

# GALACTIC HARBOUR

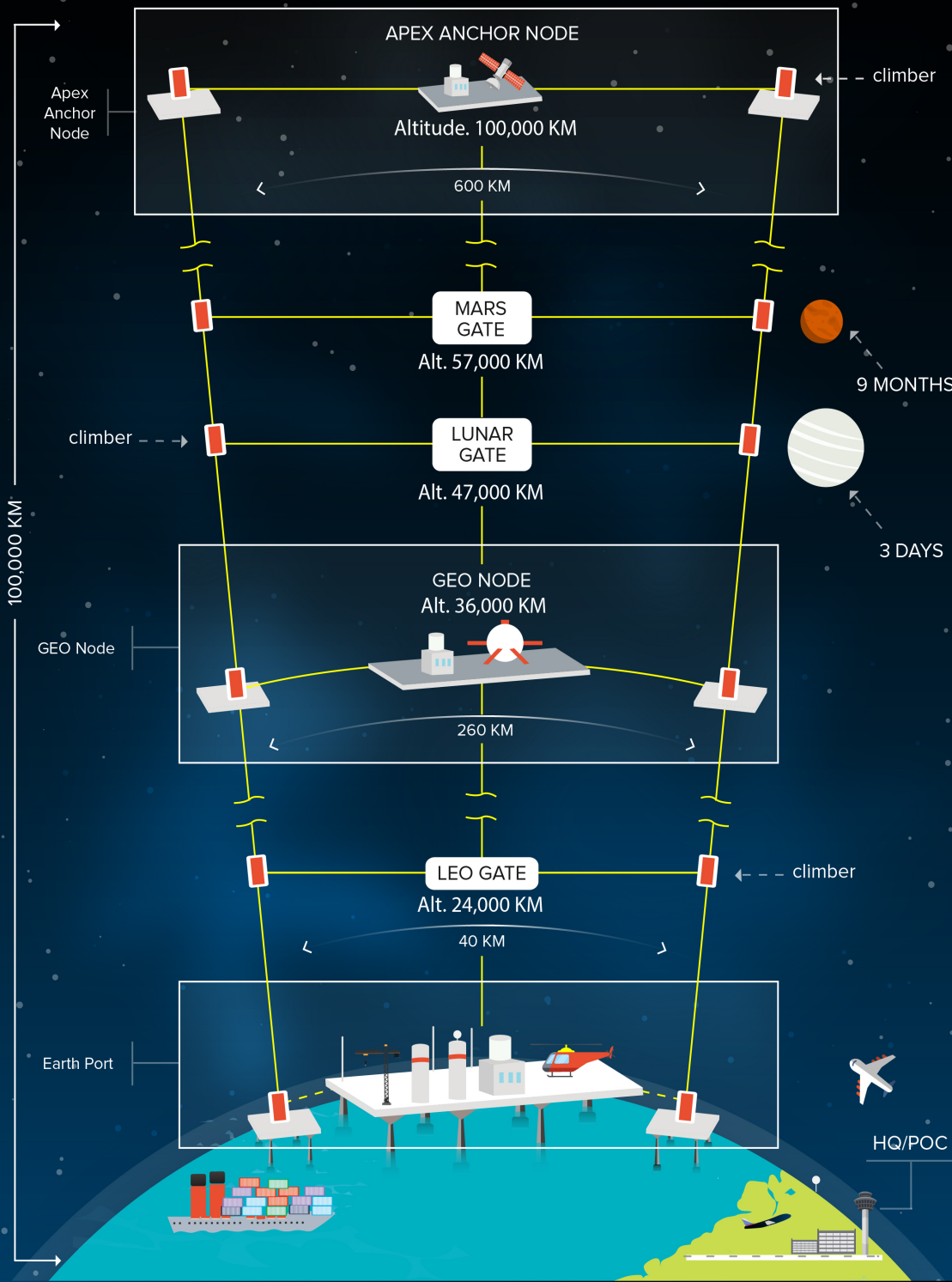


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## Space Elevator Transportation System Development Enables many Missions

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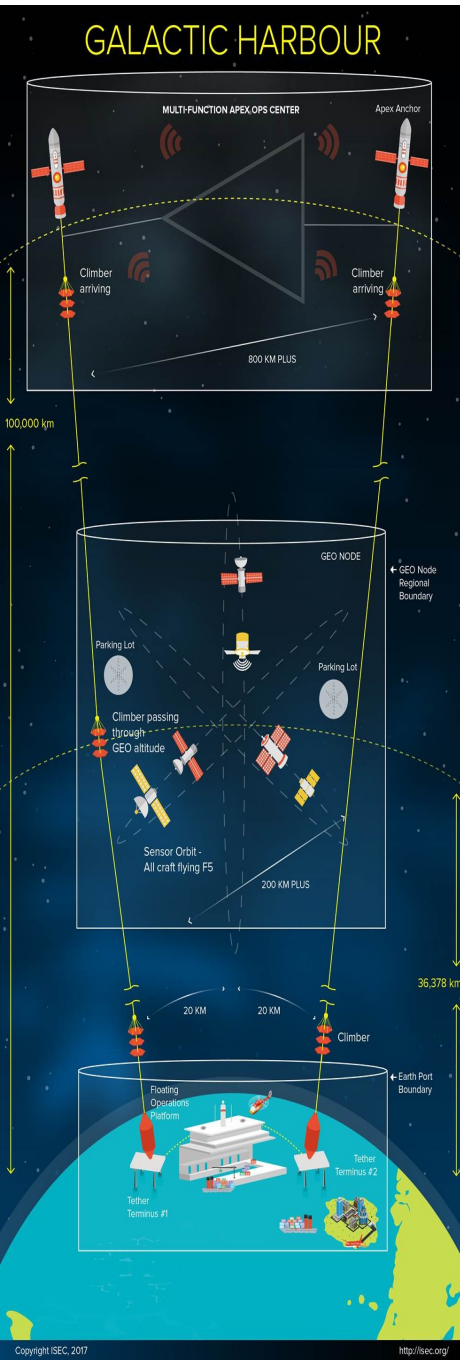
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# The Galactic Harbour enables New Space Missions



