Space Business Monthly News

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Satellite Business Network

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Editorial 01: Billionaires aim for space: So, what are we then? (Kuzuoka)

I think it can be said that July 2021 will be seen as a memorable month in the world of space flight and space business. On July 11, Richard Branson, the commander of the Virgin Group, from the U.K., reached space via Virgin Galactic's "VSS Unity." Then, on July 20, Amazon Group founder Jeffrey Bezos reached space via Blue Origin's "New Shepard." Moving forward, in September, electric vehicle maker Tesla co-founder Elon Musk is planning a trip of his own via SpaceX's "Crew Dragon." He also proclaimed that SpaceX will reach Mars in 2030. These events are not only a record of the billionaire class realizing their dreams—the events also stand as a testament to the start of civilians in space and space tourism.

In July, when space development by billionaires heated up, we are contemplating what we should aim for as space technology & space business experts in Japan. The space business in often referred to as a "capital expenditures business," which means that it basically invests huge capital and expects a return. Even if a billionaire decides to join and compete in the field of rockets and communications technologies with global partners and where he/she develops his own assets, you need a lot more than just the winning psychological profile of a billionaire mindset. In addition, the United States has a large military budget and is pursuing a large-scale constellation program such as its Tranche series, and among that, new technologies are already under development. Against that backdrop, how can Japan's space business stack up against the massive amounts of money being put into this field?

Of course, in space development, it is necessary to always be able to manufacture individual rockets and satellites from the viewpoint of national security. Like how it does for next-generation fighter aircraft, i.e., with a "view toward international cooperation," there is also the aspect of "Japan-led development," and this is a necessary factor to consider when the Japanese government is considering rockets and satellites.

However, as far as business is concerned, companies that only work with governments in the development of rockets and satellites can stay as they are just fine, but for the types of space startups that have emerged, the market involving the Japanese government alone would not be satisfactory. Then, the question is: What is to be considered in these times? There are still lots of discussions and considerations needed, but here at Satellite Business Network, we are considering the following two directions.

● From prime-oriented to subsystem-/component-oriented

In the past, Japanese space development efforts had the strong tendency of becoming a prime contractor oriented on rockets and satellites and launching them on the world stage. In the automobile industry, one of the strengths of Japan has been not only its finished vehicle manufacturers (prime manufacturers) such as Toyota and Nissan, but also its players involved in subsystem components and the strengths they have overseas, such as Denso and Aisin. Although there are some well-known overseas subsystem and component manufacturers in Japan, the attitude of emphasizing prime manufacturing is strong in both the public and private sectors, and opportunities for training are also limited. Against this backdrop, the Japanese space industry will need to actively promote business involving subsystem components.

● Toward being regionally oriented as well as globally oriented

I have often insisted that the space business is like one big global business, and I still feel that way. But now that billionaires and U.S. government budgets are shaping global infrastructure, we need to "also" think about the space business as being regional. No matter how global the world becomes, local bridges, roads, and manufacturing equipment for domestic companies will remain a regional business matter. Therefore, the space business can also consider systems aimed at regional services, such as constellations with orbits such as those used in quasi-zenith satellites, or perhaps constellations such as Taiwan's FormoSat, which always passes only specific points in a complete return orbit.

Editorial 02: NOAA, you too? Unstoppable trend of small satellites in space infrastructure (Oishi)

Personally, I have been enjoying following the trends of the National Oceanic and Atmospheric Administration (NOAA) from the viewpoint of the Joint Polar Satellite System (JPSS) terrestrial system architecture using the U.S. Department of Defense Architecture Framework (DoDAF). It was reported that, this month, NOAA took its first step toward conversion to a smallsat constellation.

The introduction of smallsats into meteorological observation is being considered not only by NOAA but also by other space agencies such as the U.S. Space Force (which has invested in the development of smallsats for providing operational weather data) and the ESA (which has developed a prototype for the Arctic Weather Satellite [AWS] meteorological satellite constellation project).

The advantages of introducing a smallsat include low cost, short delivery times, flexibility in launch vehicle selection, and quick upgrading of onboard sensor technology.

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NOAA plans to work on this step by step via such means as conducting demonstrations, etc., using the concept SounderSat (scheduled to be launched in the mid-2020s) proposed in the NOAA satellite observation system architecture research for the study of replacing the current large satellite-based JPSS system with a smallsat constellation.

