

Space Business Monthly News

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Editorial 01: SAR customers coming into view (Kuzuoka)

Last October, I wrote an editorial in *Space Business Monthly News* titled, "Where can you find new customers?" Well, the world's largest customers of high-resolution commercial optical imagery are the U.S. National Geospatial-Intelligence Agency (NGA)/National Reconnaissance Office (NRO), but in commercial SAR, at that level, the NRO/NGA have not engaged in any making contracts just yet, so we have been wondering who the customers will be.

However, customers are now starting to show. Let's take PredaSAR, which is a company that is not well known in Japan, as an example. PredaSAR was originally established in 2019 as a subsidiary of Terran Orbital, which is a nanosatellite manufacturer, and plans to construct a 48-machine C-/X-band SAR satellite constellation. Mr. Marc Bell, chairman of PredaSAR, is also the chairman/CEO of Terran Orbital. Meanwhile, Tyvak, a smallsat manufacturer closely related to Lockheed Martin, is also a subsidiary of Terran Orbital.

Now, this PredaSAR has announced a \$2 million contract from the U.S. Air Force last December. The agreement will include a laser terminal for confirming interoperability for the BlackJack constellation developed by the Defense Advanced Research Projects Agency (DARPA) and will experiment with intersatellite optical communications between BlackJack and PredaSAR. Given that BlackJack is a pioneer of the Space Development Agency (SDA), PredaSAR is considered to have been firmly positioned in the U.S. military's operational protocols.

Furthermore, on January 20 this year, NRO, the main SAR customer, finally embarked on a large contract, and PredaSAR was also selected. At present, the contract amount has not been announced, and it is not a long-term procurement contract such as would be expected for an optical satellite, but there is no doubt that the expectations of SAR companies are gathering as the first step toward large-scale procurement. This contract is under the contractual framework of Broad Agency Announcement (BAA), and Airbus U.S., Capella Space, ICEYE U.S., PredaSAR, and Umbra were selected three months ago when a proposal request for commercial SAR was made. BAA is a data procurement technique that can be used for NRO R&D, and it is a mechanism that enables quick and flexible data procurement by verifying image quality and future availability. In fact, in this BAA, modeling and simulation will be carried out for six months, and end-to-end mission performance demonstration and verification is to be carried out in orbit for 24 months. In the case of PredaSAR, combined with the inter-satellite data transmission link that was previously connected to the U.S. Air Force, a mechanism is steadily being prepared for use as a U.S. national protocol.

PredaSAR's Mr. Marc Bell told the media that, for getting started with PredaSAR, he went to the customer side so as to inquire what was needed/desired, and after listening carefully to that, their satellite was created. As a result, he has developed a SAR satellite for national security and has welcomed many veterans to his management and technological teams. In the case of Earth observation satellites, especially SAR, it seems that customers will still consist of national security organizations.

Editorial 02: Successive Starlink pre-sale suspension orders (Oishi)

This month, the Pakistani government ordered SpaceX to halt the pre-sale of Starlink satellite services. This follows a similar order by the government of India last November.

According to media reports, in both countries the order is due to a lack of regulatory approval for the service, thus causing the government of India to order SpaceX to refund all pre-orders for the domestic Starlink service.

From the viewpoint of consumer protection, the measures taken by both countries seem to be appropriate. However, in a series of media reports, what I could not understand was that, in both India and Pakistan, SpaceX has not applied (i.e., an application for landing rights permission; see the footnote) to the government for service approval. The truth of this reporting cannot be confirmed directly, but it is believed to be the case that the former India representative for SpaceX, Mr. Sanjay Bhargava, mentioned this situation in a LinkedIn post.

Previously, when I was speaking with an overseas global services satellite operator, it was assumed that one of the most-difficult matters in starting such a service is the coordination of landing rights in each country, and the need for special know-how was emphasized. Bhargava did say that the government approval process is complicated.

In particular, for landing rights acquisition, it seems that such approvals will take more time and effort, when targeting Asian countries where the protection of domestic business still holds strong.

Of course, it is assumed that SpaceX also has a legal team in place that can understand the circumstances of the company, so even if it is unavoidable that regulatory approval is not obtained, and at the stage when the satellite's orbital deployment has progressed to this point, personally I find it hard to believe that the application itself has not yet been submitted. Alternatively, based on the track record of acquiring reservations through pre-sales, should we consider that a strategy is being employed against regulatory agencies that is akin to "raiding a castle from outside the moat" (somewhat of a siege)? Meanwhile, OneWeb, funded by India's Bharti Global, is seeking regulatory approval via a partnership with a local partner in India.

