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Mina Mitry

CEO And Co-Founder of Kepler Communications

Building The Internet For Space

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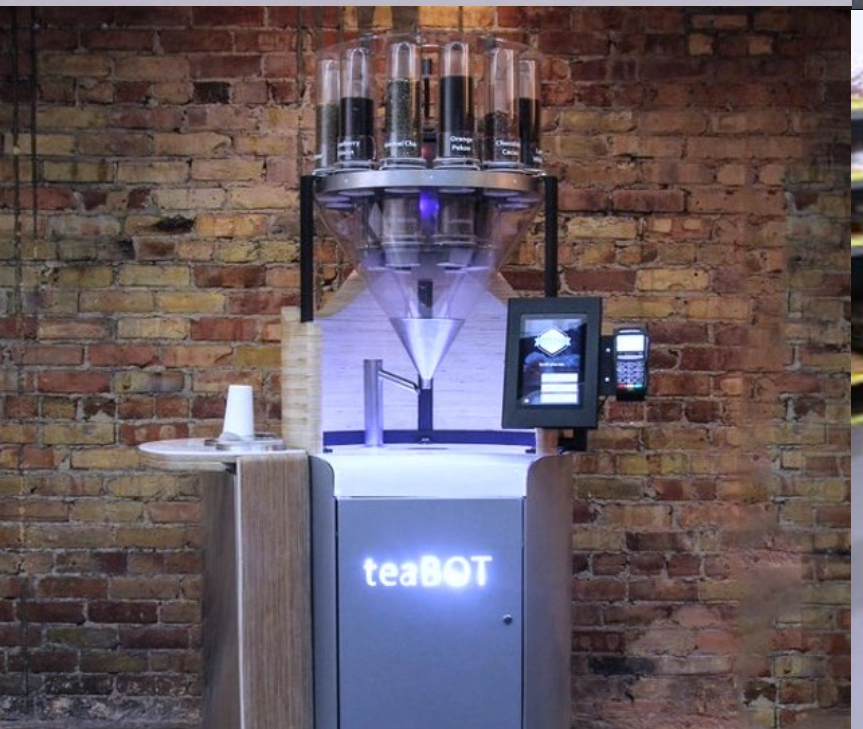
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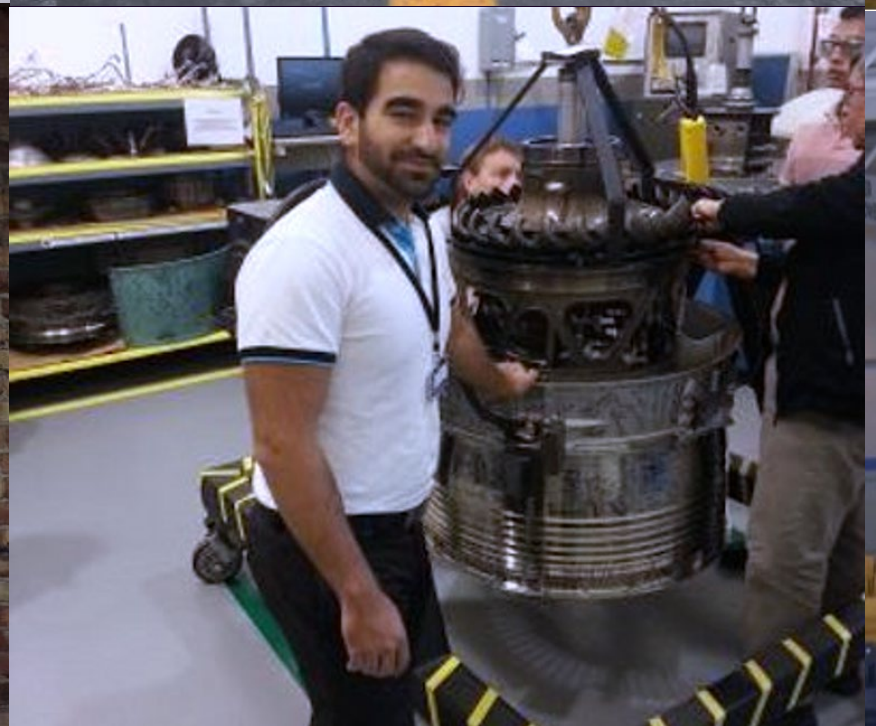