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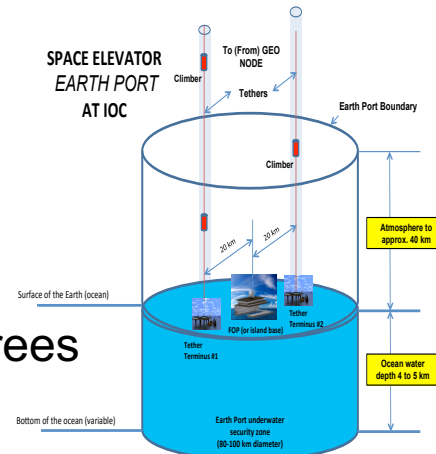
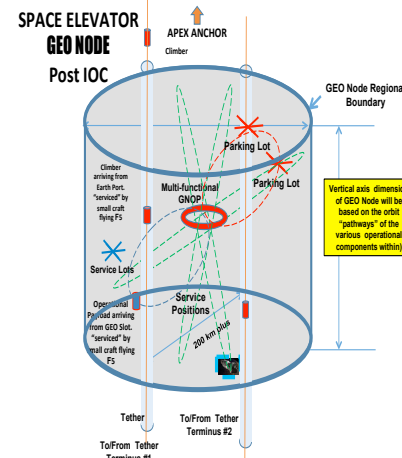
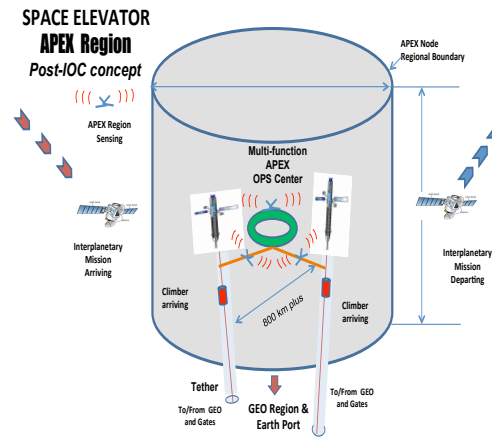
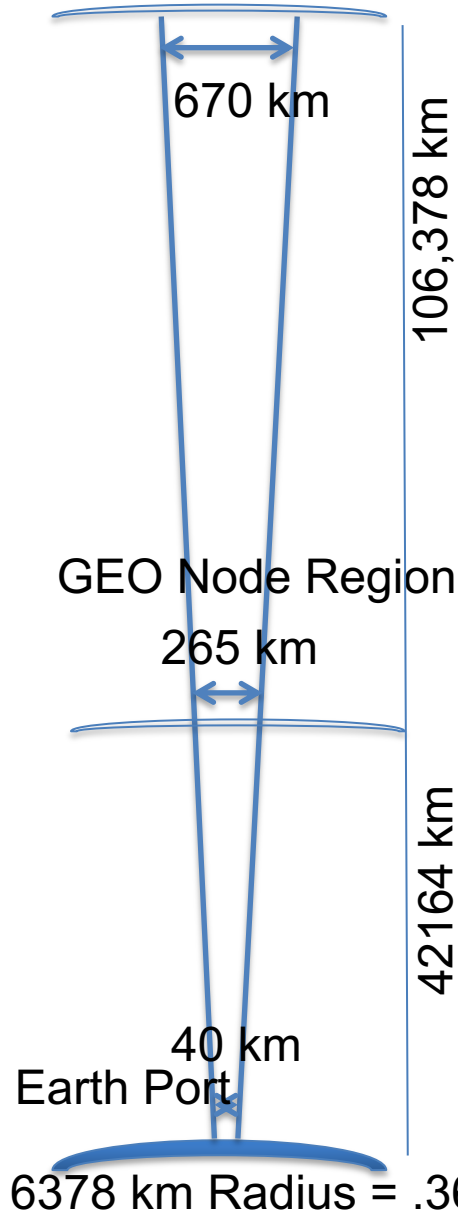


**Major Thought:** Space Elevators will provide “just in time” Logistics support to all missions to GEO and Beyond!

- *Introduction*
- Space Elevator Characteristics enabling New Missions
- Missions Enabled
- Research Summary

## *Vision*

*Space Elevators are the Green Road to Space while enabling humanity's most important missions - by moving massive tonnage to GEO and beyond. They accomplish this safely, routinely, inexpensively, and daily - all while being environmentally neutral.*



- Galactic Harbour includes two Space Elevators radially extending from Ocean surface to Apex Anchor for a permanent space access infrastructure.
- One reusable tether climber lift-off per day
- Three Regions around the equator with Earth Port to GEO to Apex Anchor capability, where commercial ventures will grow



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# The Earth Port

Floating Operations  
Platform

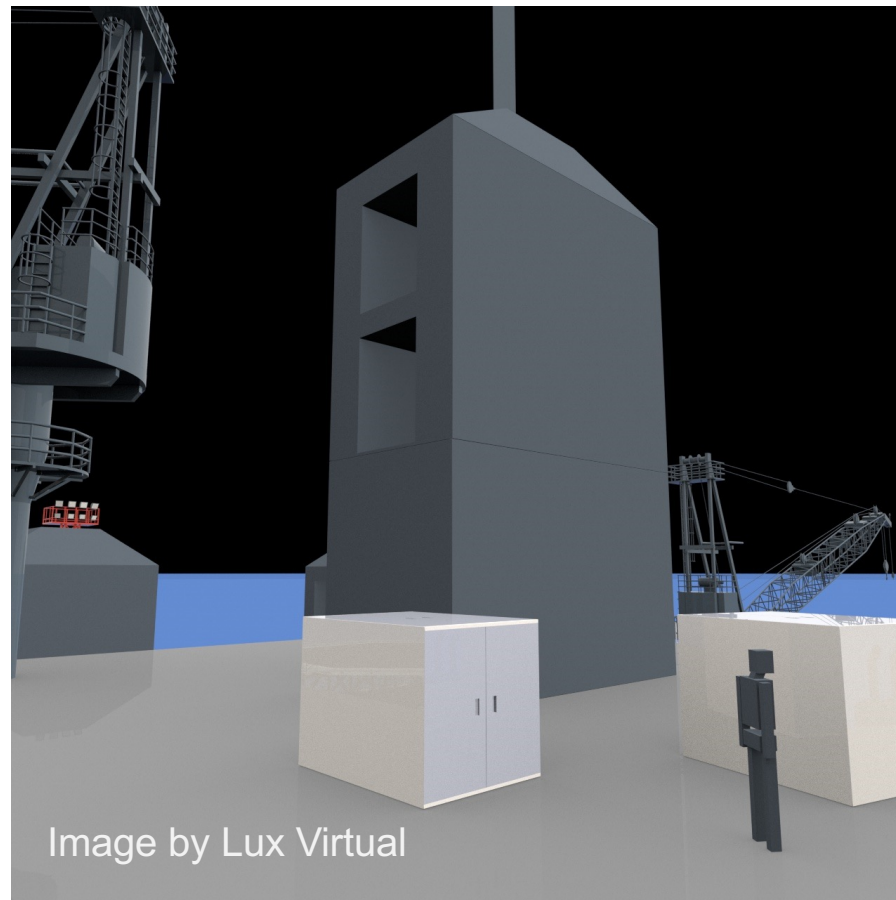


Image by Lux Virtual



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## Cargo destined for GEO being loaded at Tether Terminus





