

October 14, 2022

COMPANY INFO

Company Name	SpaceX
Sector	SpaceTech
Segment(s)	Upstream and Downstream
Ownership	Private
Last Valuation	\$127 Bn
Funds Raised	~\$9 Bn
CEO	Elon Musk
Website	https://www.spacex.com/

SALES

2015 (\$-Bn)	0.9
2016 (\$-Bn)	1.0
2017 (\$-Bn)	1.3
2018 (\$-Bn)	2.0
2019 (\$-Bn)	0.9
2020 (\$-Bn)	1.2
2021 (\$-Bn)	2.5
2022 (\$-Bn)	3.6

VALUATION

Jan-2015 (\$-Bn)	12.0
Jul-2017 (\$-Bn)	21.5
May-2019 (\$-Bn)	30.5
Aug-2020 (\$-Bn)	46.0
Oct-2020 (\$-Bn)	74.0
Dec-2021 (\$-Bn)	100.0
Aug-2022 (\$-Bn)	127.0

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SpaceX

The Best Play on Efficiency and Innovation Across The \$386 Billion SpaceTech Ecosystem

- SpaceX – the Category Creator.** For two decades, SpaceX has been at the forefront of delivering innovation and efficiency in the SpaceTech ecosystem and now leads the commercial opportunities in the \$386 billion space economy. Using innovation and vertical integration, the company has managed to bring down the cost per launch in an industry that has historically been very expensive. It disrupted the space logistics or launch market and commands a healthy 80% market share in launching spacecraft. Through its highly integrated supply chain and innovation (reusability), SpaceX's Falcon series rockets have become the first-choice spacecraft launchers for companies looking to join the space economy. With the number of space launches increasing every year, this segment lends a solid and predictable revenue base to SpaceX. The company is also pushing the boundaries of innovation with its new fully reusable Starship rocket in 2023, which will potentially take humans to the Moon and Mars, and could become a big driver of revenue and valuation growth for the company.
- SpaceX – the Disruptor.** Beyond commercial launches, SpaceX has been using its highly integrated satellite manufacturing and launching capabilities to put its own Starlink constellation of satellites into Low Earth Orbit. With a constellation of ~3,000 satellites, the company has launched high-speed, low-latency satellite Internet service across 40 countries. It already has an approval to send 12,000 satellites into the lower Earth orbit, and with this deployment, it should be able to provide unparalleled high-speed Internet connectivity across the world. In the first five months of 2022, the company has managed to increase its subscriber base by 2.8x to reach 400,000 users. This creates another predictable and scalable revenue stream for the company, where increasing subscribers expands the utilization of its constellation and drives revenue growth, while it continues to launch new satellites to increase the coverage of its services. Starlink's revenue can climb to \$19 billion in 2025 (conservative vs. management estimates), driven by a combination of rising pricing and growing subscriber base, estimated to climb from 1.2 million in 2022 to 14.4 million in 2025.
- SpaceTech = Sovereign Priority = Advantage SpaceX.** The company continues to be deeply involved in several government space exploration programs, including \$5 billion in contracts with NASA, and expects to grow a new commercial category with human spaceflight missions.
- Valuation – \$127 billion and climbing.** SpaceX derives its moat from its vertically integrated business and leadership position in two commercial markets (launch and SatCom) which have demonstrated high growth, and high barriers to entry (technological, commercial, and regulatory.) Last valued at \$127 billion, valuation has trebled in the last couple of years, in line with sales growth. We see room for meaningful long-term upside here driven by 1) continued dominance in the launch segment, especially with the Starship rocket that will potentially take humans to the Moon and Mars; and 2) Starlink commercialization. If management estimates of Starlink revenue are met, Starlink alone could be valued at ~\$100 billion, leaving room for valuation upside from the growth of Starship business.

Company Overview

SpaceX – Creating the New and Efficient SpaceTech Economy

- **Founded in 2002 by Elon Musk, SpaceX designs, manufactures, and launches advanced rockets and spacecraft, with a near-term goal of reducing space transportation costs.** In the long run, SpaceX intends to establish a human community on Mars. The company manufactures the Falcon 9 and Falcon Heavy launch vehicles, several rocket engines (Merlin, Kestrel, Draco, and SuperDraco), Cargo Dragon, Crew Dragon, and Starlink communications satellites. SpaceX utilizes a high degree of vertical integration by building its own rocket engines, rocket stages, spacecraft, principal avionics, and all software in-house at its Hawthorne, California, facility. The company performs routine missions to orbit with its Falcon 9 and Falcon Heavy launch vehicles for a diverse set of customers, including NASA, the Department of Defense, international governments, and leading commercial companies. To date, SpaceX's rockets have been launched 182 times, with a total of 144 landings and 120 reflights.

Chart 1: SpaceX's Flagship Launch Rockets: Falcon 9 and Falcon Heavy



Source: Intro-act, SpaceX

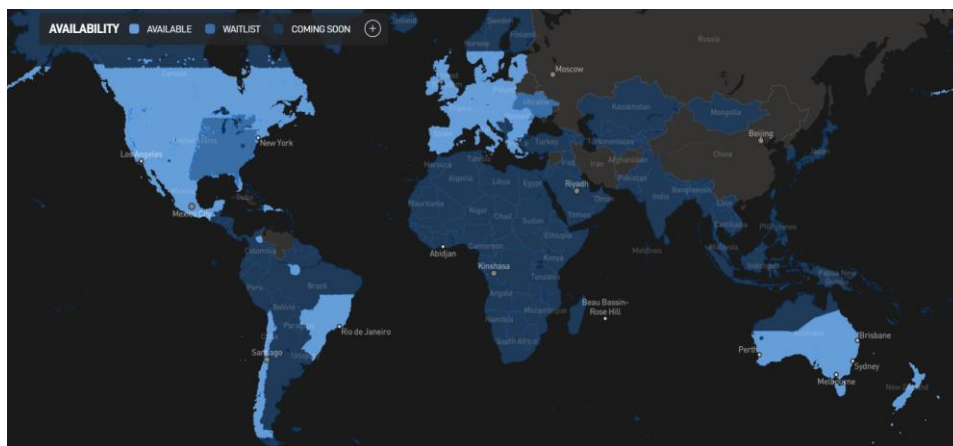
- **SpaceX is the undisputed leader in offering low-cost orbital launches, thanks to its reusable rocket boosters.** SpaceX has managed to bring down the cost per launch in an industry that has historically been very expensive. For instance, between 1970 and 2000, the cost to launch a kilogram to space remained fairly steady, with an average of \$18,500/kg. Per 2021 inflation-adjusted cost estimates, a payload cost to LEO by heavy launch vehicles would have cost NASA's Space Shuttle \$65,400/kg, United Launch Alliance's (ULA) Delta IV Heavy \$11,600/kg, ESA's Ariane 5G \$10,200/kg, China's Long March 5 \$7,900/kg, Russia's Angara \$4,500/kg, and NASA's Saturn V \$5,400/kg. For the same payload, Falcon Heavy charged \$1,410/kg, with launch prices remaining the same as of February 2022. SpaceX has been able to achieve such cost-efficient launches due to its rocket boosters, which usually return to Earth in good enough condition to be refurbished, which saves money, and helps the company undercut competitors' prices.
- **SpaceX has signed valuable contracts with NASA for transporting cargoes and crews to the ISS and with the U.S. Air Force (USAF) for national defense.** As of August 2022, SpaceX has secured \$5 billion worth of contracts from NASA for 14 operational astronaut missions.
 - SpaceX first contracted with NASA in 2006 to demonstrate cargo delivery to the ISS under the now-concluded Commercial Orbital Transportation Services (COTS) contract. Through this contract, in 2010, SpaceX became the first private company to successfully launch, orbit, and recover a spacecraft, while Dragon became the first

Company Overview

private spacecraft to successfully berth with the ISS, which occurred in 2012. SpaceX also signed a \$1.6 billion contract with NASA in 2008 for 12 cargo transport missions, covering deliveries through 2016. In May 2020, NASA certified SpaceX's Falcon 9 and Crew Dragon human spaceflight system for crew missions to and from the space station – becoming the first commercial system in history to achieve such a designation. In 2021, NASA awarded a \$2.9 billion contract to SpaceX to land NASA's astronauts on the Moon using Starship. In August 2022, SpaceX was awarded a \$1.4 billion contract for five more NASA astronaut launches.

