Interview with CEO

Mr. John Celli

President and Chief Operating Officer
Space Systems/Loral

In our interview, Space Systems Loral President and Chief Operating Officer, Mr. John Celli speaks passionately about his business strategies for international satellite communications and has introduced his future dream with enthusiastic manner for the development of reliable and cost effective satellite systems and more ...

Space Japan Review (SJR) is a technical communications journal published by AIAA Japan Forum on Satellite Communications (AIAA-JFSC), a subcommittee of the American Institute of Aeronautics and Astronautics (AIAA)'s Technical Committee on Communication Systems (TCCS). It was initially published in hard copy, but is now distributed electronically over the Internet. This column provides an opportunity for CEOs of communications satellite development and manufacturing companies and satellite communications providers around the world to discuss their strategies and aspirations, serving as a reference for AIAA members and SJR readers. Space Systems/Loral was established more than 50 years ago. Today we'd like to discuss your strategies for the satellite communications business.

SJR: First of all, please give us a quick background on yourself and Space Systems/Loral, Inc., and an overview of your strategies.

John Celli: I grew up in Italy where I completed my academic studies with a

master degree in mechanical engineering from the University of Rome. I started my career in the electronics industry at Alenia, and I've been involved with space technologies and satellites for over 30 years, starting at Alenia and then at Space Systems/Loral, which I joined 28 years ago, when it still was Ford Aerospace.

Space Systems/Loral is the leading provider of commercial satellites, for a broad range of communication applications. We make some of the world's most powerful satellites. To date we have eight 20-kW class satellites either launched or under construction and a total of 19 satellites in our backlog.

We work closely with satellite operators and service providers around the world to deliver spacecraft for direct-to-home television, digital audio radio, broadband Internet, digital multimedia broadcasting, and a variety of other services. There are 56 satellites that the company built currently in orbit and seven additional launches are scheduled before the end of the year. We count more than 1,500 cumulative on-orbit service years logged and 24,000 transponder years of on-orbit service.

Space Systems/Loral is located in Palo Alto, California, USA and we are a division of Loral Space & Communications, Inc., which is headquartered in New York, NY. We pride ourselves on our 50 year heritage of reliability, quality, and superior customer service. Approximately one third of the company's on-orbit years logged are from satellites operating longer than their estimated design life. SS/L's reliability and advanced technology has enabled it to capture approximately 40 percent of the satellite awards (with power of 8kW or greater) since 2004 and as a result our backlog as of 12/31/09 was a very robust $1.4 billion.

We also have a long history of working with organizations in Japan. In the late 1970s, SS/L provided the ETS 2/Kiku 2 satellite, which had an experimental communications payload that was built for the Japanese government. We also provided the Sakura 1 satellite, which was built for Japan's National Space Development Agency (NASDA) and Mitsubishi Electric Corporation. In the 1980s we provided Sakura 2a and 2b to Telecommunications Satellite Corporation of Japan (TSCJ) and NASDA.

SS/L provided three Superbird satellites to Satellite Communications Corp. (SCC) in the 1990s. These were the first satellites to use our 1300 platform architecture. This platform has a long history of reliability in space and

continues to evolve as a result of its cost-effective, modular design, which accommodates ongoing technology advances. Today the 1300 bus supports all of our satellites, thanks to our standard platform design, which can accommodate total end-of-life power requirements from 6-kW to 25-kW by using qualified and flight proven building blocks .

We have also found that the 1300 platform is particularly well suited to hosted payloads and multi-mission satellites both because of its modular design and because of the size of the earth facing deck. We provided MTSAT-1R (also known as Himawari 6) to the Ministry of Land, Infrastructure and Transport (MLIT) to serve the Japan Civil Aviation Bureau & Japan Meteorological Agency. Launched in 2005, this advanced geostationary satellite combines GPS augmentation for air traffic control with a meteorological payload for weather forecasting. Today it is the primary operational meteorological satellite for Japan.

SJR: We understood that Space Systems/Loral, Inc. started over 50 years ago with the mission of "making space technology more affordable, accessible and useful to millions of people on Earth". And provide the world's first Communications Satellite for Japan. What is policy and strategy of business development in the past and future?

