A Report on Satellite Innovation Symposium 2019

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Shigeki Kuzuoka

Table of Contents

Abstract

For three days from October 8 (Tue.) to 10 (Thu.), Satellite Innovation Symposium 2019 was held in Silicon Valley - Mountain View, California, U.S. This symposium is hosted by Satnews, which is a media company that focuses on space business news, and this year marks the event's third year. Until last year, the symposium's workshops were held on the first day with main meetings held on the second day, but this year there were no workshops, and the main meetings were held on the third day. Panel discussions focused on the future of the space industry from the perspective of innovation and characteristics as compared between Old Space and New Space. Participants numbered about up to 800, as was the case in the previous year, with about 60 companies exhibiting. This symposium provides direct information on the future direction of the space business.

This year featured a corner called "Tech Brief," along with a "Market Brief" corner, where experts could discuss various technologies and markets in the short time of about 15 minutes, and this was seen as a convenient way to obtain a complete overview of related fields.

Impression & Analysis

(1) Innovation regarding communications satellites

Lectures and discussions were held on the future of communications satellites, centering on Tech Briefs talking about software-defined satellites, Market Briefs focusing on the geostationary communications satellite market, and keynote speeches. Of particular concern was the importance of user terminal/terrestrial modems in supporting the development of software-defined satellites. Also, the concept of total connectivity for the mobile 5G era was emphasized rather than simply only looking at satellite communications.

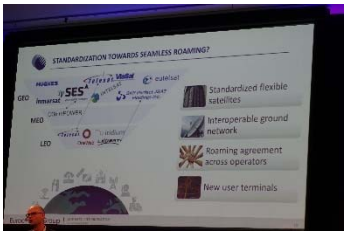
First of all, as a Tech Brief, Carnegie Labs CTO Dr. Paul Struhsaker emphasized the need for new terrestrial user terminals/modems to support software-defined satellites so as to enable seamless connectivity in looking ahead to 5G. Now that software-defined satellites that integrate the Ku/Ka bands have become technically feasible, FPGA (field-programmable gate array)-based modems have also come onto the scene, and ground terminals can now be developed easily and quickly. In addition, 3GPP 5G (a 5G-focused initiative that is part of a standardization project to examine and create specifications for 3G mobile phones [3G] and subsequent 4th- and 5th-generation mobile phones) is considering standard specifications for satellites.

The author of this report is not yet fully aware of how software-defined satellite technology actually operates, so we took the time to inquire about this during a Q&A session, specifically regarding how often it is assumed that communication parameter changes are actually implemented in software-defined satellites. Dr. Struhsaker responded that such parameters can be updated several times a day to several times a year so as to ensure business feasibility, taking the example of the fact that PC operating systems are updated weekly. However, it was relayed that it is necessary to be able to define the software for ground terminals, especially in modems. Software definition in terrestrial communications has already become technically advanced and is used in police radio, etc., but software definition in satellites involves the question of how to change the communication parameters up to and including the user terminal. However, it is felt that there is still a need for technology and operational considerations that can ensure total connectivity, including user terminals.

Moving onward, Intelsat CEO Mr. Stephen Spengler gave a keynote speech. He spoke a lot about connectivity in the 5G era, with emphasis on ubiquity and mobile communications, along with saying that satellites are indispensable for such concerns. He also relayed an equation when illustrating that 4 billion people around the world do not yet have connectivity:

Consumer experience = (5G + Mobility + Ubiquity) × Simplicity.

This is similar to the catchphrase-style of the company name of O3b ("Other 3 billion," referring to the population of the world where broadband internet is not currently available). This situation is still progressing. Mr. Spengler also emphasized the concept of data-centric traffic, which refers to access to the cloud, based on the premise of the existence of the cloud, not on the question of whether users can connect directly. This would be the same as SES's previous concept of providing connectivity between the IBM cloud and edge computing.



In addition, Euroconsult's Mr. Nathan de Ruiter explained the current market trends regarding geostationary communications satellites. In short, the future direction of satellite communications is "cheaper, smaller, and more agile." Regarding “cheaper,” the CAPEX effect (CAPEX / Gbps in the satellite segment) is becoming significantly cheaper compared to conventional satellites, i.e., from over $60 to over $7 in HTS (high throughput Satellite) Class 1 satellites and over $1.7 in HTS Class III satellites, while VHTS (very high throughput) satellites (1-6 Tbps, CAPEX at $600 million to $5 billion) are expected to reach over $0.7 (after 2021). For “smaller,” this is exemplified in the SmallGEO (small geostationary satellite) segment moving toward the 2,000 kg class, at 30–150 Gbps, at $100 million to $150 million, bringing to mind Airbus Defence and Space's OneSat lineup and Thales Alenia’s Inspire series , along with Boeing's SmallGEO 702X line, with the Inmarsat GX-7 being put into practical use from around 2023. For much small-size Very SmallGEO, Tyvak Nano-Satellite Systems, Maxar Technologies, ASTRANS, and Saturn, etc., have already begun to develop a 300–500 kg class, at 7.5 to 60 Gbps, at $60 million to $100 million, and we have the Astranis-1, Ovzon-3, and Gapsat-1, etc., coming into practical use from around 2021. Furthermore, regarding “more agile,” an explanation was given on the progress of VHTS and software-defined satellites.

Mr. Ruiter also added "standardization" to these three trends, saying that: LEO (low Earth orbit)/MEO (medium Earth orbit/GEO (geospace) satellites; having standardization and flexibility built into satellites (including terrestrial networks); the interoperability of terrestrial systems; and allowing for roaming to cross multiple operator companies, etc., are required, and that new user terminals based on standardization for that purpose are tied into this out of necessity.

