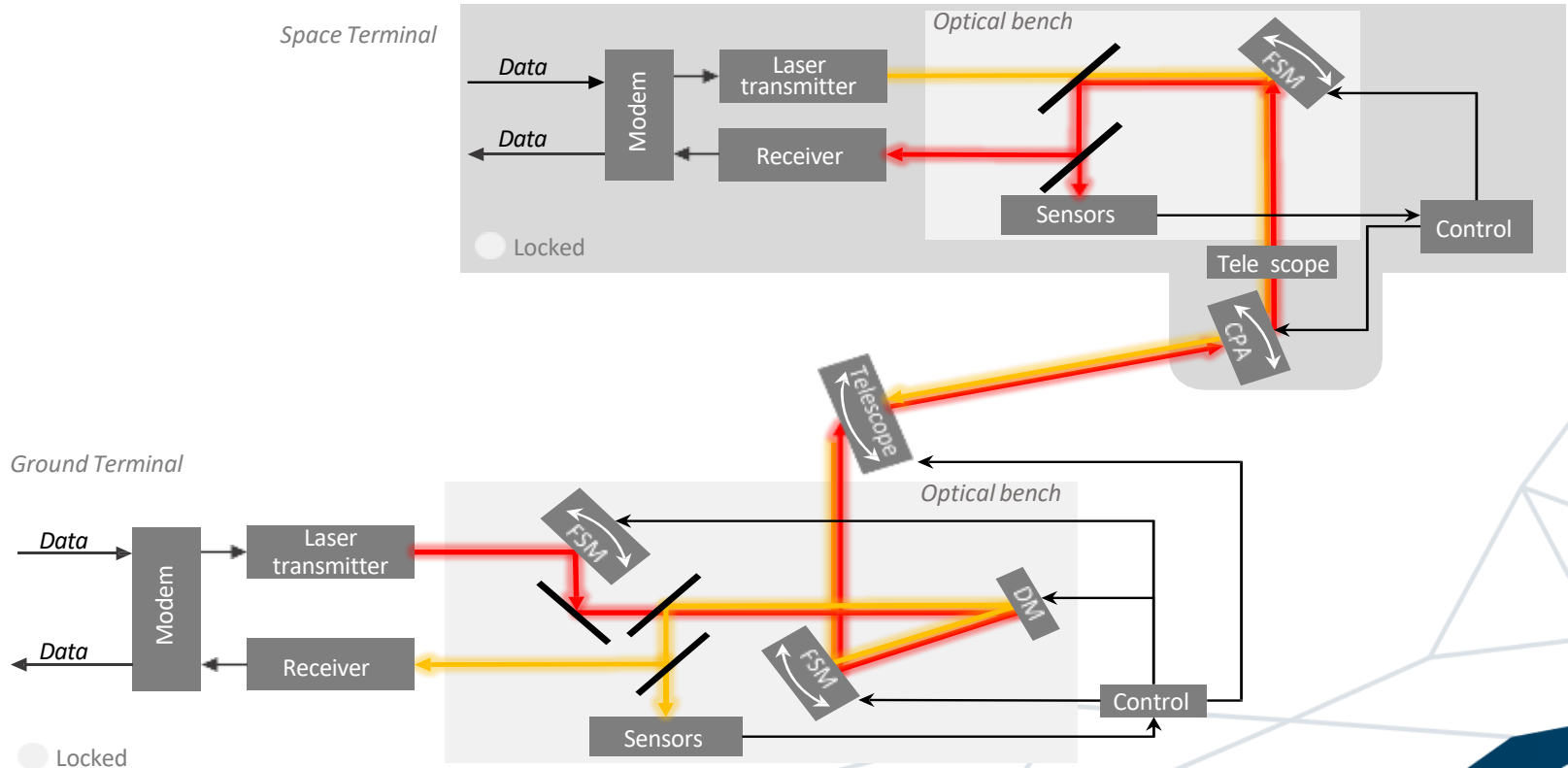
Exabytes
per Month













Source: Cisco VNI Global IP Traffic Forecast, 2017-2022



LASER COMMUNICATION – BUILD BLOCKS



RF VS LASER COMMUNICATION

	<i>RF communication:</i>	<i>Optical Communication:</i>
Available bandwidth/ license regulations		
Vulnerability (Jamming/interception)		
Price/bit		
Energy/bit		
Availability (clouds)		



FSO INSTRUMENTS

FSO Instruments is a Joint Venture that develops and supplies optical-communication components, sub-systems, and terminals in support of OEMers

- We combine the strengths of Demcon and VDL ETG with those at TNO
- Strong heritage in SEMICON and Aerospace, and bring this to Laser Com:
 - Modular and Standardized functional (sub-)systems
 - Supply chain partner for cost-effective high-volume manufacturing (MAIT)

