Space Business Monthly News

December 31, 2021, Satellite Business Network Co., Ltd.

Satellite Business Network

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Editorial 01: On reading into the revisions to the Gantt chart for Japan's "Basic Plan on Space Policy" (Kuzuoka)

On December 28, a meeting at the headquarters of the National Space Policy Secretariat was held, headed by Prime Minister of Japan Fumio Kishida. At the time of writing, the minutes of this meeting have not been released yet, but it is said that the Gantt charts used for Japan's "Basic Plan on Space Policy" (revised in 2021) have been approved. This was occurring right when the budget for the next fiscal year was being established, and the concrete direction of how the country should proceed in terms of space development and utilization from the next fiscal year onward has become clear.

Newspapers and other mass media have been spouting that "Japanese people will be on the moon in the latter half of the 2020s," but I think that this revision of the Gantt chart shows, as a more-important aspect of direction, a collaboration involving development and co-creation between the national government and the private sector.

The revision at the end of 2020 called for a plan on the chart mentioned as "Building a promotion system for satellite development/demonstration platforms by the end of FY2020." Against that backdrop, over the past year, a framework for satellite research, referred to as a "satellite development/demonstration platform" has come to be gradually established, and some of the first results are now being shown.

First of all, as part of strengthening the comprehensive foundation for space activities in the chart, "Efforts to acquire important, basic technologies for smallsat constellations " by the Cabinet Office, etc., was shown in a big heading at the beginning of the column for satellite technology development. Considering that smallsat constellations will form an important part of the satellite field in the future, this heading was read as an expression of intention to develop, as a government effort, the important technology required. Under this heading, it was shown that a new program called "Stardust" would be established and that the government would develop technologies that should be strategically addressed from the perspective of security and economic growth. Specific technologies include: low-Earth-orbit satellite-to-satellite optical communications, in-orbit autonomous control, and communications technology for beyond-5G next-generation smallsat constellations. In addition, after the demonstration of technology is examined for satellite development/demonstration platforms, orbital demonstrations will be promoted via each ministry's own means, with one of those being the technology renewal satellite program of the Ministry of Education, Culture, Sports, Science and Technology.

This program, involving smallsats and micro satellites, is also a program published from the revision of the chart in 2020, and it says that the government is aiming for rapid and agile development while maintaining dialogue between the public and private sectors toward public-private partnership. It is said that that the government will promote the basic technology that supports the digitalization of satellite systems and the digitalization of the satellite system development process, etc., itself.

On the other hand, and at the same time as advancing these government-led technological developments, as for the use of satellites for disaster countermeasures and national resilience, which is a major direction for Japan's space development activities, it is stated that by 2025 the government will build a joint observation satellite constellation that contributes to security and disaster prevention by combining a large government satellite with excellent high-resolution and wide-area observation and a small-sized satellite constellation with excellent observation frequency. Prime Minister Kishida also explained this at a press conference after the meeting at the National Space Policy Secretariat headquarters.

Considering the fact that private-sector space business carried out by billionaires in the U.S. and space development by the U.S. military are progressing very quickly, in Japan, while promoting private-sector space business, it seems that there is no choice but to focus on the development of space technology as led by the government. In Japan, where no private company has yet emerged as a huge player in the space business, and to keep up with the overwhelming speed of space development in the U.S. and even China, it has become clear that important technological development needs to be led by the government toward supporting the business of the private sector. The next important move will be to avoid technological development for the sake of such and to create an overall flow, such as in identifying who will use the important technology developed by the government and how to turn it into a private-sector business.

Editorial 02: Concerns regarding hundreds of thousands of satellites in "extreme" megaconstellations (Oishi)

Currently, megaconstellations such as Starlink and OneWeb are being deployed in orbit. According to International Telecommunication Union (ITU) filings, these megaconstellations are composed of 40,000 to 50,000 satellites, which is a tremendous number of satellites compared to past endeavors. On the other hand, in one filing, there is a super-megaconstellation composed of hundreds of thousands of satellites. It therefore goes without saying that these systems were a hot topic at WSBW in December. One filing instance that was the subject of specific discussion was the two constellations that the Rwandan government in Africa applied to the ITU for in September 2021, at a total of 327,230 satellites, along with one called "Aether," which was filed by Kepler from Canada, consisting of about 115,000 satellites.

