

The logo features a stylized yellow and blue swoosh that forms a partial circle around a white and blue arrow pointing upwards and to the right.

# HIGH SPEED FLIGHT BULLETIN

September- December 2022

## From the Chairman's Desk and Cockpit:

Dear HSAT Friends and Colleagues:

### Last 2022 High-Speed Flight-FastForward Bulletin.

Welcome onboard for the first time in 2023! I hope you all had a very Merry Christmas and a wonderful New Year celebration. The New Year 2023 promises to strengthen the value proposition that the High-Speed Aerospace Transportation (HSAT™) modality offers the world. This year's HSAT industry developments make me confident that there is a fundamental and universal consensus that the pursuit of a safe, reliable, and sustainable way to move



people and goods across the world “much” faster than we do today is well worth the effort.

More and more, the traveling public is eager to overthrow the Mach 1 tyranny that holds humanity hostage to a 600 miles per hour-world calculus, in place for the last six decades or so, since jet aircraft changed the world, for the better, in the 60's.

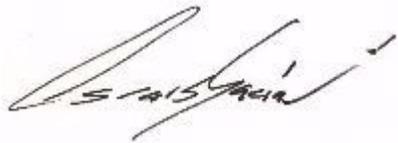
The year 2022 marked the 15th anniversary of the FastForward Project. It also marked the 5th HSAT Workshop Edition, which was, perhaps, the strongest and most compelling of all editions. The HSAT Workshop, re-established a fundamental and inspiring agreement that making the world “smaller” by connecting people and delivering goods faster, ensuring that people and goods can show up anywhere-fast, will be a force of good to elevate humanity's condition. When the capability for people and goods to show up fast - to enhance anyone's fundamental rights and values, to defend, protect and rescue anyone-anywhere from forces of evil or natural disasters, the world will be “better” and the human condition “higher”.

Importantly, the HSAT Workshop's main breakthrough was a consensual “aha” moment, facilitated by our friend and fellow visionair, Rick Tumlinson, Co-Founder of the Space Fund. This breakthrough has more to do with what the HSAT community has “not” been doing,

than with all the advocacy activities that we have been doing; technology development-demonstrations, regulatory initiatives, safety-standards development, infrastructure and integration, funding-capital formation, and economic-financial development. This “aha” moment made us realize that for decades, the HSAT message has not powerfully focused in, framed, and portrayed the many and compelling reasons why the people of the world will be better off, being able to show up or send goods across the world faster. We have been messaging “Concorde 2.0” through great innovations yet portraying a more-of-the-same commercial-flying experience, just a little faster. This is not enough, and the result is that the people of the world, do not see the cost-benefit-value proposition as we see it. And, they have accepted the Mach 1 Tyrant as King, and have not been clamouring through all available air-digital-print media waves; writing to the airlines, calling their governments, asking anyone who would listen, to satiate their appetite for speed across the world. This is about to change.

Thus, as an important resolution for the New Year 2023; I commit, with your support, that by the time we hold the HSAT 10th Edition in 2027, we will have all people of the world (all-means-all) galvanized about the amazing gains and benefits that traveling across the world faster brings to mankind.

As always, Fly Fast, Fly Safe!



Oscar S. Garcia, Chairman  
High Speed Flight  
[www.highspeedflight.com](http://www.highspeedflight.com)

**Register for FastForward Group Call**



*(Image credit: Bombardier)*

## TRANSONIC

On December 7th, a day before the HSAT workshop, the last Boeing 747 rolled out of the factory, after 53 years of production. A nostalgic, yet inspirational moment, for the aircraft that made Transonic long range commercial jet flying affordable to the masses. What is important for us, is the fact that the 747 established the Mach .8-.9 globally accepted air transportation speed “normal” for the public. A decade and a half prior to the 747, flying long range at such speeds on smaller Boeing 707’s, or McDonnell Douglas DC-8’s was reserved for the upper/middle class and the affluent-rich. Keep this in mind as faster aircraft enter service, as there will be a first stage, available to the affluent and rich, and a second stage available to the middle class for mass transportation.

[Link to: Last Boeing 747 roll-out](#)

The NBAA-BACE trade show in Orlando, October 18-20th starred the Bombardier Global 8000 as the world’s fastest certified program, announcing a High-Speed Cruise Speed of Mach .94. This means, that in flight tests, the aircraft is capable of high-speed transonic flight at circa Mach 1.1-1.2.