- With the USAF, SpaceX was awarded an indefinite delivery/indefinite quantity contract in 2005, allowing USAF to purchase up to \$100 million worth of launches from the company. In 2016, the Air Force awarded an \$83 million national security launch contract to SpaceX, which was estimated to undercut ULA's prices by ~40%. Other key USAF contracts are: a \$297 million contract to launch another three national security missions signed in 2019 and National Security Space Launch (NSSL) contracts worth \$316 million signed in 2020 for a single launch. Moreover, SpaceX will handle 40% of the U.S. military's satellite launch requirements over the next five to seven years.
- **With Starship, SpaceX hopes to fulfill its ambitions of establishing a human presence on Mars in the future.** SpaceX's Starship will be a fully reusable transportation system designed to service Earth orbit needs as well as missions to the Moon and Mars. According to SpaceX, Starship will be the most powerful launch vehicle ever developed, capable of generating around 17 million pounds of thrust (compared to 8.8 million pounds that can be generated by NASA's SLS, used for project Artemis), and with the ability to carry in excess of 100 metric tons to Earth orbit. But Starship will go to the Moon before it reaches Mars. In 2023, Japanese entrepreneur Yusaku Maezawa and the crew of dearMoon are slated to become the first civilian passengers on a lunar Starship mission, featuring a fly-by of the Moon during their week-long journey. While Starship prototypes have only conducted a few low-altitude flights off the Earth's surface to date, the vehicle is on track to earn its orbital wings in the near future. This development will be a big milestone for SpaceX and its mission to send humans to Mars. Estimates for Starship launch costs range widely, from Musk's \$2 million per launch to industry analysts' \$10 million.
- **SpaceX is planning to deploy 42,000 Starlink satellites into LEO across dozens of launches – 15x the number of operational satellites in orbit today.** The development of Starlink began in 2015, with the first prototype satellites launched into orbit in 2018. The U.S. Federal Communications Commission (FCC) has given SpaceX permission to launch 12,000 Starlink satellites. In addition, the company has filed paperwork with an international regulator to launch an additional 30,000 satellites. To date, SpaceX has launched 3,000 operational Starlink satellites into space, with about 2,500 operational and another 500 moving into operational orbits. Further, because satellites deorbit after a few years, SpaceX will need to replace them on a regular basis in order to maintain its constellation. However, the company aims to take advantage of this by progressively replacing inactive satellites with technology that performs better. As a result, the constellation will progressively be enhanced with the addition of heavier satellites capable of delivering more data and operating in higher, longer-lasting orbits.

Chart 2: Starlink Availability – September 2022



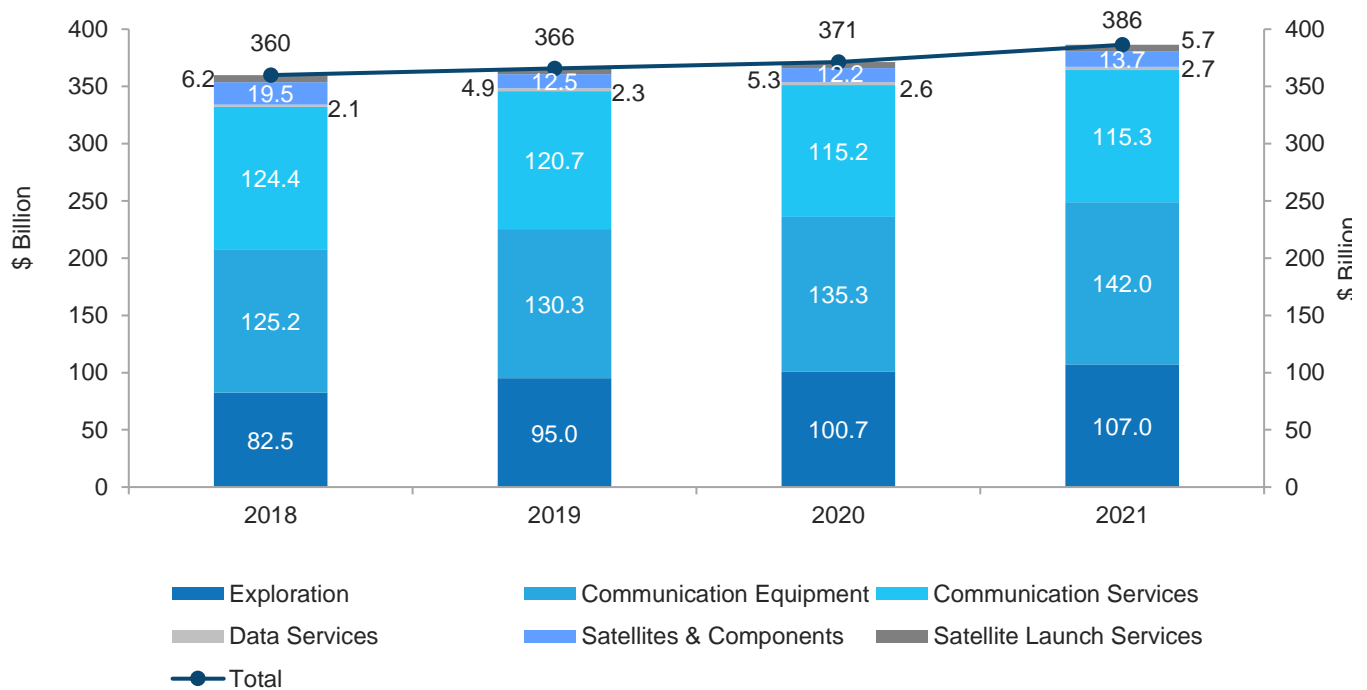
Source: Intro-act, Starlink

Industry Overview and Company Strategy

New Commercial Models Have Attracted Private Capital to The SpaceTech Ecosystem

- The SpaceTech Ecosystem has evolved rapidly in the past decade and has demonstrated resilient growth driven by accelerated participation of private capital.** The global SpaceTech ecosystem has seen strong continuous growth in the past decade, primarily due to increased private participation that has opened the space economy to several new commercial models. These are expected to drive increased participation of private capital into the SpaceTech Ecosystem. The private capital infusion is catalyzed by the higher participation of private companies in space activities and commercial applications, now accounting for more than two-thirds of the industry turnover. The strength of this market can be demonstrated by the fact that it continued to grow steadily, even in the tough COVID years and is now primed to achieve accelerated growth over the coming decade. The SpaceTech ecosystem can be classified into six major business segments that include three upstream segments – Exploration, Satellites & Components, and Satellite Launch Services; and three downstream segments – Communication Equipment, Communication Services, and Data Services. The ecosystem has grown from ~\$360 billion in 2018 to \$386 billion in 2021. This growth is being driven by strong performance of the exploration and data services segments, coupled with acceleration in satellite demand and launch.

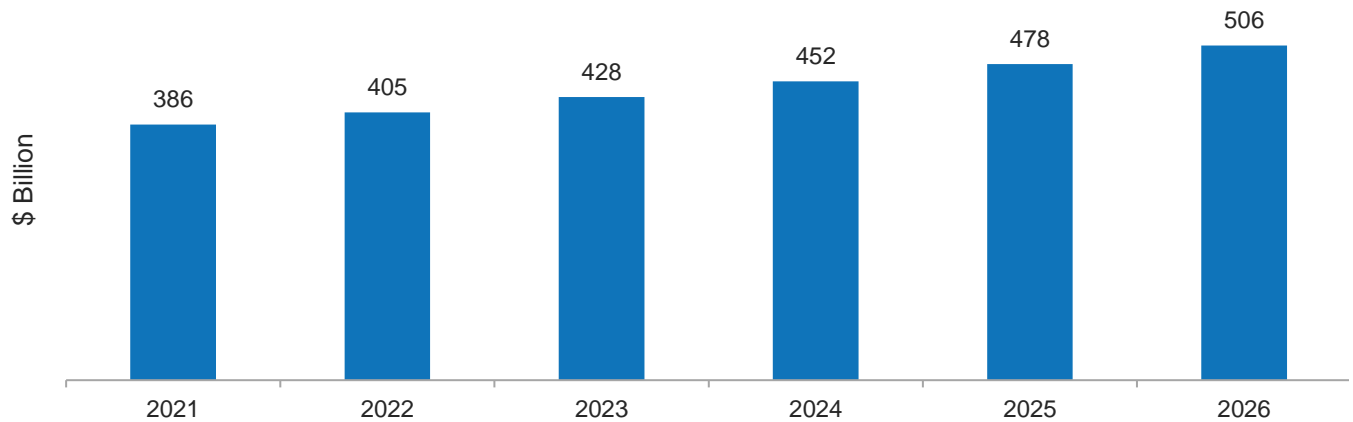
Chart 3: The SpaceTech Ecosystem Was Worth \$386 Billion in 2021



Source: Intro-act, BryceTech

- The global space economy is expected to grow to \$506 billion by 2026 and exceed \$1 trillion by 2030.** As space innovation goes beyond government space agencies, several industries are looking closely at companies to address long-standing and emerging needs that can be met through SpaceTech solutions. The space ecosystem is responding to this need with rapid technological innovation, fueled by private and government capital, to create new solutions and commercial models. The deepening integration with many industries in the next few years will emerge as one of the key drivers of industry growth and will help expand the SpaceTech Ecosystem. Our analysis of data from BryceTech and other sources indicates that the growth of the global space economy is set to accelerate to a 5.7% CAGR, suggesting that it will be worth \$506 billion in 2026. These growth rate projections are in line with those by leading banks and research houses that expect the space economy to be worth >\$1 trillion by 2030.