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Speaking personally, the "paper satellite" problem that was once talked about came back to me in a bout of déjà vu. Although it is unlikely that such "extreme" megaconstellations will be realized, it is seen that the potential risks of a "decline and collapse of morals" and a "further increase in collision risk" would be associated with these filings.

・“Decline and collapse of morals ":
Normally, if a business is not well established, it will be naturally weeded out from the market; but, for example, I think there is the possibility that certain governments and institutions could take a strategy aimed at securing slots for the time being, disregarding the feasibility of a certain business. In the above-mentioned "paper satellite" problem, the presentation of due diligence information was stipulated as a countermeasure. On the other hand, for megaconstellations, milestone regulations* were set at the World Radiocommunication Conference held in 2019. However, for example, if you drop into a secured slot but with an inexpensive dummy satellite only for the purpose of securing slots, milestone regulations just become a way to talk the talk without walking the walk. There is no substance. This is what I mean by a decline and collapse of morals.
* 10% of a constellation after two years, 50% within five years, and full deployment within seven years

・"Further increase in collision risk":
When a particular system launches so as to reach the initial milestone, for example, with a system involving 300,000 satellites, 10% is equivalent to 30,000. Depending on the orbital altitude of the satellites, if the provider's business begins to fail on the way, etc., such a huge number of satellites could simply become debris.

From the above two risk perspectives, what is worrisome is the trends of China. Traditionally, Chinese constellations have been preceded by observation satellites, but now the construction of communications constellations is being strengthened. In the 14th Five-Year Plan (2021-2025) for new infrastructure construction released by China's National Development and Reform Commission in November 2021, satellite communication is being taken up as part of information infrastructure for a new era. In addition, China's "Star Network" satellite internet project is underway with the same tone. According to some reports (China News Weekly), international applications have already begun for this satellite internet program, and the number of satellites applied for under the name of "China Telecom Co., Ltd. Satellite Communications Branch" has exceeded 10,000. However, on the other hand, according to the same media outlet, China is aware that it has been late in acquiring frequencies, and it seems that calls for "frequencies and orbits being available at all costs" are being made. Under these circumstances, to secure a slot, first of all, while launching a satellite (or satellite-like craft) and gaining time, a very irrational strategy that is impossible for commercial business to carry out, such as solving technical problems and adjusting landing lights, etc., is seemingly being established.

In the discussions at World Satellite Business Week (mentioned in the next story), some attendees seemed to expect the need for penalties for bad behavior, the irrationality of filing including an extremely large number of satellites (from an economic point of view), and the suppression effect of landing lights. However, especially in the case of constellations, I feel that there is not much time left before it becomes too late, as development is accelerating.

Editorial 03: Regarding WSBW 2021 (Murakami)

World Satellite Business Week (WSBW) was held in Paris on December 13–16, just before Christmas, for the first time in a year. While the COVID-19 omicron variant was becoming prevalent just before, causing a difficult situation, and although overall attendance was at half of the attendance at the site compared to a usual year, the program was still able to cover all fields, from communications satellites to Earth observation, and it proved itself to be a valuable opportunity to learn about the latest business trends and the strategies of each company.

Here, we will report on the topic of satellite constellations and launch services, which are core systems and which have become a hot topic in recent years at WSBW, focusing on the outlook for 2022.

Regarding communications satellite constellations, there were sessions by SpaceX, Amazon, and OneWeb (which all develop smallsat constellations), along with sessions by SES and EutelSat (which provide services covering geostationary satellites all the way to smallsats). Up to now, startups have been in a period involving satellite deployment and initial business expansion, but with the start of 2022, it is now time to establish systems, realize performance, and launch second-generation satellites for services development. This is a hot topic. Although the geostationary satellite business will not expand significantly, it was made clear that this year's scale is necessary. And it seems that those involved in low-Earth-orbit constellations first develop business by specializing in providing widespread internet coverage. Even SpaceX, which is deploying Starlink, has said that geostationary satellites can be expected to be further developed as an extension of their business line so far.