With this capability, we wonder whether with supersonic capable engines, and low boom redesign, the aircraft could achieve just over Mach 1.0. We have the precedent from the Aerion program (more on this on the Supersonic section) that below Mach 1.2, the sonic boom might be low enough to operate at such high transonic speed over land. More importantly, high-speed transonic aircraft are well accepted in terms of environmental sustainability, as their engines can use up to 100% SAF blends, which seems to be a consensus clean propellant for the next couple of decades, and even beyond.

The appetite for high-speed transonic is strong, and forecast to grow even stronger, as the business-jet fast-long range fleet forecasts from Honeywell, JetNet IQ and others were published at NBAA. Moreover, the deliveries reported by the General Aviation Manufacturers’ Association (GAMA) reflect the market purchasing power for the fastest aircraft available. We will comment on the total number of high-speed transonic (Mach .90+) delivered in 2022 as soon as the full year report from GAMA is available in the first Quarter of 2023. Here is [GAMA’s Q1-2-3 2022 report](#).

[Link to: Heavy Long-range Aircraft Forecast Address High-Speed Aircraft](#)

## AIRCRAFT DELIVERIES



## PURCHASE PLANS BY AIRCRAFT CLASS



**“The business aviation sector is expected to recover to 2019 delivery and expenditure levels by 2023, which is much sooner than previously anticipated.”**

Heath Patrick, President, Americas Aftermarket, Honeywell

(Image credit: Honeywell)

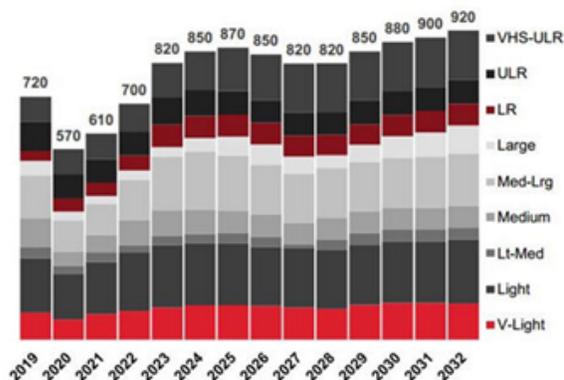
*“The business jets market is projected to grow from an estimated USD 30.1 billion in 2022 to USD 41.8 billion by 2030, at a CAGR of 4.2% during the forecast period. An increasing number of high-net-worth personnel and the replacement of aging aircraft fleets are expected to drive the growth of the market.”*

The M .925 G700 Super-Fast Long Range and Large Cabin Fleet Flagship is expected to enter service on Q4 2022

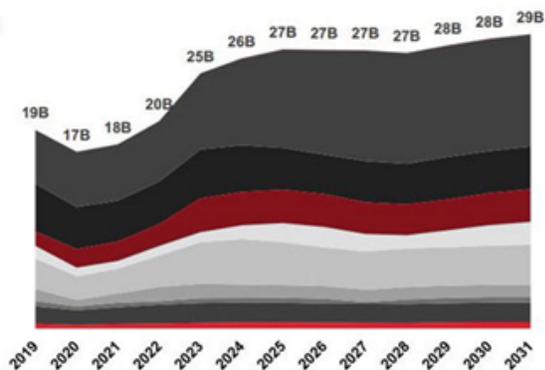
[Link to: Markets and Markets Article](#)

## 2022 BUSINESS JET DELIVERY FORECAST

Aircraft Deliveries by Class



Delivery Expenditures – Constant \$2022 Billions



**~8,500 Aircraft, up to \$274B in value from 2023-2032**

*(Note the Very High Speed-Ultra Long-Range Aircraft Segment accounts for ~50% of gross billings or ~\$137 Billion. Source: Honeywell)*

## HSAT ENDOATMOSPHERIC SUPERSONIC

Regulations to approve flight over land above Mach 1 is coming closer and closer, as the X-59 QueSST program makes progress. I would like to report that the test program is

marching on schedule and that the Lockheed Martin X-59 aircraft is scheduled to fly in 2023 and to perform its flight campaign as planned in 2024.