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# The Floating Operations Platform Key Features



Primary Operations Center

Shops, Cargo Bays, Clean Rooms

Covered Small Craft Marina

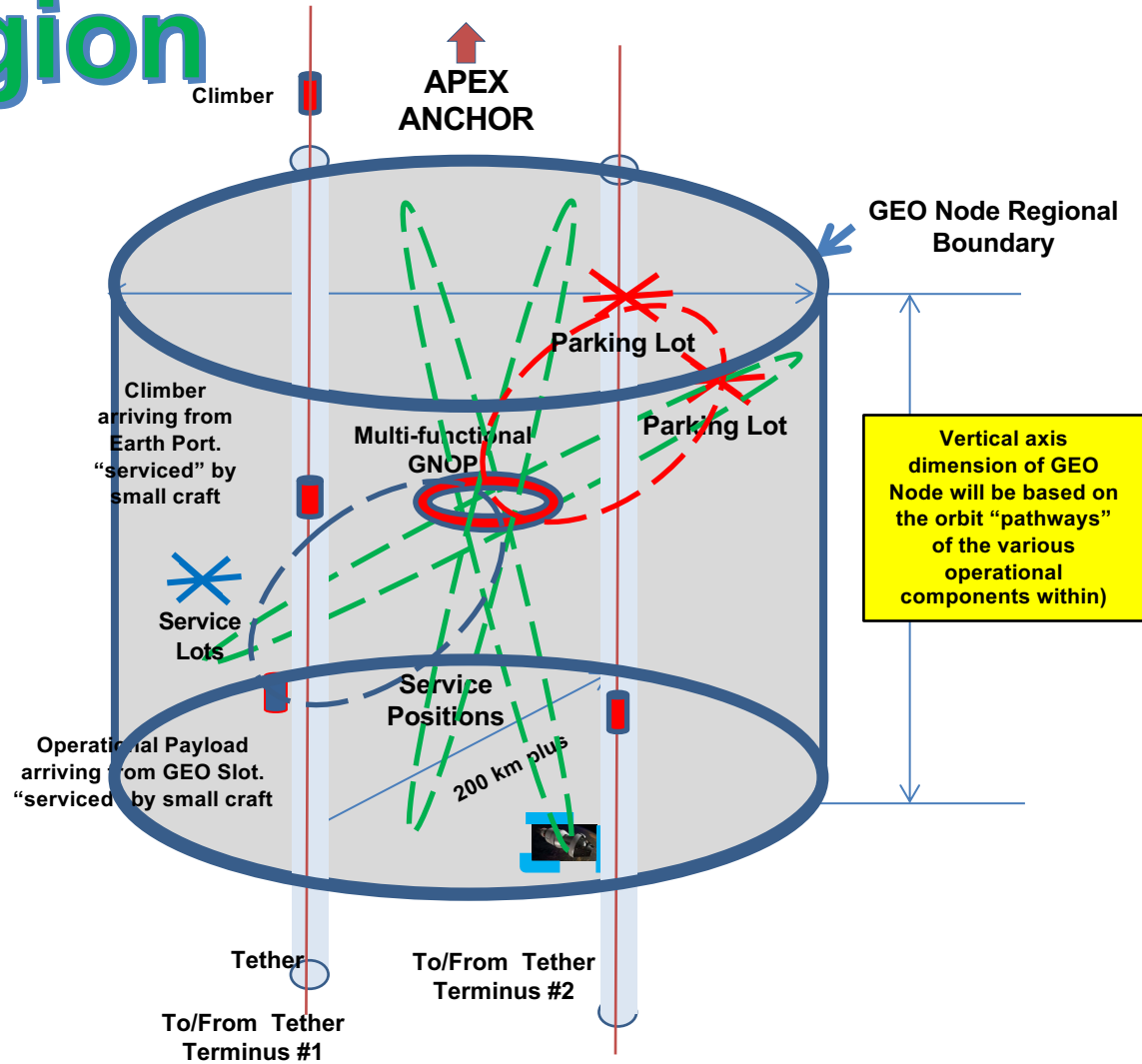
Main Cargo Handling Wharf



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# The GEO Region

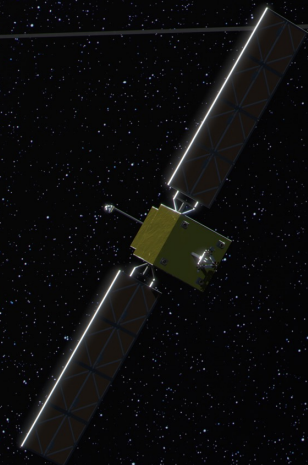
## SPACE ELEVATOR GEO Region AFTER IOC



Like taxis, space tugs await access  
to the GEO Climber



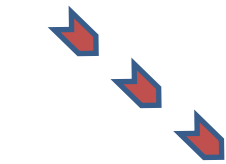
At GEO, a space tug moves into position



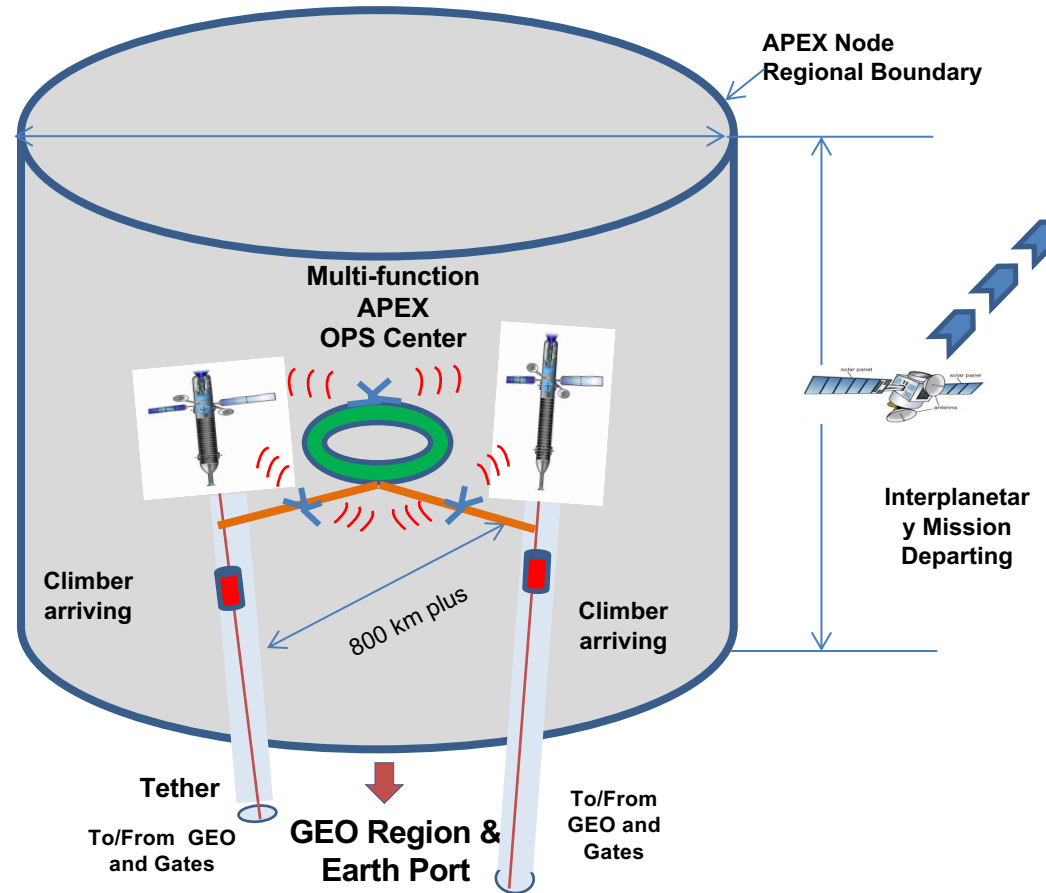


# The Apex Region

## SPACE ELEVATOR APEX Region AFTER IOC



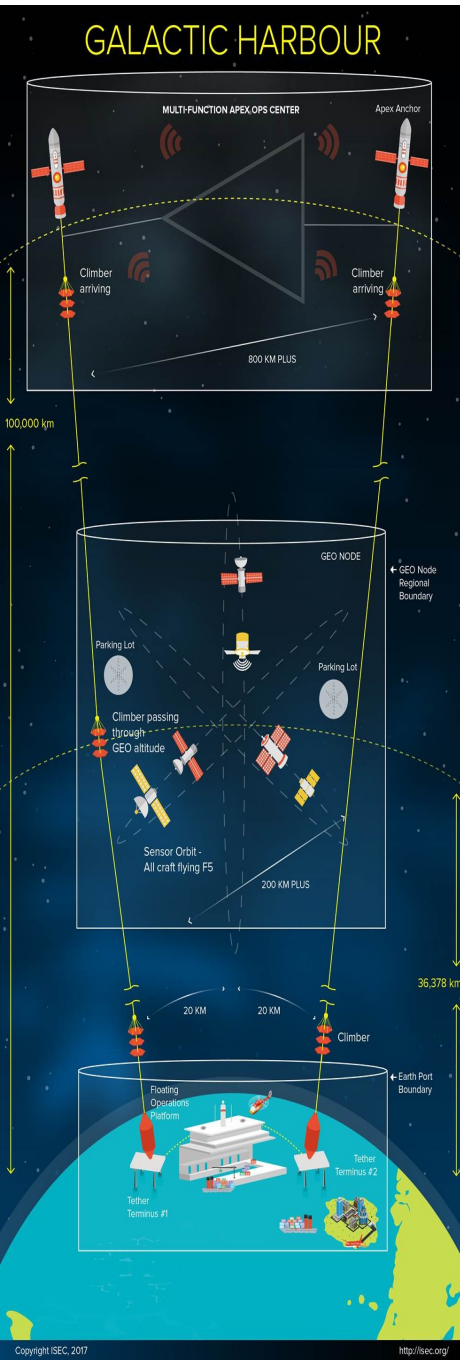
Interplanetary Mission Arriving



# The Galactic Harbour enables New Space Missions



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- *Space Elevator Characteristics enabling New Missions*
- Missions Enabled
- Research Summary

## *Vision*

*Space Elevators are the Green Road to Space while enabling humanity's most important missions - by moving massive tonnage to GEO and beyond. They accomplish this safely, routinely, inexpensively, and daily - all while being environmentally neutral.*

# Space Elevators are the Transportation story of the 21<sup>st</sup> Century



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- Galactic Harbours are ready for Engineering Development
- The main elements of the Space Elevator based Infrastructure can be built, beginning now. Testing and design efforts must start, now.
- The Space Elevator Transportation System, the core element of the infrastructure, will deliver cargo to space-based enterprises, AND provide for daily dispatch of cargo craft to operational locations across the solar system. 30,000 tonnes of cargo delivered yearly. [growing to 170,000 tonnes/yr]
- The Space Elevator based Infrastructure will logistically support every major space mission of the 21<sup>st</sup> Century going to GEO and beyond.
  - Space Based Solar Power demands for mass to GEO are huge but can be enabled with Space Elevators!
  - The Moon Colony can be fully supported
  - Enterprises along the GEO belt can be fully logistically supported, and more enterprises will flourish.
- The workforce and educational development cannot be underplayed.

# Dual Space Access Architecture



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*Rockets to Open up the Moon and Mars with Space Elevators to supply and grow the colonies. In addition, Rockets would delivery prototypes and initial operational Space Solar Power Satellites, while Space Elevators would fill out the constellations with the heavy lifting.*

Image by Amelia Stanton



**Combination of delivery approaches:** Will greatly enhance the missions of the future. Maturing customer demand for huge masses to support important missions will make the value of space elevators obvious.