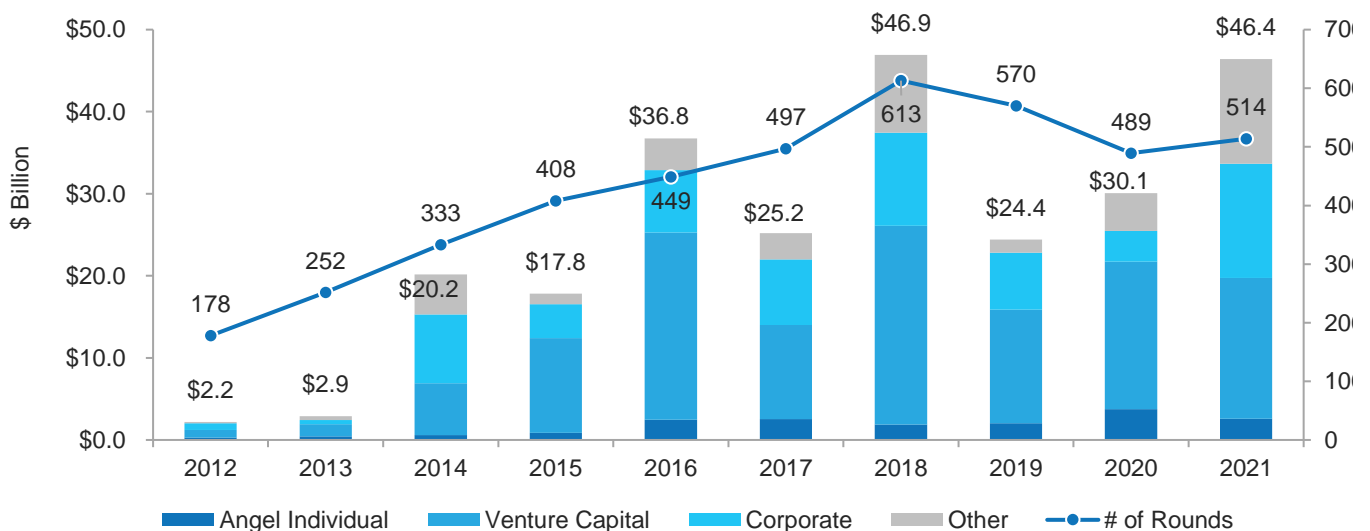
Chart 4: The SpaceTech Ecosystem is Expected to Grow to \$506 billion in 2026



Source: Intro-act, BryceTech

- Given the global SpaceTech industry's growth potential in the long term, investors are flocking toward space businesses – especially in the U.S. and China – to ride the growth wave.** In 2021, equity investments reached \$46.4 billion over 514 rounds across all space technology stacks, according to Space Capital. For each round, this implies \$90.3 million of capital raisings, which is significantly higher than the \$61.5 million equity raised per round in 2020 and is roughly 7.3x the 2012 figure. Over the last 10 years, there has been \$252.9 billion of equity investment across 1,694 unique companies over 4,000+ rounds in the broader space economy, driven by investment in companies based in the U.S. (\$116.1 billion) and China (\$77.3 billion), which collectively accounted for more than 75% of the global total in 2021.

Chart 5: Equity Funding for Space Companies Reached \$46.4 Billion in 2021 Over 514 Rounds



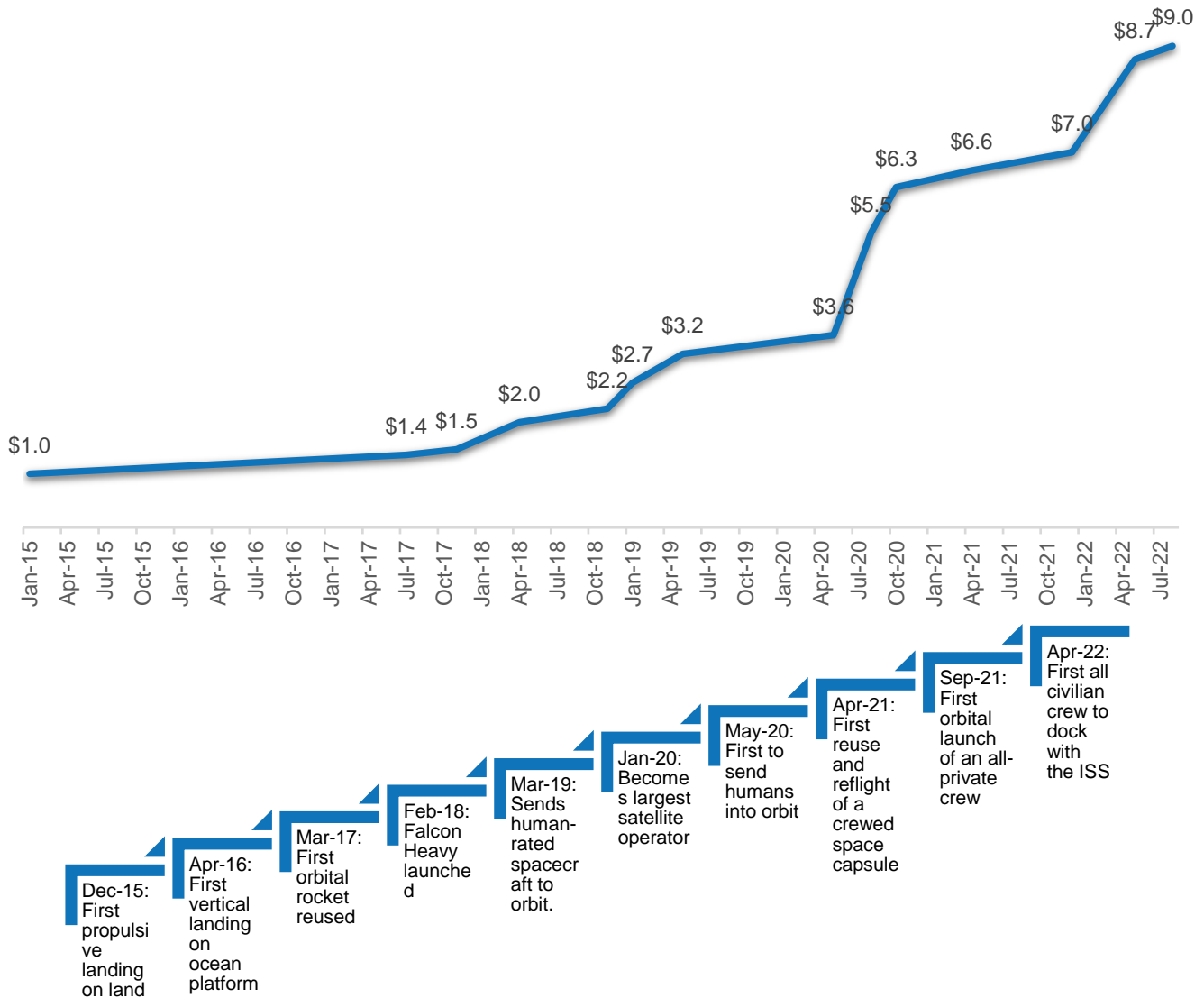
Source: Intro-act, Space Capital – Space Investment Quarterly: Q4 2021.

- SpaceX has been at the forefront of attracting private capital into the space economy and has raised ~\$9 billion since 2015.** SpaceX has played an instrumental role in the commercialization of the space economy as it first disrupted the satellite and components segment and satellite launch segments through aggressive vertical

Industry Overview and Company Strategy

integration and reusability, created the commercial spaceflight subsegment within the exploration segment, and is now primed to dominate the satellite communication industry through its Low Earth Orbit constellation, Starlink. Investors have validated the company's innovative and strategic initiatives and have backed the company by infusing ~\$9 billion in private funding since 2015. **SpaceX has been raising this significant amount of funds from investors to meet the capital expenditure requirements of its two most ambitious projects — the next generation rocket Starship and its global satellite Internet network Starlink.**

Chart 6: Funds Raised by SpaceX Since 2015 (\$ Billion)