The program is leading and guiding ICAO's CAEP efforts, assertively, and quickly. [Here is](#) the latest on the Low Sonic Boom Noise working group



[Link to: QueSST](#)

My optimism about the standard and regulations timeliness is reinforced by SEI's international Supersonic Aircraft Steering Group, formed in June and starting its activities in earnest through a December briefing to NASA, and HSAT industry leadership. Importantly, the supersonic and hypersonic HSAT communities are synergistically collaborating in the effort.

As you all know, I am a fan of industry voluntary consensus standards as means of compliance, and thus I believe the SEI initiative will lead to great results, particularly when combined with testing and evaluation of critical performance characteristics, such as the NASA QUESST program. I envision other Standards Development Organizations (SDO's) will join the efforts and benefit from normative referencing to avoid duplication of efforts. Industry bandwidth for standards development is to be used as efficiently as possible.

[Link to: SAE](#)

Propulsion remains the challenge to enable the first demonstrations and entry into service of a certified commercial supersonic aircraft. Boom Supersonic ended the year on a high note with the announcement of the new Symphony supersonic engine for the Overture FAR 25 Air Transport category. Kudos, to Boom's founder, for keeping the momentum going, the entry into service pegged at the end of the decade, despite the withdrawals from Rolls-Royce, and CFM-Safran-GE as potential engine developers. Boom's collaboration with Standard Aero-Florida Turbine Technologies (owned by Kratos)-GE Additive and Spirit Aerosystems. The engine is envisioned to generate an impressive 35,000 pounds of thrust and produce whisper quiet noise and vibration signatures, fully sustainable well in compliance meeting or exceeding FAR 33 certification protocols beyond 250. I am loudly, no pun intended, optimistic about the Symphony, it is music to my ears. As Amelia Earhart said, "The most effective way to it, is to do it". American Airlines, United, Japan Airlines, are counting on it, and so is the market!



A quick note on the Aerion Supersonic program assets: Public information on the successful assets auction last September is forthcoming and once approved by the judge, I am cautiously optimistic, and excited if I am right, that the Aerion AS-XX program will re-

emerge in the first half of 2023. I hope to celebrate with you on our March 10th first quarterly conference call of the year, and my yearly [State of the HSAT](#) industry briefing. You can follow the Aeron assets ABBC process [here](#), as always, let me know your views.



*(Image credit: Hypersonix)*

## **HYPERSONIC**

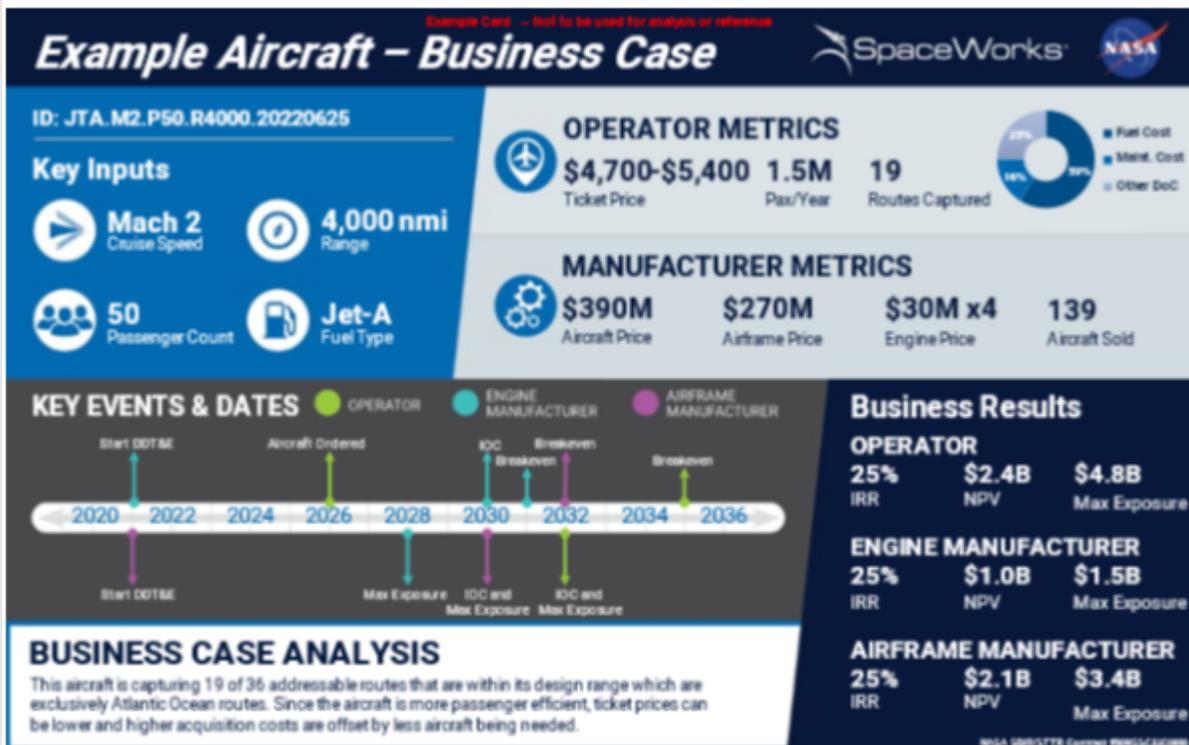
The convergence of private-public efforts to enable hypersonic platforms seems to be growing with every bulletin. Since September, the progresses that commercial companies like [Hermeus](#) (public releases, with super exciting messaging and progress of the Chimera engine and Quarterhorse, and Darkhorse programs, as a prelude to the promising Halcyon passenger carrying) and Australian [Hypersonix](#) (Delta Velos Mach 5+ vehicles and proprietary powerplant presented at the High-Speed Flight Q3 conference call by CTO and Co-Founder Michael Smart) are aligned with our educated optimism that we will see a viable reusable-commercially-certifiable Mach 4-5 vehicle in the sub 100 seat category.



