

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (2)Author: Mr. Chrishma Singh-Derewa
United StatesOASIS INTEGRATED ARCHITECTURE FOR EXPLORATION AND UTILIZATION OF THE SOLAR
SYSTEM**Abstract**

NASA's Artemis Campaign has unified industrial and international partners in laying the foundation for human exploration and industrialization of the solar system. Industry is designing systems and architectures to achieve the goal of returning humans to the Moon to stay and pushing onwards to Mars. A flexible and extensible solar system architecture enables this vision for both near term and long term missions. The Commercial Low Earth Orbit (LEO) Destination (CLD), Habitation and Logistics Outpost (HALO) at the Moon and its successor at Mars, Lunar Surface Habitats (LSH), as well as Mars Transfer Habitats (MTH) utilize the Operations and Service Infrastructure for Space (OASIS). OASIS capitalizes on refueling modules, transfer modules, as well as human and cargo landing systems (HLS) for the Moon and Mars. This sustainable architecture concurrently augments US strategic customers by expanding Earth orbiting capabilities. The Cargo/Crew Autonomous Rendezvous and Velocity Adjustment/Navigation (CARAVAN) transfer module supports mission evolution from the Moon to Mars enabling the increased mass to surface required. A fully fueled CARAVAN leaves the OASIS refueling stations in LEO, Near-Rectilinear Halo Orbit (NRHO) or Mars Orbit completes rendezvous and docking maneuvers with the customer Payload and transfers the spacecraft to its final destination. CARAVAN enables mission designs at least three times more massive while reducing system complexity by eliminating cruise propulsion requirements allowing the customer to focus more on mission goals. The OASIS refueling network builds on demonstrated in space servicing capabilities. The refueling capability of OASIS extends to not only CARAVAN but industry orbital assets as well as other customer spacecraft requiring propellants. The goal is enabling customers to launch their missions without propulsion systems is within grasp. The Lunar HALO and planned Mars successors may capitalize on this reusable architecture offering staging platforms for cargo and crew heading to surface habitats. HLS modules are able to dock and load crew for surface sorties. HALO also provides a platform for crewed and uncrewed science, teleoperations of surface assets and furthers humanities microgravity experience. This architecture leverages the successful orbital knowledge gained from the ISS program leveraging versatility built on common interfaces and heritage systems. The systems engineering team at CU Boulder utilizes an advanced referential database in order to fully depict and integrate OASIS. A digital representation of the integrated solar system architecture enables customers to design and interact with the system architecture digitally during their system formulation phase saving time and resources while increasing technical accuracy. The OASIS system design, interfaces and digital framework detailed here will facilitate the customer experience while designing a mission using OASIS to the Moon, Mars and beyond.