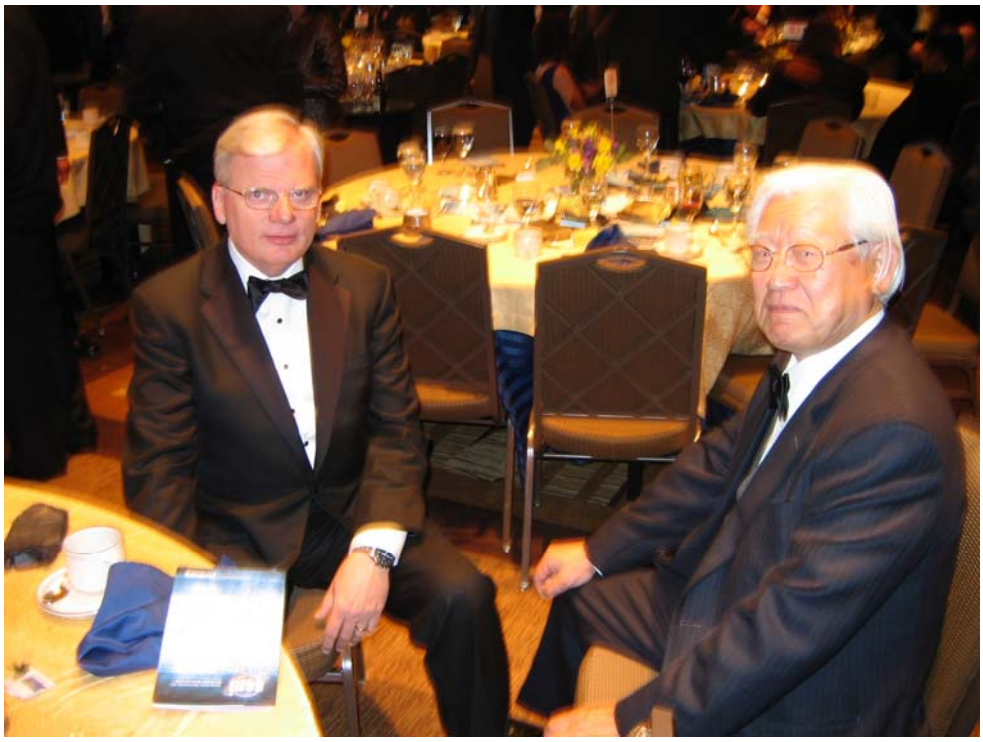

Fig-1: Mr. John Celli and Inter-viewer of JFSC

John Celli: Basically, our mission remains the same. We are focused on expanding the world's ability to communicate and helping satellite operators and networking and communications companies meet their business objectives by providing them with reliable, cost-effective infrastructure on a timely basis. We are committed to the highest level of quality and reliability and continue to support the satellites that we build throughout their life.

We are privileged to work with many great satellite operators, and our success is demonstrated by the number of repeat customers who continue to come back to us when they need new satellites. Our customers particularly value how open we are with them, and the collaborative way that we work together to provide the infrastructure that best meets their needs. We enjoy long term relationships with so many great customers. Our ability and proven capability to provide space system architectures, in addition to satellites, has proven to be instrumental in helping most of our long term customers in forging and optimizing their business plans.

SJR: At the time of Space Systems/Loral, Inc. was met the financial difficulty, the Aerospace industry was dominated by large, bureaucratic and expensive Defense conglomerates. Space Systems/Loral has overcome the difficulty. What was your strategy and idea to overcome the problem in this field?

John Celli: In 2002 when the industry went through an unprecedented downturn due to lack of business opportunities, we put together a plan that ended out serving us very well. Although we made cut backs to match the market reality, we also focused on two objectives. We had to be able to execute on our existing satellite contracts, and we had to be able to quickly rebuild our capacity when the market improved. We achieved these objectives through a retention program that covered one-third of all employees with an eye to developing technologies as well as meeting existing customers' expectations. We also were fortunate that we had some key customers who helped by ordering satellites during the downturn, such as DIRECTV, EchoStar and Intelsat.

Space Systems/Loral has a stable and cohesive culture and everyone at the company is passionate about what we do. That was very important to our success during the downturn when we had to continue to deliver high quality satellites with fewer people. When the market improved, we found that the efficiencies put in place during the lean years made us a more competitive company. We also differentiated ourselves by maintaining a sharp focus in two

areas. We concentrated on developing high-power spacecraft and we also made a commitment to helping startup companies maneuver the challenges of satellite procurement and launch.