What is news, for me and I hope for you too, is the great strides that the US DOD Joint Hypersonic Technology (JHTO) office is making through the University Consortium of Applied Hypersonics (UCAH) towards the development of effective, reliable and precise hypersonic platforms, both expendable, and reusable. The later, of outmost interest to this group. My assessment of the TRL's, MRL's and advances in materials, guidance, propulsion and maintainability that I saw at the UCAH Fall meeting in Huntsville Alabama is that we are well above TRL/MRL's of 6-8 in most of the elements needed for Hypersonic



Now, the complex part. Trust me in my assessment. that the technologies for all the elements a Mach 4-5 commercially viable hypersonic aircraft are in place, right here and right now. What I strongly believe is holding us, is the buy-in from the world at large regarding the environmental-sustainability elements of such an aircraft. We need to lead the world in analyzing the climate and ozone impacts of commercial hypersonic aircraft using state-of-the-art science modeling capabilities from detailed plume analysis to global impact scales. Ideally, with a rigorous scenario-based approach that captures variability-uncertainty and correlates impacts to market adoption, vehicle design, and regulatory-standards oversight and compliance. We need to do this NOW! More on this in our January/February 2023 Bulletin with our Year 2022 in review. Stay tuned!



## HSAT SPACE

The use of space orbital trajectories to enable HSAT is our most ambitious vision for a future way for people and goods to go “anywhere to anywhere” on earth within one hour. We shared our vision with the Commercial SpaceFlight Federation (CSF) last September at the Fall Members Meeting, and as a Research and Education (REM) Member, we would like to say thanks to CSF’s Executive Director Karina Drees and her team, and particularly Isaiah Wonnemberg, CSF’s Director of Regulatory Affairs.

In our presentation, we discussed how commercial space technologies can be harvested to enable the transportation point-to-point on earth. We also shared the progress on our Spaceport-to-Spaceport Airspace Corridors development White Paper in development with the Global Spaceport Alliance (Point to Point Working Group).

The S2S White Paper addresses guiding principles for the design and implementation of airspace (i.e., “space ways”) to



**Federal Aviation  
Administration**

accommodate spacecraft 'flight planned' to link spaceports, first US Spaceports, then globally. The document identifies over 195 possible S2S corridors linking US licensed Spaceports, and suitable to R&D missions and over 70 S2S corridors, routes or space ways suitable for commercial S2S spaceflight. The potential for S2S commercial flight is there, and it is gaining support from NASA, the FAA (Special thanks to Pam Underwood, Director of the Office of Spaceports and leader of the **National Spaceport Intergovernmental Working Group (NSIWG)** ,the DOD and most industry stakeholders involved in HSAT. We will finalize the document and provide a public release together with the GSA, at the **Spacecom-GSA Spaceport Summit**, February 20th, in Orlando, Florida.