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All that aside, at present, there are about 2,000 Starlink satellites in orbit, but the numbers alone do not give us the full view. I recently found a link like the one below that shows how it looks live, so it's worth a look. (Note: This link isn't managed by SpaceX; it's just for reference.) [Live Starlink Satellite and Coverage Map \(satellitemap.space\)](https://satellitemap.space)

The appearance of the satellites in orbit as seen via this link is kind of overwhelming; but considering that the total radius of the first generation is 4,000, which is double the number just mentioned (2,000), and with the existence of other megaconstellations, the space debris problem is a concern once again. At the same time, for SpaceX as well, when it comes to having so many assets in orbit, I feel that coordination with the above-mentioned regulatory agencies will get crazy in the future.

Landing rights can be considered the final test that causes the survival of a megaconstellation to hang by a thread, so, in the future, it seems that the major challenge will be shifting from "ensuring technical coverage (i.e., the in-orbit deployment of satellites and the confirmation of performance)" to "ensuring business coverage (i.e., the acquisition of landing rights, etc.)." We are thus paying attention to what shape this world will take in the future.

Footnote: Whether there is a unified definition for "landing rights" is not fully clear, but in general, satellite landing rights are understood to be, according to each country, approved by the regulatory agency of the country where the spectral and orbital resources are used so as to provide satellite communications services and satellite capacity. Against that backdrop, the approval of such rights is to be determined based on a technical and regulatory analysis of the application and the application documents.

Editorial 03: Regarding the US Biden administration (Murakami)

It has been a year since the Biden administration was inaugurated in January 2021. The administration began amid an unusual situation in which the U.S. Capitol Building was being occupied and the storm of the COVID-19 pandemic raged on. Against that backdrop, I have summarized the trends in the space policy of the Biden administration over the past year. NASA Administrator Bill Nelson said that the year saw some great results. Even if I can't say that's true, I think the results clear a passing score.

U.S. space policy changes every time the government changes. This time, it was promised to continue developing the lunar plan that the previous administration had unexpectedly promoted. But on the other hand, NASA and related ministries and agencies are working to increase the global environmental budget in order to respond to the environmental issues that the administration has taken up as priority issues. In addition, in order to respond to the enhancement of education, which is another priority issue, the administration has significantly increased its budget and increased opportunities for internships at NASA. Also, the National Space Council was started, and the framework was revised so that the U.S. Department of Education and U.S. Department of Labor could participate, so that a wide range of opinions could be reflected in space policy. I feel that it was good to take the method of adding priorities as an administration with the understanding that the business of space needs to be tackled from a long-term perspective over many years.

On the other hand, internationally, with increased tensions between Russia and Ukraine, Russia's anti-satellite missile experiments, and security issues with China becoming escalated, the topic of security in space is becoming more and more important. It has become clear that the United States, which should have maintained its leading status in space, has come to realize that the world of space above us is vulnerable, and it has already lost pace to China in some fields. As a realization, no one could have imagined that the threat of China would be so great.

However, who maintains superiority or inferiority in space in terms of security is not something that plays out in the super short term—it's something that is realized through investment in ranges of 10–20 years. With that, it is believed that continuous investment and strategy are essential. Fortunately, industry in the U.S. has been retaining its technological advantage in the domains of autonomous driving and DX.

With SpaceX completely redefining space transportation systems, and with a world already hyper-connected via the internet, some companies are trying to realize the grand dream of making autonomous driving in electric vehicles a reality. For example, some venture companies are developing services using smallsats as a business model and are working on the sophistication of services using AI.

From the perspective of security, it is important to promote technological innovation and make it economically solid. I feel that it is necessary to promote space development through strong companies such as GAFA, rather than thinking that GAFA would create a restrictive environment if they become too big.

Finally, amid a politically difficult environment, the Biden administration decided to continue the International Space Station program up to 2030. And even though relations with Russia are tense, I think it is desirable to be able to do business with Russia in space and to continue mutual dialogue.

2022年1月 Space Business-related Topics by Business Position/Market Field

Satellites

OldSpace, etc.

