

Space Business Monthly News

April 30, 2022, Satellite Business Network Co., Ltd.

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Editorial 01: A Report on Participation at GEOINT2022 (Kuzuoka)

I attended the GEOINT 2022 Symposium. A report on our participation will be issued separately.

Editorial 02: Amid Ukraine crisis, toward China's national megaconstellation PJT project (Oishi)

Development and expansion of production capacity for smallsat constellations

In the provision of communications services to Ukrainian war-torn areas via SpaceX's Starlink, the usefulness of megaconstellation functions for the front lines of the battlefields was once again recognized by the U.S. Space Force and others.

On the other hand, despite being captivated by the issues of Ukraine, China is steadily moving toward becoming a space powerhouse, evidenced by its construction of a megaconstellation for broadband (BB) communications, scheduled to consist of 13,000 units.

Especially, since last year, there have been conspicuous movements to improve and expand the production capacity of smallsats, such as in the operation of the smart production lines necessary for realizing megaconstellations (see table below, organized by the author based on news reports from *Xinhua News Agency*). In addition, last month, several BB communications constellation test satellites (190 kg, data speed 40 Gbps) were launched.

Location	Smallsat mass production facility description, etc.	Production capacity	Status	Notes
Wuhan City, Hubei Province	China's first smallsat smart production line at a national astronomical (space) production base/satellite industry park	240 units per year (smallsats at 1 ton or less)	Shifted to the mass production stage from last year	Possible for smart manufacturing technology to improve the production efficiency of smallsats by 40% or more
Tianjin Province	New facility that belongs to the China Association for Science and Technology (CAST)	More than 200 per year	Production testing in progress	Might be possible to use the Guowang constellation to create the national plan

A long time ago, when I visited the China Association for Science and Technology (CAST) in Beijing, the president of a smallsat company under their umbrella relayed to me the following simple framework: "Parts and materials are brought in from the entrance of the satellite factory, and mass-produced satellites come out from the exit." So, in order to achieve the constellations that China is aiming for, production capacity needs to be further increased, and so, at present, that original framework is now being realized on a grand scale.

In addition, in China, the field of launch services was opened up to the private sector in 2014, but with the national megaconstellation project as a catalyst, in addition to increasing satellite production capacity, investment in multiple, domestic, small launch vehicle companies, etc., is increasing, and access to space is being improved on and expanded.



Part of Wuhan City's smallsat smart production line (May 2021) (Photo: Xinhua News Agency)

Movements to strengthen cooperation, including the integration of Russian communications satellites into Chinese constellations

China remained silent during Russia's ASAT test last November, and, as of yet, any condemnation of Russia's ongoing invasion of Ukraine seems to be pending. However, this month, as a trend that might be relevant to Japan and its domestic security, China has completed its first ocean surveillance and observation satellite network. (Source: *People's Daily*)

Meanwhile, just a few days ago, the possibility of integrating Russian communications satellites into China's constellations was reported via multiple media outlets (*Satellite News Digest*, etc.). According to reports, the head of the Russian space agency revealed that: "We will integrate Russian communications satellites into Chinese constellations so as to develop constellations primed for surveillance and communications." If such a plan is realized, the confrontational nature of the relationship between China & Russia and the West in terms of space will become even more in sharper relief.

As mentioned above, the effectiveness of megaconstellations in the military domain has been demonstrated via Starlink, but unlike the commercial megaconstellations developed by the West, because China's megaconstellation is a national project, basically no verification of business models is required. Against the backdrop of cooperation with Russia as mentioned above, from a security perspective, we are interested to continue watching China's movements toward building megaconstellations.

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Editorial 03: Regarding the 37th Space Symposium (Murakami)

I'd like to report that, this year, I participated in the 37th Space Symposium event. The 36th Space Symposium was held mainly online in August last year after being postponed repeatedly due to the effects of COVID-19. Against that backdrop, this was the first time in two years that the event saw over 10,000 people, and I am so glad that the event could return to normal, as it is very helpful for understanding the trends of the U.S. military and the trends of each company over there.

For this article, we take a look at the companies that impressed us the most at this year's event, along with looking at their trends.