**[Link to: Charter for National Spaceport Interagency Working Group](#)**

January 2023 will mark two years since the historic NASA-FAA MOU of January 4<sup>th</sup>, 2021, reaffirming the agencies' longstanding relationship to foster robust American commercial space transportation capabilities, including commercial crew and cargo activities. The **Suborbital Spaceflight Scope** section of the MOU addresses the joint NASA-FAA intent to "advance the interests of a commercial suborbital point-to-point pilot program with designated spaceports, airspace design, sequencing, launch and landing windows, etc". Our White Paper, on S2S Corridors should be of support for the implementation of the MOU. We will bring forth the vision and intent of the MOU to NASA and the FAA in 2023. Stay tuned, this will be a game-changer.

The good news is that we estimate the existing regulatory context and tools available for S2S mission planning and execution are mostly in place. The developmental effort is relatively challenging, but manageable as long as there are vehicles that can start demonstrating S2S even linking short distances. Thus, our HSAT efforts for S2S Suborbital and Orbital trajectories are predicated on; first, integration with the NAS other users, and second, enabling the competition and cooperation of Spaceport ("coopetition") to demonstrate the safety, reliability and general feasibility of the vehicles.

The S2S airspace project is meant to evolve with your input, so please, complete the airspace corridors **[questionnaire in this link](#)**, and contact us to provide feedback on the White Paper and related work, as well as to join the HSF-GSA Point to Point Working Group.

The WG seeks input in several areas including:

- NAS integration with emphasis and focus on Upper Class E Airspace and Terminal Areas-Airport-Spaceports
- Environmental contexts, research and data for modeling and forecasting environmental impact from emissions derived from future frequent S2S flight operations
- New technologies and CONOPS, i.e., Hybrid-Electric propulsion, Beamed energy, nuclear power.

High Speed Flight-Global Spaceport Alliance Spaceport to Spaceport (S2S) **[White Paper Guiding Principles](#)**