Regarding launch services, SpaceX is expected to carry out 32 launches, a record high, and it has also become involved in providing services for manned mission, so it can be said that it is far ahead of other companies. 2022 is also a year for replacing launch craft. For example, it is now time to replace the H-IIA operated by MHI for the H3. Arianespace is also about to switch from the Ariane 5 to the Ariane 6, and ULA is about to switch from the Atlas V to the Vulcan. Due to the delay in the development of the Ariane 6, the launch of the first craft is expected to be in 2Q of 2022, and after the retirement of the Ariane 5, for which there are five craft remaining (in what would be the worst-case scenario), there are concerns that there could be a gap with the commercialization of Ariane 6. However, Arianespace chairman and CEO Stephane Israel said that such a situation is not likely. ULA is also due to see a delay in the development of the BE-4 engine, which will be supplied by Blue Origin. There was a hint that the launch of the first craft could be delayed into 2023. New Glenn's debut is also expected to be difficult in 2022.

SpaceX is also aware that future development could change significantly depending on whether Starship progresses as planned, and if there is a delay in the newly developed aircraft so far, it is expected that satellite operators might not be so keen to rely on SpaceX for a while. On the other hand, if the development of the new aircraft progresses and if a craft comes out that can be offered at a competitive price, I think that it could be possible to secure a considerable market share from the viewpoint of securing alternative means.

In that sense, next year, along with the success or failure of SpaceX's Starship plan, where will we see the early debut and reliable launch of new aircraft? Against that backdrop, I think we should keep an eye on launch service trends in 2022.