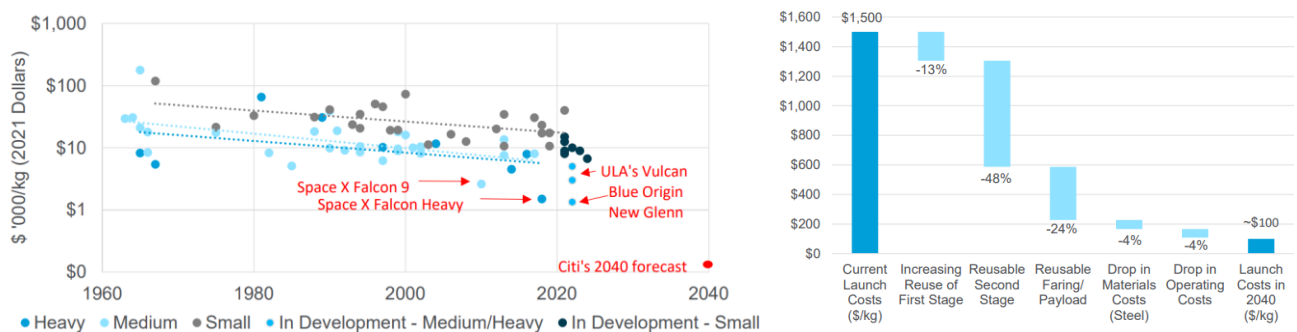


Source: Intro-act, Crunchbase, Dealroom.co

SpaceX has Disrupted the Upstream Segment Through Low Costs and Reusability

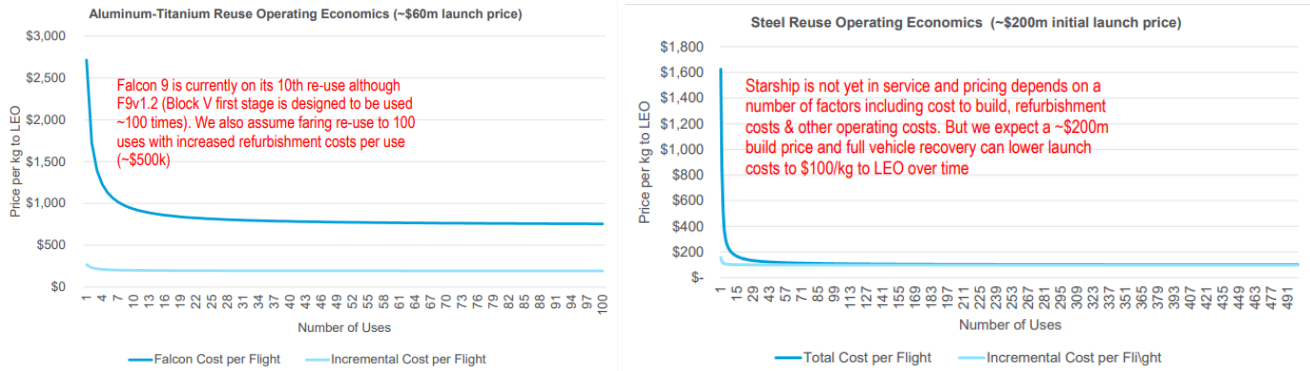
- **Lower cost of accessing space is unlocking several commercial opportunities in the launch segment.** Historically, one of the biggest inhibitors to innovation in the global space economy has been the high launch cost. This was mainly due to the extremely high cost of rockets that were used to launch payloads one time only; however, in recent years, the industry has seen technology improvements that reduce the cost of production, and with increasing reusability, a decline in launch costs as well. SpaceX is leading this process and currently is developing a fully reusable rocket (Starship/Superheavy). In addition, the industry is seeing many new start-ups developing numerous diverse solutions that hold multiple benefits for the entire space economy. These benefits include:
 - The **mass and capability of payloads can be increased**, thus improving the efficiency and functionality of satellites and other payloads. This will accelerate innovation toward making satellites more capable as they can use more components, and ultimately unlock new use cases for different industries.
 - The lower cost of rockets will lead to **higher frequency of launches**, which in turn will attract new players to the commercial space exploration and satellite segments.
 - Lower launch costs are also contributing to the **small satellite revolution** that is spurring more research and innovation by making satellite launches more accessible for a larger cross-section of stakeholders – corporations, start-ups, universities, and non-profits.
 - **Lower ticket to orbit costs** can drive volumes for the emerging space tourism industry. According to SpaceTech Analytics, the cost of a ticket to orbit could conceivably come down to a range of a few thousand dollars in the near future.
- **Led by efforts from SpaceX, launch costs have continued to tumble and could reach as low as ~\$100/Kg by 2040.** Since the 1960s, when the rocket launch costs were upwards of \$100,000/ Kg, there has been a concerted effort to lower this cost. However, the participation of private players led by SpaceX has accelerated this trend. On the one hand, companies are adopting vertically integrated operations to control launch costs, and on the other hand, they are trying to develop reusable rocket technologies to achieve massive cost efficiencies. According to estimates by Citi Research, the advancements in reusability of rockets, coupled with declining materials and operating costs, can push the launch costs down to ~\$100/ Kg by 2040, from the current ~1,500/ Kg. SpaceX has been the flagbearer of reusability in launches, with its Falcon rockets, and wants to take it to the next level with Starship. SpaceX CEO Elon Musk has set a more ambitious target of achieving a launch cost of \$10/kg for SpaceX's Starship, of which roughly one-third would be the propellant costs.

Chart 7: Launch Costs Continue to Plummet and Could Reach ~\$100/Kg by 2040



Source: Intro-act, Citi Research

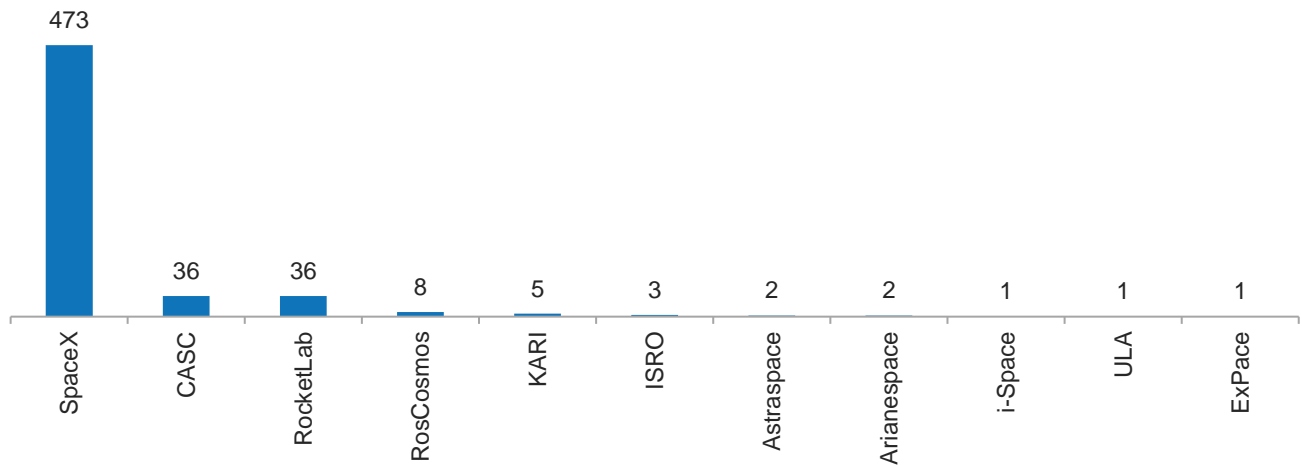
Chart 8: Reduction of Total Cost per Flight, Driven by Reusability in Falcon 9 and Starship Rockets



Source: Intro-act, Citi Research

- We believe SpaceX will continue to dominate the launch services market, due to its superior technology, reliability, and lower costs. Its Falcon 9 and Falcon Heavy are the go-to rockets for most spacecraft and this is evident from the fact that in Q2 of 2022, 83% of the launches used a SpaceX rocket, bettering the performance of the previous quarter when 80% were launched by the company.

Chart 9: SpaceX Launched 473 Spacecraft, the Most of Any Launch Provider in 2022

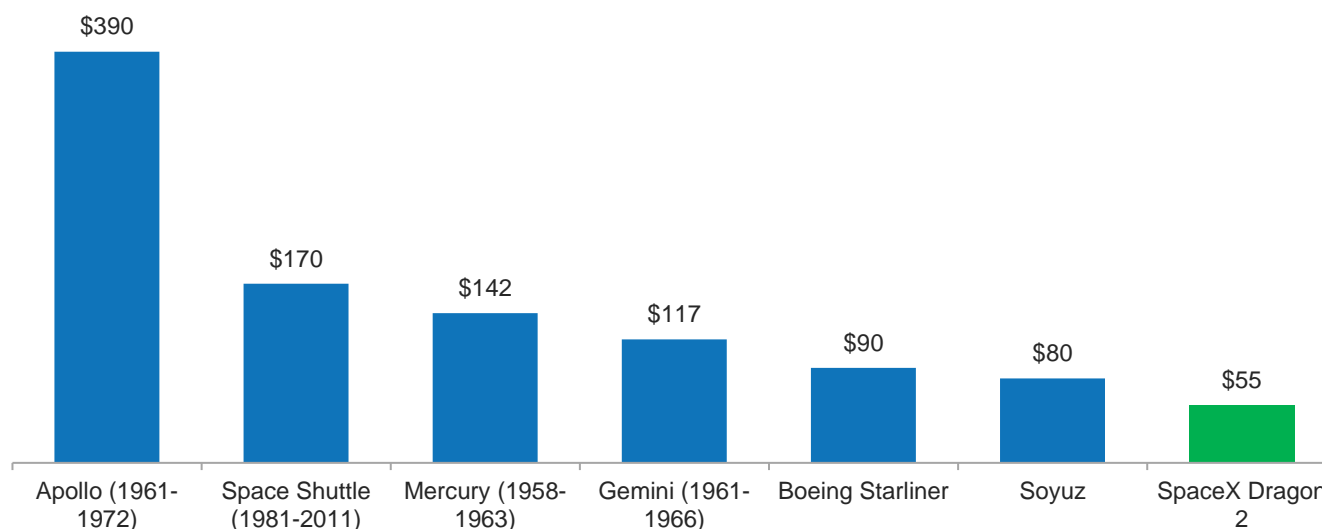


Source: Intro-act, BryceTech

Commercial Space Missions – Lending Escape Velocity to Space Tourism

- **Rapid advancement in technologies and falling manufacturing and launch costs are driving growth of the space tourism market.** With the availability of low-cost and efficient launchers, orbiters, and landers, the space tourism market is attracting increased interest from private organizations. Government research programs have gone on for several decades in the form of space missions, but in recent years, commercial entities have shown a sharp interest in crewed missions to Low Earth Orbit (LEO) and on suborbital hops. Private space tourism programs are also growing because of a sharp reduction in the cost of space travel, as SpaceX Dragon 2, which was used for a space tourism mission by Axiom in 2022, cost \$55 million per seat to travelers. This is, of course, very high for private citizens, but significantly lower than the per seat costs of astronauts on previous missions.

Chart 10: Estimated Cost per Seat for Astronauts on Select Spacecraft* (\$ Million) – SpaceX the Clear Leader



*Estimates for historical spacecraft adjusted for inflation. Soyuz estimate based on 12 seats contracted after 2017.
Source: Intro-act, NASA, The Planetary Society

- **SpaceX has significantly reduced barriers to the space environment, making it more accessible and democratizing participation in space-based commerce and exploration.** NASA awarded SpaceX and Boeing contracts worth \$3.1 billion and \$4.8 billion, respectively, under a program called Commercial Crew to develop a new spacecraft that would ferry American astronauts to the ISS. In the case of SpaceX, this resulted in the cheapest spaceflight development effort in close to 60 years; a NASA audit carried out in 2019 found that the price per seat offered by SpaceX is significantly more cost-effective than previous programs, and even the Soyuz. The NASA audit estimated that the per-seat cost of the SpaceX Crew Dragon is \$55 million while Boeing's Starliner is \$90 million. SpaceX is also considerably cheaper than the 12 trips NASA bought from Russia beginning in 2017, which worked out at approximately \$80 million per seat. An analysis from NASA's Ames Research Center found that the dramatically lower launch costs SpaceX made possible offered "greatly expanded opportunities to exploit space" for many users. The report also suggested that NASA could increase its number of planned missions to Low Earth Orbit and the ISS precisely because of the reduced price tag.
- **SpaceX's cost advantage stems from its Dragon 2 class of partially reusable spacecraft, developed and manufactured primarily for flights to the International Space Station (ISS).** There are two variants: Crew Dragon, a spacecraft capable of ferrying up to seven crew, and Cargo Dragon, an updated replacement for the original Dragon 1. The spacecraft consists of a reusable space capsule and an expendable trunk module. The Dragon spacecraft launches atop a Falcon 9 Block 5 rocket and the capsule returns to Earth via splashdown. Four operational Dragon 2 spacecraft have been manufactured as of this writing.