With these three speeches forming a backdrop, there is no doubt that software-defined satellites will be required for future communications satellites. However, software definition is not only being considered in the

world of satellite communications. In view of the 5G era, it can be concluded that it is necessary to realize integrated connectivity, including satellite communications carriers and terrestrial communications, with user terminals for that purpose. It is undeniable that conventional communication satellite engineers have been studying technology confined to satellite communications without giving themselves the opportunity to think widely about interoperability and connectivity with terrestrial communications. Thus, in the future, it will be necessary to study how to secure connectivity as a whole, while having mobile engineers exchange technologies.

(2) Innovation support

This symposium provided panel discussions on how to actually support innovation. This included panels during which investors took the stage. Catapult, from the U.K., and others, held a discussion to focus on how to support innovation. We noticed that multiple panels commented that investment is required to nurture innovation but that even that was not enough, saying also that there was a big cultural problem in promoting and accepting innovation itself.

Whether to accept innovation as a pre-technical issue depends on non-technical factors, and it has always been said that analysis into such and resulting solutions are necessary. However, it is quite difficult to decide on concrete measures regarding how to do this and how to exactly solve such cultural problems. According to Catapult's CEO, Mr. Stuart Martin, U.K. investment companies such as Seraphim Capital are not only investing in technology development but are also investing in usage (delivery) and management. This definitely makes us want to know more about this topic specifically.

Panels were hit with multiple questions, such as: “What are the key innovations that will need to be developed in the future?” Some respondents replied only to the question of development that met customer requirements, but there were many responses that did not require technology alone, such as manufacturing using digital technology (digital manufacturing), leadership, supply chain, and full-integration chains, etc. Someone said that a "cashflow positive constellation" is a constellation that has a surplus in cashflow, relaying that all of the ongoing constellation plans have yet to achieve sufficient sales, and that investors are really expressing their true desire to break through the current situation where no profits have been made. However, the lack of a concrete theory for why these profits have not appeared seems to indicate difficulty in the realization of all this.

In one panel, it was mentioned that investment was concentrated only at the system level, but

there was a question as to why there was no investment in components/subsystems companies. One investment company responded honestly that it was difficult to invest in a small components/subsystems company for which it was difficult to evaluate the magnitude of the return. However, if investment is made for a large-scale constellation, there is the possibility that the return will be large even for specific subsystems, and some investment companies have actually made investment in anticipation of this.

Regarding the U.S. government's support for innovation, there was an explanation given such that the role of government-affiliated investment companies and banks, such as In-Q-Tel and Eximbank, etc., was important. In fact, the U.S. Air Force admits that the U.S. military is a very good "early adopter" (i.e., a favorable and active recipient of new technology). In addition, throughout the past, the U.S. military has been developing and trialing various new technologies, but in the future they seemed to indicate that they wanted to develop and trial various business models. We were surprised by such a culture in the U.S. military in which they use the term, “business model.”

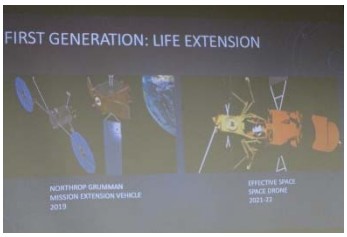
In order for innovation to occur, a cultural background that allows for taking risk for new things while also ensuring that such new things can be used is essential. Comparing the United States, which has such a culture in its public and private sectors, and the United Kingdom, which supports innovation at the national level, with Japan, which has much less cultural background regarding this, tells us that, in the future in Japan, it will be necessary to examine ordering methods, management methods, and bridging methods from development/conceptualization study up to the actual user, in order for Japan to accept and allow new technologies and mechanisms to take root.

Main Discussions

Here, along with the symposium's theme of "innovation," we would like to introduce lectures involving two fields that the author feels have not received enough attention up to now but that are expected to further develop in the future.

(1) Satellite IoT

(2) On-orbit services



Other Miscellaneous Comment

After the symposium, the author took a day off at the beach at Half Moon Bay, which is a resort area not far from Silicon Valley. We originally planned to report on the seafood here, but...

When we arrived at the hotel near the beach at Half Moon Bay, on Thursday evening, the entire area was out of power. The hotel only had emergency lighting available, and communications facilities such as the internet, etc., were down. All restaurants are also closed because of the power issue. The reason for this was some sort of serious downtime, and upon detailed inquiry, the power outage was planned by the local power company.

In remembering that there was a big wildfire in California a year ago, it seems that, at that time, a sparked caused a fire to break out due to aging power transmission infrastructure.

For this reason, the power company sometimes makes planned power outages whenever the conditions are risky for fire due to temperature, humidity, and wind.

So, in the end, all we could do was get some beer and sandwiches at a local supermarket, and we had dinner on the hotel

veranda. At the supermarket, it was cash only because of the outage, and even the cash register didn't work. However, the view of the coastline expanding out in front of you was wonderful, but as the sun went down everything just got darker and darker. The power was finally restored by around 6 p.m., when the area was already completely dark. However, a wildfire did actually break out that day, and fire trucks seemed to be quite busy. We thus really have to wonder what purpose the planned power outage actually served.

If you have any questions regarding this document, please contact:

Shigeki Kuzuoka
Satellite Business Network

Satellite Business Network
http://sat-biznet.com
E-mail: shigeki-kuzuoka@sat-biznet.com
TEL: +81-80-2052-1348

Shigeki Kuzuoka
Euroconsult Japan Office
Euroconsult
http://www.euroconsult-ec.com
E-mail: shigeki.kuzuoka@euroconsult-jp.com
TEL: +81-80-2052-1348