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

Satellite Business Network

	OldSpace, etc.	Mixed space, etc.	NewSpace, etc.
Satellites	■ Azercosmos and MEASAT agree on satellite service for Africa ■ AsiaSat and Turbidite sign partnership for satellite + ground-based connectivity ■ New Symphonie consortium involving EUROCONSULT, etc., wins concept study for the European Commission ■ "Galileo" European satellite positioning system now at 28 satellites ■ ViaSat participates in "Net Zero Space" initiative ■ Tianlian-2 02 satellite successfully launched with 2nd-gen data relay satellite system ■ Viasat's acquisition of Inmarsat proceeding smoothly ■ Oman's Omantel selects Hughes JUPITER™ system (Fig.1) ■ MAXAR secures launch window for first of WorldView Legion satellites ■ Pléiades Neo 4 satellite enters service without a hitch ■ Airbus and PASCO, Pléiades Neo embark on data partnership ■ SENER in Poland wins contract for Airbus' OneSat ejector mechanism ■ Intelsat gets approval to exit Chapter 11 in early 2022 ■ UAE and Bahrain jointly launch microsatellite toward the ISS ■ Inmarsat Orchestra hits first milestone in space with new Leo satellite ■ Ariane 5, NASA JWST launch success (Fig.2) ■ JWST deploys sunshield	■ Terran Orbital launches smallsat into orbit for EchoStar (Fig.4) ■ China's SAR satellite surge continues with new constellation plan ■ EC selects UN: IO consortium co-led by Mynaric for initial work on independent European satcom constellation ■ Rocket Lab to acquire SolAero Holdings ■ Iceye to provide satellite for MDA radar constellation ■ Honeywell and Skyloom to produce laser crosslinks for military and commercial satellites ■ Development of new CHORUS EO by MDA (Fig.5) ■ Airbus and OneWeb to expand partnership to support European defence and security forces ■ Satellite Vu orders first satellite from SSTL ■ Interoperability demo planned between DARPA's Blackjack and PredaSAR satellites ■ DARPA selects Mynaric as a next-gen optical terminal supplier	■ Anuvu raises $50M for small GEO mobility constellation (Fig.8) ■ Chinese operator ADA Space raises $55.6M ■ India suspends Starlink pre-sales until regulatory approval ■ Spire Global completes acquisition of exactEarth ■ Fleet Space develops and launches the world's first all-3D-printed smallsat constellation (Fig.9) ■ Andesat and Astranis sign landmark 2-satellite agreement to expand broadband access in Peru ■ Tomorrow.io builds meteorological constellation through SPAC (Fig.10) ■ Fleet Space Technologies to build satellite "hyper factory" ■ Planet shares begin trading on New York Stock Exchange (Fig.11) ■ BlackSky realizes the world's highest revisit for a satellite constellation ■ BlackSky to begin transition to higher-resolution imaging satellites in 2023 ■ Albedo wins license to sell 10-centimeter imagery (Fig.12) ■ No decision yet on where to build OneWeb second-generation satellites ■ Astranis unveils insurance package for Falcon Heavy launch ■ Satellogic nearing completion of SPAC merger ■ Kepler plots relay network to serve thousands of satellite terminals
Launches	■ Arianespace expands Galileo constellation to 28 units ■ China's second failure when launching the Kuaizhou No.1 series rocket ■ China's number of space launches in one year (55 launches) makes it best in the world	■ SpaceX launches Turkey's Turksat 5B communications satellite ■ Arianespace concludes 2021 with OneWeb launch	■ Rocket Lab updates Neutron rocket design (Fig.13) ■ SpaceX breaks annual launch record, deploys 48 more Starlink satellites ■ New launch vehicle faces schedule pressure ■ Falcon 9 sets reuse milestone with Starlink launch
Others	■ DARPA to launch DoD's first in-space manufacturing research program (Fig.3) ■ NASA postpones space walk on ISS due to debris ■ White House announces space priority framework ■ Chinese, European Mars probes complete in-orbit relay communication test ■ Changes ahead for Space Force procurement organizations ■ ESA spurs 5G digital connectivity ■ International Space Station forced to swerve to avoid debris generated 25 years ago ■ India and Russia agree to strengthen space cooperation ■ Parsons to develop ground operations center for DARPA's Blackjack satellites ■ Japanese billionaire Maezawa returns to Earth after 12-day ISS mission with two others ■ U.S. Defense Innovation Unit selects Maxar to produce robotic arms for on-orbit servicing	■ NASA funds three companies to develop commercial space stations (Fig.6) ■ Three startups win prize money from U.S. Space Force accelerator ■ BAE Systems to supply space-qualified microchips for DoD ■ Third consortium gets UK funds to study potential deorbit mission ■ Addition of Airbus imagery and elevation data now in Microsoft's Azure maps ■ Federation of German Industries launches "New Space" initiative ■ First commercial lunar distance communications network validated in space ■ CesiumAstro accelerates active phased-array payload development for lunar exploration, connectivity, and sensing (Fig.7) ■ China's space station maneuvered to avoid Starlink satellites	■ Airbus Ventures leads financing round with quantum sensors ■ Kymeta plans to release OneWeb terminal next summer ■ Details on the ambitious space development plan announced by China at the China Commercial Aerospace Forum in Wuhan (Fig.14)
Japan	■ Ministry of Economy, Trade and Industry promotes satellite data utilization, analysis tool development ■ JAXA satellites: Large-capacity data transmission with high efficiency (Fig.15) ■ Hayabusa 2 samples: Announcement that will rewrite history coming next spring (Fig.16) ■ H2A rocket No. 45 succeeds in launch, British communications satellite separated	■ Lunar rover jointly developed by Nissan and JAXA (Fig.17) ■ Komatsu selected for space development project by Ministry of Land, Infrastructure, Transport and Tourism involving a lunar construction machine ■ QPS Research Institute and SKY Perfect JSAT, etc., to receive 3.8 billion yen from 8 companies for funding ■ Announcement of Asia's first horizontal-launch spaceport in Oita Prefecture as a new promotion for Oita City and its "Space Noonsen Prefecture Oita" campaign (Fig.18) ■ MFM and NEC carry out demo for utilization of satellite imagery/AI utilization in farming support	■ Space BD: SpaceX "Falcon 9" aces maiden flight, launches satellites services ■ ElevationSpace: Making space a convenient place for experiments, with a satellite and base concept, a startup beginning with 1M yen (Fig.19) ■ Space BD raises about 1B yen toward expanding space transportation, such as for SpaceX rocket procurement ■ Synspective signs launch contract with Rocket Lab ■ JICA and Synspective: SAR satellite data detects new subsidence risks and ground movements in Guatemala ■ Rakuten Mobile and the University of Tokyo begin joint R&D into IoT satellite communications ■ Interstellar Technologies raises 1.77B yen in Series-D funding ■ Tokio Marine & Nichido collaborates with volunteer groups to provide disaster information ■ Hokkaido Economic Federation, "Hokkaido Spaceport" action plan (Fig.20)

From around the world

OldSpace, etc.