What surprised everyone this time was the Lockheed Martin exhibition. Lockheed secured a massive space at the best position near the entrance and exhibited everything from low orbital modules to satellites and defense systems, also allowing employees to come to the stage for discussion one after another. The discussions covered topics such as AI efforts, exploration, and defense, and, for me, I felt the complete value of the symposium simply just by being there for it all. The number of meeting spaces was substantial, as per usual, and the vibrant blue of the Lockheed Martin space really stood out.

Conversely, Raytheon's area was all red. Raytheon is centered on defense, and its involvement in space is related only to satellite sensors. Also, in the past, its involvement at Space Symposium has been limited. However, in recent years, due to its acquisition of space-related companies and the expansion of its Space Development Agency (SDA)-related operations such as in being involved in the DARPA Blackjack program, the space that they decided to take up expanded significantly. Their space was located across from one of the blue Lockheed Martin booths and was always full of people. Hosting a reception on the first day, I felt that an extraordinary amount of effort went into their presence there. Raytheon officials jokingly said that next year the meeting spaces will take up the entire area akin to making it all a whole street named "Raytheon Street"—all in red. Raytheon has acquired a number of space companies, keeping all of them intact regarding their name. In meeting with companies, Raytheon's intention seemed to be for people to hang out on the "red street" by day and attend Raytheon receptions at night.

On the other hand, SpaceX withdrew from exhibiting this year, so conference meeting spaces did seem to be less. Previously, for the purpose of strengthening relations with the U.S. military, SpaceX executives were present and hosted receptions, but I am surprised at the change. Given that sales have been made and work ordered, it seems that SpaceX found it sufficient only to send a small number of people and to carry out activities there only for the purpose of strengthening some relationships.

Also, Blue Origin had a unique initiative. They rented a nearby private residence and used it for meetings.

Meetings held at hotel meeting rooms or in open spaces of some type is efficient, but securing meeting

rooms comes with a price tag. In comparison, if you rent a whole house of some kind, conversations can be more relaxed, at lower cost.

Lastly, Euroconsult organized half-day exploratory sessions focusing the relationship between AI and space.

Overall, many people, including speakers from Japan, participated, due to themes that matched the season. As such activities will continue from next year onward, I hope to continue to participate.

Introduction of events hosted by Euroconsult:

- ASBW: June 1–3, Singapore

- WSBW: September 12–16, Paris

→ For inquiries regarding both events, please contact Mr. Oishi.

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April 2022 Space Business-related Topics by Business Position/Market Field

OldSpace, etc.

Mixed space, etc.

NewSpace, etc.

Satellites

- Telesat coordinates polar satellite design to tackle supply issues
- Lockheed Martin releases open-source satellite interface for on-orbit docking (Fig.1)
- Telesat acquires security clearance to serve US government directly
- Number of monthly calls of Beidou's high-precision space-time service exceeds 100 billion
- China completes formation of first ocean satellite network for surveillance and observation
- Satellites to test fly new cyber software
- Lockheed Martin proposes multi-layer space network for missile defense
- Russia: Possibility of integrating its communication satellites with China's constellations
- Arabsat orders first fully software-defined satellite (Fig.2)

- Millennium works with Boeing to address smallsat demand (Fig.3)
- New Chinese smallsat manufacturing capacity: Could have international impact
- Thales Alenia Space and AIKO team up to develop advanced software for space applications
- NASA selects six companies to demonstrate commercial successors to TDRS (Fig. 4)

- Starlink launches service in the Philippines as a ladder into Southeast Asia
- Millennium prepares for mass production of smallsats
- York Space to triple satellite production to meet military and commercial demand
- AAC Clyde Space's ESA funding enables development of AI capability
- French court revokes SpaceX's Starlink internet license
- BlackSky looks to expand military business
- E-Space sheds light on SDGs
- Astranis adds additional life to small GEO satellite design
- Astra wins order for electric thrusters from LeoStella
- Kepler validates intersatellite data relay terminal (Fig.9)
- Capella unveils automated tasking products (Fig.10)
- Astranis eyes U.S. military customers for its small GEO satellites
- Kymeta and OneWeb collaborate on BB connectivity for US government
- PredaSAR nears first launch of its radar imaging constellation in October
- SpaceX launch moves forward with 53 more Starlink satellites into orbit, total number reaching 2,388