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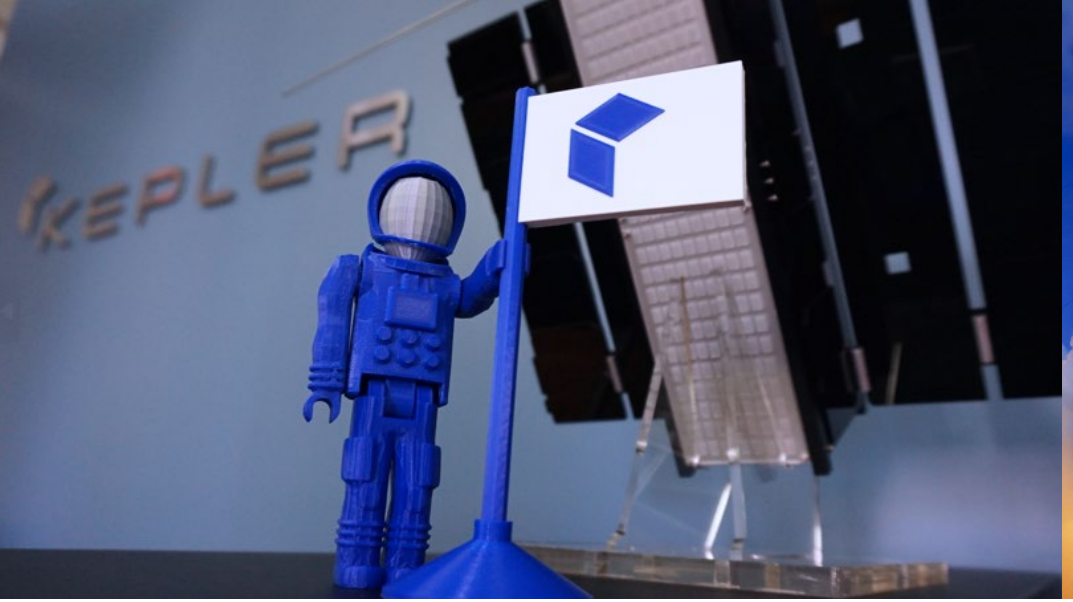
ON-ORBIT INTERNET WILL REVOLUTIONIZE SPACE

Just like the Internet on Earth fast-tracked technology and communications, Internet for space will advance defense and intelligence capabilities and drive the human reach further into space.

From Napkin To Orbit In Nine Months

University of Toronto Graduate Students Inspired To Found A Space Communications Company



Kepler Communications, Inc. Founded In 2015

Developing Critical Internet Infrastructure For Space-Generated Data

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WE ARE ON A MISSION TO BRING INTERNET CONNECTIVITY TO SPACE

23
SATELLITES LAUNCHED

$200M+
CAPITAL RAISED

150+
GROWING GLOBAL TEAM

SDA-COMPATIBLE OPTICAL CONSTELLATION

IN-HOUSE PRODUCTION FACILITY

GLOBAL GROUND STATION NETWORK

Current Space Communications are Broken

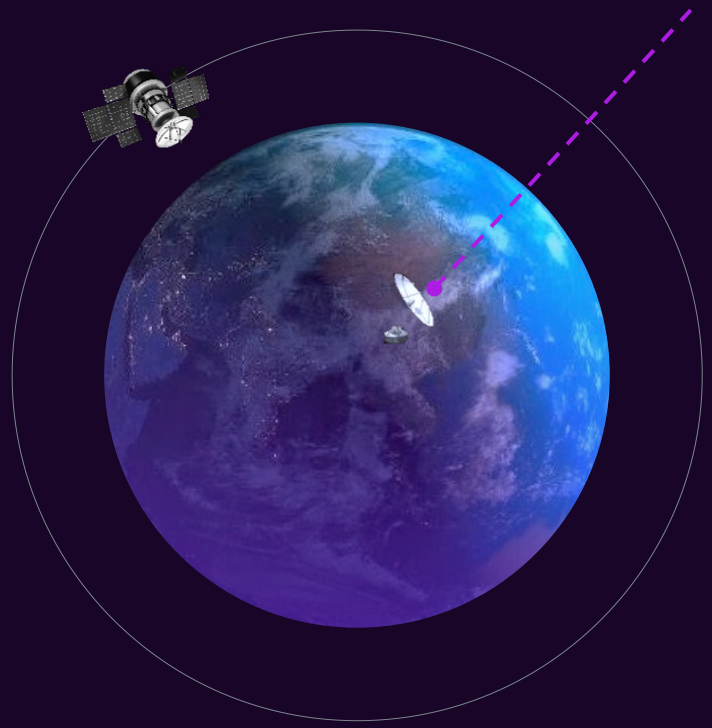
CUSTOMERS CANNOT COMMUNICATE WITH EARTH

70% OF THE TIME

RESULTING IN MAJOR BOTTLENECKS, LIMITING MISSIONS

Existing communications infrastructure is limited by geographic and geopolitical barriers, making it impossible to provide 100% coverage.

Modern missions require space communications to be as reliable as terrestrial communications: real time with high bandwidth and low latency.