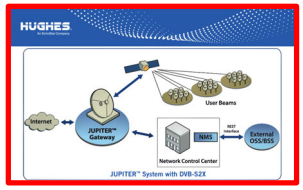

Fig.1: Hughes' JUPITER™ system

Fig.2: JWST, as seen from the top of Ariane 5 after separation (Credit: Arianespace)

Fig.3: DARPA's Biotechnology Office launches new program: B-SURE

Mixed space, etc.

Fig.4: Terran Orbital announces launch of EchoStar Global 3 smallsat into final orbit

Fig.5: MDA and ICEYE sign an agreement on CHORUS, MDA's next-generation commercial EO mission, with ICEYE supplying X-band SAR satellites

Fig.6: Image of Northrop Grumman's proposed space station in orbit (Credit: Northrop Grumman)

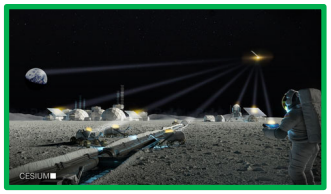

Fig.7: CesiumAstro's next-generation Nightingale active phased-array antenna, enabling communications and sensing for the Moon and for Moon-Earth orbits (Source: CesiumAstro)

NewSpace, etc.

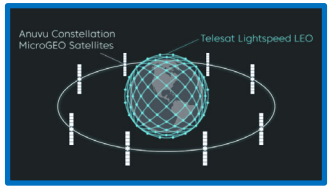

Fig.8: Anuvu states LEO satellite to be supported by a small GEO satellite with a target beam; will provide most of the connectivity for this in the future. (Credit: Anuvu)

Fig.9: Fleet Space Technologies announces future strategy based on its "Alpha" 3D-printed smallsate constellation, with the first machine to be launched within 12 months

Fig.10: Tomorrow.io to monitor the world's weather via dozens of mini-refrigerator-sized satellites; launches scheduled to start in 2022 (Credit: Tomorrow.io)

Fig.11: Planet rings the opening bell at the New York Stock Exchange (Credit: NYSE screenshot)

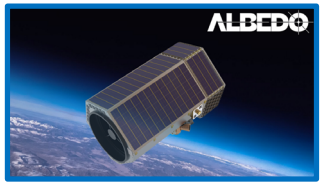

Fig.12: Albedo to collect images at 10 cm per pixel via its LEO (Credit: Albedo)

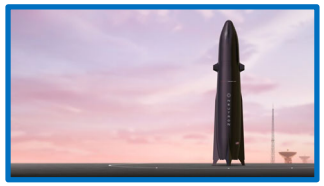

Fig.13: Rocket Lab: Proprietary Neutron rocket allows for rapid reuse and is cost-competitive compared to other medium-class rockets (Credit: Rocket Lab)

Fig.14: Rocket for space travel ("bullet flight") planned by iSpace,* i.e., the "Hyperbora-3" (at left), plus a spacecraft (Credit: iSpace)
* A Chinese aerospace venture company based in Beijing (different from the Japanese space development venture firm known as "ispace"

From Japan

Fig.15: Appearance of the Development Model of the Satellite MIMO Technology Demonstration Communication Device (LEOMI-TRX)

Fig.16: Sample from the "Ryugu" asteroid (provided by JAXA) that will lead to "a great discovery that rewrites the science of meteorites" (Sankei Digital Co., Ltd.)

Fig.17: Lunar rover jointly developed by Nissan and JAXA

Fig.18: Announcement of Asia's first horizontal-launch spaceport in Oita Prefecture as a new promotion for Oita City and its "Space Noonsen Prefecture Oita" campaign

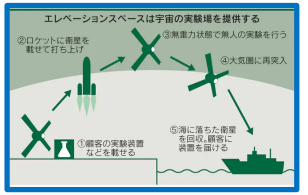

Fig.19: ElevationSpace: Space experiment site concept; expecting launch of a demonstration machine in 2023, aiming for commercialization in 2026

Fig.20: Image of the Hokkaido Spaceport, featuring a vertical rocket launch pad, a runway to and from for space vehicles, and space for a group of companies in Japan's space version of "Silicon Valley," at the back (Credit: Space Cotan)