Launches

- Successful first launch of China's "Long March 6A" (improved) solid fuel rocket
- ULA orders 116 Aerojet Rocketdyne engines
- NASA halts third SLS countdown rehearsal

- Amazon signs multibillion-dollar Project Kuiper launch contracts (Fig.5)
- First UK orbital launch from Space Cornwall: Catapult's Amber-1
- South Korea hires SpaceX to launch spy satellites by 2025
- SpaceX launches US National Reconnaissance Office mission NROL-85
- OneWeb signs contract to launch satellites from India in 2022

- SpaceX launches fourth dedicated rideshare mission
- Rocket Lab launches BlackSky satellites as it prepares for mid-air booster recovery
- Astranis launches ultra-compact GEO sat via SpaceX's Falcon 9
- Rocket Lab launches with HawkEye 360 for satellites in the first Wallops Electron mission
- Chinese reusable rocket startup secures new funding round

Others

- Northrop Grumman weighing options for new Artemis lunar lander
- SES to work with NorthStar on space situational awareness
- War in Ukraine emphasizes need for missile defense upgrades
- Speedcast sees shortage of satellite capacity ahead
- U.S. Space Force to enhance cybersecurity as threats proliferate
- Antonov shortage threatens delivery, delays for big satellites
- Boeing expands cloud partnerships to accelerate digitization
- Lockheed Martin signs SIAT license agreement with NEC for use in space programs
- White House releases in-space servicing strategy
- Opening of Space Safety Centre as a new base for ESA space weather forecasting
- UAE partners with NASA on Mars missions to boost scientific collaboration
- ESA ends cooperation with Russia for lunar missions
- China eyes next-generation manned carrier rocket/spaceship with 7 passengers
- US commits to banning anti-satellite missile tests citing satellite debris and danger to astronauts
- China's "Tianzhou 3" space cargo ship carries out turning flight and docking, etc.
- South Korea: Double-digit space budget boost
- China to conduct asteroid deflection test by around 2025
- China to build communications and navigation constellation around the Moon

- Ball Aerospace + Microsoft Azure to explore on-orbit computing
- New SEC rules: Could undermine SPAC activity
- Private company to offer full-scale "hotel in space" via space station (Fig.6)
- Astrobotic lunar lander on track for late-2022 launch (Fig.7)
- First all-civilian crew of 4 launched on "Ax-1" mission to ISS return safely to Earth (Fig. 8)

- Axiom Space and Mitsui & Co., Ltd. announce Japan-based joint venture
- Astroscale U.S. and Orbit Fab sign first on-orbit satellite fuel sales agreement (Fig. 11)

Japan

- Operations begin for successor to "MICHIBIKI" as the first quasi-zenith satellite
- IPS and SKY Perfect JSAT supply satellite BB to the Philippines (Fig.12)
- Fujitsu builds orbital space debris analysis system
- JAXA astronaut recruiting for 2021: 4,127 applicants!
- New JP government strategy: Utilization of AI for emergency response
- First order received for launch of private satellites via the Epsilon No. 6 rocket
- SKY Perfect JSAT introduces high-speed internet environment to cruise ships
- NTT and SKY Perfect JSAT form new company for building space data center

- Leading orbital technology: Continued contracts for R&D for Astroscale received from Japan's Ministry of Economy, Trade and Industry
- Demonstration of odor removal technology on the ISS: Photocatalytic air purification equipment developed by Japanese private sector and academia goes to the space station (Fig.13)
- NTT demos world's first aluminum nitride field effect transistor as a road to high-temperature, high-voltage power semiconductors
- NEC SOL develops high-precision satellite positioning software, utilization of corrective information for the "MICHIBIKI" quasi-zenith satellite system

- Space Walker raises millions for composite spaceplane, business development (Fig.14)
- Meiko Denshi develops GNSS module with integrated antenna
- ArkEdge Space raises \$18.7M for nanosat
- Mitsui Sumitomo Insurance unifies information for disaster prevention support system development
- Astroscale to restart debris-removal demo with half the thrusters
- Astroscale pauses Elsa-d retrieval mission after detecting spacecraft anomaly
- Warpspace aims at US market (Fig.15)
- Mikasa IST/rocket development program underway via 4 companies
- Tokio Marine & Nichido announces "Lunar Insurance" (Fig.16)
- Japan's ispace negotiating first commercial Moon landing insurance
- Kindai University's "SpaceTuna1" to be launched within the year

OldSpace, etc.

