An Exploration of the Small Satellite Value Chain and the Future of Space Access

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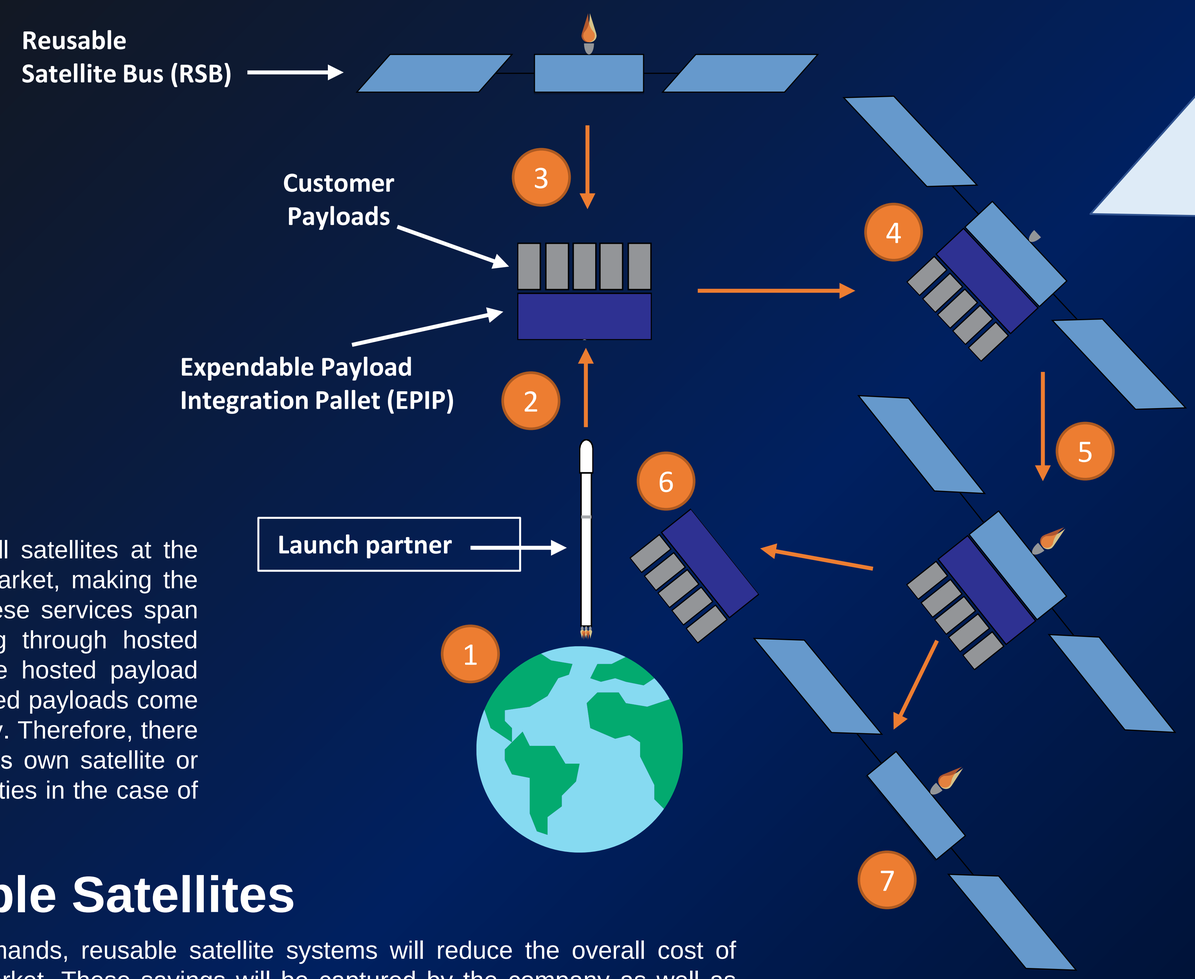
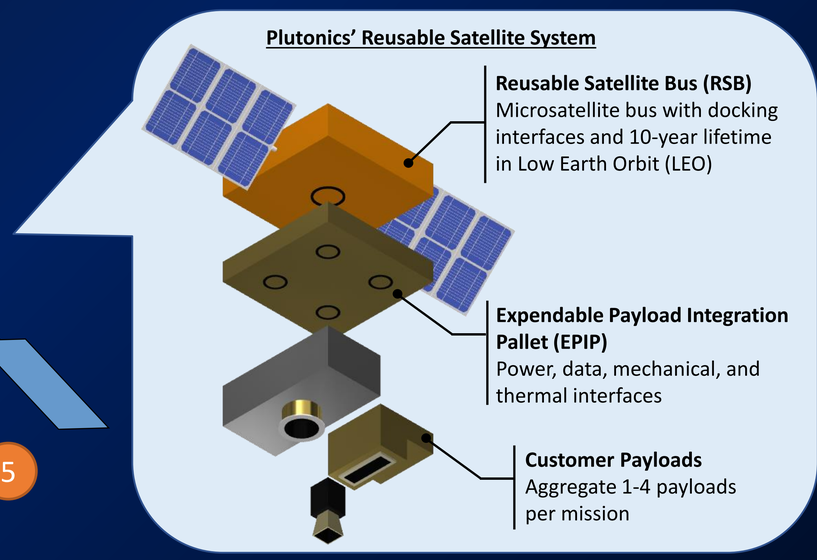
Intro: Current Market