Industry Overview and Company Strategy

- **Cargo Dragon supplies cargo to the ISS under a Commercial Resupply Services-2 contract with NASA.** The first flight of Dragon 2 in a cargo configuration was launched in December 2020. It shares this duty with Northrop Grumman Innovation Systems' Cygnus spacecraft, and Sierra Nevada Corporation's Dream Chaser spacecraft is expected to join them in 2022.
- **As of 2022, Crew Dragon is the one of the only two U.S. human-rated orbital transport spacecraft.** It was the first reusable crewed spacecraft, and reusable cargo spacecraft, until it was joined by Boeing Starliner, earlier this year.. Its primary role is to transport crews to and from the ISS under NASA's Commercial Crew Program, succeeding the crew orbital transportation capabilities of the Space Shuttle, which retired from service in 2011. Crew Dragon is also used for non-docking orbital space tourism and is expected to shuttle passengers to and from the ISS on Axiom Space's planned space tourism flights. This relationship will likely continue when Axiom has its own space facility.

Chart 11: SpaceX's Dragon Reusable Spacecraft

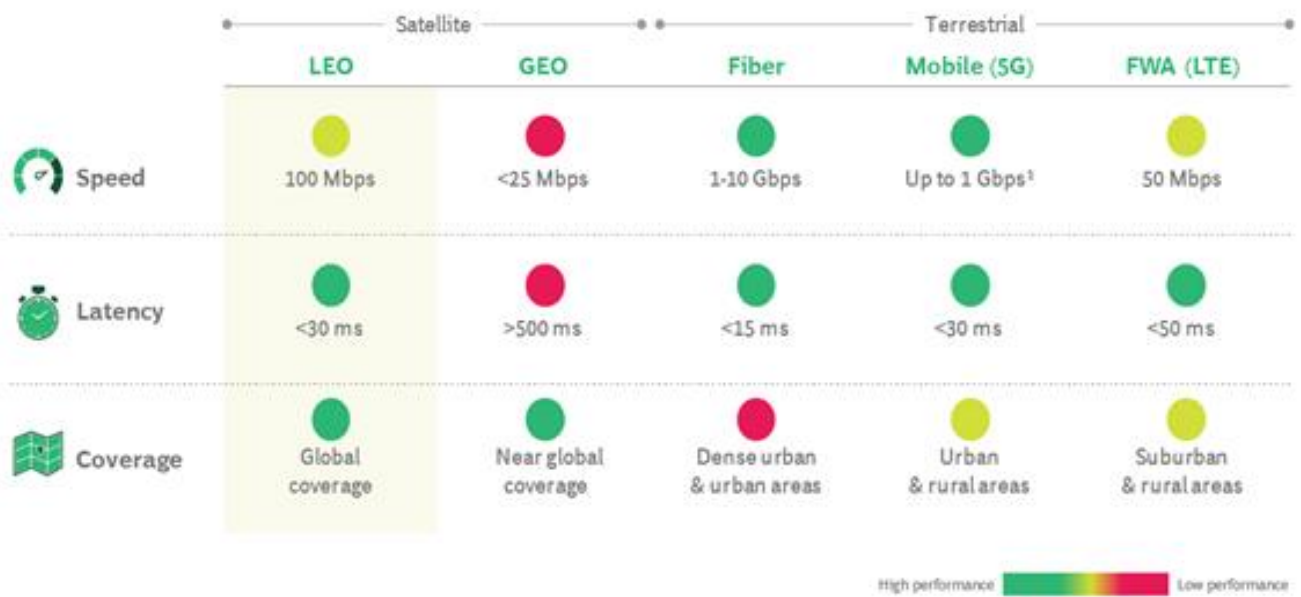


Source: Intro-act, SpaceX

SpaceX – Disrupting the Satellite Internet Market Through Starlink

- Satellite Internet is a decades-old technology, but has remained limited to specialized use cases due to limitations of GEO satellites.** One of the telecom industry’s main endeavors is to provide higher Internet speeds at lower latency levels. Traditionally, satellite Internet connectivity has been delivered by geosynchronous (GEO) satellite technology, which is characterized by low data transfer speeds and very high latency. The technology relied on by large GEO satellites is costly and difficult to launch and offers speeds and latency that can at best be compared to those offered by dial-up Internet connections from two decades ago. The advent of fiber broadband, 4G, and 5G mobile networks and fixed wireless access (LTE) have transformed terrestrial Internet access in terms of both network speeds and latency, and Internet services offered through GEO satellites are now restricted to only niche use cases where other options are unviable. As a result, GEO satellites service only 0.3% of the world's Internet demand.

Chart 12: Comparison of Satellite and Terrestrial Internet Technologies



Source: Intro-act, BCG

- LEO satellites that can provide high-speed low latency connectivity are primed to grab a bigger pie of the satellite communications (SatCom) market.** To address the shortcomings of GEO satellites, the idea of exploring other Earth orbits for placement of the satellites has long been explored. Hence, nongeosynchronous-orbit (NGSO) communications constellations, that include LEO and MEO satellites, have been examined by various companies over the past three decades. In the 1990s, companies such as Globalstar, Iridium, Odyssey, and Teledesic all tried to create large LEO constellations with an objective of providing global connectivity through satellites. However, all of them except Iridium had to scale back due to high satellite and launch costs and low demand. The industry has also seen some recent failures such as LeoSat, which closed in 2019 due to lack of investment capital. U.K.-based OneWeb, which started in 2012, went bankrupt in March 2020 after struggling to raise capital to fund 90% of its satellite network. The company emerged from bankruptcy with a new ownership group that included the U.K. government, Softbank, and India-based Bharti Global. The emergence of OneWeb from its bankruptcy suggests that investors have started to look at this sector differently than they did a few years ago – we believe this is due to multiple trends that are combining to paint a better future for LEO satellite constellations.
- Starlink is a satellite network developed by the company to offer high-speed, low-latency broadband Internet to remote locations around the world.** SpaceX has deep experience with both spacecraft and on-orbit operations, and it is leveraging this experience to deploy the world’s most advanced broadband Internet system. In the future,

Industry Overview and Company Strategy

SpaceX is aiming to one day deliver 10 Gbps Internet speeds via Starlink—a 10x increase over its previous 1 Gbps goal. If successfully achieved, Starlink would be faster than many ground-based gigabit broadband networks in the U.S.

- **Starlink’s Internet performance is superior compared to its Internet satellite and fixed broadband peers in major developed nations and comes at an affordable price.** Data from Speedtest Intelligence’s 2Q22 report shows that Starlink’s median download speed in the U.S. was 62.53 Mbps – much higher than HughesNet’s 22.62 Mbps and Viasat’s 23.68 Mbps. Starlink is not only dominant in the U.S. but also vs. fixed broadband providers in other countries such as Australia, Belgium, France, Germany, New Zealand, and the UK. More importantly, Starlink’s Internet plan costs \$110 a month (up from \$99 earlier) for download speeds of 50–150 Mbps vs. Viasat’s \$65 to \$300 a month for download speeds of 12–150 Mbps, and HughesNet’s \$45 to \$140 a month for download speeds of 25 Mbps.

Chart 13: Starlink Dominated Other Satellite Internet Providers in Terms of Internet Performance in Q2 2022



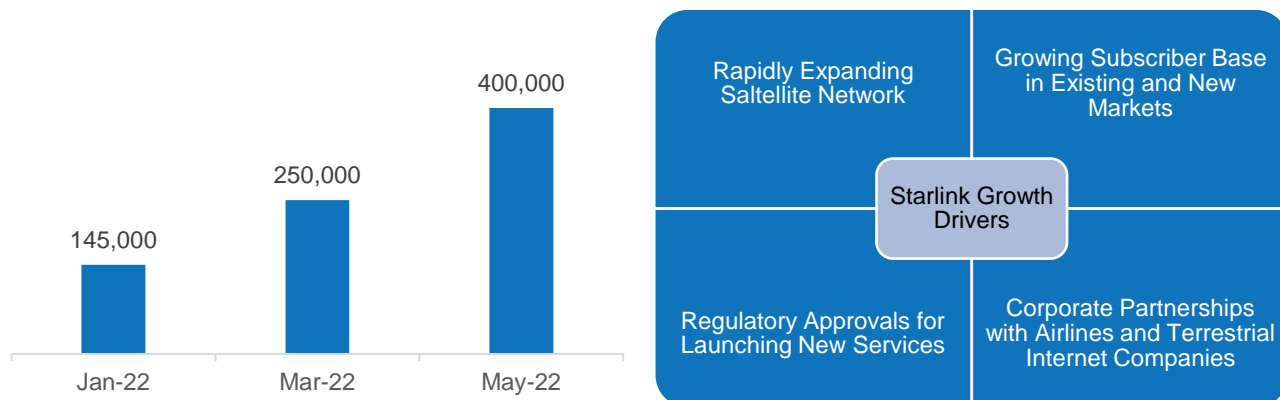
Source: Intro-act, Speedtest Intelligence