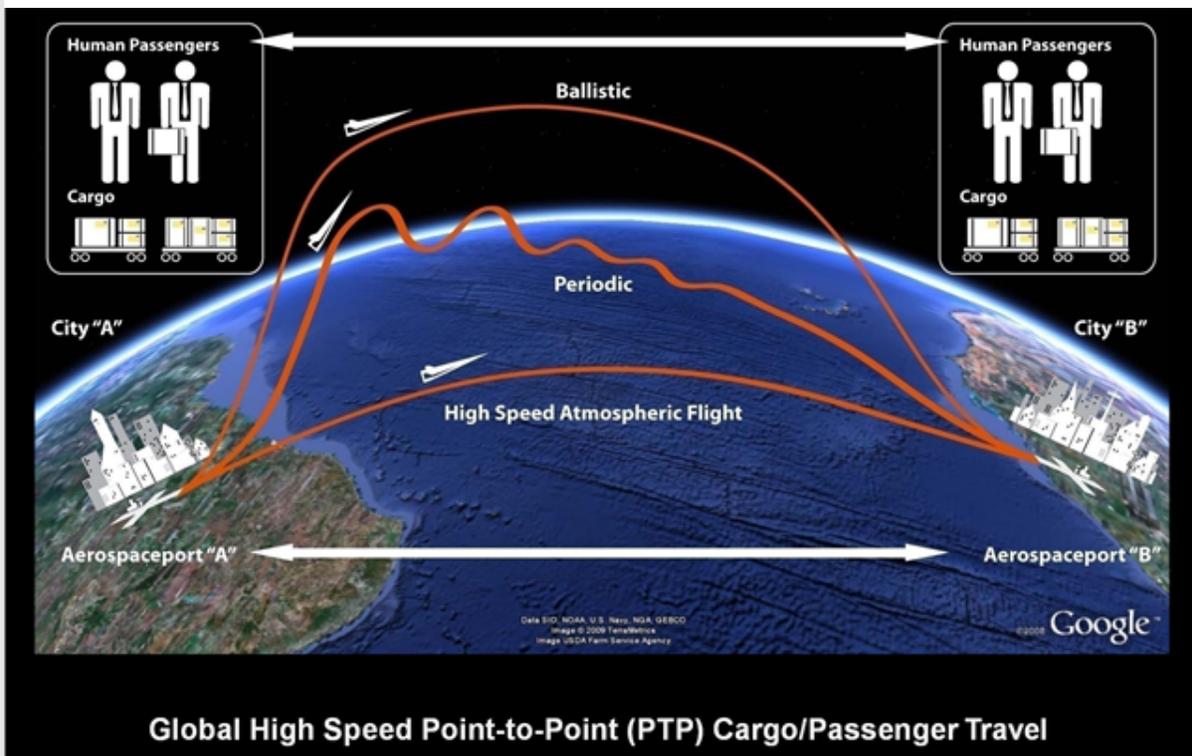
# S2S WHITE PAPER

**Spaceport to Spaceport**  
**Suborbital Flight**  
**Airspace Guiding Principles**



Author: Oscar S. Garcia, MBA  
 Chairman & CEO,  
 InterFlight Global Corporation  
 High Speed Flight  
 December 2022

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## SUBORBITAL

In this section we track the suborbital point to point HSAT industry programs and vehicles operating in near space or below 150KM (~500,000) and completing less than a full orbit of earth to complete a point-to-point mission.

### Virgin Galactic

We are fans of a possible SpaceShip XX-P2P vehicle as a future iteration of Spaceship 2/3. Sir Richard Branson's enthusiasm for Suborbital P2P in 2019/2020 with the TSC-VG and NASA Space Act Agreement was well noted by our group. We would like to see VG's Mach 3 Super-Hypersonic aircraft and future Spaceship demonstrations on viable P2P, or better S2S, ideally, benefitting from our Airspace Corridors guiding principles and research.



*(Image credit: Virgin Galactic)*

[Link to: NASA Spaceflight.com on Virgin Galactic](#)

### **Venus Aerospace**

We are watching the developments of Venus Aerospace and their hypersonic spaceplane concept, particularly their rotation detonation powerplant and "airplane" like design dubbed Stargazer and concept of operations. I have met both co-founders of Venus and extended an open invitation to share their visions and activities with our group in 2023.



*(Image credit: Venus Aerospace)*

[Link to: Venus Aerospace](#)

### **Dawn Aerospace**

This Dutch-New Zealand-American company is making great strides with their Aurora MK-II, and future MK-III Spaceplanes and we are bullish on their first demonstrations on P2P trajectories, ideally in the USA and using inland corridors to allow the reuse and R&D/T&E efficiencies from recovering the tests articles in nominal and off nominal conditions. Well done, Jeroen and Stefan, we look forward to having you fly in the USA soon.



*(Image credit: Dawn Aerospace)*

[Link to: SpaceNews article on Dawn Aerospace](#)



*(photo credit: SpaceX)*

## ORBITAL

In this section we track the suborbital point to point HSAT industry programs and vehicles operating in space above 150Km (~500,000) and completing less than a full orbit of earth to complete a point-to-point mission.

### SpaceX Starship

We love how SpaceX succinctly and decisively address “earth to earth” Starship transportation, not to mention the videos, graphics and other messaging channels. As per [SpaceX’s website](#). We enjoyed the interactions with SpaceX Starship Team, Ryan Parino and George Sondecker this year, and Ryan’s participation at HSAT was very welcome. We look forward to Starship environmental, and FCC preparations to fly the first mission from Brownsville to Hawaii, the long way around in 90 minutes or so. We all know there will be a before-and-an-after when this flight takes place... Godspeed Starship! We are all tuned in and ready to support this important development, anytime. I can watch [this video](#) over and over, with increasing enthusiasm for the future HSAT P2P/S2S future world!

# EARTH TO EARTH TRANSPORTATION

With Starship and Super Heavy, most international long-distance trips would be completed in 30 minutes or less. In addition to vastly increased speed, one great benefit to traveling in space outside of Earth’s atmosphere is the lack of friction as well as turbulence and weather. Imagine most journeys taking less than 30 minutes with access to anywhere in the world in an hour or less.

We look forward to developing our S2S White Paper to capture airspace, air and space traffic management, mission requirements and flight planning elements to enable S2S for Ultra-long distances across the earth. As we mentioned before, the good news is that most regulatory and compliance frameworks are in place, and ready to be streamlined to

accommodate frequent-commercial operations across the world. As they say, the journey of a thousand P2P Spaceflights, starts with a one-off demonstration at a time”.

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