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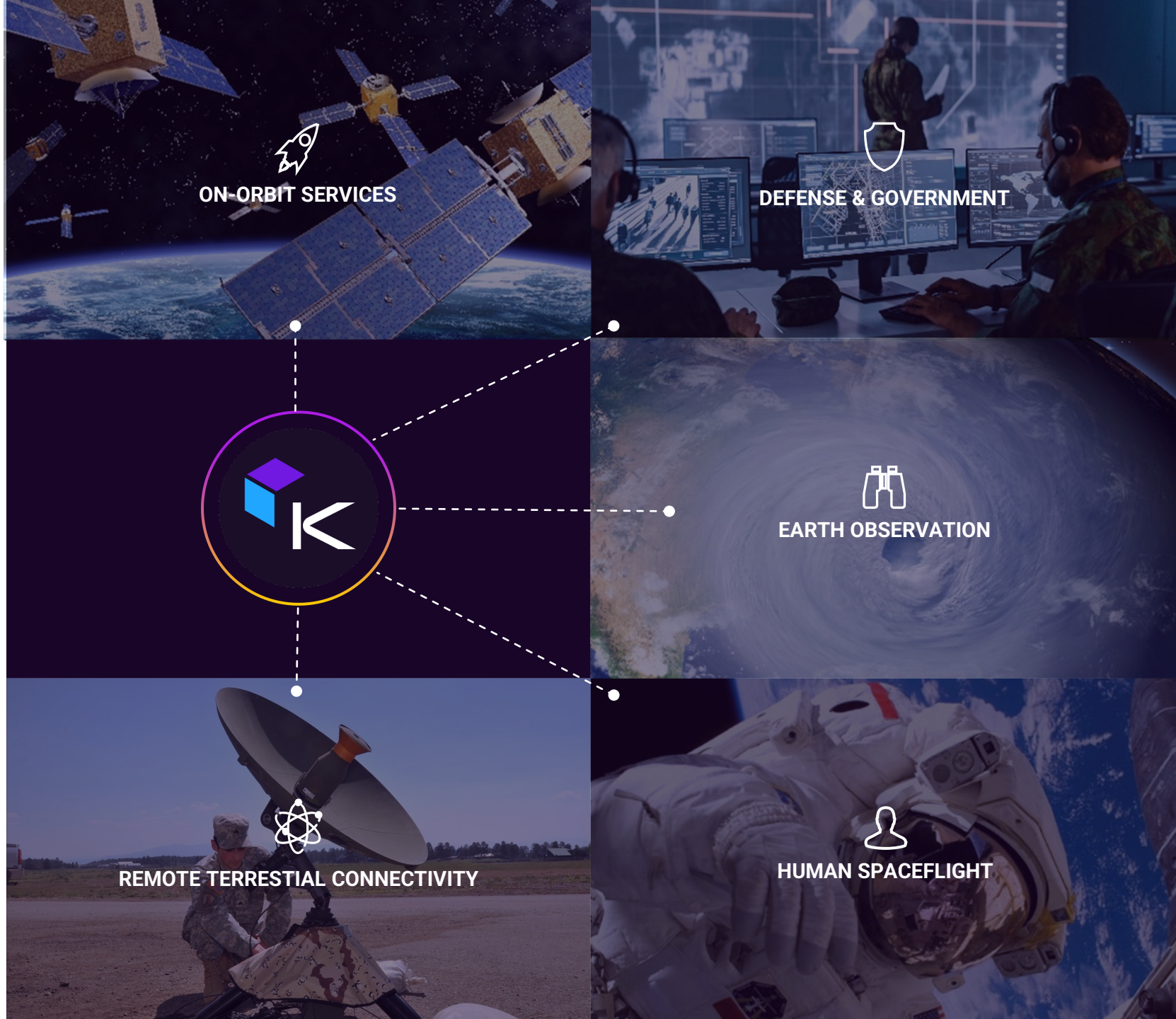
EVERY SPACE MISSION NEEDS COMMUNICATIONS

... Leading To Unprecedented Demands In Space-Generated Data



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THE KEPLER NETWORK

Kepler is delivering data at lightspeed with an SDA-compatible optical data relay network connecting space and Earth communications with low latency, high throughput, and enhanced security.

Optical Communications Are Ready To Support The Future Space Economy

Technology Maturity + **Standardization** + **Demand** = **Open Optical Ecosystem**