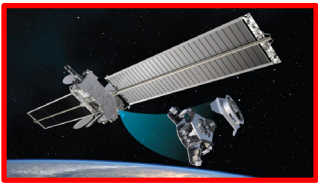


Fig.1: Conceptual image of Lockheed Martin's in-orbit docking station for satellite services (Credit: Lockheed Martin)



Fig.3: Conceptual image of Millennium Space Systems' U.S. Space Force-launched wide-field missile alert satellite (Credit: Millennium Space Systems)



Fig.5: Amazon's 83 launch contracts include 18 Ariane 6 launches, 12 to 27 New Glenn launches, and 38 ULA launches (Credit: Arianespace/Blue Origin/ULA)

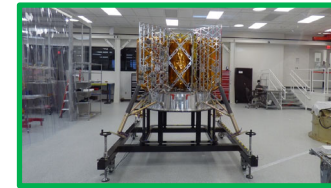


Fig.7: The Astrobotic "Peregrine" lander (second-half phase of assembly) (Credit: SpaceNews/Jeff Foust)

NewSpace, etc.



Fig.9: Kepler is planning to sell terminals to other satellite operators and to make available the data relay constellation scheduled to start next year. (Credit: Kepler Communications)



Fig.2: Conceptual in-orbit image of Arabsat's first fully software-defined GEO satellite, the Arabsat 7A (Credit: Thales Alenia Space)

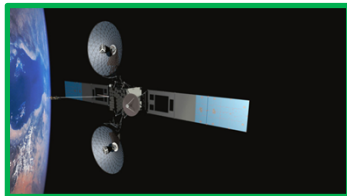


Fig.4: NASA selects 6 commercial satellite operators to demonstrate a successor to the TDRS satellite. (Credit: NASA)



Fig.6: Conceptual overview of "hotel in space" concept now on offer from private company



Fig.8: Crew Dragon "Endeavor" of the Ax-1 mission, landing off the coast of Florida (Credit: SpaceX)

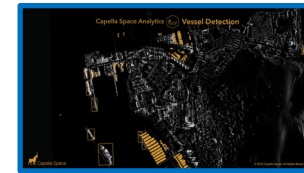


Fig.10: Capella Space's ship detection solution uses AI and machine learning algorithms to identify and display ship ranges. (Credit: Capella Space)



Fig.11: Orbit Fab and Astroscale U.S., a subsidiary of Astroscale, conclude a commercial agreement to replenish Astroscale's GEO in-orbit life extension service aircraft.

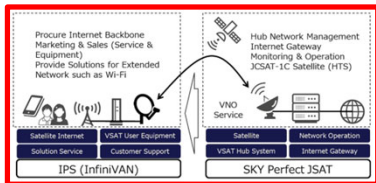


Fig.12: Overview of IPS and SKY Perfect JSAT supplying satellite broadband services to the Philippines

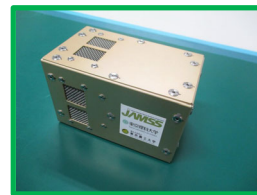


Fig.13: Flight prototype for the photocatalytic air purification device developed by Japan Manned Space Systems Corporation, the Tokyo University of Science, and the Tokyo University of Agriculture and Technology (Credit: JAMSS)



Fig.14: Spacewalker's cumulative seed funding for spaceplane development reaches millions of dollars.



Fig.15: Conceptual image of Warpspace's WarpHub InterSat intersatellite communications system (Credit: Warpspace)

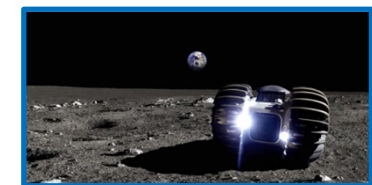


Fig.16: In tandem with Beazley and Dymon, Tokio Marine & Nichido has developed insurance for lunar exploration, also supporting Dymon as one of the world's first private companies aiming at a lunar mission via its "YAOKI" lunar rover (shown in photo). (Credit: Dymon)