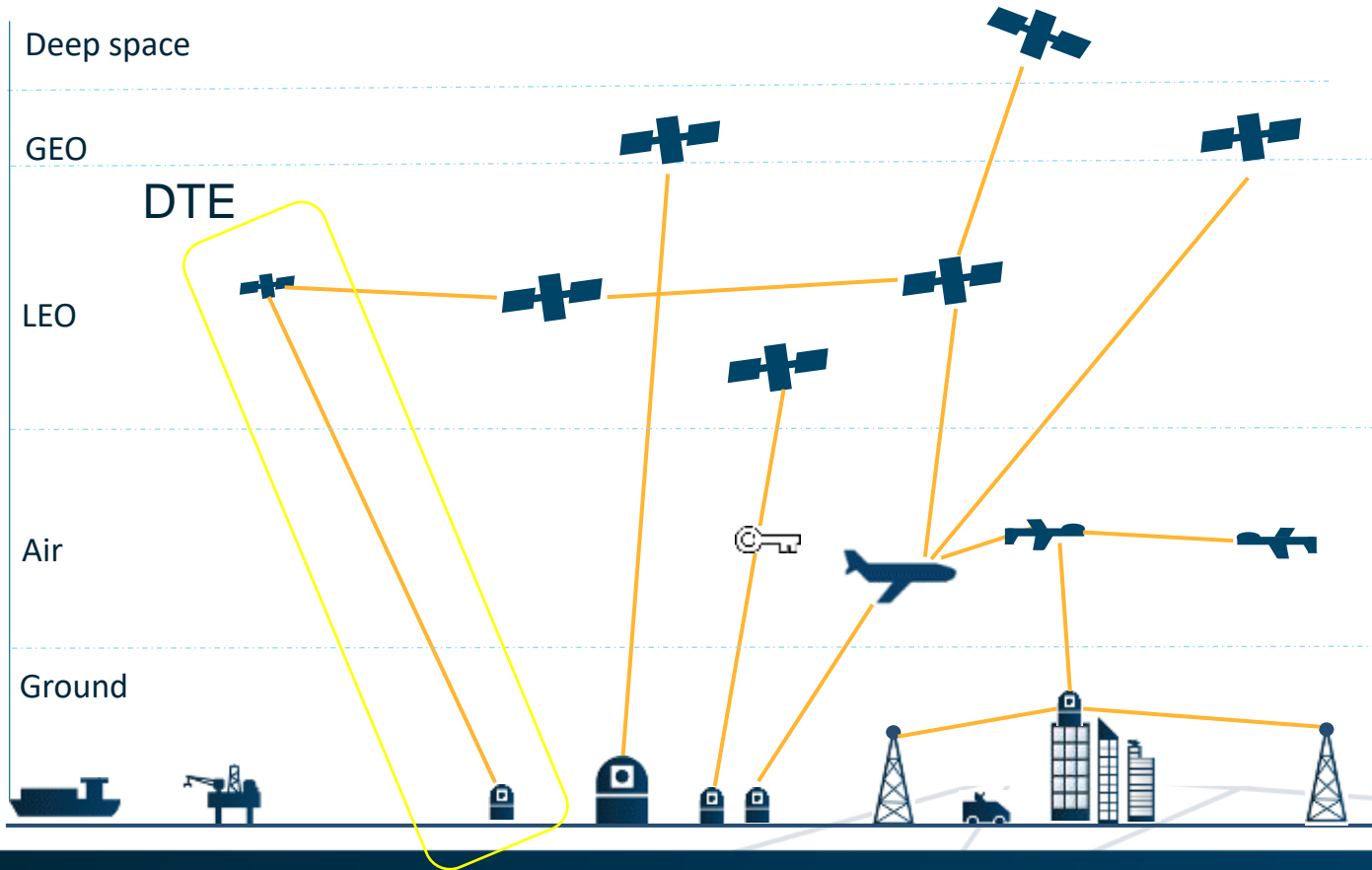


FSO HELPS BRING TNO TECHNOLOGY TO MARKET

Supporting traditional OEMers with scale production



SATCOM MARKET OVERVIEW



> DTE - OGS

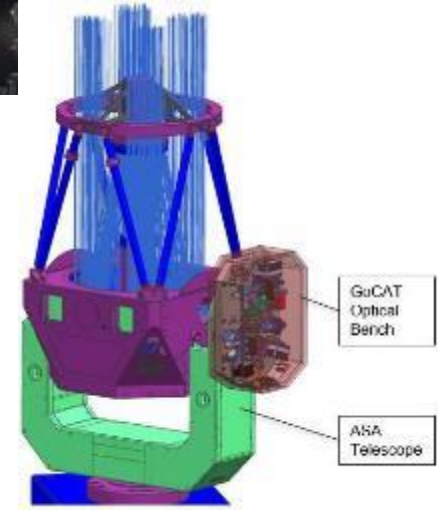
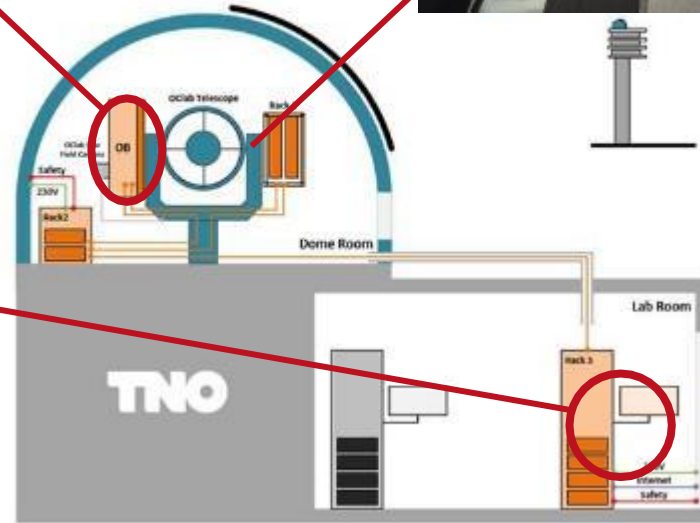
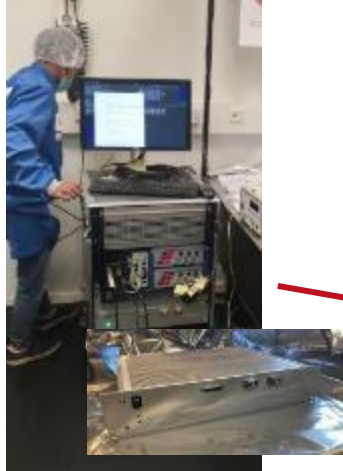
Project with:

TNO **AIRBUS**



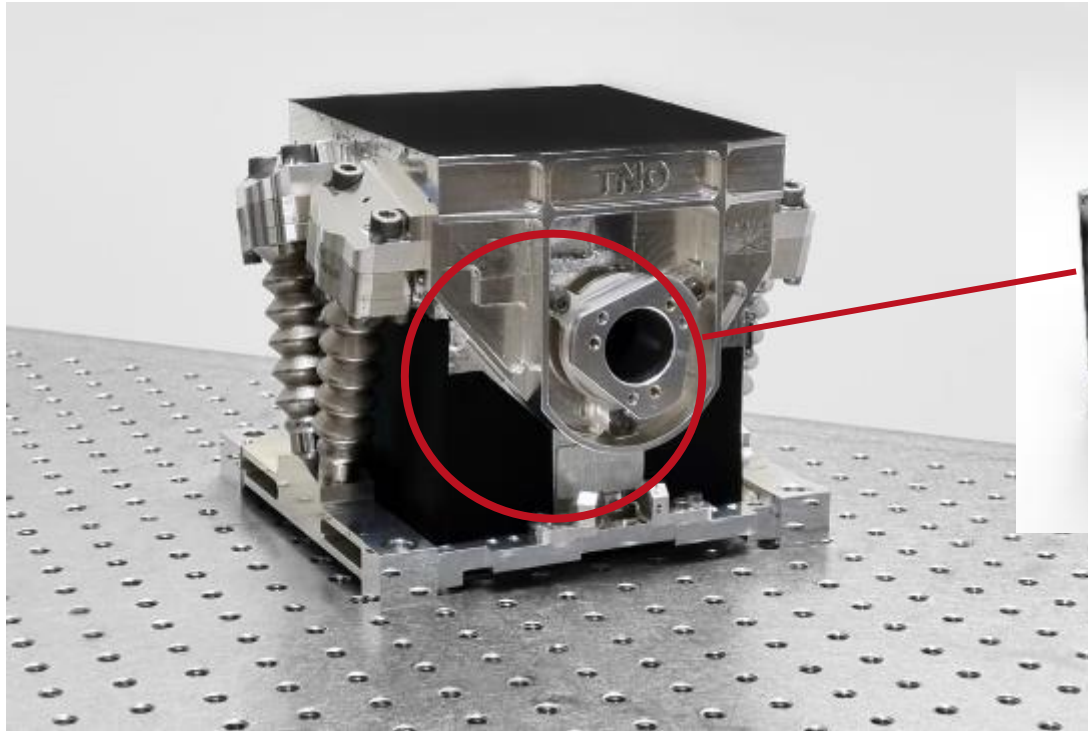
> DTE - OGS

Project with:



› DTE – CUBECAT TERMINAL

Project with:



› DTE – IOD SMALL ON NORSAT-TD

Project with:



› DTE – IOD SMALL ON NORSAT-TD

Project with:

TNO



Netherlands
Space
Office



esa



- SAT EMC level EMC test Done
- Vibration Test Done
- Delivery to Launch provider Jan 2023
- Launched April 2023
- Link demonstrations in progress

DTE – CUBECAT LAUNCH

Launched April 2023 –
Transporter 7 mission



CONCLUSION / TAKE AWAYS

- Significant laser communication program within the Netherlands
- PPS projects have played a key role in the Netherlands satcom program
- Support from NL MOD has had significant influence on the program
- Exciting future as first wave of NL technology become fully commercial
- TNO to continue to innovate on second wave leading to sustainability



CONSORTIUM PARTNERS THANKS TO ALL!



ABN-AMRO



QuTech



enabling PHOTONIC TECHNOLOGIES



PHOTONIS



SINGLE QUANTUM



› **THANK YOU FOR
YOUR ATTENTION**

FOR MORE INFORMATION:

will.crowcombe@fso-instruments.nl

Martin.Siegl@tno.nl

Michiel.Ringers@tno.nl