2017
EDRS (GEO ↔ LEO)
>80k links acquired

2023
SDA PWSA (LEO)
60 T0 OCTs launched
575 T1 OCTs planned

CCSDS Consultative Committee for Space Data Systems

SDA SPACE DEVELOPMENT AGENCY

Optical Communications Terminal (OCT) Standard Version 3.1.0

esa

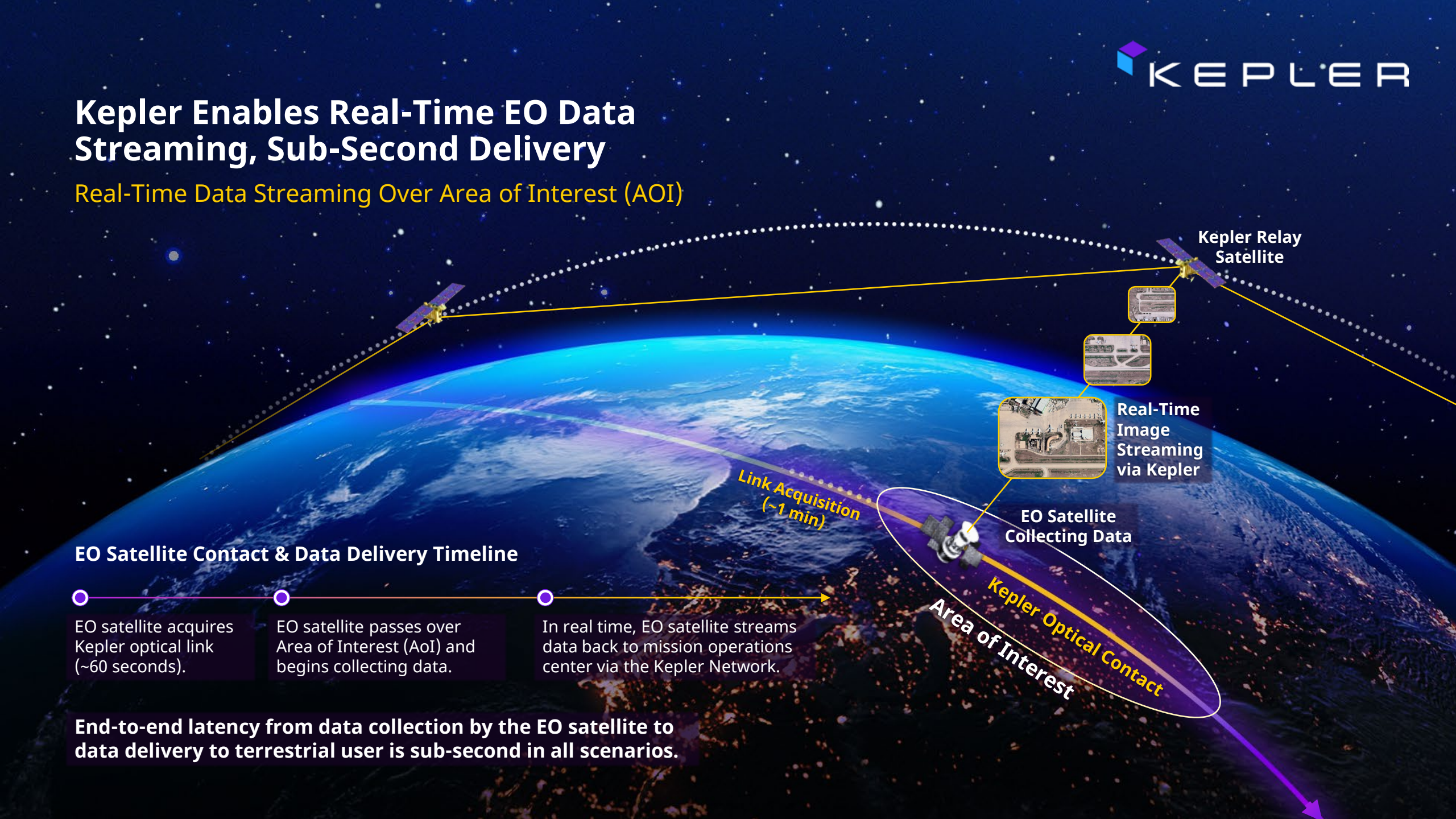
Large Constellations
= Faster Revisit
= Lower Latency

High-Performance Sensors
= Higher Bandwidth
= More Data Volume

Enhanced Security
= Reduced Jamming
= Eliminate Interception

Kepler Enables Real-Time EO Data Streaming, Sub-Second Delivery

Real-Time Data Streaming Over Area of Interest (AOI)