- **Management expects Starlink to generate \$30 billion in revenue by 2025; however, Starlink is a capex-heavy project and will require at least \$5 billion-\$10 billion before it turns out to be cash positive.** SpaceX is ready to spend as much as \$30 billion in the long term to sustain the project. Currently, Starlink hardware costs \$1,300 for SpaceX to produce, but it is selling the equipment at \$599. SpaceX expects to bring down terminal costs from over \$1,000 to \$300-500 in the next 12 months, which would improve margins. Per Elon Musk, Starlink could achieve the revenue target of \$30 billion by 2025—about 10x the annual revenue of SpaceX’s rocket business. SpaceX has deep experience with both spacecraft and on-orbit operations, and it is leveraging this experience to deploy the world’s most advanced broadband Internet system. It is aiming to one day deliver 10 Gbps Internet speeds via Starlink—a 10x increase over its previous 1 Gbps goal. If successfully achieved, Starlink would be faster than many ground-based gigabit broadband networks in the U.S. Starlink is already running in 40 countries. SpaceX has launched about 3,000 satellites to support the global network and commands a base price of \$110 per month per user. The subscriber base for this service is increasing at a good rate, as the company improves coverage and launches in new regions. As of May 2022, the company reported 400,000 subscribers, which is 2.8x the number of subscribers it had reported in January 2022. The base price of the service at \$110 per month excludes \$599 for hardware, whereas the premium option comes at \$500 a month and \$2,500 in hardware costs. There is also a relocation fee of \$25 per instance when users move their antennas. Assuming the base subscription for its user base gives the revenue visibility that is upwards of \$500 million for Starlink from its subscription business. In addition, the company is striking commercial partnerships with entities such as Airlines, Internet Service Providers and Enterprise Technology Provider, which can create additional revenue streams. Some of the new revenue streams that the company is exploring are discussed below:
 - **Partnership with Airlines:** The company is partnering with Airlines to provide inflight Wi-Fi services. It has signed deals with air carriers Hawaiian Airlines and JSX to add Starlink antennas on their aircraft.
 - **Partnership with Internet Service Providers:** SpaceX is also looking to partner with traditional mobile and Internet service providers to improve their existing network coverage by integrating its services. In August 2022, it partnered with T-mobile for a similar arrangement.

Industry Overview and Company Strategy

- **Providing backbone for cloud infrastructure:** In October 2020, Starlink partnered with Microsoft to connect the Azure cloud computing network.
- **Launching New Services:** The company is pursuing regulatory approvals to provide satellite Internet services in new remote markets, and to create new organic markets. In June 2022, the Federal Communications Commission authorized SpaceX to provide Starlink satellite Internet to vehicles in motion.

Chart 14: Starlink Subscribers are Growing Rapidly, and It is Diversifying Revenue Channels



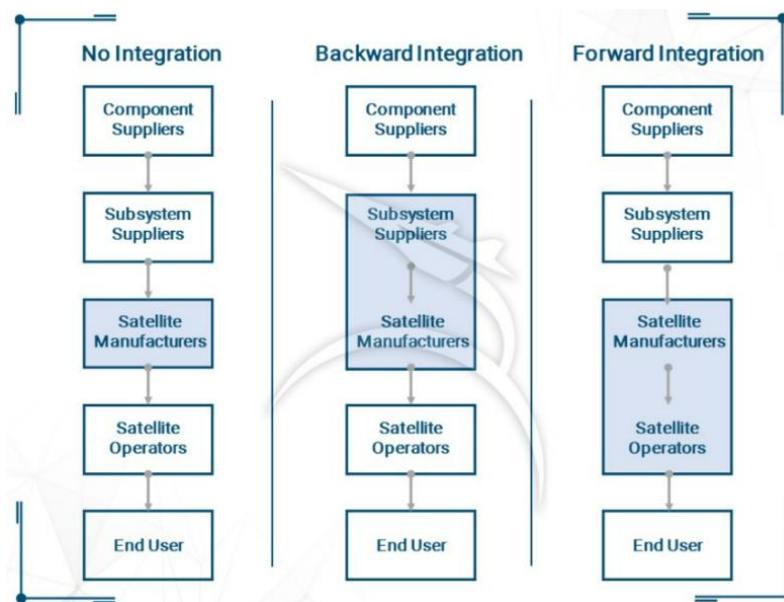
Source: Intro-act, CNBC

SpaceX's Moat

Vertical Integration with Industry-Leading Technology and Presence in the Upstream and Downstream Segments Makes SpaceX the Pioneer

- We believe SpaceX is the undisputed leader of the SpaceTech ecosystem due to its highly efficient and effective vertically integrated business model.** The SpaceTech ecosystem was traditionally seen as a slow-moving, inefficient ecosystem with highly distributed supply chains and a high degree of dependence on government contracts. However, the last decade has seen the emergence of vertically integrated companies that have accelerated the rate of innovation and opened the doors to new commercial models, thereby expanding the space economy. SpaceX is the torchbearer for vertically integrated commercial SpaceTech operators. Its tremendous success in shortening the innovation cycle and delivering rapid efficiency includes areas such as bringing down launch costs per kg, developing reusable rocket technology, and rapidly delivering satellites into its LEO constellation. At the heart of the vertical integration trend are the multiple benefits this business model offers, including 1) economies of scale, 2) better quality control, 3) lower supply-chain risk, 4) better cost visibility, and 5) better user experience, all of which contribute to faster innovation and better results for end users.
- This has inspired many other next generation space companies** – Planet Labs (NYSE: PL), Rocket Lab (NASDAQ: RCLB), and Maxar Technologies (NYSE: MAXR) – to pursue forward and backward integration in their value chains to achieve various degrees of integration in upstream and downstream activities. Competition to SpaceX could come from Blue Origin in the space exploration segment and Amazon (NASDAQ: AMZN) in the downstream segments through 1) AMZN's Project Kuiper, aimed at creating a LEO constellation for providing global satellite broadband coverage, and 2) Amazon Ground stations. AMZN's ability to challenge SpaceX will be boosted by its highly integrated technology business model, which should lend speed and efficiency to its commercialization efforts.
- However, with integration across SpaceTech segments, SpaceX retains a distinct advantage and should continue to reap benefits of higher efficiency.**

Chart 15: Vertical Integration in the Satellite Manufacturing Industry



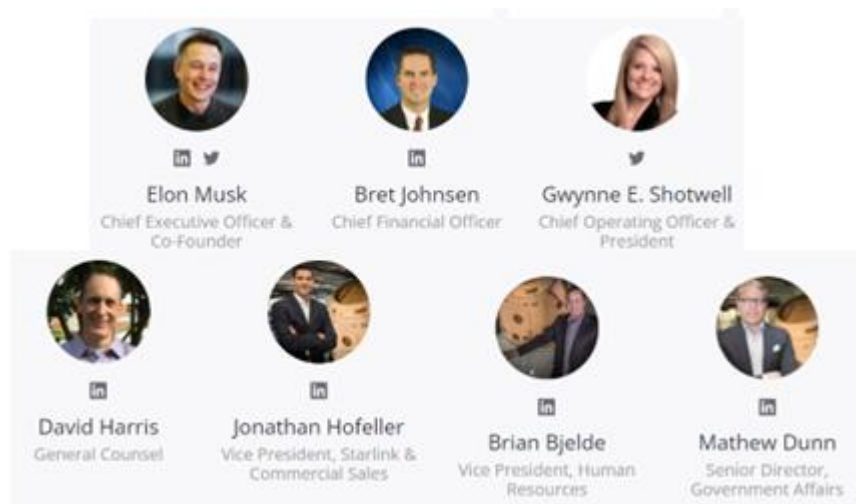
Source: Intro-act, Spaceworks

Management Team

Seasoned and Highly Experienced Management Led by Elon Musk

- **The management team is lean and highly experienced and is led by Elon Musk, who founded the company in 2002.** Most members of the management team have grown with the company and have been there for more than a decade. This indicates that the team works coherently and given what SpaceX has achieved over the past 10 years, the team seems to have great execution skills. Key members of SpaceX’s management team include:
 - **Elon Musk:** Elon Musk is the CEO and Co-Founder of SpaceX. He launched the company in 2002 and has been responsible for the highly technical and strategic disruption of the SpaceTech ecosystem through SpaceX. The company has brought many new commercial models to the industry and immense efficiency gains to major subsegments, such as exploration and manufacturing and launch services, as well created new commercially viable models such as Low-Earth-Orbit-based satellite Internet, and human commercial spaceflight. Beyond SpaceX, Musk is also the founder of Tesla Motors, which is the largest electric vehicle company in the world, and he also holds significant stakes in The Boring Company, Neuralink, and Twitter.
 - **Gwynne E. Shotwell:** Gwynne Shotwell is the President and Chief Operating Officer of the company, and has been with SpaceX since 2002, joining the company three months after its founding, and as the seventh employee. She is responsible for day-to-day operations, as well as business development. She was in charge of selling the company’s standardized rocket launches to private companies and was instrumental in securing investment from NASA to develop a reusable launch rocket, the Falcon. Gwynne Shotwell ranks 40th on Forbes’ 2022 America’s Self-Made Women list.
 - **Jonathan Hofeller:** The Vice President of Starlink and Commercial Sales has been with SpaceX since 2007. He joined the company as a business development manager for Middle East and Asia regions and has grown into his current position, which he assumed in August 2019. In his current role, he leads business development efforts for Starlink, commercial launch, and private human spaceflight endeavors. Prior to joining SpaceX, Hofeller worked at The Raytheon Company as a Senior Mechanical Engineer and designer on several satellite programs.

