The Interplanetary Network (TIN)

v0.3.9
Persistent, Delay-Tolerant Relay Architecture for Lunar South Pole and Interplanetary Operations

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Mission

Enable life-saving, delay-tolerant communication at the lunar south pole and far side — where dust, plasma, and long shadows make every link critical. TIN is a lean hybrid polar + ELFO architecture designed to deliver 100 % coverage where it is needed most, using proven DTN principles and AI routing.

Current Baseline

- 6–8 smallsats in 400 km circular 90° polar orbits
- Primary DTN/AI hub: Lunar Pathfinder ELFO (frozen elliptical orbit, perilune over South Pole)
- 28-day simulation (elev >5°):
  - South Pole: 99.9–100.0 % coverage
  - Far Side: 63.2–68.5 % coverage
- Full modeling of DTN custody handoff, link budget, latency, and solar storm resilience

Why This Matters Now

The lunar south pole is the gateway for sustained Artemis surface operations. DUSTER will reveal the harsh dust and plasma environment that threatens every communication link. TIN was built to survive exactly those conditions — providing redundant, tolerant relays so crews, rovers, and science instruments never lose contact when it matters most.

Repository Contents

- **data/** — All simulation datasets + README.md
- **docs/** — Whitepapers, LSIC LOI, trade studies, notes
- **results/** — Coverage maps (PNG) and JSON outputs
- **scripts/** — All simulation code (Python + shell)
- **archive/** — Legacy materials and LaTeX files
- **simulations/** — Reserved for future work
- **README.md** — Full project details
- **.gitignore** — Modern best practices

Immediate Next Steps

- Submit to NASA 2026 STMD Civil Space Shortfalls (deadline Feb 20)
- Integrate findings with DUSTER lunar south-pole environment data
- Open to collaboration with LSIC CC team and Artemis relay efforts

Build once. Communicate everywhere — even when the Moon tries to stay silent.

Open-source under MIT. Independent research for the benefit of the lunar and interplanetary community.
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