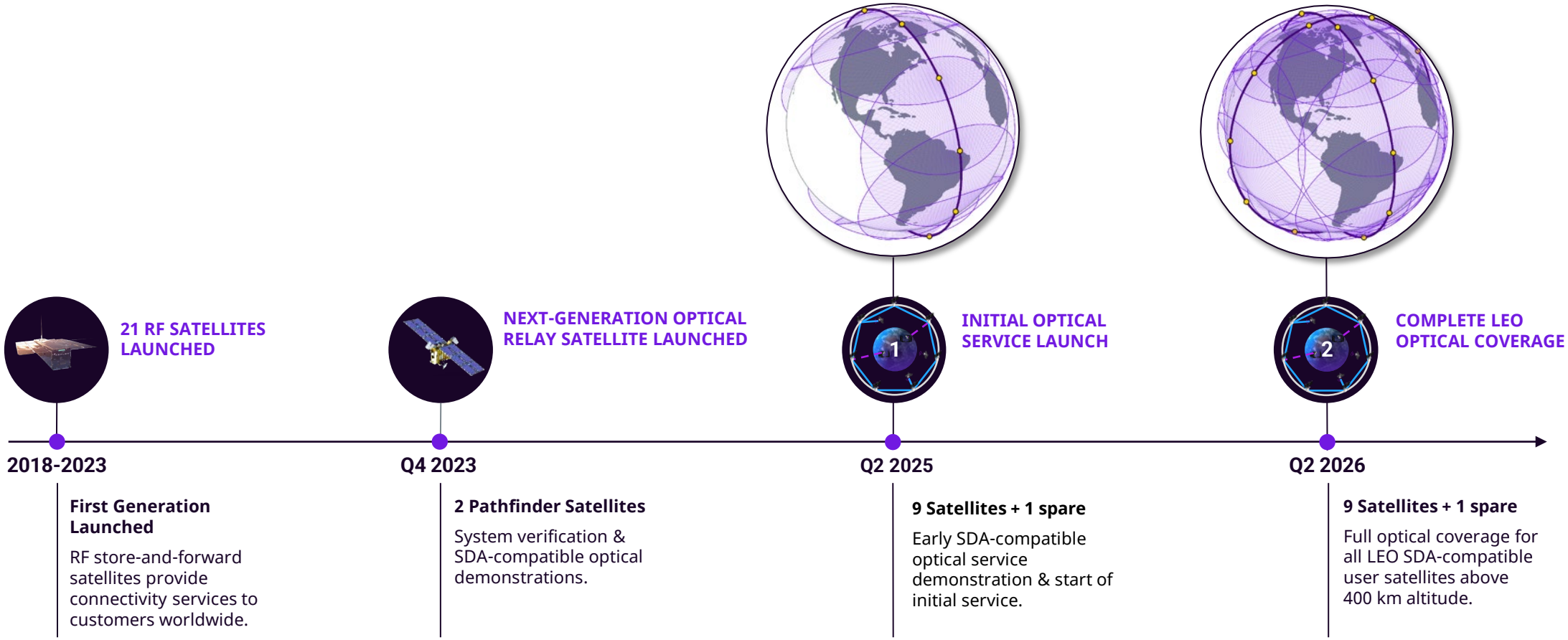


EO Satellite Contact & Data Delivery Timeline

1. EO satellite acquires Kepler optical link (~60 seconds).
2. EO satellite passes over Area of Interest (AoI) and begins collecting data.
3. In real time, EO satellite streams data back to mission operations center via the Kepler Network.

End-to-end latency from data collection by the EO satellite to data delivery to terrestrial user is sub-second in all scenarios.

Kepler Service Deployment Timeline



Satellite Development Heritage

Kepler was founded on the premise of rapid cycles of learning including designing, developing, and delivering hardware on orbit.

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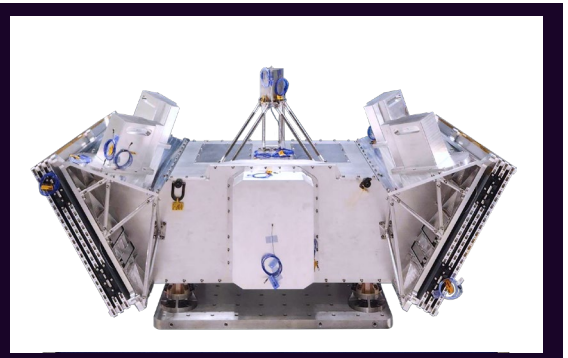
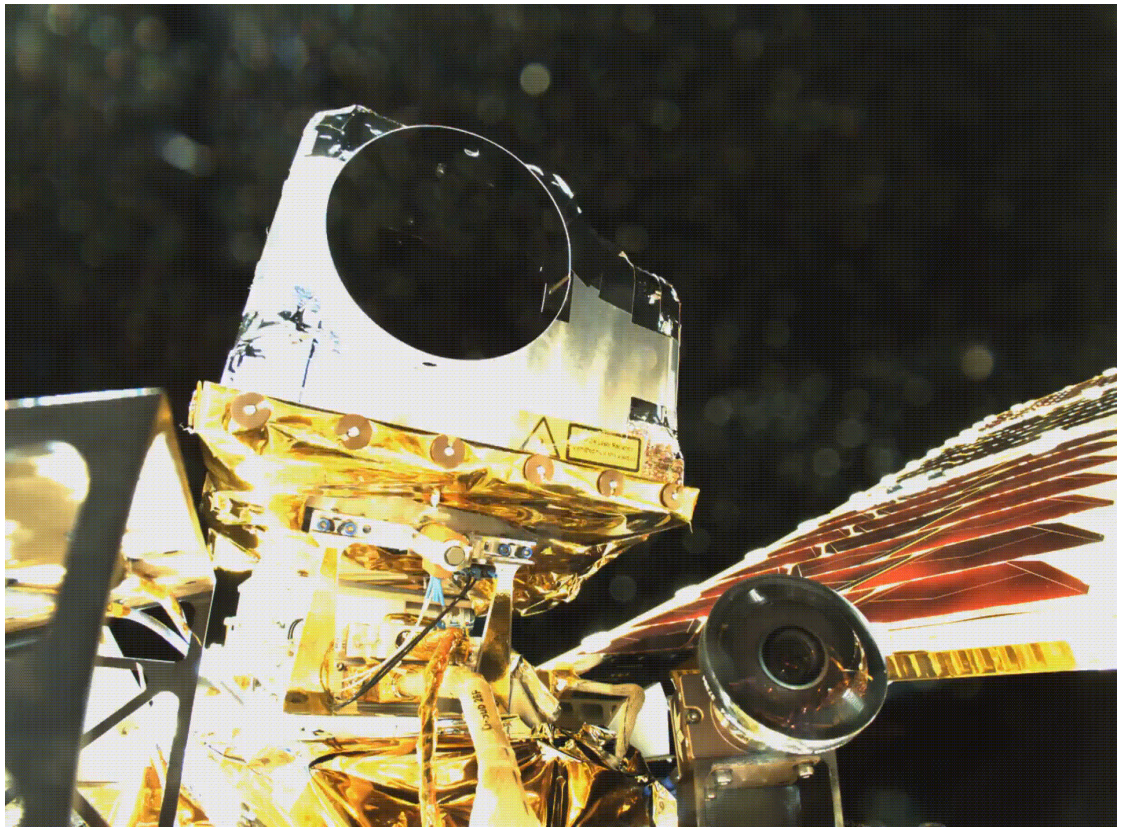