Chart 16: SpaceX Management Team



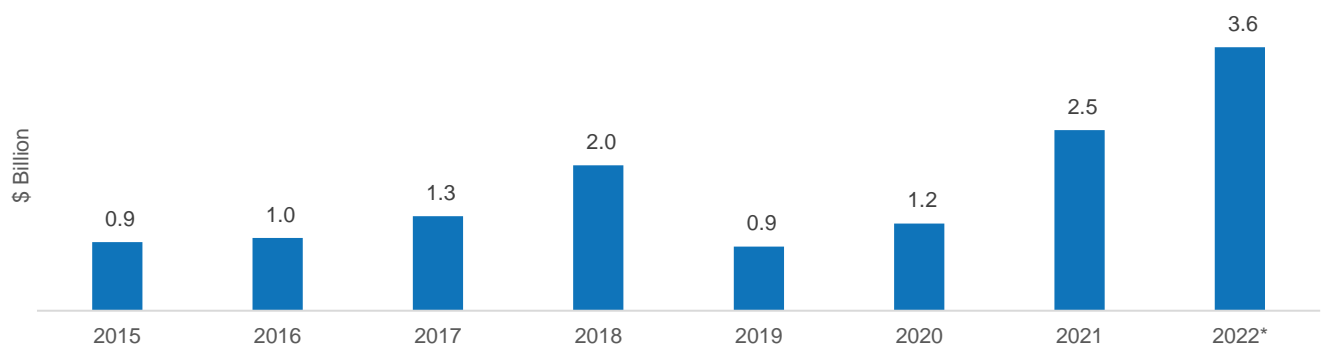
Source: Intro-act, Craft.co

Fundamentals & Valuation Analysis

\$127 Billion and Counting – Dominance in Large Untapped Segments is Driving Valuation

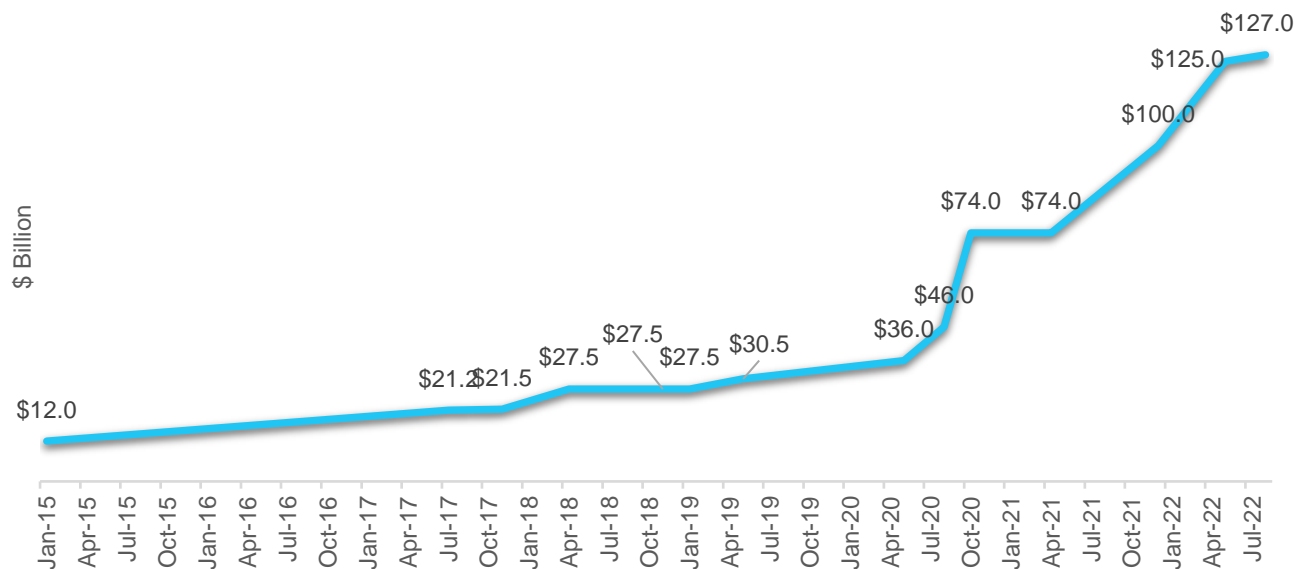
- SpaceX has disrupted the traditional satellite communications market and is driving unparalleled efficiency in the satellite launch segment – this is reflected in its climbing valuation.** The valuation of SpaceX has grown at a CAGR of 40.8% between 2015 and 2022, from \$12 billion in 2015 to \$127 billion in 2022. In the current year, the company has already raised ~\$2 billion at a valuation of \$127 billion, and this makes it one of the most valuable private companies in the world. Between 2020 and 2022, the valuation of the company has tripled from ~\$30 billion to ~\$127 billion, and this maps the estimated revenue of the company that has tripled from \$1.2 billion in 2020 to \$3.6 billion.

Chart 17: SpaceX Revenue Estimates



Source: Intro-act, Trefis, *2022 estimates include \$500 million revenue from Starlink Subscriptions and is prorated based on number of launches until August and subscriber base as of May 2022

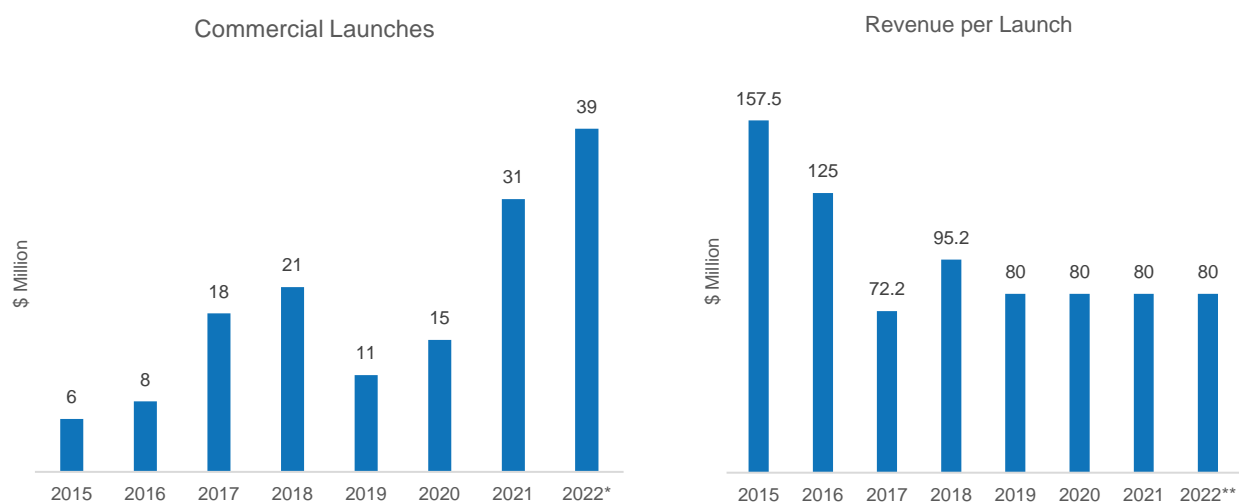
Chart 18: SpaceX Valuation



Source: Intro-act, Crunchbase, Dealbook.

- **We expect the company’s valuation to grow even higher as it leverages its dominance in large untapped segments with little competition.** SpaceX has two major predictable revenue drivers in the form of launch revenue from its vertically integrated launch business and its subscriber revenue from the Starlink business. The launch business revenue depends on the number of successful commercial launches executed by the company and the Starlink revenue depends on the number of subscribers.
 - **Launch Revenue:** The company is primarily involved in launching spacecraft and earns a certain amount of revenue per launch from the customers. The launch activity has resumed post-pandemic, which is evident from the fact that the company completed 31 launches in 2021, which was more than 2x the number of launches it had in 2020. In 2022, the company has already done 39 launches (through end of August), which means that 2022 will end much stronger than 2021. According to Trefis, the revenue per launch has been assumed as \$80 million per launch, as the company charges \$60 million per launch for Falcon 9 and \$150 million per launch for Falcon Heavy. This gives us a revenue of \$3.1 billion from launch services, as of August 2022. In this segment, the company dominates, capturing the bulk of commercial launches – we expect this dominance to continue and believe this will drive valuations higher, especially with the new fully reusable Starship rocket that will potentially take humans to the Moon and Mars in 2023.

