

PROMETHEUS

WP-05 | GOLD EDITION

THE MILLION-SATELLITE ECONOMY

Orbital AI, Starship, and the Supply Chain Behind the Next Infrastructure Revolution

A PROMETHEUS white paper examining what physical industrial system would have to exist for orbital computing at unprecedented scale - and who would have to build it.

Research discipline: Confirmed facts, documented relationships, strategic exposure, and forward-looking analysis remain clearly separated throughout this paper.

Executive Premise

SpaceX has asked the Federal Communications Commission for authority to launch and operate a new non-geostationary orbital data-center system of up to one million satellites. The FCC accepted the application for filing in February 2026. The proposed system would operate across approximately 500-2,000 km and would rely heavily on high-bandwidth optical inter-satellite links.

The critical distinction for PROMETHEUS is that one million is an authorization ceiling and proposed system scale - not a demonstrated deployment commitment or a guaranteed 2030 operating fleet. WP-05 preserves that distinction throughout.

SpaceX has since publicly described its Starmind orbital-AI architecture, including large solar-powered AI satellites, laser connectivity through Starlink, a planned Gigasat Factory in Bastrop, and a dependence on Starship for mass-to-orbit. NVIDIA has separately confirmed that the first-generation Starmind AI satellite is planned around an optimized Vera Rubin NVL72 architecture.

The central PROMETHEUS question is therefore larger than satellite count:

What industrial system - launch, compute, energy, communications, manufacturing, materials, capital and governance - would have to exist for orbital AI infrastructure at even a fraction of this scale to become practical?

Why WP-05 Matters

WP-01 established the broader proposition that intelligence is becoming infrastructure. WP-05 tests that proposition against one of the most ambitious infrastructure proposals now visible: the convergence of AI compute, solar energy, reusable launch, satellite manufacturing, optical communications and orbital governance.

Even if the proposed system never approaches one million operating satellites, pursuing 1%, 10% or 25% of that scale could create significant industrial demand and force major changes in launch cadence, satellite manufacturing, semiconductor supply, power systems, photonics, specialty materials and regulatory capacity.

The Infrastructure Stack

1. Starship and Launch Infrastructure

Reusable launch vehicles, engines, propellant systems, cryogenic equipment, launch sites, ground processing, specialty metals and high-cadence operations.

2. Satellite Manufacturing

Structures, electronics, printed circuit boards, semiconductors, sensors, thermal systems, power electronics, robotics and high-volume assembly.

3. AI Compute in Orbit

Accelerators, CPUs, memory, networking silicon, radiation tolerance, thermal engineering, software and modular compute architectures.

4. Power

Large solar arrays, power conditioning, distribution, storage, deployment mechanisms and spacecraft energy management.

5. Optical Communications

Laser terminals, photonics, inter-satellite links and high-bandwidth pathways into the existing Starlink network.

6. Ground Infrastructure

Gateways, terrestrial fiber, network operations, spectrum coordination, data interfaces and supporting terrestrial compute.

7. Direct-to-Device and Mobile

RF systems, antennas, modems, spectrum partnerships and integration with terrestrial telecommunications networks.

8. Industrial Capacity

Factories, machine tools, materials, logistics, workforce, financing and the replacement capacity required to sustain very large constellations.

Supply-Chain Evidence Standard

The supply-chain investigation is one of WP-05's defining contributions. It must not confuse a company that makes a useful component with a company that actually supplies SpaceX.

Tier	Classification	PROMETHEUS standard
A	Confirmed supplier / partner	Direct documentary evidence of a SpaceX, Starlink or SpaceXAI commercial or technology relationship.
B	Confirmed component presence	A component is identified in SpaceX hardware, but the commercial relationship or future volume is not fully documented.
C	Strategic supply-chain exposure	The company produces technology relevant to the infrastructure, but no confirmed SpaceX relationship has been established.
D	Speculative beneficiary	A plausible beneficiary based on analysis only; must be explicitly labeled speculative.

Current high-confidence example: NVIDIA belongs in Tier A for the orbital-AI program. NVIDIA announced on August 24, 2026 that SpaceXAI plans to extend NVIDIA accelerated computing into space and that the first-generation Starmind satellite will be based on an optimized Vera Rubin NVL72 system.

Important counterweight: SpaceX is highly vertically integrated. WP-05 investigates not only suppliers SpaceX uses, but also industries or suppliers that SpaceX may bypass by internalizing manufacturing.

White Paper Architecture

Part I - The Million-Satellite Proposal. What SpaceX actually filed, what has been publicly stated, what the FCC has accepted for review, and what has not been promised.