**Rocket Strengths:** (1) Operational today with future growth, (2) rockets reach multiple orbits, and (3) rapid movement through the radiation belts

## Collaboration and Cooperation

**Space Elevator Strengths:** As permanent infrastructure they lead to daily, routine, massive, environmentally friendly, and inexpensive departures towards mission destinations

**Minimizing the Rocket Equation Limitations**  
[www.isec.org](http://www.isec.org)

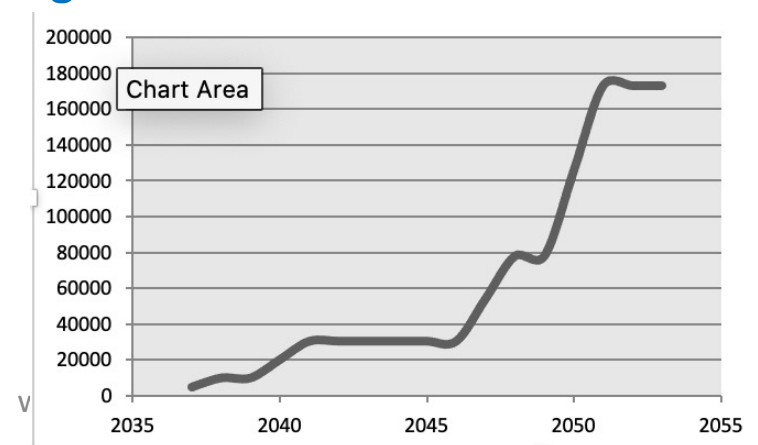
# Transformational Characteristics

The transformation of space access will be similar to moving from small boats crossing a large river to a permanent infrastructure called a bridge moving traffic daily, routinely, safely, inexpensively, and with little environmental impact. Permanent transportation infrastructures called space elevators will enable missions by leveraging their strengths:

- **Daily**, routinely, safely, inexpensively
- **Transforming the economics** towards an infrastructure with access to more valuable, lucrative, stable and reliable investments.
- **Massive movement** (30,000 tonnes/yr vs. approx.. rockets' 26,000 tonnes over 65 years)
- **Green Road to Space** ensures environmentally neutral operations
- **High velocity** (starting at 7.76 km/sec at 100,000 altitude enables rapid transits)
- **Reduction of the need for Rocket Fairing Design limitations**
- **Assembly at the Top of the Gravity Well**

## Annual payload (tonnes/yr)

*Figure 88. Massive Cargo Movement by Space Elevators (Swan "Dual Space Access Strategy Minimizes the Rocket Equation," Space Renaissance International 3<sup>rd</sup> World Congress 2021 – Congress Theses, Final Resolution and Papers. Pg 254-255.)*

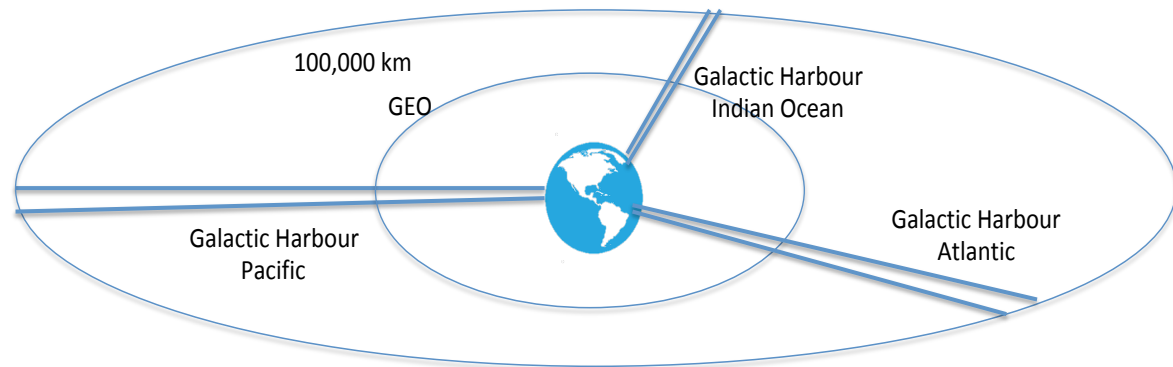


SETS Strength Four: *This Green Road to Space ensures environmentally neutral operations*



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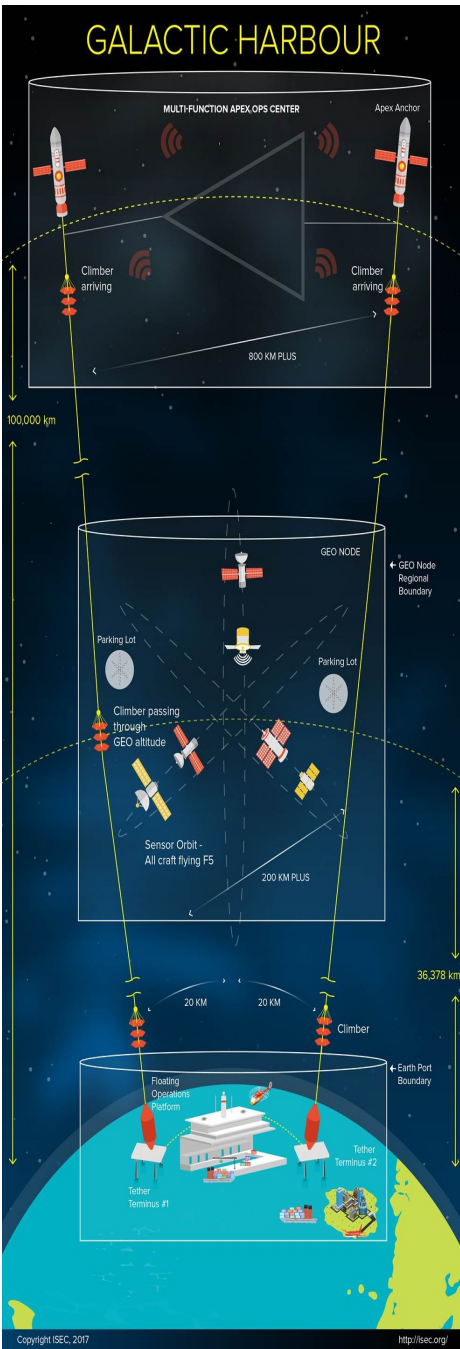
# A Green Road to Space



Massive tonnage\* raised by electricity to GEO and beyond, daily, routinely, inexpensively, safely, and in an Earth Friendly manner.