SJR: We understood that Space Systems/Loral Corporation has started from European and Japanese small communications satellite like CS,CS-2,CS-3 and ECS satellites. This allowed the company to grow through the mid-1970 to 1980 using FS-1300 followed by upgraded FS-1300 Bus. How did you realize this dream? What's behind this success?

John Celli: As I mentioned previously, we have provided satellites for operators in Japan since the 1970s and our satellites are used for a broad number of applications including weather monitoring, air traffic control, television broadcast and a variety of other telecommunications services.

In the 1990s, we made a commitment to achieve a satellite that could generate 20-kW of power. Demand for higher power was primarily driven by our direct-to-home television customers who needed large satellites with more capacity to deliver the growing amounts of programming available. This is even more important today with high definition programming. Now we are seeing a trend to replace smaller satellites with larger, more powerful ones that leverage the cost of launch over more transponders.

Because the 1300 satellite bus has a modular design, we have been able to very carefully make incremental technology advances based on space-proven hardware. With this process we have successfully introduced the use of Lithium Ion batteries, stationary plasma thrusters and various other technologies that extend satellite life and minimize weight to allow for more fuel and larger and more powerful payloads.

We have also developed spacecraft with some of the world's largest antenna reflectors in order to transmit to very small mobile devices. We also developed the world's first two way ground based beam forming system, which provides unprecedented flexibility to focus RF beams on the areas where there is the most demand for communications. By keeping the processing on the ground, we minimize the cost to our customer and can deliver satellites faster than if we were building flexible satellites with on-board processing.

SJR: Could you introduce the main performance of upgraded FS-1300

Bus and how to expand their capability for your future market in the worldwide?

John Celli: The Space Systems/Loral 1300 satellite bus is a very flexible platform that can accommodate as much as 4800 kg dry mass and measuring up to 6.1 meters in height. Our short bus is appropriate for satellites in the 5 – 10 kW range and can accommodate an average dry mass of 1300 – 1850 kg with a maximum height of three meters. There are several incremental products in between so that we have the flexibility to design satellites appropriate for a variety of launch vehicles. Our largest bus now has the capacity to generate as much as 25+ kW of power.

SJR: What was your energy to Success of the new field of Satellite business and which market area do your company focused on as an initial started and how did you get the resource and educated manpower?

John Celli: In the early years of the company's history Space Systems/Loral provided satellites to the government for both military communications and weather monitoring. With the Intelsat V program in the 1980s, we launched into providing communications satellites for commercial services. Now, commercial satellites are used for video transmission more than any other application. That includes both fixed satellite services for broadcast television and transmission to cable head ends as well as direct-to-home television.

However, we see the future in mobility and the Internet and there is increased demand for satellites that support those services. Satellite communications can be the only mode of communication in emergencies, and they can also provide connectivity for ships at sea. Satellites also have a broad range of applications for businesses that need to transmit data within organizations that may be spread around the world. Businesses use satellite services for network backup as well as for employee training, digital signage, inventory tracking and banking transactions. They also are used for distance learning and to enable telephone networks in some parts of the world.

SJR: What are next series of Space Systems/Loral 1300 spacecraft bus performance and what are your international business development strategies including Japan?

John Celli: Space Systems/Loral will continue to focus on maintaining and

improving the reliability of our satellites while looking for ways to carefully and incrementally increase power generation, improve pointing accuracy and provide more value to our customers.

The international market has been and will continue to be very important to SS/L. At times more than one-half of our satellites under construction have been with non-US owned companies. Japan remains a very important market for SS/L. One of the world's largest and most successful satellite operators is headquartered in Japan, SKY Perfect JSAT. We continue to work very hard to win the business of SPJ.

SJR: Could you introduce your Palo Alto Facility in California area to our reader in Japan who are interesting in your asset to realize excellent performance of satellite communications.

John Celli: We own facilities covering about 564,000 square feet (52,397 square meters) on 29 acres (11.84 cho) in Palo Alto, California and we lease about the same amount of space in buildings nearby. Palo Alto is in what is known as the Silicon Valley region of Northern California and it is the home of Stanford University and the well-known technology company, HP, which makes computers, printers and servers. We have made Palo Alto the world capital of the commercial satellite industry.

We are also located near the headquarters of other important international companies such as Cisco, Google and Intel, so the area draws a very dynamic and technically sophisticated population from around the world. We have a beautiful temperate climate with just a few months of rain in the winter, and are located very near San Francisco, the Pacific coast, the northern California wine regions of Napa and Sonoma, as well as close by to the Pebble Beach Golf Links in Monterey, California.