- Hughes India and Bharti Airtel for JV to supply BB services
- Order increase for Gilat VSATs for Japanese Tier-1 mobile NW carrier
- Thales receives two orders for INTELSAT-41 and INTELSAT-44 (Fig.1)
- China megaconstellation project establishes satellite cluster in Chongqing
- DOD detects hypersonic weapons and reveals satellite network construction plan
- Chinese satellite in close encounter with Russian ASAT debris: state media
- Maximum resolution at 0.5m for China's high-res multi-mode satellite starts up
- 2nd-generation COSMO-SkyMed satellite ready for launch
- For internet in Africa: Intersat selects KONNECT
- CACI ramps up production of LEO luminous terminals

Launches

- Design mistake revealed as cause of failure for new Korean rocket debut
- China Aerospace Science and Technology Group plans launch of 40+ space missions this year
- Upper stage of Angara rocket re-enters after failed launch
- Arianespace plans launch of 8 new Galileo satellites
- China's number of space launches highest in the world in 2021
- China's space business: Successful in launch at beginning of 2022
- ULA launches 2 space surveillance satellites for US Space Force
- FTC blocks acquisition of Aerojet Rocketdyne by LM
- SpaceX rocket left behind in space to collide with Moon

Others

- White House commits to extension of ISS
- S. Korean army newly establishes "Military Space Branch"
- JWST telescope deployment successfully completed (Fig.2)
- US warned about delay in orbital junk removal (Fig.3)
- Airbus to develop Gateway module power management, etc. (Fig.4)
- Successful dislocation test using robot arm on China's space station
- ISS connects via the Airbus' SpaceDataHighway
- Space Norway restores redundancy for Svalbard ground station
- HGC supports Kacific's high-speed local BB throughout Southeast Asia
- Comtech rejects \$790B takeover offer
- China's Shijian-21 satellite docks with/tows abandoned satellite
- Toward fostering new space-base economic formats: China and space travel

Japan

- First in Japan: Space-focused course at a public high school in Wakayama prefecture, to be newly established in 2024
- Postponement of launch of new flagship H3 rocket, development uncertain (Fig.14)
- Four companies of Airbus, NTT, DOCOMO, and SKY Perfect JSAT conclude MoU for jointly studying the early commercialization of High-Altitude Platform Stations (HAPS) (Fig.15).
- H3 test rocket no.1 not to be launched in FY2021
- JSATmarine introduced to the "Kizuna"—a cable-laying ship
- Mitsubishi Electric develops world's smallest antenna for satellite-based positioning terminal (Fig.16)

Mixed space, etc.

- HawkEye 360 awarded \$15.5M AFRL contract (Fig.5)
- Loft Orbital signs manufacturing contract with Airbus for 15 Arrow satellite platforms (Fig.6)
- OHB, LuxSpace, and OQ Technology sign MOU for IoT services
- OneWeb and Hughes agree to supply broadband communications for India

- SpaceX signs \$120M contract with US Air Force for point-to-point space transportation technology demonstration

- Advanced Robotics Foundation to demonstrate new logistics drone next month; crossing Tokyo Bay, controlled by a quasi-zenith satellite
- AMH Philippines and Synspecive conclude MoU, aiming to utilize SAR satellite data for geohazard mitigation projects in the Philippines

NewSpace, etc.

- Starlink representative resigns as SpaceX refunds pre-orders
- Loft Orbital orders more LeoStella satellite buses (Fig.7)
- Leidos signs on as HawkEye 360 investor and strategic partner
- SpaceX kicks off 2022 with Starlink launch
- Astroscale U.S. and Orbit Fab sign first on-orbit satellite fuel sale agreement (Fig.8)
- Multi-orbital constellation startup Mangata Networks raises \$33M (Fig.9)
- Kepler deploys 4 GEN1 smallsats to constellation
- ICEYE expands world's largest SAR satellite constellation, launches first US-manufactured satellite (Fig.10)
- SpaceChain launches blockchain payload for 6th time
- Bluestaq gets new investor to fund growth in defense and space data management (Fig. 11)
- SpaceX launches 2,000th Starlink satellite
- Pakistan suspends Starlink pre-orders, following India
- Rocket Lab completes acquisition of SolAero Holdings
- EO firm Satellogic acquires millions in investment + goes public
- Capella Space and ICEYE win SAR satellite capability demonstration contract from NRO
- OneWeb builds distribution partnership in India
- Xplore contracts with Orb Astro for bus procurement for various missions
- Satellogic completes SPAC merger