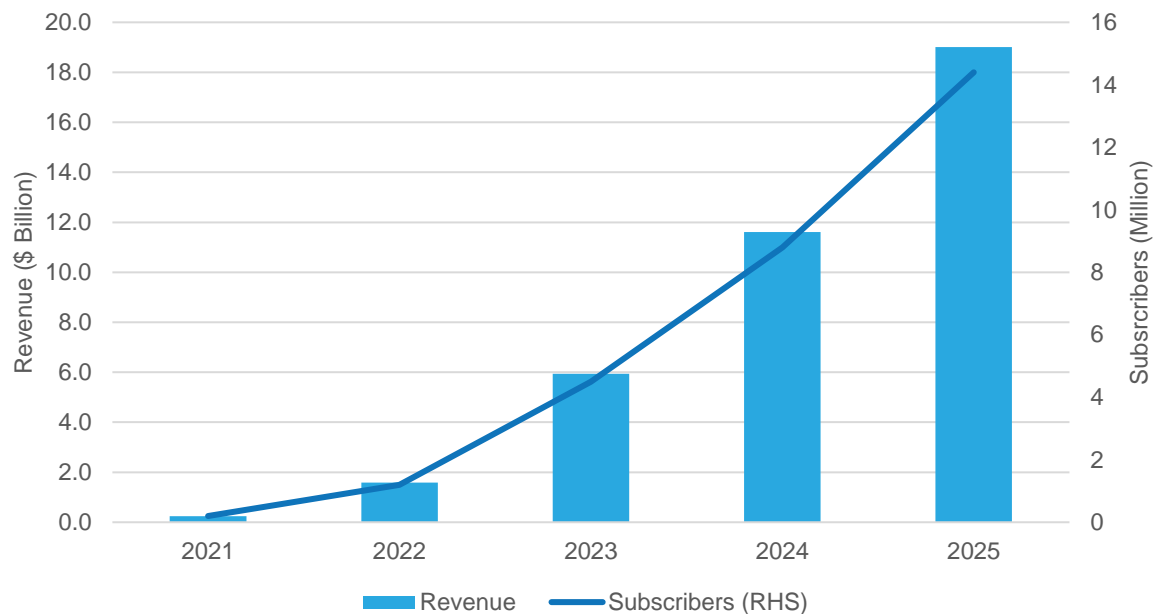
Chart 19: Commercial Launches and Revenue Per Launch



Source: Intro-act, Trefis, *2022 Launches as of Aug 2022, **2022 latest estimates unavailable so assuming constant revenue per launch

- **Starlink Revenue:** As noted earlier, as of May 2022, the company reported 400,000 subscribers and a base price of the service at \$110 per month, excluding \$599 for hardware. We are assuming base subscription for its user base gives revenue visibility that is upwards of \$500 million (in the first five months of CY22) for Starlink from its subscription business. In this market, the closest competitor to Starlink is OneWeb, which is building its constellation targeting B2B customers, and is therefore not a direct competitor. The other competitor is Amazon Kuiper, but it is still far behind Starlink in terms of commercialization; the company can therefore emerge as a dominant first mover in the high-speed satellite internet market. Estimates from Trefis and our analysis suggest that Starlink’s revenue can climb from \$0.2 billion in 2021 to \$19.0 billion in 2025 – this will be driven by a combination of 1) rising pricing – currently at \$110, up from \$99 in 2021; and 2) growing subscriber base – estimated to increase from 1.2 million in 2022 to 14.4 million in 2025. Applying a conservative 3.0x P/Sales multiple to the \$19.0 billion 2025E sales suggests that the Starlink business could be valued at ~\$60 billion. Note that this \$19 billion dollar number is lower than the \$30 billion 2025E goal set by Elon Musk, which would imply that Starlink could be valued at ~\$100 billion, leaving a lot of room for valuation upside from the growth of Starship business.

Chart 20: Starlink – Revenue and Subscriber Model



Year	Subscribers (Million)	Pricing (\$)	Revenue (\$ Billion)
2021	0.2	99	0.2
2022	1.2	110	1.6
2023	4.5	110	5.9
2024	8.8	110	11.6
2025	14.4	110	19.0

Source: Intro-act, Trefis

Chart 21: SpaceX – Funding Rounds and Investors

DATE	INVESTORS	AMOUNT	ROUND
Aug-02	N/A	\$61m	Series A
Jan-03	Conconi Growth Partners	N/A	-
Feb-05	N/A	\$11m	Series B
Apr-06	Elon Musk	\$100m	Early VC
Feb-07	N/A	\$32m	Series C
Mar-08	N/A	\$15m	Series E
Aug-08	Founders Fund	\$20m	Series D
Mar-09	N/A	\$15m	Series E
Aug-09	Threshold Ventures Scott Banister DFJ Growth	\$30.4m	Series E
Nov-10	Threshold Ventures Founders Fund Valor Ventures	\$50m	Series F
Dec-11	137 Ventures	N/A	Late VC
Dec-12	Threshold Ventures	\$30m	Secondary

Fundamentals & Valuation Analysis

	Rothenberg Ventures		
Apr-14	N/A	N/A	Late VC
Jan-15	Google	\$1.0b	Series G
	Threshold Ventures		
	Valor Equity Partners		
	Founders Fund		
	Fidelity		
	Capricorn Investment Group		
May-16	All Blue Capital	N/A	Secondary
Jul-17	N/A	\$351m	Series H
Nov-17	Bracket Capital	\$100m	Series H
	Oakhouse Partners		
Feb-18	Craft Ventures	N/A	Late VC
Apr-18	Elon Musk	\$507m	Late VC
	Fidelity Investments		
Nov-18	Bank of America	\$250m	Debt
Jan-19	Baillie Gifford	\$486m	Late VC
May-19	N/A	\$536m	Late VC
Oct-19	N/A	\$3m	Grant
May-20	N/A	\$346m	Late VC
Aug-20	Sequoia Capital	\$1.9b	Late VC
	Fidelity		
Sep-20	Legendary Ventures	N/A	Late VC
Oct-20	Sequoia Capital	\$13.5m	Late VC
	Morgan Creek Capital Management		
Feb-21	Sequoia Capital	\$850m	Secondary
	Valor Equity Partners		
	Coatue Management		
	Fidelity Investments		
	D1 Capital Partners		
Apr-21	N/A	\$314m	Secondary
Aug-21	BBQ Capital	N/A	Secondary
	K3 Diversity Ventures		Not yet verified
Dec-21	Google	\$337m	Late VC
	Alphabet		
	Fidelity Investments		
May-22	N/A	N/A	Private Placement VC
Jun-22	N/A	\$1.7b	Late VC
Jul-22	Mirae Asset Capital	\$250m	Late VC
Aug-22	Vika Ventures	\$250m	Secondary

Source: Intro-act, Dealroom

Investment Risks

- **Need for significant capital investments and financial risks.** SpaceX generates limited revenue from its launch services, making it difficult to predict its future operating results. Moreover, the company has been investing heavily in R&D to develop new technologies, procure high quality talent, and run costly operations. As a result, the company's losses may be larger than anticipated, and it may not achieve profitability when expected, or at all, and even if it does, it may not be able to maintain or increase its profitability. Its ability to generate profit will depend on its ability to grow its operations and drive operational efficiencies in the business to generate better margins. With more launches, more satellites in orbit, and more subscribers, the operating expenses are expected to increase over the next several years. Any failure to increase its revenue sufficiently to keep pace with its investments and other expenses could prevent it from achieving or maintaining profitability or positive cash flow. The future growth and operating performance may fail to meet investor or analyst expectations, and the company may have future negative cash flow or losses resulting from investment in acquiring customers or expanding operations. Such a situation could dry-up investment flow into the company, which could hamper company's cash flow and smooth operations.
- **Potential collision with space debris and environmental concerns.** Recent years have seen increases in the number of satellites deployed to Low Earth Orbits, and publicly announced plans call for many thousands of additional satellite deployments over the next decade. The proliferation of these LEO constellations could materially increase the risks of potential collisions with space debris and limit or impair the growth of the small LEO satellite market, as potential customers may be less inclined to use launch services to deliver payloads into Low Earth Orbits. Launching satellites takes a huge environmental toll on ground as well in space. As SpaceX plans to launch ~30,000 satellites for its second-generation Starlink network, some non-profit groups have raised concern about the environmental impact of this activity and have urged the FCC to undertake an environmental review of Starlink's second generation satellites. In case these concerns materialize in the form of regulatory investigations or delays, it can derail the plans of Starlink network deployment.
- **Intense competition.** Despite its leadership position in most markets, SpaceX faces intense competition in the commercial launch industry and satellite Internet markets. Currently, its primary competitors in the U.S. market for commercial launch of small satellites to LEO are Virgin Orbit and Rocket Lab. In addition, several entities are actively engaged in developing commercial launch capabilities for small- and medium-sized payloads, including Relativity, Astra Space, Inc., ABL, and Firefly, among others. It also faces competition from foreign launch companies, such as Arianespace, Vega, and launch providers in China and India, as well as potential new competitors in other countries. Similarly, in the Satellite Internet market, it faces competition from incumbent GEO satellite operators, who can try to improve the capability of their services, as well as other players in the LEO satellite Internet companies, such as OneWeb and Kuiper.
- **Risks related to government contracts.** SpaceX derives significant revenue from contracts with NASA and the U.S. government and plans to enter into further contracts with the U.S. and foreign governments in the future. A substantial portion of its revenues is earned pursuant to U.S. and foreign government contracts. Business conducted pursuant to such contracts is subject to extensive procurement regulations, including the Federal Acquisition Regulation, and other unique risks.
- **Operational risks.** SpaceX's operations are subject to many hazards and operational risks inherent to its business, including general business risks, product liability, and damage to third parties, its infrastructure or properties and the facilities of its third-party contractors and suppliers that may be caused by fires, earthquakes, tsunamis and other natural disasters or severe weather, power losses, telecommunications failures, terrorist attacks, disruptive political events, epidemic outbreaks, human errors and similar events. Additionally, its manufacturing and launch operations are hazardous at times and may expose it to safety risks, including environmental risks and health and safety hazards to our employees or third parties. Finally, if the company is unable to launch its rockets in time, due to regulatory hurdles, unavailability critical components or any other reason, it might disrupt its operations and lead to additional financial burden on SpaceX.

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