Already, NOAA has signed a six-month review agreement in 2020 with: Ball Aerospace, L3Harris, Raytheon, LM, Maxar, Northrop Grumman, General Atomics, and York Space Systems, all in preparation for SounderSat. Even though smallsats are, by definition, small, the satellite size recommended by each company varies from a CubeSat to several hundreds of kilograms.

It is certain that meteorological satellites will become smaller as electronic components continue to shrink, but there is still a considerable amount of time before NOAA's actual decision is made to introduce a smallsat. In the meantime, it is huge that the mechanisms of the organization, including its culture and procurement methods, can be changed so that a new concept can be accepted, in addition to their ability to evaluate technical substitutability, such as the observation performance.

When I talked with an official from a U.S. company who once tried to introduce to the DoD a smallsat system, he said that, repeatedly, the DoD stuck with its "good enough" design concept sense and that he struggled to get them to understand the merits of smallsat introduction.

In addition to how smallsats will be engineered in terms of hardware system replacement (the hurdles have become much lower than when smallsat constellations first appeared), we are witnessing an experiment regarding how existing organizations and their cultures will come to see and accept smallsat constellations going forward. I, for one, am very interested in the opportunity to watch this.

Editorial 03: Lunar flagship infrastructure (Murakami)

5G has debuted as an Earth-based communications infrastructure, with service development progressing rapidly.

Meanwhile, on the moon, Europe has started its Moonlight project, toward Moon-based communications and positioning. Two groups, SSTL and Telespazio, have been signed for consideration. SSTL teamed up with its parent company, Airbus, to design satellites, and SES is included as an operator. On the other hand, Telespazio's group includes Thales Alenia and OHB as satellite makers and Inmarsat as an operator.

In advance, SSTL received a contract to launch a demonstration satellite, and I thought that this was how it was done, but for full-scale operations, it seems that ESA's intention is to sign contracts with multiple companies and then work to efficiently create a better system.

In the United States, NASA carries out technological development missions such as for optical communications, but it does not develop its own systems. Instead, its policy is to procure services. Against this backdrop, Intuitive Machines announced that it plans to launch a relay satellite in 2022 by utilizing free space to the moon via the Commercial Lunar Payload Services (CLPS) contract transportation service. Intuitive Machines plans to conduct 4G communications tests in cooperation with Nokia, even in the contract prior to that, toward steadily expanding service areas. Now that 5G is becoming more widespread here on the ground, I'm thumbing my nose at the 4G test, but listening to Intuitive Machines and Nokia executives makes me wonder what's coming next.

Meanwhile, China, in addition to aiming for relay satellites supporting missions on the other side of the moon, it was announced that it plans to conduct a launch in 2024 in preparation for a lunar polar mission. Chinese authorities said that they would prepare what is needed to promote a joint scientific mission with Russia.

The United States, Europe, and China are each promoting and proceeding with lunar plans and are thinking that it is essential to develop a communications/positioning system, as core infrastructure.

Regarding manned landers, which are core infrastructure in other fields, SpaceX is in a situation where it alone cannot proceed with a contract due to objections to the contract by another company that also made a bid. In this situation, the contract cannot go forward. A U.S. Senate/House committee has called for a budget increase, and Amazon's Bezos has sent a document to NASA stating that he is willing to inject $2 billion to help cover project costs; therefore, perhaps some decisions are expected to be made in the near future. This seems to be a Musk vs Bezos showdown. This could affect the future of core systems, but it seems that we are in a situation where both sides simply can't give up.

Does this mean that he who controls communications and transportation controls the world and space?

