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MOON TO MOON SERVICES – LUNAR PATHFINDER AND FUTURE LUNAR COMMS AND NAV CONSTELLATION TO CONNECT LUNAR ASSETS TO EACH OTHER AND BACK TO EARTH, STARTING 2025

Abstract

In Dubai last year, Surrey Satellites Technology Limited (SSTL) shared with the congress attendants the plans for the Lunar Pathfinder satellite and communication services, realized by SSTL in collaboration with the European Space Agency (ESA). On the same day, ESA was echoing the need for Lunar communication and navigation services by unveiling the Moonlight initiative, a follow-on infrastructure in which Lunar Pathfinder becomes the first node of an ambitious lunar constellation offering high performance communication and navigation services on a commercial basis.

Despite its apparent stillness, the Moon is actively preparing for a thriving ecosystem. Each year, new lunar missions appear on the lunar road-map, get financed and manifested for launch. On the Moon like on Earth, there are certain fundamentals that should be taken for granted... Good quality communication and navigation services at affordable prices should be part of them! This October in Paris, a year further into the development of Lunar Pathfinder, SSTL is a year closer to solving the first and providing a response to the second of those fundamental expectations.

Lunar Pathfinder will be launched by NASA towards end 2024, using the Commercial Lunar Payload Service (CLPS) programme. In return for the launch, NASA will have access to the service and become one of the first Lunar Pathfinder users. With a store and forward architecture, a proximity link allowing for two simultaneous links with lunar missions in S-band and UHF, and backhaul link to Earth in X-band, the data-relay satellite will be able to solve both direct line of sight and performance limitation due to distance between the Earth and the Moon. In addition, an ESA GNSS receiver capable of detecting weak signals coming from the Earth GNSS infrastructure (GPS and Galileo) will be hosted onboard Lunar Pathfinder, demonstrating GNSS's potential role in Lunar navigation as a future services.

Building on the foundations of Lunar Pathfinder, and as part of the ESA-Moonlight Phase A/B1 study, SSTL is also looking at the next steps. With a team of established commercial space organizations, the aim is to characterize the end-to-end service infrastructure, as well as the commercialization model, that would enable the provision of Moonlight lunar communication and navigation services. The return to the Moon is an international effort and Moonlight is designed to integrate into the global lunar infrastructure, in harmony with programmes such as NASA LunaNet. Together, they will energize the future lunar economy.