Part II - Why Put AI Compute in Orbit?. Solar availability, terrestrial grid constraints, cooling claims, latency, bandwidth, radiation, reliability and economics.

Part III - The Starship Equation. Why reusable heavy lift, payload mass, turnaround and launch cadence are prerequisites.

Part IV - Building the Industrial Base. Satellite manufacturing rates, replacement cycles, factories, materials, workforce and capital requirements.

Part V - The SpaceX Supply Chain. Evidence-ranked mapping of confirmed suppliers, components and strategically exposed industries.

Part VI - The Public-Market Infrastructure Map. Publicly traded companies with documented or strategically relevant exposure - presented as infrastructure research, not investment advice.

Part VII - Constraints and Failure Modes. Orbital congestion, collision risk, debris, astronomy, spectrum, environmental effects, economics, regulation, Starship execution and technical uncertainty.

Part VIII - The PROMETHEUS Assessment. Scenario analysis at 1%, 10%, 25% and 100% of the proposed maximum scale.

The Scenario Framework

The strongest analytical section is the scenario analysis. The question is not simply whether one million satellites will be launched. The more useful question is what happens to the industrial system at progressively larger fractions of the proposed architecture.

Scenario	Illustrative scale	Research question
1%	10,000 satellites	Does orbital AI become a specialized but meaningful infrastructure category?
10%	100,000 satellites	What manufacturing, launch, compute and optical-network capacity becomes necessary?
25%	250,000 satellites	What happens to orbital governance, supply chains, launch cadence and replacement economics?
100%	1,000,000 satellites	What industrial and regulatory system would be required to sustain the full proposed ceiling?

This framework protects the paper from becoming dependent on the literal achievement of a one-million-satellite constellation. The industrial consequences may become significant long before the maximum proposed scale is reached.

Research Guardrails

- Do not state that one million satellites will be operating by 2030 as established fact. Treat one million as the maximum system size sought in the FCC application unless stronger primary evidence establishes a deployment commitment.
- Separate SpaceX statements and engineering claims from independently verified performance.
- Use primary documents wherever possible: FCC filings and orders, company technical material, supplier disclosures, SEC filings, earnings calls, patents, procurement evidence and teardown/component evidence.
- Distinguish confirmed suppliers from companies that merely manufacture relevant products.
- Give counterarguments full treatment: economics, debris, collision avoidance, astronomy, spectrum, atmospheric effects, radiation, thermal engineering, replacement rates and regulatory capacity.
- Treat public-company mapping as industrial research, not as a recommendation to buy or sell securities.

Primary Evidence Identified

FCC: Public Notice DA 26-113, released February 4, 2026, accepting SpaceX's application for a new NGSO orbital data-center system of up to one million satellites. ICFS File No. SAT-LOA-20260108-00016.

SpaceX: Starlink / AI Satellite materials describing solar-powered orbital compute, laser connectivity through Starlink, AI1 spacecraft characteristics, the Bastrop Gigasat Factory and Starship's role in deployment.

NVIDIA: August 24, 2026 announcement that SpaceXAI will use Vera CPUs and Vera Rubin infrastructure, including an optimized Vera Rubin NVL72 foundation for the first-generation Starlink satellite.

Opposition / governance evidence: American Astronomical Society petition raising optical, infrared and broader astronomy concerns regarding the proposed orbital data-center system.

PROMETHEUS Working Thesis

The decisive story may not be whether SpaceX ultimately deploys one million orbital data-center satellites. The more consequential story may be the industrial system created in attempting to make orbital intelligence infrastructure scalable.

WP-05 follows that system from semiconductor to satellite, factory to launch pad, solar array to laser link, and corporate ambition to public governance. With the factual discipline established for PROMETHEUS, it serves as both a technology paper and an industrial map of a possible new infrastructure economy.

Selected Source Notes

1. Federal Communications Commission, Space Bureau Public Notice DA 26-113, Feb. 4, 2026, ICFS File No. SAT-LOA-20260108-00016.
2. SpaceX, Starlink / AI Satellite technical overview, accessed Sept. 1, 2026.
3. NVIDIA, "SpaceX AI Adopts NVIDIA Vera CPU to Accelerate Agentic AI at Massive Scale," Aug. 24, 2026.
4. American Astronomical Society, Petition to Deny regarding SpaceX Orbital Data Centers, Mar. 6, 2026.
5. Reuters, "SpaceX seeks FCC nod for solar-powered satellite data centers for AI," Jan. 31, 2026.