Kepler Satellite Generation	Gen 1	Pathfinders	Tranche 1
Launch date	2018-2023	November 2023	Q1 2025
Service start	Current	Q3 2024	Q2 2025
Number of satellites	21	2	9 + spares
Satellite wet mass	~9 kg	~150 kg	~250 kg
Availability	15 passes / satellite / day	15 passes / satellite / day	Continuous (24/7)
End-to-end latency	~1 hr (store and forward)	~1 hr (store and forward)	Real time (≤500 ms)

Over 50 years of cumulative on-orbit heritage in Kepler spacecraft and systems

November 11, 2023 - Kepler Launched Two Optical Pathfinder Satellites Hosting The First Commercial, SDA-Compatible OCTs

Kepler Optical Pathfinder Satellites On Orbit



NORAD IDs: 58281 & 58299.
Altitude: 527 km
Sun-synchronous, 10:30 am LTDN.

- Launch ✓
- TT&C check-in ✓
- Hardware checkout ✓
- Satellite ↔ satellite OISL (exp. Q2 2024)
- Partner demonstrations (H2 2024)

Kepler's Pathfinder satellites host the first commercial, SDA-compatible OCTs ever launched

Kepler Tranche 1 Optical Space Data Relay Satellites

Kepler's data relay satellites enable optical communication between Kepler satellites and customer satellites using SDA-compatible optical communication terminals (OCTs)

10 Satellites Launching April 2025

Kepler Tranche 1 Satellites	
Satellite Bus	▪ ~250 kg wet mass. ▪ >5-year lifetime at 1,000 km altitude. ▪ 1.2 kW deployable solar array. ▪ High pointing accuracy and stability (<750 µrad attitude knowledge error) ▪ Krypton/xenon thruster for orbit-raising and station-keeping.
SDA-Compatible OCTs	▪ 4 × 80 mm OCTs: 70 W / 15 kg. ▪ 2.5 Gbps bidirectional.

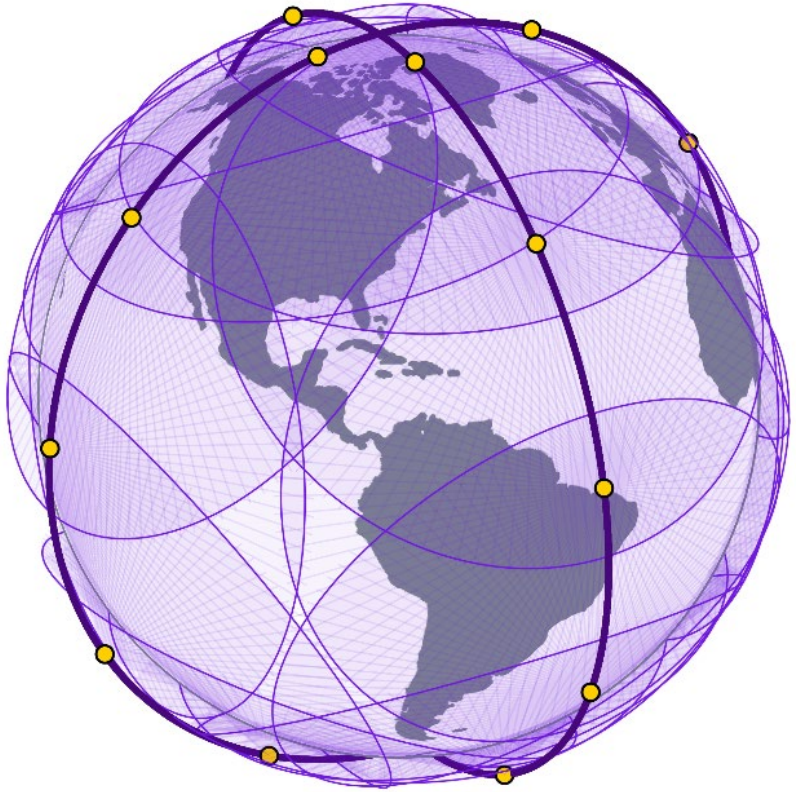
Avionics	▪ FPGAs and GPUs for processing & edge computing (AI, ML, automatic target recognition, etc.).
	  ▪ 4 × GPU: 275 TOPS, 64 GB RAM.
	  ▪ 2 × FPGA: 682K CLBs, 20 Gbps IO.
	▪ >10 Gbps FPGA-based packet router.

