

Re: Space port/dock/ship yard location

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Vehicle sizes increase – 5x with each added stage, so the 5,000 tonne LEO stage, becomes a deep space stage, with the addition of a 500,000 tonne booster, and the 100,000 tonne, booster is modified to operate as a second stage.. in this way, vehicle sizes are increased as demand increases and fleet size increases and launch rate increases – to increase human presence across the solar system.

Gross Lift Off Weight (GLOW) scales the size of populations off world. Increasing numbers on the moon to over three million and the numbers on mars to over two million by merely increasing vehicle size and launch rate. Though with chemical propulsion, there is still a large fleet of craft launched every synodic period to Mars while regular flights operate between Earth and Moon.

Large 10,000 tonne GEO spacecraft – power sats, that are 500 sq km in area, and generate 273 GW of laser energy beamed by conjugate optics to any number of users in 10,000 watt increments – at 650 W/cm² at 1,100 nm wavelength.

Deep space stage extend human presence beyond Mars to the asteroid belt, where a survey is completed of all the small objects in the inner solar system. Earth crossing asteroids are collected into sunsynchronous polar orbits. A polar launch/recovery operation is set up at Labrador, Norway, and the Gobi Desert. Here communications satellite constellations as well as factory satellite constellations are launched into sun–synch polar orbits.

Asteroids, and asteroidal fragments are navigated into polar orbits near the tele–robotic factories and solar power satellites beam energy to those factories, to provide power for mining, smelting, processing, forming, manufacturing, assembly, and powering mass driver rail guns to deliver products throughout human space, including Earth's surface. People anywhere can work anywhere else on Earth, and in LEO telerobotically 24/7.

Once sufficient capacity is available on orbit, very large satellites are constructed on orbit, and the launchers described earlier provide LEO service only, whilst deep space stages operate from Earth orbit, near the asteroidal feedstocks.

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Large pressure vessels are constructed to provide farmlands, and forests on orbit. This allows a vast expansion in the production of food and fiber on orbit.

Three asteroids massing 10 billion kg to 20 billion kg each arrive every day, and provide sufficient raw materials to supply every man woman and child in the solar system with 4 tons of products per year – ending human reliance on the biosphere of Earth – which returns to the wild.

Garbage on Earth is tossed back to orbit via 'space fountain' based rail guns, operating at the equatorial locations, powered by solar energy. Garbage is fully recycled on each of the major human outposts, though in special situations, high value garbage is returned to where it has the highest value.

Very large solar power satellites designed to operate inside the orbit of Mercury, operate at the terawatt level, and beam energy with lasers across the solar system, providing advanced rocket capabilities, improved power levels, and expanded populations off-world by providing ultra-low-cost low-impact power to all.

Large pressure vessels are constructed on orbit, and deorbited to float as hot air type balloons in the skies of Earth and Mars and Venus. These are powered by laser beams from orbit, and are supplied from orbit. On Earth these cloud nine sky cities provide a special role in removing people from repressive regimes and giving them resources jobs a stable currency, and basic human services throughout the planet – during humanity's transition to a truly civilized world.

Laser powered rocketry and laser light sails lower the cost and increase the frequency of interplanetary travel, while swelling off-world populations begin to deplete population levels on Earth.

Laser powered propulsive skins provide personal ballistic transport on Earth and around the other human settlements in the solar system. These personal transport systems are also capable of flying off-world to support vessels on orbit. These vessels provide deep space capability.

Large pressure vessels built on orbit, are adapted to space homes, which are purchased by individuals to provide a very high estate level of living. Tele-robots on each estate have workers report to work there each day for a few minutes, rather than transport materials from farm to factory to store to home. All the equipment is present on the space home, and people arrive telerobotically and put the same time and effort into processing estate products to whatever is desired.

Laser light sails and space homes operate together with laser rockets to set out on voyages deep in the solar system, developing Kuiper belt

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objects, and ultimately transporting people star to star, once software develops to automate these robotic systems or space homes travel in sufficiently large fleets to have a self-sustaining population of people with requisite skills nearby – or some mix.

High performance rockets and laser light sails combined with laser-driven propulsive skin personal spacecraft, make a seamless transition between planetary or moon surface, space habitat, high speed transit to another planet moon or larger space habitat – possible. This is the golden age of space travel. The numbers of people on Earth fall dramatically as the number of humans spread across the nearby stars of the Perseus arm.

As population levels fall on Earth, smaller cities and towns depopulate and are returned to nature. Eventually all but the most important historical cities are removed from Earth's surface. Eventually even the space ports decline in importance as personal ballistic travel and direct delivery from orbit replace major movement of industrial products. Large spacecraft are stored on orbit in large pressure vessels filled with low pressure dried nitrogen and maintained by robotic labor launch/landing facilities for the craft are reduced to the minimum required to support emergency operations.

The Earth is returned to a nature preserve as people move to orbit. Similar shifts in populations occur on the moon and Mars as the number of habitats on orbit increase in the skies of these worlds.

Ultimately, a ring of 188,495 solar power stations, each 100 km diameter orbit 3 million km above the center of the sun. Each station produces 16 Quadrillion watts of power – approximately 1,000x today's power usage for the entire human race. 188,495 of these stations support not only the vast infrastructure described here, but also the projection of this infrastructure to nearby stars using laser-powered light sails. One of the first payloads sent to nearby stars, are stations just like this, to provide a means to continue expansion, and to send products material and people back to Sol creating a highway of laser light in the sky.

Large Fresnel optics the size of a small moon, beam energy from near the sun's surface to points 1,000 AU away, where large mirrors use the gravity lensing of the sun itself to project sensible energy many many lightyears away – these waves of energy are preprogrammed and announced with radio telescope signals producing both an interstellar internet, AND a standard protocol for riding the waves of interstellar commerce.

That is, since it is impossible for these light beams to respond to starships dozens of lightyears away, these waves of powerful light that are sweeping light sails from star to star, might be thought of metaphorically as waves crashing on a beach, with a regular rhythm announced by radio telescope signals. So, arriving and departing

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starships listen to the 'subspace' signals and know where and when to be somewhere to ride a wave of light energy. Starships talk by radio with other nearby starships to coordinate use of the resource, which repeats regularly. These are akin to public trails across the cosmos.

In this way, urban humans, become sub-urban and then tribal again, spanning the space frontier while living standards rise to impossibly high levels by today's standards, limited as we are to the resources of one world.

The 4 million solar mass – supermassive black hole at the center of our galaxy, spins at 37% the speed of light, and is 30,000 light years away. It is possible to send signals around that object in a way that returns the signal back to Earth at a point in time earlier than it left. With this reversed time link, it should be possible to send signals back and forth across the cosmos in real time!

That is, a small portion of a powerful radio pulse sent from Earth should be capable of being detected back on Earth at the same time, as well as shortly before and shortly after it was sent, since a portion of the energy travels through many paths around the black hole. More on another topic with that.