Space Elevators Beat the Rocket Equation  
We Enable Dreams

\*(30,000 tonnes/yr vs. approx.. rockets' 26,000 tonnes over 65 years)



# The Galactic Harbour enables New Space Missions



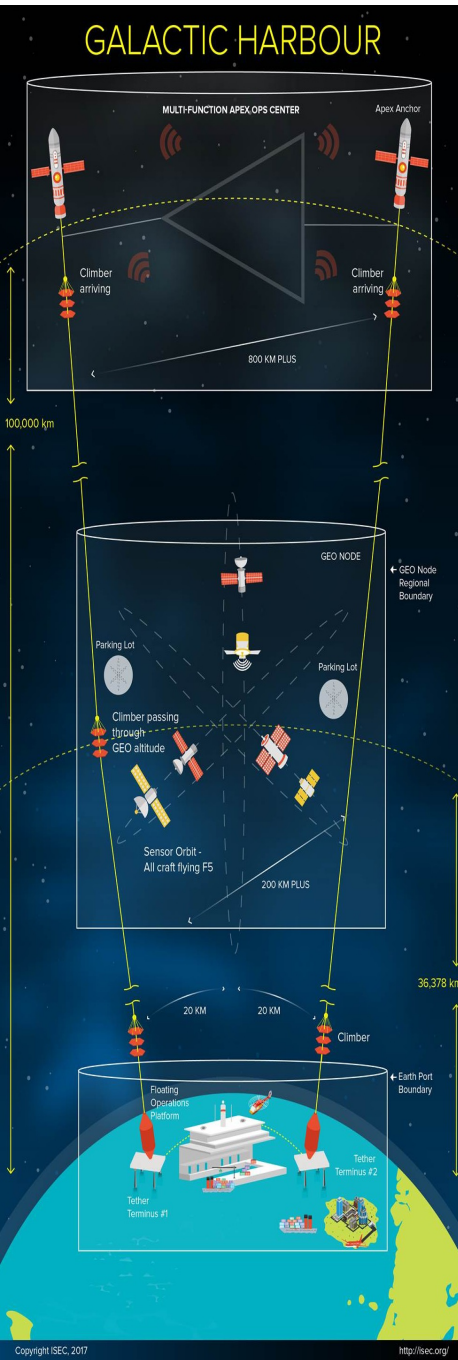
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**Major Thought:** Space Elevators will provide “just in time” Logistics support to all missions to GEO and Beyond!

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- *Missions Enabled*
- Research Summary

## *Vision*

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**Space Elevator overall mission is:  
“Just in Time” Transportation and  
Logistics Support**



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***The following specific missions will be created through the Galactic Harbour’s transportation capabilities. These missions will execute the GH’s logistic support role across the solar system***

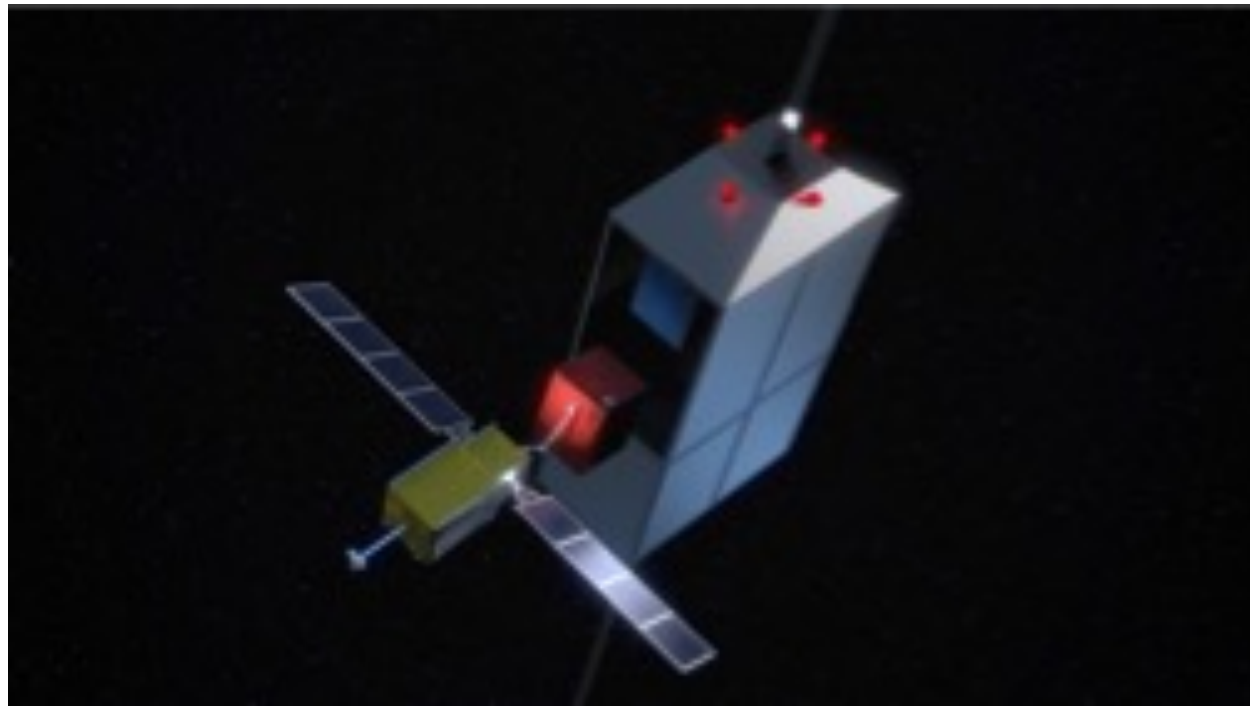
- Logistics Transshipment Management***
- The (extended) Situational Awareness***
- The Rescue Mission***
- Explore the Solar System Missions***



