Spacetruck Introduction

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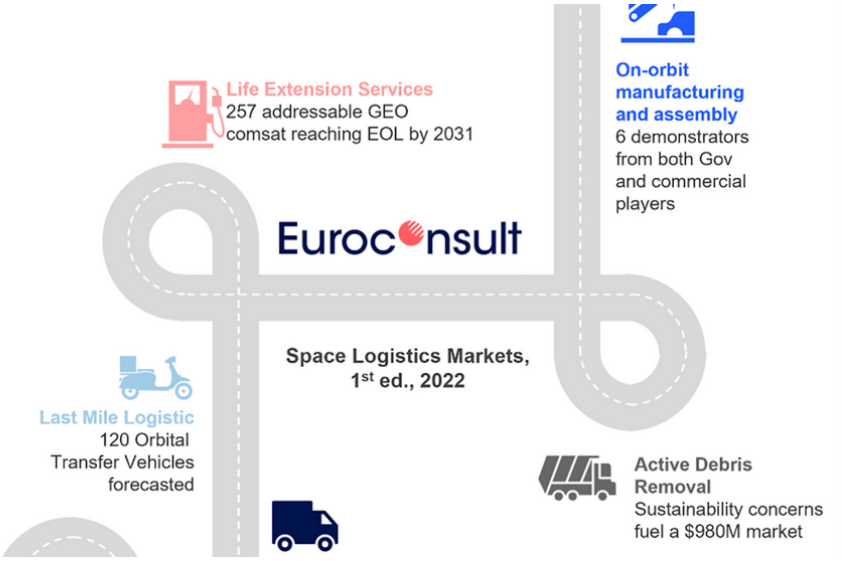
General

Objective:
Space Mobility with three product lines addressing every specific demand with a specific product. SpaceTruck (SR) is the low range space system. Spacetruck is the long range spacecraft that will also be moving payload beyond LEO.

Critical Technology:
SpaceTruck (LR)'s key technology is the engine manufactured by the company called Combined Liquid Electric Propulsion System (formerly CLEPS, now Phoenix). Phoenix is a highly efficient subsystem that uses both electric power and chemical power to reduce the need for immediate refueling and enable long range traveling among orbits such as GEO, MEO, and possibly CisLunar & Mars Missions.

Vision:
The ultimate vision of SpaceTruck (LR) is to operate up to 25 of them all at once, refuel them, and keep them operational at all times while providing services

Target Market:
The service portfolio of SpaceTruck (LR) is not only satellite delivery, but also tactical maneuvering between orbits, which we believe there will be a strong demand for, from multiple governments needing to secure, or relocate orbits, or extend life. Vehicles at-all-time operational in space for tactical maneuvering, active debris removal, on-orbit manufacturing and assembly payload provision for any payload more than few hundred kilograms to few tons.



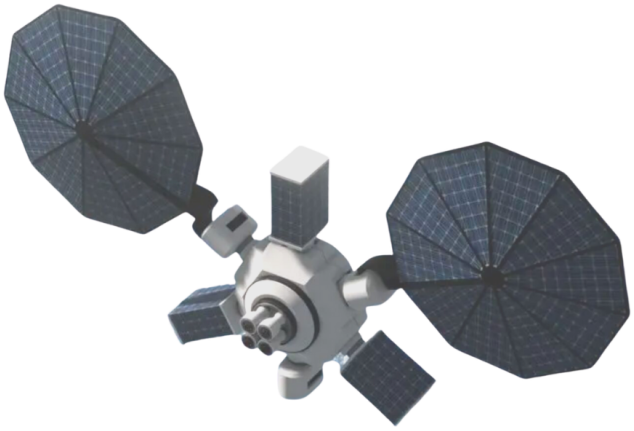
The Demand for In-orbit use of Long Range Space Truck- Plasmos Mobility Services Portfolio - Reference: Euroconsult

Business Plan

Overview

Problem - Last Mile Delivery: Last mile delivery of satellites means after the satellite is delivered to the first orbit with a ride-share program, the last mile delivery tug can take it to its destination (e.g. Equatorial, high LEO, or low MEO, or GEOStationary..

