

19th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND  
DEVELOPMENT (D3)

## Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

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LUNAR COMMS AND NAV INFRASTRUCTURE – FIRST DATA RELAY ORBITER LUNAR  
PATHFINDER, OPERATIONAL IN 2024, PAVES THE WAY FOR FULL CONSTELLATION BY 2030**Abstract**

At IAC 2020, Surrey Satellites Technology Ltd (SSTL) introduced Lunar Pathfinder, the first data-relay lunar orbiter to commercially offer communication services to missions on the surface and in orbit around the Moon. From 2024 onwards, lunar missions of all types (orbiters, rovers, landers, stationary instruments) will be able to access the service and dramatically enhance the value of their mission by lifting the multiple constraints of transferring data back to Earth.

Transmitting Direct to Earth (DTE) presents several limitations that can be alleviated with a communication relay infrastructure. DTE relies on direct line of sight, which makes it impossible for far-side missions, and a risk for mobile missions likely to encounter obstructing terrain. It also limits the achievable data-rate and contact time with the often oversubscribed deep space ground stations, therefore constraining the overall volume of data that can be retrieved by the end user. With a store and forward capability, a proximity link, two simultaneous channels in S-band and UHF, Lunar Pathfinder data-relay spacecraft is designed to lift these constraints, allowing longer upload durations at higher data-rates with each of the lunar assets, and bulk-sending data, at high speed, back to Earth Ground Station, ready for distribution to the end users.

At IAC 2021, SSTL is proud to announce that the build of the Lunar Pathfinder spacecraft is underway,

and SSTL Lunar, newly branded Lunar Service team within SSTL, is actively working with ESA and NASA lunar missions to set-up their specific comms support from 2024 onwards.

And we are not stopping there. . . As lunar missions evolve and move from science and exploration towards in-situ resource utilisation as well as purely commercial endeavours such as tourism, the lunar support infrastructure needs to expand with them.

Building upon the Lunar Pathfinder experience and the commercialisation of its services, an SSTL-led consortium, including established telecom operators as well as space and ground segment integrators, is already working on the next generation infrastructure. With a space segment based on a constellation of data-relay orbiters and strong interoperability requirements with other infrastructure elements such as Gateway, the overall system will integrate into the backbone infrastructure that will enable sustainable lunar exploration and utilization.