- SpaceX, 2nd generation Starlink to be by Starship
- SpaceX launches third ride share mission for smallsats
- Virgin Orbit launches 7 CubeSats in 3rd mission
- ABL Space Systems rocket destroyed in accident in second stage during test
- Blue Origin acquires Honeybee Robotics

- Atomos Space secures funds for space tug development (Fig.12)
- Radian Aerospace emerges from stealth mode (Fig.13)
- OMEGA participates in space debris removal mission
- Phase Four, Orbit Fab, Maxwell collab for engine refueling efforts

- Space Shift adopted by Microsoft's "Microsoft for Startups" startup support program (Fig.17)
- Sony putting camera in orbit for photographers (Fig.18)
- Astroscale pauses debris-removal demo following anomaly
- ispace "Mission 1" lunar lander scheduled for launch at end of 2022
- Axelspace business: Announces new "AxelGlobe" product lineup
- Mitsubishi UFJ also considers JPY10B loan fund for space industry

(Reference: Conferences held in February)



OldSpace, etc.



Fig.1: Intelsat 41 and Intelsat 44 are based on the Space Inspire platform (INstant SSpace In-orbit REconfiguration)

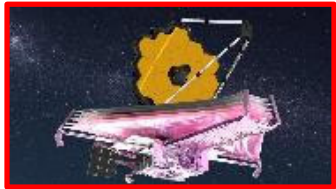


Fig.2: JWST sunshield tensioning is a major step in the deployment of space telescopes. (Photo credit: NASA GSFC/CIL/Adriana Manrique Gutierrez)



Fig.3: Conceptual view of LeoLabs' space radar in Western Australia (Photo credit: LeoLabs)



Fig.4: Airbus affiliate Airbus Crisa concludes an existing contract with Northrop Grumman for power management and distribution systems for HALO.

Mixed space, etc.



Fig.5: The HawkEye 360 satellite launched in December 2020 is significantly larger than the older model and includes processor updates and a larger solar array for increased onboard power for multiple simultaneous signal acquisition. (Photo credit: HawkEye 360)



Fig.6: Airbus has signed a supply contract with space startup Loft Orbital for more than 15 satellite platforms derived from the Arrow platform, which is the basic satellite platform of the OneWeb constellation.

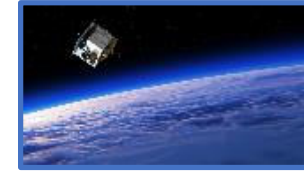


Fig.7: Image of a satellite in orbit using Leo Stella bus systems (Photo credit: Loft Orbital)



Fig.8: US Orbit Fab announces a commercial contract to refuel Astroscale's Life Extension In-Orbit (LEXI™) Servicer in geostationary orbit (GEO). LEXI is the first satellite to sign a refueling contract with Orbit Fab.



Fig.9: Mangata plans a network of 791 communications satellites across medium-altitude and highly elliptical orbits. (Photo credit: Mangata NW)

NewSpace, etc.



Fig.10: Image of ICEYE's SAR smallsat in orbit (Photo credit: ICEYE)



Fig.11: Bluestaq integrated data library overview (Photo credit: Bluestaq)



Fig.12: In-orbit image of the Quark OTV scheduled to be deployed by Atomos Space in 2023 (Photo credit: Atomos Space)



Fig.18: Conceptual image of Sony's 6U CubeSat; the satellite houses one of the full-frame cameras. (Photo credit: Sony)



Fig.13: Image of a completely reusable horizontal-takeoff-&-landing aircraft by Radian Aerospace



Fig.14: H3 rocket no.1, the overall appearance of which was first released March last year, seen here at Tanegashima Space Center in Kagoshima Prefecture

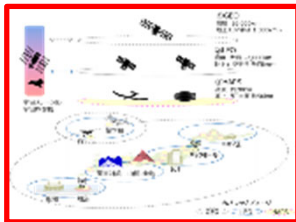


Fig.15: Overview of providing communications services via satellite/HAPS

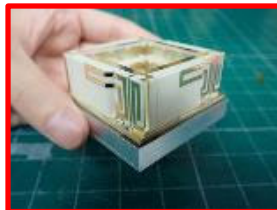


Fig.16: Prototype antenna for satellite positioning terminals (Source: Mitsubishi Electric)



Fig.17: Space Shift has been adopted by Microsoft's "Microsoft for Startups" for the development of algorithms related to AI analysis of satellite data, utilizing the cloud platform "Azure" provided by Microsoft.