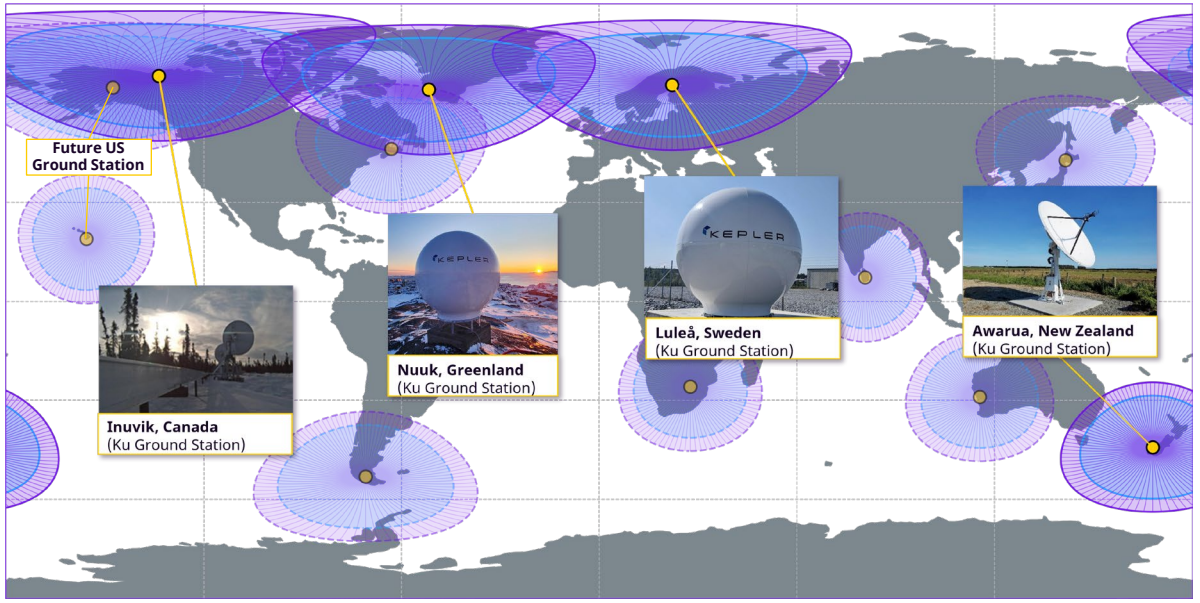
Ku-Band Feeder Link	▪ 2.5 Gbps downlink, 800 Mbps uplink. ▪ Gimbal/positioner with 2π sr field of regard.

Initial data relay constellation capacity is scalable and can be increased by deploying additional satellites.

Kepler Network | Space and Ground Segments

The Kepler Network's space segment consists of two planes of optically inter-linked data relay satellites in sun-synchronous orbits, providing 100% line-of-sight coverage to LEO orbits above 400 km. Kepler also owns and operates a global network of ground stations for connection to data relay satellites and direct RF connectivity services.





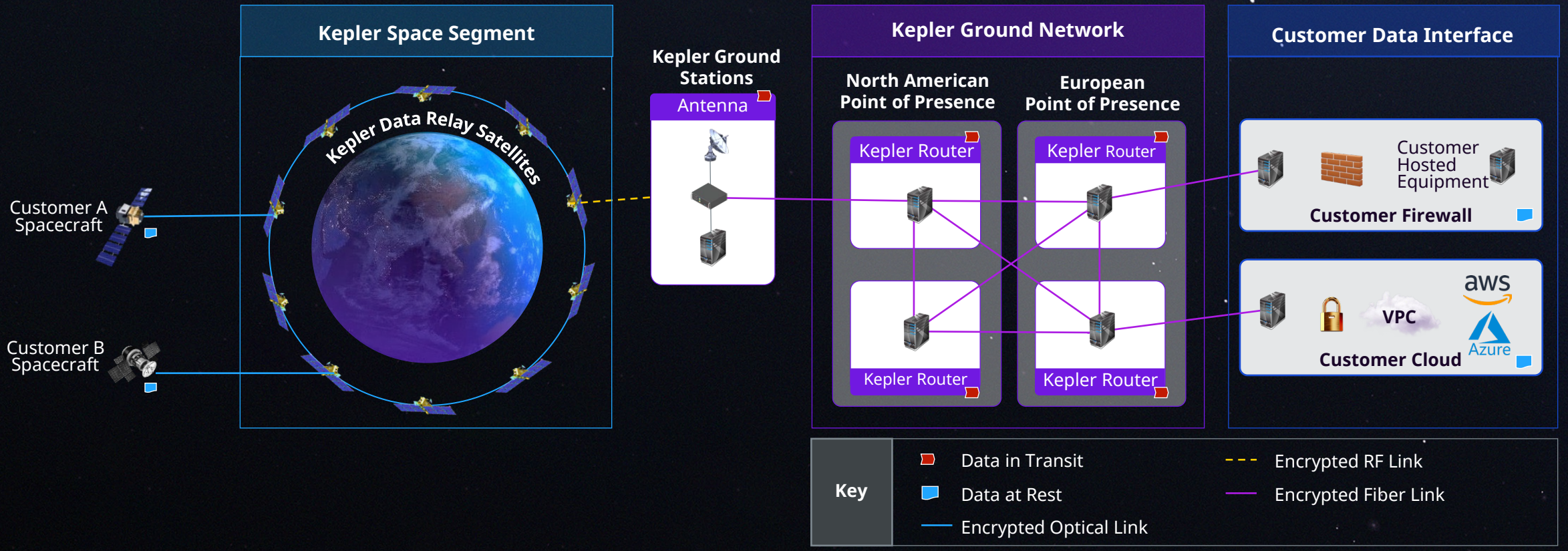
Coverage is shown at 400 km and 600 km altitudes, assuming a 5° minimum elevation angle in all directions from the gateway site.