SpaceTruck (Long Range): is a Long Range SpaceTruck, taking deliveries up to X tons (to be defined to Geostationary or high MEO. This spacecraft is meant to carry up to four payload each up to 400 kg from LEO / SSO to GEO/MEO.



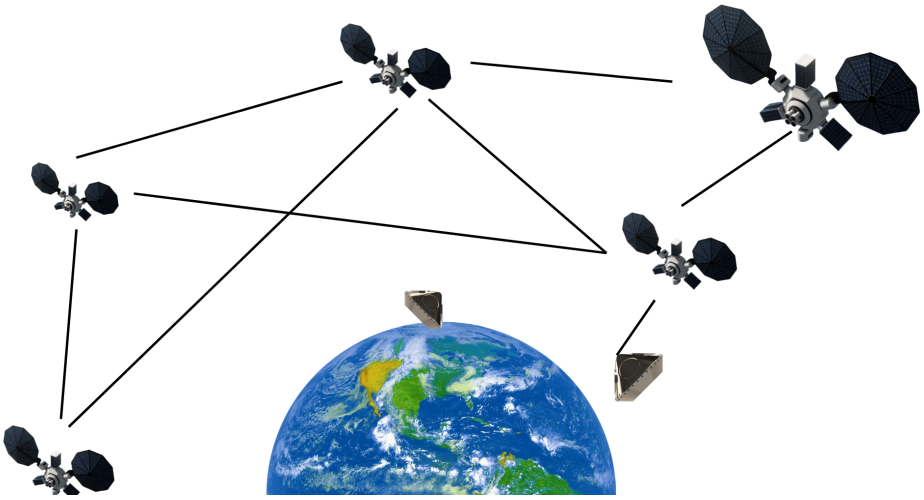
Operational Concept

The concept of SpaceTruck (LR) comes from a simple space tug for payload delivery to MEO & GEO.

SpaceTruck (LR) - Vehicle Ad hoc NETwork - a set of spacecraft

Overall idea of the tug is to build a network of transport vehicles that can carry payload from / to multiple orbits on affordable rates, because of a smart network, reliably.

The tugs overall will have a common satellite deployer interface that will commonly be used to deliver and take satellites from SpaceTruck (SR) in LEO to SpaceTruck (LR) to MEO & GEO and beyond. The network architecture allows for random availability.



Design & Operation Features

ID	Feature	Rationale
DF1	Designed to industrial best practices of satellite & spacecraft systems	Satellite industry has grown for years, and there are industrial common practices and knowledge - which can be used to not make mistakes that have -known to be- results.
DF2	Partnership based manufacturing, processing and system and subsystem integration	Recalling DF1, thus we like to develop partnerships than a vertical integration, in order to build slower, but a reliable service
DF3	Advanced & Combined propulsion architecture	Propulsion systems that are used in space transportation are outdated - thus plasmos has started to build fundamentally different propulsion systems that are using the chemical propulsion's high power and efficiency of electric propulsion.
DF4	High power demands - in the 5-8 kW range. Possible Solution: Orbital Atk solar (UltraFlex) for supplying the high power demands of the engine.	According to DF3, Plasmos's Propulsion system will have high power requirements. Thus, the propulsion system needs to have a high power need for its solution.

DF5	Highly Storable Propulsion Fuel. Possible Solution: : Rocket-grade hydrazine is the primary option with studies on Hydrogen Peroxide.	The Chemical Propulsion part of the propulsion is using a highly storable fuel, thus cryogenic fuels are not optimal.
DF5	Standard on both SR and LR release and separation systems for stage separation and standard payload fairing separation.	We are looking for a safe separation that possibly can be our own standard separation, as we have ideas to do multi-platform missions using the SR and LR systems of ours.
DF6	Over the air Upgrade	The electronics & control unit system shall be able to be safely upgraded with new system maneuver information to improve over time safely and securely.
DF7	Refueling Feature using RAFTI ™ by Orbits Fab	The system will refuel in order to be operational for longer period and have flexibility in orbital maneuvering. RAFTI (by Orbit Fabs) interface is being considered for implementation on the serial production.
DF8	Random Availability in urgent situations (NATSEC)	Space debris, junk, need for tactical maneuvering and more will be happening randomly. The rising population of space debris increases the potential danger to all space vehicles. As these dangers are growing, the probability of a collision is enough that evasive action or other precautions to ensure the safety of the crew are needed.
DF9S	Special Services: The network effect can result to specific use cases such as ambulances, or Uber - like transport services that are massively derived by the ability to provide services in urgent situations in any orbit. Note: This segment may require classified operation.	Situational Awareness, and Tactical Maneuvering & National security use cases such as but not limited to: GEO- Urgent Response: within less than few days response time in GEO, Low MEO: within some hours response time in emergency situations and busy space debris manuevers required in certain areas High MEO & GEO: within 2 weeks within GEO. These services need to be built into the government service portfolio & portfolio (Owner

