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LUNAR BASE BUILDUP TIMELINE AND OPPORTUNITIES

**Abstract**

With the building momentum to deploy multiple assets on the lunar surface in the next decade comes a compelling assessment of how the assets will aggregate over time and potentially work together. This assessment reviews the current planned, forecasted, and potential lunar landings that will develop a Lunar Base at the South Pole, and at other locations. Today, several Commercial Lunar Payload Services (CLPS) missions are contracted by the National Aeronautics and Space Administration (NASA), while additional crewed lunar landers, surface habitats, and rovers are in various stages of development. The delivery of these assets describes a multi-phase timeline where a few autonomous assets are initially on the Moon, then several more to support crewed operations, and then potentially several more to replenish the logistics of their predecessors. Additional assets are forecasted to explore the commercial opportunities of In Situ Resource Utilization (ISRU), and they will be deployed in concert with the foundation elements of the Lunar Base, and supported by some of the capabilities provided by the base.

Within one to two decades, it is reasonable to envision a Lunar Base that contains within its radius of influence a large number of landed assets, potentially dozens, as are modeled in this buildup timeline. This vision invites the discussion of several opportunities to enhance and improve the base operations, including advanced preparations, resource sharing, and even component scavenging, all as a practice to continually inform and improve successive asset deployments, potentially lowering costs and encouraging growth. Certain technical challenges to the effective organization of a Lunar Base are discussed, as well as potential revisions that may be driven by delays or changes to the expected individual programs. Ultimately, the lunar base, as it grows, invites services and infrastructure enhancements that can greatly increase the science return and lower the barriers for future missions.