Solid colors indicate operating stations. Dashed lines indicate planned stations

The Kepler Network provides persistent and resilient connectivity via multi-path routing and global coverage

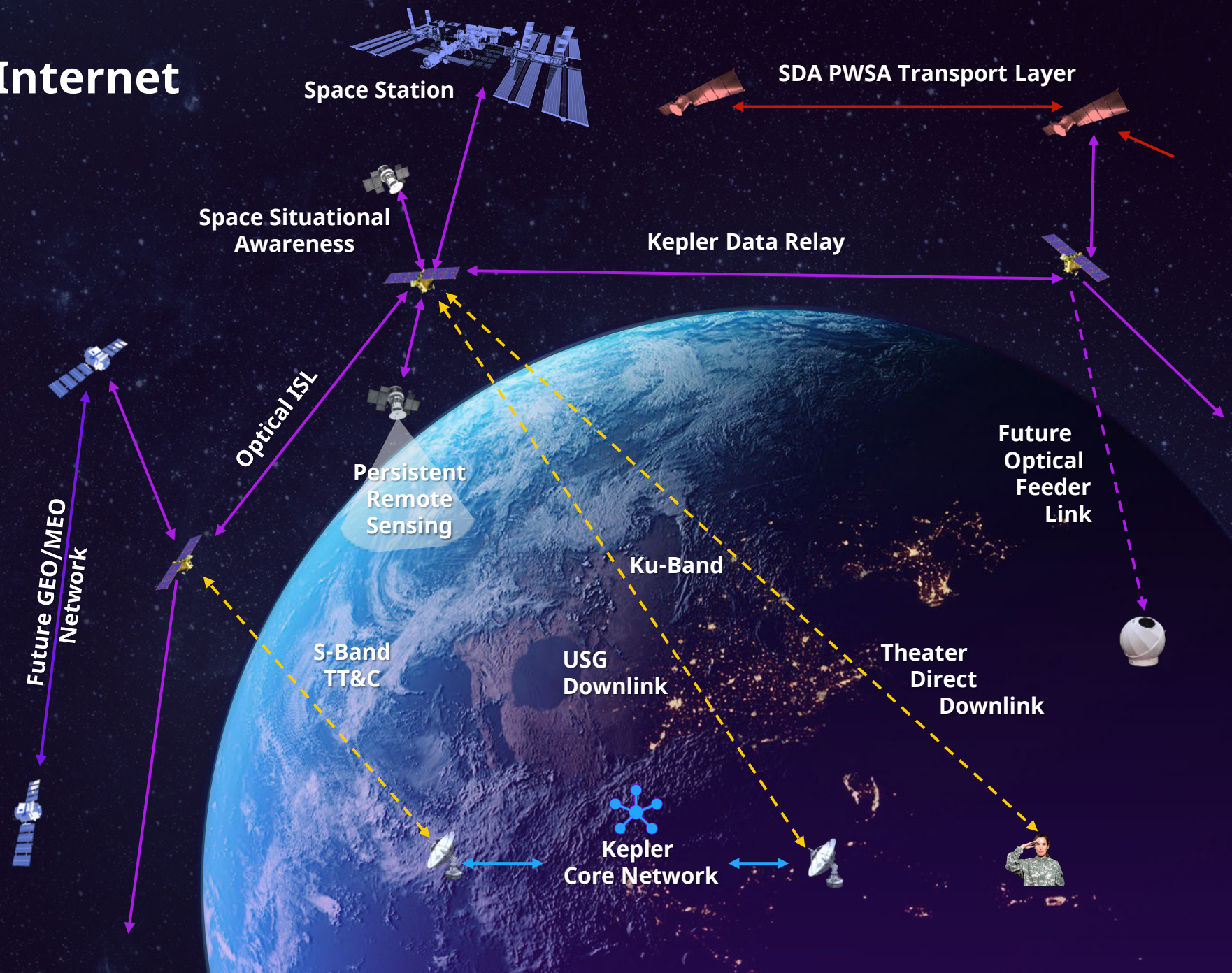
Kepler Network | Routing and Security

- Standard IP Protocols
- Customer-Encrypted Data
- Compliant with NIST SP 800-171
- High Network Reliability
- Virtual or Hosted Customer Interface
- NIST SP 800-53 in Progress



Kepler's Open Space Internet Architecture

- Committed to Open, Non-Proprietary Standards
- Launched First Commercially Available SDA-Compatible OCTs
- Compatibility Across Networks
- Supporting Government and Commercial Users
- Resiliency for Government Programs
- End-to-End Connectivity
- Persistent Connectivity to LEO Assets



Why Are We Still Waiting For Data?

There Are No Speed Limits In Space