# *Understand the future Space Architecture's Transportation Core*

## *The Logistics Transshipment Management*

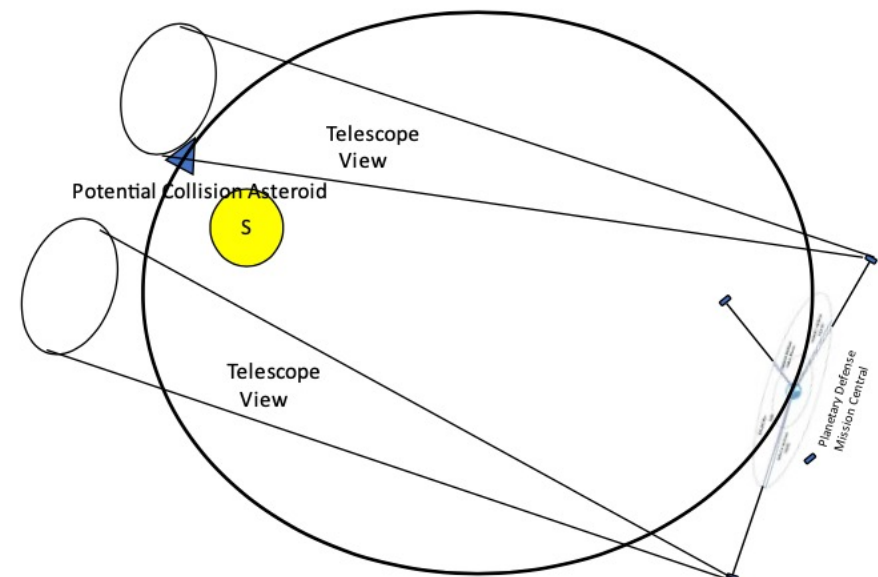
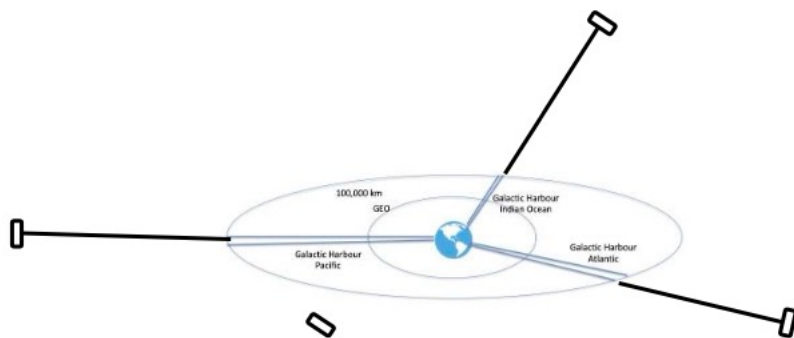
Simply stated, the Logistics Transshipment Mission manages the Galactic Harbour's cargo delivery service, the final delivery of the cargo to customers. It starts with identification and tracking from the initial loading at a customer's production facility, tracks it through its transportation history, stores the cargo until the enterprise customer requires the cargo, and then delivers as the customer requests at its destination.



# Understand the future Space Architecture's Transportation Core

## The (Extended) Situational Awareness

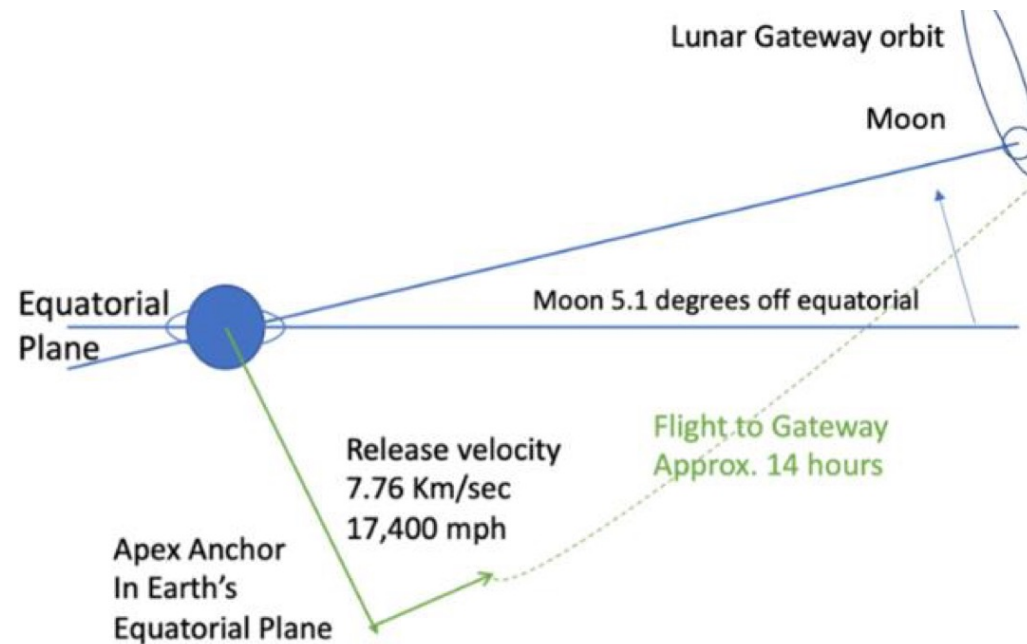
This new and necessary mission envisions a Galactic Harbour operations center working closely with the Situational Awareness authorities regarding who/what is in each of the Regions (Earth Port, GEO and Apex Anchor), who/what is approaching the Regions, and keeping track of all those items - including debris and space detritus that might be wandering by and through the Regions. In addition, monitoring all of the objects inside the designated region of concern must be continuous with forecasting of motion to ensure no conjunctions, including the tether from Earth Port to Apex Anchor (



# Understand the future Space Architecture's Transportation Core

## The Rescue Mission:

The Rescue Mission → Prepare for, store for, immediate release (in the GEO Region and the Apex Anchor). Provides emergency response times appropriate for crisis. This would include vehicles to replace damaged capsules, power to replace failed sources, oxygen (and other supplies) for critical shortages, and medical assistance as needed. ... across the Solar System and especially the Moon & Mars