July 2021 Space Business-related Topics by Business Position/Market Field

Satellite Business Network

	OldSpace and other topics	Mixed space topics	NewSpace
Satellites	■ Airbus mounts military UHF payload on Eutelsat 36D (No.001) ■ First acquisition of high-precision images and data by meteorological satellite FengYun-4B (No.014) ■ NOAA takes first step toward smallsat constellation (No.029) ■ Hellas Sat achieves 5G satellite backhaul live demo (No.032) (Fig.1) ■ Successful launch of "Tianlian I" no.5 data-relay satellite in China (No.033) ■ DARPA deploys two Blackjack Mandrake 2 satellites (No.034) ■ Spacecom extends AsiaSat satellite leasing transaction (No.045) ■ Malaysia's MEASAT-3 satellite totally lost? (No.058) ■ SES spearheads quantum technology cryptographic network in Luxembourg (No.062) ■ Hokuto positioning realizes accurate & large-scale production of wheat (No.079) ■ Reprogrammable satellite (Quantum) ready for launch (No.084) ■ Abnormality in Malaysia's MEASAT-3, cause still under investigation (No.089) ■ Inmarsat announces multi-orbital Orchestra constellation (No.093)	■ Bharti Global invests $500M additional to acquire OneWeb's largest stake (No.006) ■ Missile Defense Agency confirms deployment of CubeSat launched via Virgin Orbit (No.049) ■ Alpha Space receives CAD 1.7M contract from Canadian Space Agency for development of SAR technology for space exploration (No.054) ■ Umbra and Hypergiant selected for JADC2 air force contract (No.060) ■ Court denies Viasat's suspension of Starlink launch until proceeding (No.074) ■ European satellite constellation expansion by Rovial SAS and consortium members underway (No.082) ■ Officina Stellare supplies ISI with multispectral optical payloads for defense and intelligence (No.083) ■ Strong regulations on UK, Starlink, OneWeb, and other NGSO constellations (No.086) ■ Anuvu announces high-performance micro GEO satellite constellation (No.092)	■ OneWeb achieves coverage target with latest launch, will aim at southern hemisphere in future (No.011) ■ ICEYE launches 4 new radar satellites, building observation capability (No.013) ■ Ursa Space signs exclusive agreement with SI Imaging Services (No.015) ■ Fleet Space beamforming smallsat launched (No.024) (Fig.6) ■ Planet becomes joint-stock company through merger with dMY IV (No.025) ■ Satellogic goes public via SPAC transactions (No.028) ■ Astranis begins final assembly of Alaska satellite (No.035) ■ Astranis accelerates production with four more small GEO satellites (No.056) ■ Exodus Orbitals developing open satellite platform (No.071) ■ Mynaric signs MoU to enter India's aerospace market (No.081) ■ GeoOptics launches next-generation Earth sciences constellation (No.094)
Launching	■ China uses super heavyweight rocket (about 900) tons to build space-based solar power system (No.022) ■ Hacker connected to North Korea accesses South Korean rocket development company (No.037) ■ Only 21 days after launch command, U.S. Space Force succeeds in launching "tactically responsive" satellite (No.041)	■ N/A	■ Radio telescope faces threat from satellite constellation (No.023) ■ Exobtics' world-first portable TVT system released (No.031) (Fig.7) ■ Branson flies in space via SpaceShipTwo (No.040) (Fig.8) ■ Musk reserves seat on Virgin spacecraft (No.047) ■ New Q-/V-band phased-array satellite antenna now available from ThinKom (No.053) (Fig.9) ■ Virgin Galactic holds lottery for two free space travel tickets (No.061) ■ Bezos launch successful, space tourism begins (No.067) (Fig.10) ■ Equipping satellites with edge computing! Aiming for development, US startups form partnership (No.073) (Fig.11)
Others	■ Cygnus supply ship departs from ISS, deploys several smallsats into atmosphere (No.004) ■ Manned spacecraft Shenzhou 12 succeeds in first extravehicular activity (No.020) (Fig.2) ■ NASA concludes Gateway module manufacturing contract with Northrop Grumman (No.039) (Fig.3) ■ NASA and ESA conclude agreement on climate science cooperation (No.050) ■ KSAT adds new ka-band KSATlite antenna to Troll Satellite Station in Antarctica (No.052) ■ NASA requests proposal for commercial space station development (No.055) ■ Fraunhofer IIS succeeds in terrestrial IoT communications test via GEO (No.095) ■ Space station temporarily loses attitude control after Nauka docking, Starliner launch postponed due to same problem (No.098)	■ Satcube awarded grant for new low-cost LEO satellite terminal development (No.043) (Fig.4) ■ Kymeta demonstrates interoperability of LEO and GEO satellite communications in military combat research exercises (No.072) ■ Bezos provides billions of incentives for NASA's lunar module contract (No.091) (Fig.5) ■ GAO denies protests about NASA lunar lander agreement between Blue Origin and Dynetics (No.097)	■ Momentus evaluated/revised SPAC transaction significantly reduced (No.007) ■ Astra completes SPAC merger, begins public trading (No.010) ■ US startup announces start of MaaS business in space for orbital service providers (No.018) ■ SpaceX succeeds in second ride-sharing mission (No.021) ■ Investors drop out of Momentus SPAC trading (No.066) ■ Rocket Lab identifies cause of Electron launch failure (No.069)
From Japan	■ Japan aims to increase spaceports and become "Asian hub for space business" (No.008) ■ "Lunar industry" private sector-led proposal by Japan's Lunar Industry Vision Council (No.048) (Fig.-12) ■ Ministry of Internal Affairs and Communications public contract offering: SKY Perfect JSAT/R&D for satellite quantum cryptography for a global quantum cryptography network structure (No.070) (Fig.-13)	■ Government supports smallsat network development, purchases observation data in advance (No.064) (Fig.14) ■ Astroscale and MHI cooperate in debris removal technology (No.087) ■ JAXA and Synspective start demonstration for social implementation of a service for grasping situations of disaster using small SAR satellite constellation technology (No.088) (Fig.15)	■ Infostellar integrating AWS ground stations into its own mission control SW (No.012) ■ IST "Screw Rocket" succeeds in reaching space for second time (No.017) ■ "HAKUTO-R" aiming for the Moon, cleared lander thermal environment testing, moving on to flight model assembly (No.086) (Fig.16) ■ OC Global and Synspective conclude MoU on use of SAR satellite data in overseas shipping and transportation infrastructure projects (No.065)

