

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Upper Stages, Space Transfer, Entry and Landing Systems (3)

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NEO-SPACETUG: A COMPACT SOLAR ELECTRICAL PROPULSION CARRIER MODULE FOR  
EXPLORATION, SERVICE & ORBITAL TRANSFER

**Abstract**

Thales Alenia Space proposes a product line of Carrier Service Module based on Solar Electrical propulsion: NEO-SpaceTug. This product line combines several key innovations to offer a maximum fairing volume, mass and transfer capability to its payload. Its compact design relies on the combination of :

- Thin film solar array with a compact storage and simple deployment system.
- Deployable Radiators
- Highly integrated avionics.

These technologies benefit of synergies with new geo-telecommunication product-line enabling to benefit of optimised cost thanks to series production. The SpaceTug is declined in different scales optimised for targeted launcher segment:

- NEO-SpaceTug-500: launched as piggyback on medium or heavy launchers.
- NEO-SpaceTug-20k: Optimised to maxime payload on medium and heavy launchers.

The smaller version, NEO-SpaceTug-500, targets a low cost access to geostationary orbit for: telecommunication, Earth Observation (environment, meteo, ocean) or Space Observation small payloads. The larger version will target several applications:

- Space infrastructure deployment from a low injection to high orbits (Lunar Vicinity, Asteroid Transfer, Mars), with various capabilities: Habitat Module, Cargo, Lunar Lander.
- Space infrastructure service module (power supply, stabilisation, orbital manoeuvres)
- Combined with a Rendez-Vous and Robotics Module, several servicing applications: orbit transfer, refuelling, repair, Debris Removal and transfer to graveyard or re-entry orbits.

For Manned Application, the architecture already modular, benefits of enhanced redundancies of some functions (avionics) and extended FDIR to ensure man rated reliability. The paper highlights:

- How the above key technologies combined with high power electrical engines make such a system feasible.
- How the product-line is defined to ensure scalability and multi-mission capability.
- Examples of main missions.