Our highly specialized manufacturing facility includes several clean room high bay integration and test areas that can accommodate today's large geostationary satellites. We just completed building TerreStar-1, which is a satellite for mobile services that is more than eight meters tall and has an 18-meter antenna reflector. At launch it will weigh 6900-kg and it will be the largest commercial satellite ever launched.

The facility also includes a Thermal Vacuum Chamber that simulates the temperature extremes of space and a Vibration Lab, where the launch dynamic

input to the spacecraft is simulated. There is also a 1,765 square meters command and control facility where we monitor and maneuver satellites once they are on orbit.

Fig-2: The 1,765 square meter Mission Control facility at Space Systems/Loral

We have a compact antenna test range, which enables antenna performance testing in a totally controlled environment. Our high bays for satellite integration activities also include a center of gravity/moment of inertia facility, which can accommodate today's very large satellites and enables measurement of all three axes. Integrated System Test Complexes accommodate testing of every aspect of a spacecraft's system performance as it goes through the integration and test process and we have a structures lab with a 5-ton bridge crane.

In 2008, we expanded our facility for greater in-house manufacturing of RF components and subassemblies and we also made significant upgrades to existing SS/L satellite test operations. The new facility for Repeater Subsystems Operations (RSO) is just over 1950 square meters and includes a new vibration lab for unit-level vibration testing, and acceptance test and parts screening areas. Liquid nitrogen pipes run throughout the lab and production areas, making the areas completely reconfigurable between assembly and test

and the room has a conductive floor for grounding. Improvements also include new test equipment and assembly process equipment.

Fig-3: The newly renovated 1950 square meter Repeater Subsystems Operations (RSO) was designed to be reconfigurable for either assembly or test.

There is quite a lot that I can say about our sophisticated facility and its capabilities. However, I will just mention a few specifics about our very specialized equipment.

Our Machining & Manufacturing Department performs all metal component tasks within SS/L related to machining, welding, sheet metal, and final finish and/or plating of composite components. Computer Numerical Control (CNC) and manual lathes, mills, presses, and punches are integrated into a 3,000-square-meter, environmentally controlled, manufacturing area.

The General Machine Shop has a four-axis horizontal spindle, computer numerical controlled machining center, with 400-mm interchangeable pallets for holding parts, which is pictured below. This enables us to machine complex structural, mechanical, electronic, and RF metal parts for all satellite product lines. It can hold 80 cutting tools, which can turn up to 12,000 rpm. The axes can move up to 2362 inches per minute. The controller is programmed using the NC Complete software module within the Pro/Engineer CAD environment, allowing cutting tool paths to be created directly from engineered part models.

We have a Materials Manufacturing Technology Department which is responsible for the manufacture of all composite components and assemblies at SS/L, including honeycomb graphite and fiberglass strut and bracketry and graphite/honeycomb antenna feeds and reflectors. This department also performs thermal coating and encapsulation of electronic components.

We also have a state-of-the-art composite facility with more than 4,650 square meters of working area in a modern stand-alone two story facility. It contains an office area and clean rooms for layup, a high-bay for assembly and a machine shop for graphite parts machining. This facility is devoted exclusively to the fabrication of spacecraft structures and structural components using various advanced composites materials.

The Spacecraft Structure Mechanical Integration Facility comprises 670 square meters of high bay, which is air-conditioned with filtered air to maintain an environment equivalent to Class 1B standards. A 4.5-metric-ton bridge crane and a 1.8-metric-ton monorail crane are located in this facility. It is used primarily for structural assembly and integration, and can process multiple satellite structures simultaneously.

The Solar Array and Mechanisms Assembly and Test Lab is housed in a 1,700 square meter facility. (See picture below.) Of this area, 1,440 square meters are class 1B clean room consisting of two adjoining high bays. The remaining area consists of office space, an air lock, a small shop facility, and a solar cell test lab.