OldSpace and other topics

Mixed space topics

NewSpace

From the world

Fig.1: Demonstration of backhaul connection between 5G core NW and 5G gNB through Hellas Sat 3 (No.032)

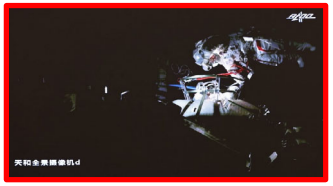

Fig.2: Extravehicular activity of two astronauts displayed on a huge monitor at the Beijing Aerospace Flight Control Center (No.020)

Fig.3: In-orbit image of the Habitation and Logistics Outpost (HALO) module (right) (Credit: Northrop Grumman) (No.039)

Fig.4: Swedish public innovation agency grants Satcube subsidy for the development of low-Earth orbit LEO satellite terminals (No.043)

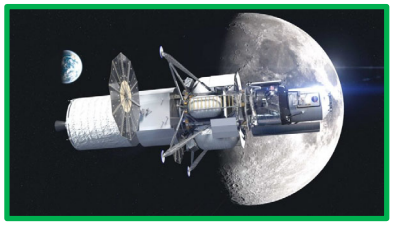

Fig.5: Bezos mentions that if NASA orders a second manned lander from Blue Origin, the company will spend over $2B in development costs, etc. (Credit: Blue Origin) (No.091)

Fig.6: In-orbit image of Fleet Space's Centaurus 4 (Credit: Fleet Space) (No.024)

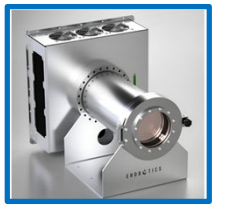

Fig.7: Exobotics' XO-VAC: A world-first portable TVT system (No.031)

Fig.8: SpaceShipTwo separates from mothership White Knight Two and then from the rocket motor (Credit: SpaceNews/Jeff Foust) (No.040)

Fig.9: ThinKom Q-/V-band user terminal antenna (Credit: ThinKom) (No.053)

Fig.10: Rocket taking off with four people onboard (from a video of Blue Origin) (No.067)

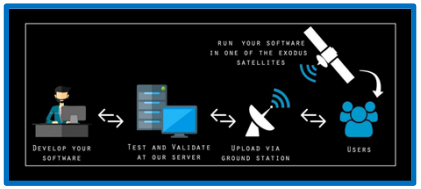

Fig.11: Conceptual diagram of a satellite using edge computing (Credit: Exodus Orbitals) (No.073)

From Japan

Fig.12: "Lunar industry" private-sector initiative, recommended by Japan's Lunar Industry Vision Council (No.048)

Fig.13: Image of a quantum cryptography communication network on a global scale (No.070)

Fig.14: (Photo: *Yomiuri Shimbun*) (No.064)

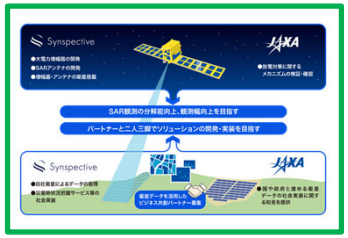

Fig.15: ©JAXA/Synspective, for the purpose and sharing of this project (No.088)

Fig.16: "HAKUTO-R" (Credit: Impress Watch [Impress Co., Ltd.]) (No.051)