Currently, there are 3,372 operational satellites in Earth's orbit. The total number of satellites launched per year is projected to increase from 181 in the previous decade, to 1,011 by 2029. Two thirds of these will be operating in LEO, providing a growing variety of services. By any measure, the market is massive where the space market is estimated to be $360B and estimated to be $1T by 2040. The global satellite market is a subset of the space industry and estimated to be $154B and includes government, commercial, and consumer services. Space Logistics will become a huge challenge in efficiently supporting over 8,000 satellites that are expected to be launched through the next decade.

Problem Statement

As the commercialization of space increases, with small satellites at the cornerstone, more commercial services will enter the market, making the process of getting payloads into space streamlined. These services span from a complete turn-key solution to resource sharing through hosted payload solutions. For cost conscious space users, the hosted payload solution offers a unique value proposition. However, hosted payloads come at the price of reduced volume, power, and pointing ability. Therefore, there is a trade-off to be made between developing your one's own satellite or constellation and sharing resources with reduced capabilities in the case of a hosted payload.





Key Takeaways

There are different options available to deploy a payload to orbit, but the limitations of the current satellite technology may lead to the current options not being able to meet the customer requirements. Presented here is a new opportunity/option enabled by emerging reusable satellite system technology that will make space access easier. Reusable infrastructure, such as the one currently under development by Plutonics, is the key to solving these customers' pain points. With a reusable satellite system, a single bus would be efficiently used across multiple customers lowering the cost basis for payload developers and enabling the commercialization of space.

Proposed Solution: Reusable Satellites

As one of the potential solutions for meeting these demands, reusable satellite systems will reduce the overall cost of operating a payload in space and reduce the time to market. These savings will be captured by the company as well as satellite users. We can estimate the potential initial addressable market by understanding the percentage of the market that are technology demonstrators, experimental payloads, and not constellations. The overall serviceable obtainable market is estimated to be $2B per year. Currently the global satellite manufacturing market is $12.5B per year and the small satellite constellations account for 83% of the market. Payload deployment service providers may initially target 17% of the market that are not constellations in the small satellite sector, the fastest growing satellite segment.

1. **PAYLOAD INTEGRATION.** Plutonics aggregate and integrate customer's payload(s) to the Expendable Payload Integration Pallet (EPIP)
2. **LAUNCH.** Rocket carries the EPIP as a secondary payload to Low Earth Orbit (LEO)
3. **DOCKING.** The RSB finds and docks to the EPIP that was recently launched
4. **MISSION OPERATIONS.** Mission operations begin and customers access and task their payloads and pay for what they use
5. **DEORBIT BURN.** The RSB thrusts into a decaying orbit in preparation of jettisoning the EPIP
6. **EPIP DEORBIT.** The RSB jettisons the EPIP in a decaying orbit. The EPIP deorbits passively due to drag at lower altitude
7. **REUSE! The RSB is now ready to receive a new set of customers and start the cycle over**

VS.

Currently Available Options for Sending Payload to LEO

	Cost	Schedule	Available Payload Volume	Resources	Notes
DIY	+ Starting at ~$250k	− 3 – 4 years	− Restricted volume, bus takes up to 50% of the volume	− Limited by CubeSat size 15 – 120W	− Lower reliability + High customization
Turnkey Hosted Payload	− Starting at ~$0.8M	− Dependent on available opportunities	+ Up to 50% of the bus volume can be used for payload	+ Based on base spacecraft Up to 1kW	− Dependent on main customer payload destination + Simple operations
Turnkey Free Flyer	− Starting at ~$1M	+ 12 – 15 months	− Restricted volume, bus takes up to 50% of the volume	− Limited by CubeSat size 15 – 120W	− Customization comes at a cost + Simple operations

Key References

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