Point-to-Point (P2P) Transportation Market Forecasts and Implications for the LEO Economy

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Abstract

In 2017, Elon Musk presented SpaceX's concept for point-to-point (P2P) transportation, whereby a rocketship designed and built for transporting humans to Low Earth Orbit (LEO), the Moon or Mars could alternatively be used for transporting up to 1,000 humans from any point on Earth to another (e.g., New York to Tokyo) in less than an hour. The concept got additional attention with a report published by the Union Bank of Switzerland (UBS) in early 2019 on the potential market demand for P2P transportation. The concept was further validated as a realizable market with Virgin Galactic's SEC filings including P2P as the next step to the company's growth and a recent investment from Boeing's HorizonX Ventures into Virgin Galactic for its impending P2P capability. A recent survey by UBS also accentuated the emergence of "environmentally conscious consumers" that are reducing their air travel and are thus laying the foundation for alternative methods of long-distance travel. Based on these recent developments and market signals for P2P, the Spacexchange team posits that P2P travel is imminent and its market share growth should be studied in the context of potential positive feedback loop impacts on the growth of the LEO economy. We have thus conducted a preliminary analysis of price elasticity, market demand, and environmental implications of the conceptual P2P transportation paradigm:

Significant reduction in LEO transportation costs. P2P-based transportation of passengers and parcels could reduce the cost of access to LEO up to 74% by 2030 and as much as 91% by 2040, via economies of scale on the manufacturing and operational normalization of LEO "class" rockets and vehicles.

Development of a new market. A demand of 4.8 million seats per year for P2P transportation could be realizable at a price point of $20K per one-way seat, resulting in a potential market size of $96B per year by 2040. An additional demand of 95 million kg in P2P international parcel delivery could provide revenues of $45B per year, for a total market potential of $141B in 2040.

Inherent environmental benefits. Liquid hydrogen (LH2) fuel based P2P at its maximum realized market demand could have a net benefit to reduction of global CO2 emissions of 97 million tons/year, or 6.3% of projected global aviation emissions in 2040.

Table 1 summarizes key quantitative findings.

Table 1: Summary of our preliminary P2P market analysis and its effects on LEO costs & tourism

Note: We plan to update Table with new data and analysis when available	**Potential P2P market by 2030**		**Potential P2P market by 2040**	
	Nominal	**Optimistic***	**Nominal**	**Optimistic***
Cost of P2P flight (one-way)	$20,000	$2,500	$20,000	$2,500
Number of passengers (1,000s) per year	2,916	13,751	4,825	22,756
Fraction of total long-haul airplane travel	1.29%	6.07%	1.51%	7.12%
P2P-reduced costs to LEO ($/kg)	$230	$119	$101	$51
Reduction in cost relative to non-P2P LEO base case ($750/kg in 2030)	74%	86%	83%	91%
Induced LEO tourists (1,000s)/yr	56	108	161	311
Fraction of global aviation CO_2 emissions saved via P2P using H_2/O_2 rockets	1.0%	4.6%	1.4%	6.3%

* Based on UBS report