ATB Technical Report — SDC & COMMS Program

Document ID: ATB-2025-10-SDC-OPTICAL-TERABIT-INTEGRATION-01
Prepared For: Advanced Tech Board (ATB) / NASA Partner Liaison
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Executive Summary

This report defines the engineering and compliance framework for achieving ≥ 1 terabit-per-second optical throughput between GEO clusters and LEO relay nodes using a dual-provider integration of SpaceX Starlink V3 and Amazon Kuiper optical intersatellite links. The design extends prior SDC & COMMS architecture work (Optical White Paper v1.1 and Master Plan v1.1) by unifying Starlink V3 terminals (> 1 Tbps capacity per satellite, launched H1 2026), Kuiper OISL interfaces (~ 100 Gbps per link, multi-link mesh), and MECSAI autonomous routing, quantum-resilient security, and Change-Detection automation.

Standards and Compliance Matrix

Standard	Section	Compliance Action	Responsible Agent
LNIS v5	§5.2.4 Optical Links & Routing	Integrate Starlink/Kuiper link-state QoS telemetry into MECSAI logs	CHRONOMETRE
ICSIS Rev B	§4.6 Interoperable Relay Interface	Validate cross-provider session continuity	RNC / GSI
SCaN-MOCS	§3 Service Tiers	Include multi-vendor maintenance events in ops timeline	CODEWRITE
LCRNS	Testbed Validation	Run inter-provider optical acquisition tests and record timing metrics	ARCHITECT

Routing Memorandum

TO: ATB Board (SYS-SAFE, ICS-SEC, RELIAB, HFX, STRUCT)
CC: ARCHITECT, MECHWORK, CODEWRITE, MECSAI
FROM: SDC & COMMS Program Office (Gary Spear / “Sam”)
DATE: October 21 2025
SUBJECT: Transmission — ATB-2025-10-SDC-OPTICAL-TERABIT-INTEGRATION-01

This memorandum formally submits the Terabit Optical Backbone Integration report for review and Quality-First Gate processing under NASA-STD-7009. It documents the technical basis for GEO–LEO optical link integration with Starlink V3 and Kuiper Networks and establishes the foundation for multi-provider redundancy within the SDC & COMMS infrastructure.