# *Understand the future Space Architecture's Transportation Core*

## *The Explore the Solar System*

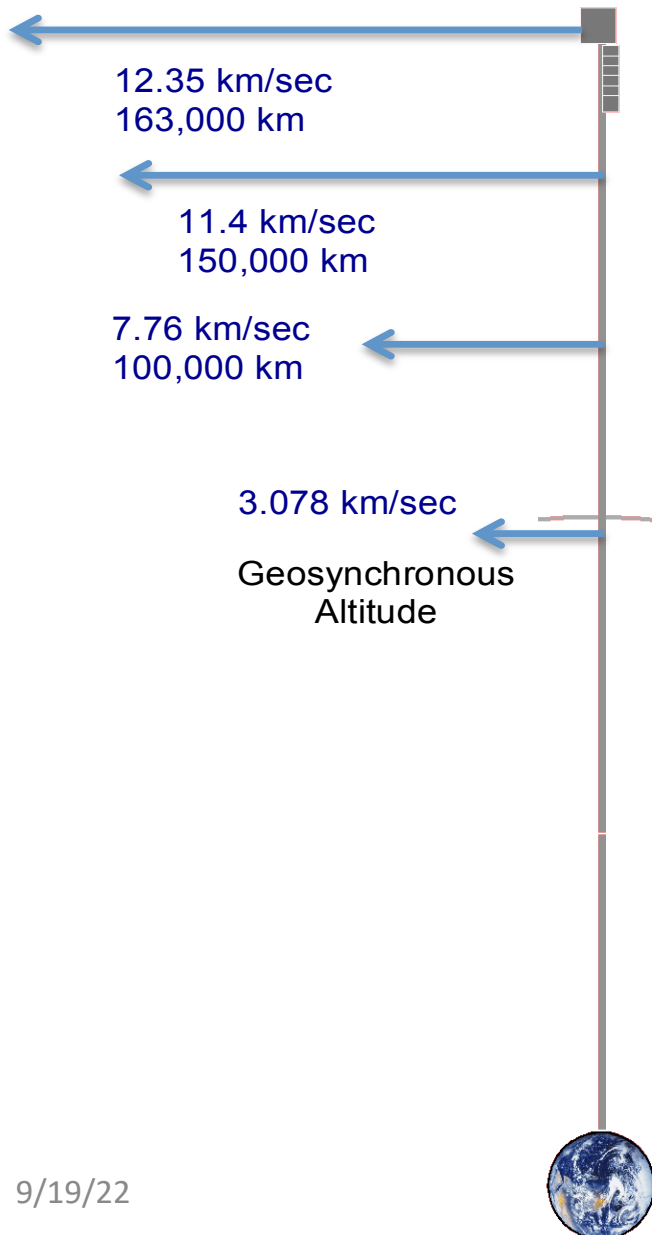
This mission leads to Transformational Release of Scientific Payloads from the Apex Anchor – Any Size, Every Day, Anywhere in the Solar System. Two main strengths enable these claims of revolutionary Scientific Payloads. The first is the ability to raise massive cargo against the Earth's gravity while being friendly to our environment. The beauty of Space Elevators is that they raise massive cargo with electricity [hence – “the Green Road to Space”]. The second operational capability is that it can release scientific spacecraft each day towards solar system bodies with great velocity (minimum 7.76 km/sec). To set the stage, research within Arizona State University has one example which explains the new conundrum quite well.

Traditional launches to Mars are 8-month trips and are separated by 26-month windows until the next opportunity. Currently, delivery to the surface of Mars is about 1 percent of the mass on the pad on Earth. When looking at releases from Space Elevator Apex Anchors (at 100,000 km altitude) the release towards Mars can be every day. In addition, it can send massive amounts of cargo and has a spectrum of travel times – the shortest is a normal release from the Apex Anchor of roughly 61 days. This capability embodies the idea of logistics “on time delivery.”

# SETS Strength Five: *High velocity* (starting at 7.76 km/sec at 100,000 km altitude) enables rapid transits



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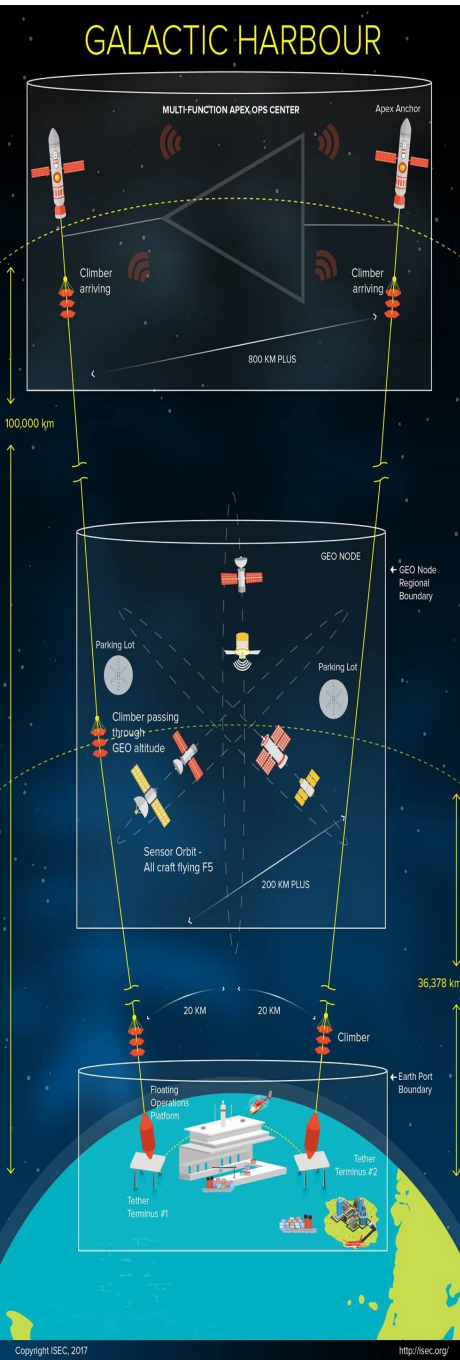


- This new vision of Galactic Harbour architectures will change the "thinking" for off-planet migration – **How fast can we go?**
- At 100,000 km altitude, there is **no significant gravity pull** to limit departures
- At 100,000 km altitude, there is tremendous velocity (7.76 km/sec) enabling beyond Mars
- With longer Space Elevators, the whole solar system opens up and **even escape from the sun is possible** (without thrusting from rocket fuel).

# The Galactic Harbour enables New Space Missions



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### ***Space Elevator Transportation System (SETS) has Started Development***

The Space Elevator Transportation System (SETS) is inarguably part of the future space transportation architecture; joining advanced rockets. The Modern-Day Space Elevator has evolved from a dream to a scientific reality and has moved into the second phase of development (Engineering Validation). The conclusion of this recent research is that we can do it now! The Space Elevator, as the green road to space, has started!

# Collaboration is Mandatory