Operational Targets

Plasmos is building a highly reliable Long Range Systems. The Systems that want to go to GEO are highly sophisticated and expensive systems. Thus Plasmos's Truck is to achieve a 99.7 % reliability rate in satellite delivery.

Year	Target	Rationale
2026	First Operational unit in Space	Lead time for electronics of the engine is anticipated to take one year. The design is anticipated to finish by July 2023 and flight ready version by December 2024.
2028	4 Operational	Demonstrating a reliable and fast mission deployer is key to plasmos's tug build success
2030	Up to 10 Operational	Transferring to Serial Production
2032	Up to 20 Operational	According to a Euroconsult report up to 297 GEO Satellites will reach the end of life. Requests for End of Life extensions, Advanced tactical maneuvering and beyond is expected to grow exponentially by 2032.

PLASMOS

High Level Mission Requirements

Req-ID: PLS-REQ-0001

The space truck LR design shall incorporate the following mission types:

1. Final orbit injections in ESC, GEO or MEO for Customer S/C with a delta V of up to XXX m/s after launch with a LEO/GTO Launcher (performance increase stage of launcher).
2. In-orbit injection of up to 2 S/C per truck launch with a total combined mass of up to 2000 kg in MEO, GEO, or ESC (1 S/C only).
3. In-orbit Customer spacecraft relocation maneuvers (ferry) with a delta V of up to XXX m/s.
4. Lifetime extension missions – increasing the Customer S/C lifetime by a minimum of 10 (TBC) years.
5. Space debris removal – capture and re-entry of Customer S/C ensuring proper demise.

Owner:
Parent:
Notes: to 1) Any MEO orbit shall be attainable – typical ESC scenarios shall be feasible (Lunar, Mars, Jupiter, Mercury, Venus)

Req-ID: PLS-REQ-0002

The space truck design and margin philosophy shall ensure achievement of a graveyard orbit or full demise after executing its intended mission.

Owner:
Parent:
Notes: refurbishment of external components is acceptable.

Req-ID: PLS-REQ-0003

The space truck shall be designed for an in-orbit lifetime of 10 years under GEO environmental conditions.

Owner:
Parent:
Notes:

Req-ID: PLS-REQ-0004

The space truck design shall be single-point failure free.

Owner:
Parent:
Notes:

Req-ID: PLS-REQ-0005

The space truck design shall incorporate all subsystem components for operation, communication, telecommanding and monitoring of both the S/C as well as the Customer's S/C health.

Owner:
Parent:

Notes:

Req-ID: PLS-REQ-0006

The space truck design shall be compatible with a multitude of launcher systems.

Owner:
Parent:
Notes: Compatibility with many launcher systems shall ensure Customer remains flexible to select his/her launcher without restrictions from the Plasmos truck.

Req-ID: PLS-REQ-0007

The space truck design shall enable launch Customers TBD communication and power IFs to the truck.

Owner:
Parent:
Notes: A limited amount of power and health monitoring shall be possible as an option/service to the customer.

Req-ID: PLS-REQ-0008

The space truck shall be able to accommodate standard S/C launch adapter IFs.

Owner:
Parent:
Notes:

Req-ID: PLS-REQ-0009

The space truck shall have a reliability of 0.97 (TBC) over the full mission lifetime

Owner:
Parent:
Notes:

Req-ID: PLS-REQ-0010

The space truck shall enable orbit injections for various inclinations and orbital altitudes.

Owner:
Parent:
Notes: