TECHNICAL SPECIFICATION: SPERS ORBITAL LOGISTICS NETWORK

System Designator: OLN-T1 (Orbital Logistics Network - Tether Class 1) **Component:** Electrodynamic Induction Tether (The "Space Highway") **Date:** November 24, 2025 **Classification:** Infrastructure / Propulsion

1.0 SYSTEM OVERVIEW

The OLN-T1 is a propellant-less propulsion system designed to transport heavy cargo between Low Earth Orbit (LEO) and Geostationary Orbit (GEO) / Lunar Transfer Injection.

Instead of chemical rockets, the system utilizes **Electrodynamic Tethers (EDTs)** to interact with Earth's magnetosphere. By driving current through a conductive tether, the system generates a **Lorentz Force**, pushing against the Earth's magnetic field to boost or de-orbit cargo without consuming reaction mass.

1.1 Key Advantages

- **Zero Fuel Cost:** Propulsion is generated purely from electrical energy (Solar/Nuclear).
- **Reusability:** Tethers are permanent infrastructure, not consumable stages.
- **Material Synergy:** Constructed from Carbon Nanotubes (CNT) harvested from the SPERS reactor waste stream.

2.0 HARDWARE ARCHITECTURE

2.1 The Tether (The "Rail")

The physical connection and propulsion medium.

- **Material:** Multi-walled Carbon Nanotube (MWCNT) composite braid.
- **Length:** 20 km to 100 km (Variable deployment).
- **Conductivity:** Aluminum-coated core for electron flow.
- **Tensile Strength:** $> 60 \text{ GPa}$ (Derived from reactor carbon output).
- **Geometry:** "Tape" profile (50 cm wide, microns thick) to resist micrometeoroid severance.

2.2 The Crawler (The Cargo Tug)

The vehicle that grips the tether and houses the payload.

- **Propulsion:** Inductive Linear Motor.
- **Power Source:** Solar Wings + Onboard Supercapacitors.
- **Mechanism:**
  - **Boost Mode:** Solar panels drive current *down* the tether $\rightarrow$ Lorentz Force pushes the system *up* (higher orbit).
  - **Brake/Harvest Mode:** System moves *down* orbit $\rightarrow$ Induces current *up* the tether $\rightarrow$ Generates electricity (Regenerative Braking).

3.0 PHYSICS OF OPERATION

$$F = I \cdot L \times B$$

- F **(Force):** The thrust vector.
- I **(Current):** Electrical current flowing through the tether (up to 50 A).
- L **(Length):** The deployed length of the tether ($20\text{–}100 \text{ km}$).
- B **(Magnetic Field):** Earth's magnetic field vector.

3.1 Operational Modes

Mode	Action	Current Flow	Result
Boost (Up)	Power Supply drives current.	Against EMF	Orbit raises. (Cargo to GEO)
De-Orbit (Down)	Passive electron collection.	With EMF	Orbit lowers. (Return empty crates)
Station Keeping	Variable pulsing.	Balanced	Maintains altitude against drag.

4.0 INTEGRATION WITH SPERS

The OLN-T1 is the logistical backbone of the Phoenix Protocol.

1. **Source:** SPERS reactors on Earth produce excess Carbon during waste dissociation.
2. **Fabrication:** This carbon is spun into Nanotube ribbons.
3. **Deployment:** Ribbons are launched to build the Tethers.
4. **Operation:** Spent SPERS cores are launched to LEO. The Tether system grabs them and "railguns" them to the High Earth Orbit (HEO) detonation zone without using fuel.
5. **Return:** Harvested Rare Earth Elements (REE) are loaded into descent capsules. The Tether absorbs their orbital energy to generate electricity, gently lowering them to LEO for retrieval.

5.0 PERFORMANCE DATA

- **Thrust:** 0.5 N to 5 N continuous (Low thrust, but applied 24/7).
- **Specific Impulse (I_{sp}):** Infinite (No propellant mass ejected).
- **Payload Capacity:** $5,000 \text{ kg}$ per crawler.
- **Transit Time (LEO to GEO):** 30 - 60 days (Slow, efficient freight).

6.0 SAFETY PROTOCOLS

- **Severance Protection:** The "Tape" geometry ensures that small impacts puncture the tape but do not snap the tether.
- **Discharge Control:** Hollow Cathode Plasma Contactors prevent dangerous charge buildup on the cargo modules.
- **Collision Avoidance:** The tether is actively rigidized by current flow, allowing it to maneuver slightly to dodge space debris.