Fig-4: The solar array rigs use overhead suspension for test deployments

The clean room area consists of:

1. The mechanisms lab used for assembly and testing of small mechanisms, containing four flow benches for assembly work and two thermal vacuum bell jars for testing
2. Two solar array deployment rigs, for deploying solar arrays at ambient temperature. These rigs use the overhead suspension technique. One rig uses air bearings to accommodate cross-axis motion of the arrays during deployment
3. One solar array deployment room that accommodates high- and low-temperature deployments. The rig in this room uses both overhead suspension and air bearings to accommodate cross-axis motion of the solar array
4. A second deployment room, for high- and low-temperature deployments, has a 5.2 x 7.6-m air-bearing table. Test items (solar arrays, reflector hinges, etc.) are mounted on air-bearing feet that float over the air-bearing table, resulting in low-friction deployments
5. Two high bays: one high bay contains a 2.7-metric-ton X-Y overhead crane; the second contains a 1.8-metric-ton monorail crane
6. One 6000-gallon LN_2 tank for cold testing

Our Bus Systems Operations Directorate manages two Three-Axis Servo-Table test facilities, which are used for design verification testing of the Attitude Control Subsystem. This facility simulates the dynamic on-orbit spacecraft environment and is used to verify flight software and for software development projects. Each facility includes a Contravez-Goertz 53M3BT table and controller, a Sun simulator and Earth simulator, and a structural mounting pad and they are managed from separate control rooms.
I could continue to describe many other areas but I think this is enough for now.

SJR: Satellite broadband services have begun to emerge. Japan recently launched the high-speed Internet satellite WINDS on February 23, 2008, and its use is steadily increasing, while overseas there are such craft as iPStar, Wild Blue and ViaSat. What do you think satellite operator business using your developed satellites and your strategies for corporate with them?

John Celli: We are very optimistic about the role of satellite broadband in the future. Satellite is the best way to deliver broadband connectivity to remote areas and parts of the world with little or no existing infrastructure. Even in highly developed regions such as North America, there are many communities that are not currently served by cable or DSL. HughesNet and WildBlue each serve about 400,000 customers in the rural U.S. and both companies say they are capacity constrained, so we see the demand is there.

SS/L has designed and built more Ka-band satellites than any other manufacturer and Ka-band is particularly well suited to broadband. Ka-band satellites with multiple spot beams can provide extremely high throughput, which is increasingly important to keep up with worldwide demand for video exchange.

You mentioned our iPStar (Thaicom-4) satellite, which broke records for size when it was launched in 2005. It provides about 45 Gbps of total throughput, which is the highest capacity commercial satellite available today. Now we are building ViaSat-1, which will provide 100 Gbps throughput. With this kind of data capacity, satellite becomes very competitive with terrestrial infrastructure, even for more densely populated areas.

You mentioned WINDS in Japan, which was recently shown to be quite useful for the kind of large volume, real time interactive communications that can enable distance learning. I think you also have some commercial providers of satellite broadband in Japan and I know that BB SAT Co, Ltd. located in Tokyo,

recently started offering service.

According to industry analysts satellite broadband was a US$3.3 billion business in 2008 and that is predicted to more than double in the next ten years so we are pleased to be working on the cutting edge of the technology and think it is a very important market.

SJR: The Space Basic Law in Japan was established last year and new activities in the field of space development are expected, what is Space Systems Loral, Inc.'s strategy to get into this field?

John Celli: It remains to be seen what kind of impact the Space Basic Law will have. We are very open to collaboration with Japanese companies and the government of Japan within the constraints of U.S. and Japanese policies. Our past success in working with NASDA is a testament to our capabilities.

SJR: On the whole business is growing steadily, and although the share price has not performed well, perhaps due to the fallout from the subprime loan crisis in the U.S., you've been proactive in your investor relations program and other activities. What successes and setbacks have you had in this regard?

John Celli: We believe that clear evidence of the company's asset value was demonstrated last October, when, at the height of the financial crisis, six of the world's leading bands agreed to provide SS/L with a revolving credit facility. Over the past year we have had significant successes as a company and we believe that the combination of Telesat and SS/L continue to provide a solid foundation for growth in shareholder value.

Fig-5: Thank you Mr. Celli for your valuable comments on SJR

SJR: Finally, the AIAA Japan Forum is providing wide-ranging support for the AIAA ICSSC 2009 conference to be held in Edinburgh this coming June. AIAA Japan Forum has plan to perform the AIAA ICSSC 2011 to be cooperator with AIAA in Asia probably some area of Japan, We look forward to your support.

John Celli: We are very active in the AIAA Communications Committee and are happy to support such an important and worthy organization. We will definitely be involved in these future events and look forward to having the opportunity to participate in the conference in Japan.

SJR: We hope you will continue to cooperate with us in the development of satellite communications. Thank you for taking the time to talk with us today and for support to previous issue of our SJR by your executive.

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