

spacepreneur

A Space Explore Edition...

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Aeolus' Fiery Demise to Set Standard for Safe Reentry



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EDITORIAL



B. KARTIKEYA

Hello my dear readers,

Our editorial covers the news on astronomy, invention, space travel & also celebrate humankind's ongoing exploration of the last frontier. We take readers on a tour of the solar system and beyond while offering them accessibility and in-depth coverage of the most current findings.

Discover more by checking out the Global News section. NASA scientists spot first Polar Cyclone on Uranus. Iridium satellites from Thales Alenia Space's enhanced constellation successfully launched five more spares. Furthermore, the Italian Space Agency executes a contract for an In-orbit Servicing Demo Mission with a consortium of businesses led by Thales Alenia Space. In the Jet Propulsion section, you can learn more about how NASA's Voyager will conduct additional research with its new power strategy. Viasat Inc., a leader in satellite communications, has announced that K. Guru Gowrappan has been named as the next company president, beginning April 13, 2023. Gowrappan will collaborate closely with Viasat Chairman of the Board and CEO Mark Dankberg in his new role as President to oversee the company's worldwide operations and expansion plan.

Examine the cover interview with MR. RADHAKRISHNAN DURAIRAJ, Chairman & Managing Director of NEW SPACE INDIA LIMITED (NSIL). He is referring to the full range of NSIL activity. Check out the defense, innovation, and appointments sections as well.

Travelling through space is as much about the process as the final destination. Therefore, you'll find something extraordinary every issue of Spacepreneur, from skywatching tips and breathtaking night sky photographs to rocket launches and breaking news about robotic missions exploring distant planets.

spacepreneur

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LM on Blue Origin's National Team Selected to Develop Human Lunar Lander

Lockheed Martin is on the team that has won a contract from NASA to develop and demonstrate a human landing system for the Artemis program under the agency's Human Landing System program. The goal of the program is to rapidly develop a sustainable human lunar lander and perform a crewed demonstration flight to the lunar surface for Artemis V. Led by Blue Origin, the National Team that will develop and build the lander also includes Draper, Boeing, Astrobotic and Honeybee Robotics.

NASA's Artemis program is redefining how we explore deep space, and a sustainable human landing system program is key to extending our human presence away from Earth in a long-term way, which will greatly add to our scientific knowledge of the solar system.

As a principal partner on Blue Origin's National Team, Lockheed Martin brings to the lunar lander effort more than 50 years of experience in space exploration – from developing the Orion spacecraft, to supporting numerous planetary robotic missions, to developing the space shuttle's external fuel tank. Additionally, Lockheed Martin and National Team partners are drawing on their extensive supplier base, engaging strategic small and mid-sized businesses across the country in the development of the landing system.



Congratulations to Blue Origin on this achievement. Lockheed Martin is excited to be part of Blue Origin's National Team and we are looking forward to building humanity's first Cislunar Transporter," said Kirk Shireman, vice president of Lunar Exploration Campaigns at Lockheed Martin Space. "We value Blue Origin's thoughtful approach to developing human-rated flight systems and are thrilled to be part of a diverse team that combines innovation, deep experience and a strong industrial base.



Axiom Space Private Astronauts Headed to ISS

Four private astronauts are in orbit following the successful launch of Axiom Mission 2 (Ax-2), the second all private astronaut mission to the International Space Station. Axiom Space astronauts lifted off at 5:37 p.m. EDT on Sunday, May 21, from Launch Complex 39A at NASA's Kennedy Space Center in Florida.

A SpaceX Falcon 9 rocket propelled the company's Dragon spacecraft carrying Ax-2 crew members Commander Peggy Whitson, Pilot John Shoffner, and Mission Specialists Ali Alqarni and Rayyanah Barnawi into orbit on a mission to conduct scientific research, outreach, and commercial activities on the space station.

"Congratulations to Axiom, SpaceX, and the Axiom Mission 2 crew on a successful launch! During their time aboard the International Space Station, the Ax-2 astronauts will carry out more than 20 scientific experiments, helping us better understand space radiation, weather in low-gravity conditions, and more," said NASA Administrator Bill Nelson. "This mission is more proof of NASA's commitment to help our industry partners develop the next generation of space technology and a support a growing commercial space economy."

Beginning at 7:30 a.m. Monday, May 22, NASA will provide live coverage of SpaceX Dragon docking, hatch opening, and a ceremony to welcome the crew on NASA Television, the NASA app, and the agency's website.

The SpaceX Dragon will autonomously dock to the space-facing port of the station's Harmony module around 9:16 a.m. Monday with hatch opening about 11:13 a.m. live mission coverage will conclude following the welcome ceremony expected to start about 11:45 a.m. The mission also will be covered by Axiom Space on its website.

Once aboard the station, the Ax-2 crew will be welcomed by Expedition 69 crew members, including NASA astronauts Frank Rubio, Stephen Bowen, and Woody Hoburg, UAE (United Arab Emirates) astronaut Sultan Alneyadi, and Roscosmos cosmonauts Dmitri Petelin, Sergey Prokopyev and Andrey Fedyayev.

Axiom Space astronauts are expected to depart the space station May 30, pending weather, for a return to Earth and splashdown at a landing site off the coast of Florida.



X-Bow Systems Announces Selection for \$60 million STRATFI Award

X-Bow Systems Inc (X-Bow) announced that the innovation engine for the Department of the Air Force, AFWERX, has selected the company for a Strategic Funding Increase (STRATFI) award. The award secures up to \$60 million between government funding, private investment, and matching Small Business Innovation Research (SBIR) funds. The funding will extend X-Bow's previous and existing work with the U.S. Air Force Research Lab (AFRL) at Edwards Air Force Base. The work will focus on rapidly produced, low-cost solid rocket motors (SRMs) using X-Bow's proprietary advanced manufacturing technology and culminate in a flight test series.

X-Bow is a new, non-traditional, small business producer and supplier of SRMs, suborbital and orbital launch services and defense technologies. It further leads the market with patent-pending innovations of Additively Manufactured Solid Propellants (AMSP) for solid rocket motors.

Recent reports have noted a consolidation in the solid rocket motor industry from six to just two domestic manufacturers. This has created significant cost and lead time increases, along with an inability to deliver SRMs in the quantities needed to support industry plans and national defense needs. X-Bow's market entry and STRATFI selection is well timed to fill this domestic manufacturing and national security need.



"We are thrilled to be selected and funded for this STRATFI award. We further see the award as a strong signal from our U.S. Government partners for the need of X-Bow's solid rocket technology and SRM production capabilities in both the DoD and commercial industry," says X-Bow Systems' Chief Revenue Officer, Maureen Gannon.



Exotrail electric propulsion systems selected by Korean satellite manufacturer Satrec Initiative

Exotrail unveils a new contract with the satellite manufacturer Satrec Initiative, to embark a spaceware™ electric propulsion system for a Korean governmental mission. Satrec Initiative is a Korea based world-leading Earth observation solution provider. They have selected Exotrail's spaceware™ product to meet the space mobility needs of an Earth observation satellite which will be used for a Korean governmental R&D mission.

Within a year, Exotrail will deliver a spaceware™ - micro XL propulsion system engineering model, as well as a flight model for a proof-of-concept mission for an innovative earth observation service aiming to validate the use of Satrec Initiative's Earth observation platform in Low Earth Orbit (LEO). The LEO mission will allow Satrec Initiative to significantly increase the performance of its Earth observation service; a breakthrough in Earth observation made possible by Satrec Initiative's cutting edge satellite platform design paired with Exotrail's unparalleled high thrust spaceware™ propulsion system.

spaceware™, and its nano, micro, mini and cluster product configurations, is Exotrail's space-proven Hall-Effect electric propulsion system for satellites ranging from 10 to 1,000 kg. Spaceware™ - micro is a 150W propulsion system delivering more than 7mN of thrust for missions up to 60kNs and more. It provides an unrivalled trade-off between thrust compared to mass and volume efficiency. Thanks to its high level of thrust and modularity, spaceware™ drastically improves satellite deployment, increases service performance, and contributes to the reduction of space pollution.

The inking of this contract by a French company and a Korean company, both in strong leadership positions in their respective markets, is announced at the occasion of the visit of Mr. Jean-Noël Barrot, French Minister for Digital Transformation and Telecommunications, and in attendance of Mr. Cho Joo Hyun, Korean Vice-Minister of SMEs and startups. This first commercial contract of Exotrail in South-Korea proves the relevance of its propulsion system product portfolio for both small satellite constellations, and the dynamic Asian market.

On this occasion, Satrec Initiative's CEO Ee-Eul Kim expressed his excitement about the partnership, stating:

Exotrail's CEO and cofounder Jean-Luc Maria, added: "We are extremely thankful to Satrec Initiative for this mark of confidence, emphasizing the fact that our spaceware™ product is a true asset for the constellation market, notably for Earth observation satellites. Additionally, we are proud to sign this contract fueling a positive dynamic between France and South-Korea, one of the leading space nations in Asia."



"We are thrilled to be working with Exotrail for our upcoming LEO mission. This partnership will enable us to deliver breakthrough Earth observation services with increased performance, while contributing to the reduction of space pollution."





NASA, SPACEX LAUNCH SOLAR ARRAYS, CARGO TO SPACE STATION

Following a successful launch of NASA's SpaceX 28th commercial resupply services mission, two new solar arrays, science investigations, and supplies are on their way to the International Space Station. Carrying more than 7,000 pounds of cargo to the orbiting laboratory, the uncrewed SpaceX Dragon spacecraft launched on the company's Falcon 9 rocket at 11:47 a.m. EDT, Monday, June 5, from NASA's Kennedy Space Center in Florida.

Live coverage of arrival will begin at 4:15 a.m., Tuesday, June 6, on NASA Television, the agency's website, and the NASA app. The cargo spacecraft is scheduled to autonomously dock with the space-facing port on the station's Harmony module at approximately 5:50 a.m. and remain at the station for about 21 days.

The SpaceX Dragon will deliver a pair of IROSAs (International Space Station Roll Out Solar Arrays) that, once installed, will expand the energy-production capabilities of the microgravity complex.

The spacecraft will also deliver the following: Thunderstorm Watch What Happens above Thunderstorms (Thor-Davis), an investigation from ESA (European Space Agency), will observe thunderstorms from the space station. This vantage point will allow researchers to see the electrical activity from above, particularly the inception, frequency, and altitude of recently discovered blue discharges. Scientists plan to estimate the energy of these phenomena to determine their effect on the atmosphere. A better

understanding of lightning and electrical activity in Earth's atmosphere could improve atmospheric models and provide a better understanding of Earth's climate and weather.

Helping Plants Chill in Space: Plants exposed to environmental stress, including spaceflight, undergo changes to adapt, but those changes may not be passed on to the next generation. Plant Habitat-03 (PH-03) will assess whether plants grown in space can transfer such adaptations to the next generation and, if so, whether a change continues through subsequent generations or stabilizes.

The investigation will create a second generation of plants using seeds previously produced in space and returned to Earth. Results could provide insight into how to grow multiple generations of plants to provide food and other services on future space missions. This investigation also could support development of strategies for adapting crops and other economically important plants to marginal and reclaimed habitats on Earth.

Testing a Telomere Technique: Telomeres, genetic structures that protect our chromosomes, shorten with age and wear. But research has shown that telomeres lengthen in space. Genes in Space-10 will test a technique for measuring telomere length in microgravity, where methods typically employed on Earth are difficult to use due to gravity. The experiment will explore whether telomere lengthening in space is caused by proliferation of stem cells –undifferentiated

cells that give rise to specific body components and that typically have long telomeres.

Understanding the mechanism behind telomere lengthening could reveal possible effects on astronaut health during long-duration missions. Results also could lay the groundwork for a variety of related research to benefit future space travel and people on the ground.

Genes in Space is a national contest for students in grades seven through 12 to design biotechnology experiments for space. The program is sponsored by miniPCR, Math for America, Boeing, New England Biolabs Ltd., and the International Space Station National Laboratory.

Thawing Ice, Solar Storms, and Attitude Recovery : Mission 26 for the station's Nanoracks CubeSat Deployer (NRCSD) includes Educational Space Science and Engineering CubeSat Experiment Mission (ESSENCE), sponsored by the International Space Station National Laboratory and developed by universities in Canada and Australia. It carries a wide-angle camera to monitor thawing of ice and permafrost in the Canadian Arctic, which could provide a better understanding of the effects on Earth's climate and support better local infrastructure planning.

The satellite also carries a solar energetic proton detector to collect data on periods of solar activity that emit highly energized radioactive protons that can damage the structure and electronic components of spacecraft. Understanding these effects could help make future CubeSats more resistant to radiation. In addition, the investigation demonstrates a novel method to recover control of a satellite's attitude, or orientation, if a control mechanism fails. ESSENCE is part of the Canadian CubeSat Project, led by CSA (Canadian Space Agency).

Watching Cosmic Weathering : Iris, sponsored by the International Space Station National Laboratory, observes weathering of geological samples exposed to direct solar and background cosmic radiation and determines whether changes are visually detectable. The investigation also demonstrates experimental sun sensors, torque rods (which provide attitude control and de-tumbling for satellites), and a battery heater. A collaboration between graduate, undergraduate, and middle school students in Canada, the project provides hands-on experience that promotes interest in science, technology, engineering, and mathematics studies and careers.

Results also could provide insight into weathering processes on planetary bodies and, when combined with data from asteroid sampling missions, improve understanding of the origins of asteroids. Iris is part of the Canadian CubeSat Project, led by CSA.



NASA SCIENTISTS MAKE FIRST OBSERVATION OF A POLAR CYCLONE ON URANUS

For the first time, NASA scientists have strong evidence of a polar cyclone on Uranus. By examining radio waves emitted from the ice giant, they detected the phenomenon at the planet's North Pole. The findings confirm a broad truth about all planets with substantial atmospheres in our solar system: Whether the planets are composed mainly of rock or gas, their atmospheres show signs of a swirling vortex at the poles.

Scientists have long known that Uranus' South Pole has a swirling feature. NASA's Voyager 2 imaging of methane cloud tops there showed winds at the polar center spinning faster than over the rest of the pole. Voyager's infrared measurements observed no temperature changes, but the new findings, published in *Geophysical Research Letters*, do. Using huge radio antenna dishes of the Very Large Array in New Mexico, they peered below the ice giant's clouds, determining that the circulating air at the North Pole seems to be warmer and drier – the hallmarks of a strong cyclone. Collected in 2015, 2021, and 2022,

the observations went deeper into Uranus' atmosphere than any before.

"These observations tell us a lot more about the story of Uranus. It's a much more dynamic world than you might think," said lead author Alex Akins of NASA's Jet Propulsion Laboratory in Southern California. "It isn't just a plain blue ball of gas. There's a lot happening under the hood."

Uranus is showing off more these days, thanks to the planet's position in orbit. It's a long haul around the solar system for this outer planet, taking 84 years to complete a full lap, and for the last few decades the poles weren't pointed toward Earth. Since about 2015, scientists have had a better view and have been able to look deeper into the polar atmosphere.

Ingredients for a Cyclone : The cyclone on Uranus, compactly shaped with warm and dry air at its core, is much like those spotted by NASA's Cassini at Saturn. With the new findings, cyclones (which rotate in the same direction their planet rotates) or anti-cyclones (which rotate in the opposite direction) have

now been identified at the poles on every planet in our solar system except for Mercury, which has no substantial atmosphere. But unlike hurricanes on Earth, cyclones on Uranus and Saturn aren't formed over water (neither planet is known to have liquid water), and they don't drift; they're locked at the poles. Researchers will be watching closely to see how this newly discovered Uranus cyclone evolves in the coming years.

"Does the warm core we observed represent the same high-speed circulation seen by Voyager?" Akins asked. "Or are there stacked cyclones in Uranus' atmosphere? The fact that we're still finding out such simple things about how Uranus' atmosphere works really gets me excited to find out more about this mysterious planet."

The National Academies' 2023 Planetary Science and Astrobiology Decadal Survey prioritized exploring Uranus. In preparation for such a mission, planetary scientists are focused on bolstering their knowledge about the mysterious ice giant's system.



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“The exploration of space relies on renewable energy and so has direct value for our energy transition on Earth. The insights we gain from designing and fabricating these artificial photosynthesis devices could help us meet the green energy challenge on Earth and could become a key part in realising our sustainability goals on Earth and beyond” concludes Katharina.

”

ARTIFICIAL PHOTOSYNTHESIS FOR REAL OXYGEN

On Earth our varied and abundant species of plants produce all the life-giving oxygen we need to breathe, but when we venture outside of our world such as on the International Space Station or the Moon, we need to make our own. Devices are currently being developed that mimic the process of photosynthesis in plants to turn sunlight and water into oxygen. A study by the University of Warwick, UK, the University of Bremen, Germany, and EPFL, Switzerland, sponsored by ESA, has shown that they will work on the Moon and even on Mars.

Currently, electrolysis is the most common way to produce oxygen from water, but this process requires electricity. Inspired by plants, artificial photosynthesis devices produce oxygen from water and sunlight using semiconductor materials coated with metallic catalysts – and thereby bypasses the need for electricity.

“Water has been detected on the Moon

and on Mars so this study paves the way to develop an alternative device that keep future astronauts breathing fresh oxygen on exploration missions,” says Brigitte Lamaze, ESA environmental control and life support engineer.

“More efficient and environmentally-friendly ways to recreate parts of the life-giving conditions of Earth’s atmosphere – using resources at hand – is promising to fine-tune our goal of creating a complete ecosystem in a box.”

“At ESA we are constantly pushing the boundaries of theoretical knowledge to develop and create better technology,” says Christel Paille, ESA environmental control and life support engineer, “This study is just one example of how we are progressing to understand the developments needed for new space technologies.”

Is it sunny on Mars?

The research team has calculated that artificial photosynthesis would even work

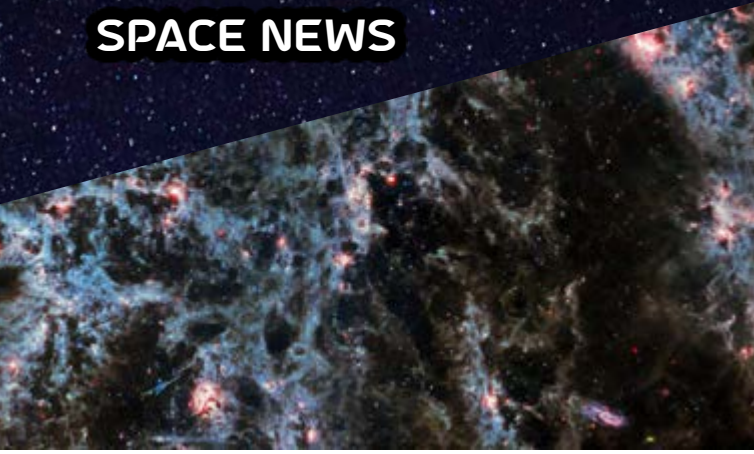
on Mars, where sunlight is less intense as it is further away from the Sun. Simple solar mirrors to concentrate sunlight would improve the process and could lead to higher oxygen production yields.

“Several years of intense research will be necessary before we can use this technology in space, but copying the essential bits from nature’s photosynthesis could give us some advantages, and our study has shown that the theory is sound,” says Katharina Brinkert of the University of Warwick research team.

ESA funds a brighter future

This research was published in Nature Communications and is available here.

It is part of an ongoing project being funded by the Discovery element of ESA’s Basic Activities. The idea was originally proposed through the Open Space Innovation Platform (OSIP) in response to a call for ideas on sustainable hydrogen production technologies.



Raytheon Technologies Team Receives NASA Award for JWST Subsystem Development

Raytheon Technologies announced that its James Webb Space Telescope Flight Operations Subsystem Development Team was recognized with a NASA Group Achievement Award for its contributions in developing the Webb Flight Operations Subsystem.

James Webb Space Telescope's mid-infrared image of barred spiral galaxy NGC 5068. Credit: ESA/Webb, NASA & CSA, J. Lee and the PHANGS-JWST Team. The NASA Group Achievement Award recognizes the team's achievements and their impact on the success of the Webb mission.

The Flight Operations Subsystem is vital for the James Webb Space Telescope's smooth and efficient functioning. Developed by Raytheon, its core software handles command and control, telemetry analysis, ground contact scheduling, observation plan management, and data retrieval for astronomers and the scientific community worldwide. In orbit, the ground control software monitors observatory health and performance, providing valuable insights to the Mission Operations team.

The team's technical skills, innovative approach and dedication in developing this subsystem contributed significantly to Webb's success in its groundbreaking discoveries, which will ultimately lead to new science and unlocking the mysteries of the universe.

"This team persevered through many extraordinary challenges over a long period of time to bring the JWST operations center into fruition, we are incredibly proud they received the NASA Group Achievement Award and are being recognized on a national level," said Sandy Brown, Raytheon Technologies vice president of Digital and Mission Solutions.

On May 24, 2023, Walt Burns, who served as the Raytheon Technologies Webb program manager from 2003 to 2022, accepted the award on behalf of the entire team at the 2022 NASA Honor Awards Ceremony held at Goddard Space Flight Center, Maryland.

After accepting the award, Burns said: "This recognition highlights NASA's appreciation for our team's exceptional efforts in developing the Flight Operations Subsystem for the James Webb Space Telescope. I want to express my gratitude to each member of the team for their creativity, perseverance and personal sacrifices that have ensured the FOS played a vital role in the mission's accomplishments."

The subsystem went operational on Dec. 25, 2022, during Webb's launch, providing 24 hour a day, seven days a week command and control capabilities. Currently, the Flight Operations Subsystem supports more than 200 international external users worldwide.



Sun-watching Proba-3 Formation Flyers Tested for Take-off

ESA's pair of Sun-watching Proba-3 satellites have been placed in take-off configuration, one on top of the other, for testing in simulated launch and space conditions at IABG in Germany, ahead of their planned lift-off next year. Proba-3 is made up of two satellites being launched together into orbit for a single mission. The pair will fly in precise formation relative to one another to cast a sustained shadow from the disk-faced 'Occulter' spacecraft to the 'Coronagraph' spacecraft, allowing the observation of the inner layers of the Sun's faint corona, or atmosphere, which are normally concealed by the brilliance of the solar disc.

The satellites were completed in the spring, and were then shipped to IABG for testing. IABG is one of a trio of European satellite test centres equipped with facilities to simulate every aspect of the space environment.

"Our first priority is to be sure the pair will endure launch stresses, so once the Coronagraph spacecraft was placed on top of the Occulter spacecraft the combined stack was put through 'sine' testing – where we put them on a shaker table to subject them to vibrations of steadily increasing frequency to identify any resonant frequencies that might cause damage," explains Alexandru Vargalui, Proba-3 structural engineer at ESA.

"Next came acoustic testing, where the spacecraft stack is blasted with noise levels representative of a launcher take-off."

Having established Proba-3's fitness to fly, the next step was to perform deployment mechanisms testing, trying out the systems that will separate the pair from their upper stage, and each other, as well as, crucially, the solar array drive mechanisms that will turn their solar panels towards the Sun, allowing them to charge up in orbit. The next test stage will be one unique to this mission, explains Damien Galano, Proba-3 project manager: "For the Proba-3 pair to maintain their positions relative to each other down to millimetre-level precision, they employ a range of guidance, navigation and control systems. We are taking advantage of the large amount of space available at IABG to test Proba-3's vision-based sensor system. This combines cameras on the Occulter spacecraft with bright LEDs on the Coronagraph spacecraft to allow them to find each other and estimate their distance apart.

"With this system designed to operate across up to 250 m between the two satellites, we need a wide space to test it – so we've previously made use of the main corridor of ESA's ESTEC technical centre in the Netherlands."

Following that test, Proba-3 will undergo more traditional 'thermal vacuum' testing – involving the satellites being operated in space-quality vacuum for a sustained period of time while also being exposed to orbital-style temperature extremes, space being a place where it is possible to be hot and cold at the same time, if parts of your structure are illuminated by sunlight while others are in shadow. Once the environmental campaign is complete, the satellite pair will return to Belgium to complete functional verification. Proba-3 is due to be flown by a PSLV launcher from India next year.



Ax-2 Astronauts Splash Down, Completing 2nd Private Mission to ISS

The Ax-2 crew aboard the SpaceX Dragon Freedom spacecraft safely splashed down off the coast of Florida at 11:04 p.m. EDT on May 30, 2023. The crew's return officially concludes the second all-private astronaut mission to the International Space Station (ISS). You can watch the replay of the splashdown at www.axiomspace.com.

The Ax-2 crew includes Axiom Space's Director of Human Spaceflight and Commander Peggy Whitson, a former NASA astronaut, Pilot John Shoffner, and Mission Specialists Ali Alqarni and Rayyanah Barnawi, from the Saudi Space Commission (SSC). Both are members of the inaugural Saudi national astronaut class.

The Ax-2 crew spent eight days aboard the ISS, orbited the Earth 126 times, and traveled 3,331,440 miles. During the mission, the Ax-2 crew conducted more than 20 research experiments and served as research subjects to better understand the impacts of microgravity on the human body, as well as established methods for the utility of novel technologies that could be used for future human spaceflight pursuits and improving life on Earth. Additionally, the crew carried out over 20 STEAM (science, technology, engineering, the arts, and math) engagements.

The Ax-2 mission made history on many fronts. Ax-2 was the first commercial mission with both private and government-sponsored astronauts. Peggy Whitson is now the first female commander of a private space mission, adding to her accomplishment as the first female commander of the ISS and standing record for the longest cumulative time in space by an American astronaut (674 days). Ali Alqarni and Rayyanah Barnawi are the first Saudi astronauts to visit the ISS and Rayyanah Barnawi is the first Saudi female to go to space. In addition, John Shoffner became the first person from the U.S. state of Alaska to fly to space.

Axiom Space is the commercial space industry's only full-service orbital mission provider, conducting end-to-end crewed missions to the International Space Station. Axiom Space's broad range of services includes training and flying private astronauts, access to training facilities and instructors, hardware and safety certification, and operational on-orbit management. Candidates for flight complete Axiom Space's rigorous training curriculum over many months in preparation to live and conduct meaningful work in space. The expert team at Axiom Space is helping nations and organizations build human spaceflight programs, develop astronaut selection programs, and provide the expertise needed to expand the international community of space explorers to a larger and more diverse representation of humanity.



Firefly Aerospace Announces Strategic Acquisition of Spaceflight to Bolster On-Orbit Services

Firefly Aerospace announced the acquisition of Spaceflight Inc. to strengthen Firefly's on-orbit solutions and service the entire lifecycle of customers' satellites and spacecraft. The acquisition further supports Firefly's robust portfolio of low-cost space transportation services, including responsive launch and in-space mobility, on-orbit hosting and servicing, and lunar delivery operations. Terms of the transaction were not disclosed.

"This acquisition is the result of Firefly's business plan to strengthen the company through organic growth in addition to accelerating its capabilities with strategic acquisitions," said Bill Weber, CEO of Firefly Aerospace. "The combination of Spaceflight's on-orbit experience with Firefly's launch vehicles, Blue Ghost landers, and Space Utility Vehicles is an overnight game changer for our customers and investors."

Spaceflight's flight-proven orbital vehicles provide payload deliveries, hosting, and transfer services. With extensive expertise in mission management and selling and filling manifests, the company has also supported the deployment of more than 460 payloads into space. Spaceflight operates manufacturing and payload processing facilities in Bellevue, Washington, including state-of-the-art clean rooms, environmental testing capabilities, and large high "With a high market demand for our on-orbit services and rapid response missions, this acquisition uniquely positions Firefly to respond immediately to our customers' needs," said Weber. "We look forward to welcoming this team into our incredible Firefly family!"

The addition of Spaceflight brings added capabilities that complement Firefly's vertically integrated product line, including launch, lunar, and in-space vehicles. Firefly's Alpha launch vehicle is manifested through 2023 with the U.S. Space Force, NASA, and other commercial customers, as the Company concurrently builds a new medium launch vehicle in collaboration with Northrop Grumman. Firefly's Blue Ghost lunar lander is scheduled to complete the first of two missions to the Moon next year with NASA as the anchor customer, and Firefly's Space Utility Vehicle has a mission scheduled early next year to demonstrate the vehicle's on-orbit capabilities.



Ariane 5 Flight VA261: Follow the Launch

Europe's Ariane 5 rocket is being prepared for its final flight. You can follow the launch live on ESA Web TV. Flight VA261 will lift off as soon as 16 June at 23:26 CEST, pending suitable conditions for launch.

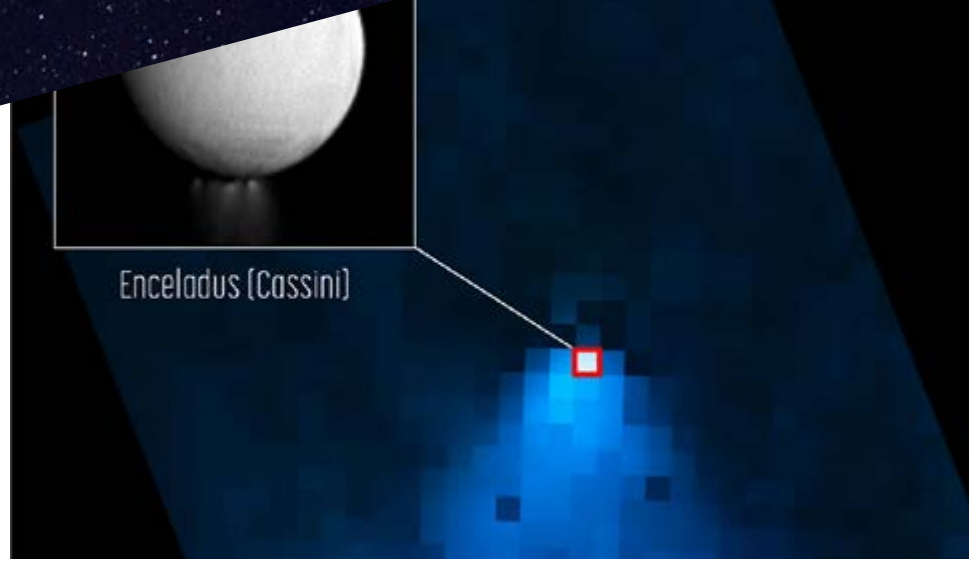
Broadcast begins 22:55 CEST/21:55 BST on ESA Web TV

Liftoff scheduled for 23:26 CEST/22:26 BST/21:26 UTC/18:26 Kourou

Flight VA261 will carry to space two payloads – the German space agency DLR's experimental communications satellite Heinrich Hertz and the French communications satellite Syracuse 4b.

The flight will be the 117th mission for Ariane 5, a series which began in 1996. Notable Ariane 5 payloads have included ESA's comet-chasing Rosetta, a dozen of Europe's Galileo navigation satellites – orbited with just three launches – and the NASA/ESA/CSA James Webb Space Telescope. Ariane 5's next-to-last launch sent ESA's Juice mission to Jupiter.

This heavy launcher more than doubled the mass-to-orbit capacity of its predecessor, Ariane 4, which flew from 1988 until 2003 as a favourite of the telecommunications industry with its need to put large payloads into very high geosynchronous orbits. Ariane 5's capacity enables it to orbit two large telecommunications satellites on a single launch, or to push large and heavy payloads into deep space.



Webb Maps Surprisingly Large Plume Jetting from Saturn's Moon Enceladus

A water vapour plume from Saturn's moon Enceladus spanning more than 9600 kilometres – long enough to stretch across the Eurasian continent from Ireland to Japan – has been detected by researchers using the NASA/ESA/CSA James Webb Space Telescope. Not only is this the first time such water ejection has been seen over such an expansive distance, but Webb is also giving scientists a direct look, for the first time, at how this emission feeds the water supply for the entire system of Saturn and its rings.

Enceladus, an ocean world about four percent the size of Earth at just 505 kilometres across, is one of the most exciting scientific targets in our Solar System in the search for life beyond Earth. Sandwiched between the moon's icy outer crust and its rocky core is a global reservoir of salty water. Geyser-like volcanoes spew jets of ice particles, water vapour, and organic chemicals out of crevices in the moon's surface informally called 'tiger stripes'.

Previously, observatories have mapped jets hundreds of kilometres long from the moon's surface, but Webb's exquisite sensitivity reveals a new story. The length of the plume was not the only characteristic that intrigued researchers. The rate at which the water vapour is gushing out, about 300 litres per second, is also particularly impressive. At this rate, you could fill an Olympic-sized swimming pool in just a couple of hours. In comparison, doing so with a garden hose on Earth would take more than 2 weeks.

The NASA/ESA/ASI Cassini mission spent over a decade exploring the Saturnian system, and not only imaged the plumes of Enceladus for the first time but flew directly through them and sampled what they were made of. While Cassini's position within the Saturnian system provided invaluable insights into this distant moon, Webb's unique view from the Sun-Earth Lagrange Point 2, 1.5 million kilometres from Earth, along with the remarkable sensitivity of its Integral Field Unit aboard the NIRSpec (Near-Infrared Spectrograph) Instrument, is offering new context.

The Webb observations directly demonstrate how the moon's water vapour plumes feed the torus, a fuzzy doughnut of water that is co-located with Saturn's E-ring. By analysing the Webb data, astronomers have determined that roughly 30 percent of the water stays within this torus, and the other 70 percent escapes to supply the rest of the Saturnian system with water.

In the coming years Webb will serve as the primary tool for observing the ocean moon Enceladus, and discoveries from Webb will help inform future Solar System satellite missions that will look to explore the depth of the subsurface ocean, how thick the ice crust is, and more. Building on discoveries made by Webb, as well as those made by ESA's Jupiter Icy Moons Explorer (Juice) mission, ESA is planning to get even closer to the icy moons of Jupiter and Saturn with future missions, to search for possible biosignatures.

Webb's observations of Enceladus were completed under Guaranteed Time Observation (GTO) programme 1250. The initial goal of this programme is to demonstrate the capabilities of Webb in a particular area of science and set the stage for future studies. The team's results were recently accepted for publication on 17 May in *Nature Astronomy*.



Handing over European Service Module for Artemis II

In the presence of one of the four Artemis astronauts that will rely on the European Service Module-2 for water, air, electricity, propulsion and temperature control on their two-week voyage around our Moon, ESA's European Service Module production manager Anthony Thirkettle and NASA's Orion programme manager Howard Hu signed the papers for the handover of the hardware at NASA's Kennedy Space Center in Florida, USA.

The European Service Module-2 will power the Orion spacecraft on the Artemis II mission that will see NASA astronauts commander Reid Wiseman, pilot Victor Glover, and mission specialists Christina Koch with Canadian Space Agency astronaut Jeremy Hansen complete flyby of the Moon and return to Earth.

The crew will fly Orion to 8889 km beyond the Moon before completing a lunar flyby and returning to Earth. The mission will take a minimum of eight days and will collect valuable flight test data, in the first time for over 50 years that humans have voyaged to our natural satellite.

The European Service Module has 33 thrusters, 11 km of electrical wiring, four propellant and two pressure tanks that all work together to supply propulsion and everything needed to keep the astronauts alive far from Earth – there is no room for error.

"The handover is a formality, but it is an important milestone for the programme. It could not have been achieved without the tremendous effort of all the teams involved," said Anthony, "ESA will continue to work closely with our NASA and industry colleagues on getting the Orion spacecraft ready for launch and throughout the Artemis II mission."

The European Service Module-2 will go through further tests before being connected to the Orion crew capsule later this year. The full spacecraft will then be put on track for the launchpad with fuelling and integration with NASA's mega Moon rocket SLS for a launch next year.



Rocket Lab to Launch Small Satellite Swarm for NASA

Rocket Lab USA, Inc. a global leader in launch services and space systems announced it has signed a deal to launch NASA's Starling mission, a multi-CubeSat mission to test and demonstrate autonomous swarm technologies, as well as automated space traffic management for groups of spacecraft in low-Earth orbit. The four Starling small satellites have been manifested on an Electron commercial rideshare mission scheduled for lift-off from Rocket Lab Launch Complex 1 in New Zealand in Q3 this year. Rocket Lab will deliver the satellites to space within three months of the contract signing.

The Starling mission is designed to test technologies to enable future "swarm" missions. Spacecraft swarms refer to multiple spacecraft autonomously coordinating their activities to achieve certain goals. Starling will explore technologies for in-space network communications, onboard relative navigation between spacecraft, autonomous maneuver planning and execution, and distributed science autonomy.

NASA's Small Spacecraft Technology program within the agency's Space Technology Mission Directorate manages the Starling project. The program is based at NASA's Ames Research Center in California's Silicon Valley. Starling joins a growing list of NASA missions launched by Rocket Lab since 2018, including the ELaN-19 educational CubeSat program, the CAPSTONE mission to the Moon, and two dedicated Electron launches for the NASA TROPICS mission.

“

Electron has been delivering rapid and reliable access to orbit for NASA since 2018 and we're delighted to continue that strong heritage with the Starling mission," said Rocket Lab founder and CEO Peter Beck. "Starling has the potential to revolutionize the way science is done in orbit and we're immensely proud to make that possible.

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A CONSORTIUM OF COMPANIES LED BY THALES ALENIA SPACE SIGNS CONTRACT WITH ITALIAN SPACE AGENCY FOR AN IN-ORBIT SERVICING DEMO MISSION

Thales Alenia Space, the joint venture between Thales (67%) and Leonardo (33%), has won a €235 million contract from the Italian Space Agency (ASI) to design, develop and qualify a spacecraft for a dedicated In-Orbit Servicing (IOS) demonstration mission. Thales Alenia Space is leading a Temporary Grouping of Companies regrouping Leonardo, Telespazio, Avio and D-Orbit.

The mission will be developed in the framework of the National Recovery and Resilience Plan (PNRR), with support from the Italian Space Agency. The demonstration mission will operate in low Earth orbit (LEO) and is set to be launched by 2026. A growing number of satellites are now circling the Earth to meet a wide range of requirements, from geolocation and connectivity, to weather forecasts, environmental monitoring and much more. Thales Alenia Space is therefore developing in-orbit servicing solutions to address the evolving needs of satellites in orbit.

“We are delighted that the Italian Space Agency chose the team of Thales Alen-

ia Space, Leonardo, Telespazio, Avio and D-Orbit to carry out this ambitious project that will make space more sustainable,” said Massimo Claudio Comparini, Senior Executive Vice President, Observation, Exploration, and Navigation at Thales Alenia Space. “This mission reflects the skills and experience of established players in complex space projects, coupled with the more agile approach provided by emerging space companies. By working together they will generate synergies that ensure the future viability of the space sector, while also developing all-Italian technologies to support the growth of the country’s space industry.”

The demonstration mission will test enabling technologies for future on-orbit servicing missions by performing a wide range of robotic operations on satellites already in orbit: refueling, component repair or replacement, orbital transfer and atmospheric re-entry. These operations will be executed thanks to a dexterous robotic arm, developed by Leonardo in collaboration with SAB Aerospace, the Italian National Institute for Nuclear Physics (INFN)

and the Italian Institute of Technology (IIT).

Telespazio, together with Altec, will be in charge of the demonstration mission Ground Segment design, development and validation. Space logistics company D-Orbit will manage all activities related to the target satellite platform, which is based on the company’s proprietary ION (In Orbit Now) platform, as well as the refueling system, with the transfer of a fluid from the servicer satellite to the target satellite.

Avio will carry out the design and development activities of the Orbital Support and Propulsion Module for the orbital stages. In Orbit Servicing vehicles represent a real paradigm shift, since they will introduce unrivaled system scalability and flexibility by providing in-orbit maintenance and upgrade possibilities – also changing the whole approach to satellite design. To meet this challenge, industry will call on its unrivaled multidisciplinary expertise spanning from launchers, satellite infrastructure, robotics, sensing and artificial intelligence up to atmospheric re-entry systems.



Airbus Selects UK National Satellite Test Facility for SKYNET 6A Testing

Airbus has selected the National Satellite Test Facility (NSTF) at Harwell in Oxfordshire to carry out the comprehensive test campaign on the UK Ministry of Defence's next generation secure communications satellite SKYNET 6A.

The £116 million government-funded NSTF, operated by experts from the STFC RAL Space (Science and Technology Facilities Council), will carry out the SKYNET 6A test campaign, including electromagnetic compatibility, as well as acoustic and thermal vacuum testing, to replicate the harsh conditions of space.

Richard Franklin, Managing Director of Airbus Defence and Space UK, said: "SKYNET 6A is designed and manufactured at our Stevenage and Portsmouth sites and will undergo its entire testing campaign at the new National Satellite Test Facility. It is fitting that the facility's first testing contract is for Britain's next generation SKYNET 6A, which will provide critical, secure-communications capability for our armed forces and will help further extend the UK's space ecosystem and capability."

Ian Annett, Deputy CEO at the UK Space Agency, said: "The National Satellite Test Facility is a significant addition to the UK's growing space infrastructure that will improve the support available for companies across the breadth of the UK space industry, which employ thousands of people across the country. The brand new facility, the first customer of which will be Airbus Defence and Space, will also help attract new businesses of all shapes and sizes to Harwell and the UK. This will catalyse investment and accelerate the development of new technologies for decades to come – from advanced satellite manufacturing to secure communications, navigation and Earth observation."

SKYNET 6A will be the first SKYNET miltatcom satellite to be entirely designed, built and tested in the UK. The programme involves a 500-strong team at Airbus and is being supported by more than 45 SMEs across the UK. This geostationary telecommunications satellite will provide secure communications services for the UK's armed forces around the world following its launch in 2025.



Spacex to Launch Vast's Commercial Space Station and 1st Human Spaceflight Mission

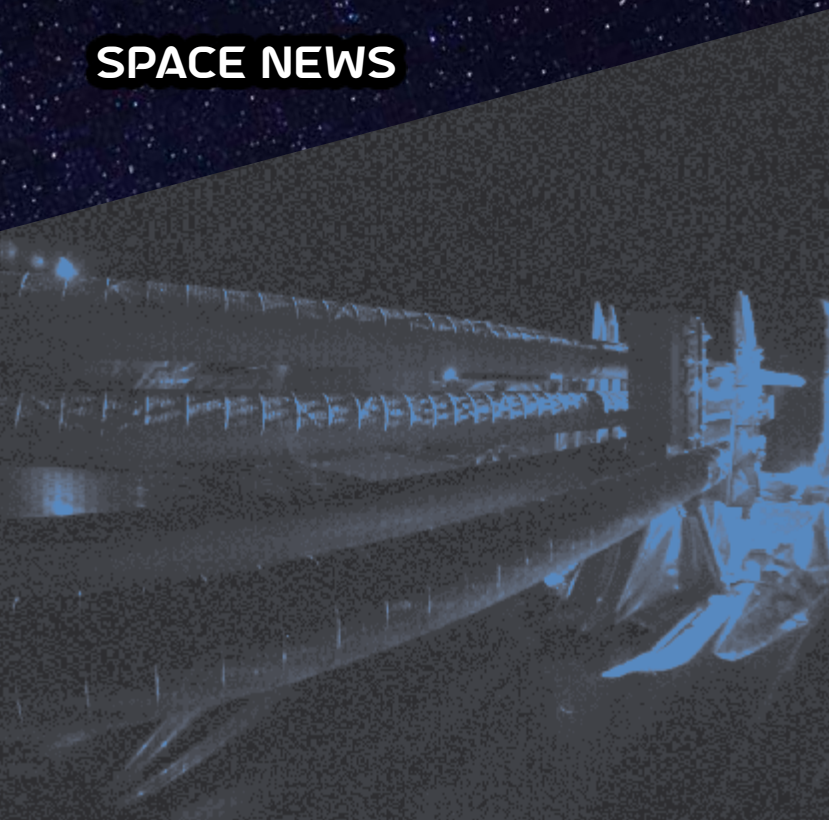
Vast announced that SpaceX will launch what is expected to be the world's first commercial space station, known as Vast Haven-1, quickly followed by two human spaceflight missions to said space station. Scheduled to launch on a Falcon 9 rocket to low-Earth orbit no earlier than August 2025. Haven-1 will be a fully-functional independent space station and eventually be connected as a module to a larger Vast space station currently in development.

Upon launch of Haven-1, Falcon 9 will launch Vast's first human spaceflight mission to the commercial space station, Vast-1. Dragon and its four-person crew will dock with Haven-1 for up to 30 days while orbiting Earth. Vast also secured an option for an additional human spaceflight mission to the station aboard a Dragon spacecraft.

The Vast-1 crew selection process is underway and the crew will be announced at a future date. Once finalized, SpaceX will provide crew training on Falcon 9 and the Dragon spacecraft, emergency preparedness, spacesuit and spacecraft ingress and egress exercises, as well as partial and full mission simulations including docking and undocking for return to Earth.

Vast's long-term goal is to develop a 100-meter-long multi-module spinning artificial gravity space station launched by SpaceX's Starship transportation system. In support of this, Vast will explore conducting the world's first spinning artificial gravity experiment on a commercial space station with Haven-1.

This new partnership between Vast and SpaceX will continue to create and accelerate greater accessibility to space and more opportunities for exploration on the road to making humanity multiplanetary.



Juice's RIME Antenna Breaks Free

More than three weeks after efforts began to deploy Juice's ice-penetrating Radar for Icy Moons Exploration (RIME) antenna, the 16-metre-long boom has finally escaped its mounting bracket. During the first attempt to extend the folded-up antenna, only the first segments of each half were deployed. Flight controllers suspected that a tiny stuck pin jammed the other segments in place.

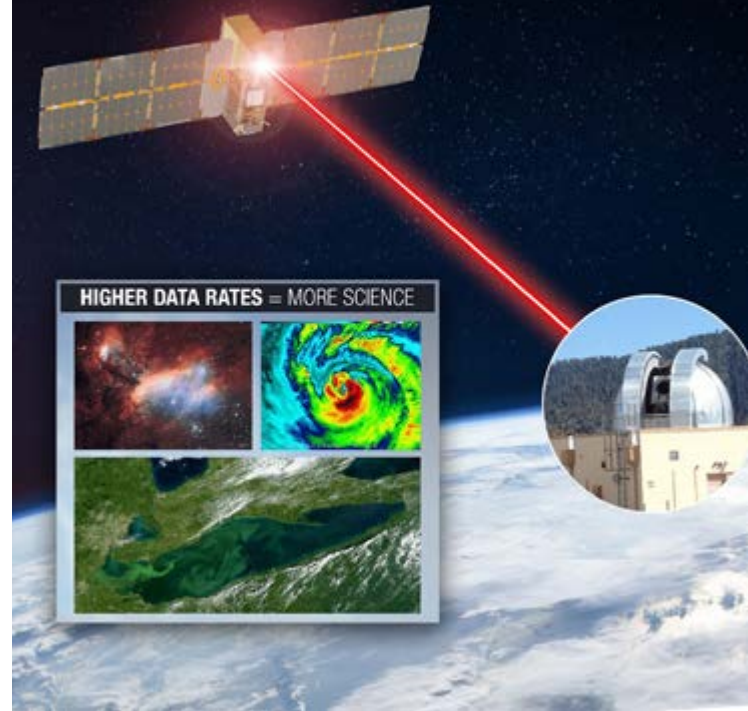
Fortunately, the flight control teams at ESA's mission control centre in Darmstadt had lots of ideas up their sleeves. To try to shift the pin, they shook Juice using its thrusters, then they warmed Juice with sunlight. Every day the RIME antenna was showing signs of movement, but no full release.

On 12 May RIME was finally jolted into life when the flight control team fired a mechanical device called a 'non-explosive actuator' (NEA), located in the jammed bracket. This delivered a shock that moved the pin by a matter of millimetres and allowed the antenna to unfold.

The 2nd image shows the mechanical shock delivered by the firing of the actuator in the mounting bracket. The actuator was fired at the moment labelled 'NEA 6 Release'. The resulting damping oscillation indicates that the antenna is released and then wobbles back and forth before stabilising into an extended, locked position.

But a final part of the antenna remained folded. Confirmation that the RIME antenna was successfully deployed came only when the flight control team fired another actuator in the bracket, causing RIME to fully stretch itself out after months spent folded up for launch.

Once ESA's Jupiter Icy Moons Explorer (Juice) arrives at Jupiter, it will use RIME to study the surface and subsurface structure of Jupiter's icy moons down to a depth of 9 km. RIME is one of ten instruments on board Juice set to investigate the emergence of habitable worlds around gas giants and the formation of our Solar System.



Terran Orbital-Developed PTD-3 Enables 200 Gigabits per Second Space-to-Ground Optical Link

Terran Orbital Corporation a global leader in satellite-based solutions primarily serving the aerospace and defense industries announced the Terran Orbital-developed Pathfinder Technology Demonstrator 3 (PTD-3) satellite enabled a successful 200 gigabits per second space-to-ground optical link. The NASA satellite hosts the TeraByte InfraRed Delivery (TBIRD) payload funded by NASA Space Communications and Navigation (SCaN) and developed by MIT Lincoln Laboratory.

With a transmission rate of multiple orders of magnitude faster than current state-of-the-art satellite communications, this technology enables spacecraft to downlink several terabytes of data to the ground in a single ground station pass. This breakthrough has the potential to revolutionize the space-based earth observation and synthetic aperture radar industries, among others, by offering a space-demonstrated solution to the data throughput bottlenecks that have historically limited their capabilities.

Previously, Terran Orbital aided TBIRD's data transmission of 1.4 terabytes of test data to a single ground station in a pass that lasted less than five minutes – a record breaker at the time in terms of both speed and data transmission quantity. The 200 gigabits per second space-to-ground optical link broke this record.

"The completion of the 200 gigabits per second link is both monumental and record-breaking," said Terran Orbital Co-Founder, Chairman, and Chief Executive Officer Marc Bell. "Terran Orbital is honored to have worked alongside NASA on this groundbreaking mission and is grateful to MIT Lincoln Laboratory for creating the payload. We look forward to working with NASA and MIT Lincoln Laboratory on future satellites as we continue to make record-breaking in space commonplace."



AEOLUS' FIERY DEMISE TO SET STANDARD FOR SAFE REENTRY

ESA's wind mission, Aeolus, will soon be lowered in orbit leading to its fiery reentry and burn-up through Earth's atmosphere. ESA's efforts to ensure a safe return go well beyond international standards and place the Agency in the lead for space safety. Having exceeded its planned life in orbit, the 1360-kg satellite is running out of fuel. Ensuring that enough fuel remains for a few final manoeuvres, ESA's spacecraft operators will bring Aeolus back towards our planet's atmosphere for its inevitable demise.

They will aim the mission towards the ocean, further reducing the very small chance that fragments could cause harm should any reach Earth's surface. This is the first assisted reentry of its kind and sets a precedent for a responsible approach to reduce the ever-increasing problem of space debris and uncontrolled reentries.

Why is Aeolus coming home? : Launched in 2018, Aeolus has outlived its planned three-year life in space by more than 18 months. During its mission, its trailblazing wind-mapping laser, which at one stage was thought a nigh-impossible feat of engineering, has significantly improved weather forecasts worldwide.

Aeolus has been hailed as one of the most successful missions ever built and

flown by ESA. As an Earth Explorer research mission, it was designed to demonstrate new space technology, but it became one of the highest impact-per-observation weather satellites, and its laser is still performing as well as ever. However, Aeolus' fuel is now almost depleted and orbiting low, at an altitude of just 320 km, means it is already being caught up by Earth's wispy atmosphere.

Speeding up Aeolus' return is the Sun: Solar flares and coronal mass ejections release matter and radiation, and when this washes past Earth, it increases the density of Earth's atmosphere. Intense solar activity in recent months means that the satellite has been using even more fuel to remain in orbit. For Aeolus, it's been like running against the wind. This is why, after five years of spectacular science, ESA's wind mission ended operations on 30 April 2023.

Making use of this phase, scientists have put its instrument into a special mode to perform end-of-life activities that will help to prepare the Aeolus-2 follow-on mission, which like a phoenix will emerge from the ashes of its pathfinding predecessor.

Aeolus' final breaths: Over the next few months, Aeolus will descend naturally from its current altitude of 320 km to 280 km. At this point, spacecraft operators at ESA's mis-

sion control centre, ESOC, in Darmstadt, Germany, will gradually lower it to 150 km above Earth's surface. The satellite will burn up as it descends to around 80 km.

As populated regions make up a relatively small percentage of Earth's surface, the chance of a re-entry causing any harm is exceptionally low. The final date depends on how solar activity speeds up the process, but Aeolus is expected to be no more before the end of August.

Aeolus engineers and industry partners have carefully worked out how to best position Aeolus in Earth's atmosphere to target open ocean waters upon reentry, hugely reducing the amount of land over which pieces fragments could fall. ESA's Aeolus Mission Manager, Tommaso Parrinello, said, "The exact details on the reentry approach and series of manoeuvres and operations, as well as a more detailed timeline will be made public in mid-June.

"For now, we can anticipate that we are targeting the best ocean corridor to reenter."

With the assisted reentry of Aeolus, ESA is clearing the way for future missions to continue taking the pulse of our planet. They can only do this if Earth's orbits aren't filled with dangerous space debris, and safety is at the forefront of end-of-life activities.

NASA'S WEBB SPACE TELESCOPE PEERS BEHIND BARS

A delicate tracery of dust and bright star clusters threads across this image from the James Webb Space Telescope. The bright tendrils of gas and stars belong to the barred spiral galaxy NGC 5068, whose bright central bar is visible in the upper left of this image – a composite from two of Webb's instruments. NASA Administrator Bill Nelson revealed the image Friday during an event with students at the Copernicus Science Centre in Warsaw, Poland.

NGC 5068 lies around 20 million light-years from Earth in the constellation Virgo. This image of the central, bright star-forming regions of the galaxy is part of a campaign to create an astronomical treasure trove, a repository of observations of star formation in nearby galaxies. Previous gems from this collection can be seen here (IC 5332) and here (M74). These observations are particularly valuable to astronomers for two reasons. The first is because star formation underpins so many fields in astronomy, from the physics of the tenuous plasma that lies between stars to the evolution of entire galaxies.

By observing the formation of stars in nearby galaxies, astronomers hope to kick-start major scientific advances with some of the first available data from Webb.

The second reason is that Webb's observations build on other studies using telescopes including the Hubble Space Telescope and ground-based observatories. Webb collected images of 19 nearby star-forming galaxies which astronomers could then combine with Hubble images of 10,000 star clusters, spectroscopic mapping of 20,000 star-forming emission nebulae from the Very Large Telescope (VLT), and observations of 12,000 dark, dense molecular clouds identified by the Atacama Large Millimeter/submillimeter Array (ALMA). These observations span the electromagnetic spectrum and give astronomers an unprecedented opportunity to piece together the minutiae of star formation.

With its ability to peer through the gas and dust enshrouding newborn stars, Webb is particularly well-suited to explore the

processes governing star formation. Stars and planetary systems are born amongst swirling clouds of gas and dust that are opaque to visible-light observatories like Hubble or the VLT. The keen vision at infrared wavelengths of two of Webb's instruments — MIRI (Mid-Infrared Instrument) and NIRCам (Near-Infrared Camera) — allowed astronomers to see right through the gargantuan clouds of dust in NGC 5068 and capture the processes of star formation as they happened. This image combines the capabilities of these two instruments, providing a truly unique look at the composition of NGC 5068.

The James Webb Space Telescope is the world's premier space science observatory. Webb will solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and the Canadian Space Agency.



“In the past we’ve seen objects in the main-belt with all the characteristics of comets, but only with this precise spectral data from Webb can we say yes, it’s definitely water ice that is creating that effect,” explained astronomer Michael Kelley of the University of Maryland, lead author of the study.



WEBB FINDS WATER, AND A NEW MYSTERY, IN RARE MAIN-BELT COMET

The NASA/ESA/CSA James Webb Space Telescope has enabled another long-sought scientific breakthrough, this time for Solar System scientists studying the origins of the water that has made life on Earth possible. Using Webb’s NIRSPEC (Near-Infrared Spectrograph) instrument, astronomers have confirmed gas – specifically water vapour – around a comet in the main asteroid belt for the first time, proving that water from the primordial Solar System can be preserved as ice in that region. However, the successful detection of water comes with a new puzzle: unlike other comets, Comet 238P/Read had no detectable carbon dioxide.

“Our water-soaked world, teeming with life and unique in the universe as far as we know, is something of a mystery – we’re not sure how all this water got here,” said Stefanie Milam, Webb Deputy Project Scientist for Planetary Science and a co-author on the study reporting the finding. “Understanding the history of water distribution in the Solar System will help us to understand other planetary systems, and if they could be on their way to hosting an Earth-like planet,” she added.

Comet Read is a main-belt comet – an object that resides in the main asteroid belt

but which periodically displays a halo, or coma, and tail like a comet. Main-belt comets themselves are a fairly new classification, and Comet Read was one of the original three comets used to establish the category. Before that, comets were understood to originate in the Kuiper Belt and Oort Cloud, beyond the orbit of Neptune, where their ices could be preserved farther from the Sun. Frozen material that vaporises as they approach the Sun is what gives comets their distinctive coma and streaming tail, differentiating them from asteroids. Scientists have long speculated that water ice could be preserved in the warmer asteroid belt, inside the orbit of Jupiter, but definitive proof was elusive – until Webb.

“With Webb’s observations of Comet Read, we can now demonstrate that water ice from the early Solar System can be preserved in the asteroid belt,” Kelley said.

The missing carbon dioxide was a bigger surprise. Typically carbon dioxide makes up about 10 percent of the volatile material in a comet that can be easily vapourised by the Sun’s heat. The science team presents two possible explanations for the lack of carbon dioxide. One possibility is that Comet Read did have carbon dioxide when it formed, but has lost that because of

warm temperatures.

“Being in the asteroid-belt for a long time could do it – carbon dioxide vaporises more easily than water ice, and could percolate out over billions of years,” Kelley said. Alternatively, he said, Comet Read may have formed in a particularly warm pocket of the Solar System, where no carbon dioxide was available.

The next step is taking the research beyond Comet Read to see how other main-belt comets compare, says astronomer Heidi Hammel of the Association of Universities for Research in Astronomy (AURA), lead for Webb’s Guaranteed Time Observations for Solar System objects and co-author of the study. “These objects in the asteroid belt are small and faint, and with Webb we can finally see what is going on with them and draw some conclusions. Do other main-belt comets also lack carbon dioxide? Either way it will be exciting to find out,” Hammel said.

Co-author Milam imagines the possibilities of bringing the research even closer to home. “Now that Webb has confirmed there is water preserved as close as the asteroid belt, it would be fascinating to follow up on this discovery with a sample collection mission, and learn what else the main-belt comets can tell us.”



Raytheon Technologies and SpiderOak Collaborate to Secure Satellite Communications in Proliferated Low-Earth Orbit

Raytheon Technologies BBN division and SpiderOak announced a strategic partnership to develop and field a new generation of zero-trust security systems for satellite communications in proliferated low-Earth orbit, or pLEO.

Spider Oak's Orbit Secure solution will be combined with Raytheon BBN's Distributed, Disrupted, Disconnected and Denied (D4) secure cloud solution to ensure resilience of mesh networks in contested environments.

"This partnership is paving the way toward secure, on-demand, Geostationary Equatorial Orbit network-like pLEO communications," said Raytheon BBN President Jason Redi. "Raytheon's networking technology ensures that the satellite constellation provides the best routing solution during normal operation, while also dynamically supporting autonomous cross-link routing during disrupted environments. SpiderOak's technology allows us to maintain distributed secure operations with high efficiency, particularly when the constellation is reconfiguring and paths are not preplanned."

"This cooperative effort reflects a common vision for a disruption-tolerant space networking future, which will be important for all mesh networks, and absolutely vital for the future of battle management command and control," said Charles Beames, SpiderOak executive chairman.

The combined solution can be applied across multi-vendor constellations despite orbital or malicious dynamics and will provide maximum resilience and efficiency in difficult or hostile operating environments. This includes cyber and kinetic threats that require on-orbit network and network function redundancy and flexibility.

During this one-year effort, Raytheon, Raytheon BBN, SEAKR Engineering, and SpiderOak will integrate the capability developed during phase one into space-qualified hardware with the goal of making it flight-ready.



Rocket Lab Launches New Constellation-Class Star Tracker

Rocket Lab USA, Inc. a global leader in launch services and space systems announced a new class of star tracker, the ST-16HV, is now available for commercial use, expanding the Company's Space Systems catalogue of products for the global satellite market.

The new ST-16HV star tracker is an attitude determination sensor based on Rocket Lab's existing high-performance ST-16RT2 star tracker that has been evolved for mass manufacturing. The change results in a more affordable star tracker that is mass producible to meet the short lead time needs of both commercial and government satellite constellation projects.

By using the same electronics and electrical interface and much of the same mechanical design as the heritage star tracker, the ST-16HV can be used in its place as a responsive small satellite solution, especially for satellites and constellations in low Earth orbit.

"Rocket Lab's Space Systems Division has made tremendous strides in developing new technology and products and the new ST-16HV star tracker is the latest to join a long list of reliable and trusted space components," said Brad Clevenger, Vice President, Space Systems. "This new mass-produced star tracker will be a game changer in fulfilling the growing demand from satellite constellation customers and will be made at the Sinclair by Rocket Lab facility where we already mass produce reaction wheels."

The ST-16HV star tracker is the latest new satellite component announced in 2023, after the Frontier-X satellite radio and constellation-class 12Nms reaction wheel assembly were released in February.

The ST-16HV star tracker joins the Company's existing heritage space systems components including reaction wheels, separation systems, radios, flight software, ground software, and solar power solutions. Rocket Lab has more than 100 star trackers on orbit, including on the Defense Advanced Research Projects Agency's (DARPA) Mandrake 1 and Mandrake 2 satellites and Rocket Lab's in-house designed and built Lunar Photon spacecraft which supported NASA's Artemis program that delivered the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) CubeSat to orbit the Moon.



DISH TV Adding to Fleet with New Maxar Satellite Order

Maxar Technologies provider of comprehensive space solutions and secure, precise, geospatial intelligence, received an order for a direct broadcast satellite from DISH, designated ES XXV. This geostationary (GEO) communications satellite will be operated by DISH and deliver content across North America.

ES XXV will be built on the proven Maxar 1300TM series platform at the company's manufacturing facilities in Palo Alto and San Jose, California. ES XXV will be equipped with a high-power, multi-spot beam payload, allowing DISH to provide high-quality content to its customers. A high-resolution render of the spacecraft is available here.

"The GEO market remains important, and Maxar's experience delivering value for our customers continues to be a key focus," said Chris Johnson, Maxar's Senior Vice President and General Manager of Space. "We offer scalable platforms to support a variety of missions, and we're proud to continue that legacy with this new order."

ES XXV joins a fleet of Maxar spacecraft in orbit. Since 1999, Maxar has manufactured 11 satellites for DISH TV's fleet, including several of the largest commercial satellites ever built.



Boeing Delivers Powerful Satellite Platform to Viasat

Boeing delivered the most powerful satellite platform the company has built to date, the 702MP+, and a custom-designed spacecraft for network provider Viasat.

"Working with Boeing, we're very excited to complete the ViaSat-3 Americas and bring us one step closer to providing higher speeds, more bandwidth, and greater value to our customers on a global scale whether they be on land, on the sea, or in the air," said Dave Ryan, president Space & Commercial Networks, Viasat. "The innovation of this satellite allows us new levels of flexibility to dynamically allocate capacity to the most attractive and engaged geographic markets."

Upon embarking from the Boeing factory in California, ViaSat-3 Americas was flown to the Florida Space Coast where Boeing and Viasat teams will support launch and mission operations as the spacecraft prepares to travel to geostationary orbit, approximately 22,000 miles from Earth. Once in orbit, ViaSat-3 Americas will be the first of three 702MP+ satellites to make up the ultra-high-capacity ViaSat-3 satellite constellation, designed to provide high-quality, affordable global connectivity and coverage.

"We designed, built and delivered the most powerful satellite platform we have ever provided to a customer. The result really is an engineering marvel," said Michelle Parker, vice president of Space Mission Systems at Boeing Defense, Space & Security. "We expanded the boundaries of our design and the platform components to exceed Viasat's demanding mission requirements, while ensuring alignment with Boeing's proven qualification and reliability standards."

Based on the flight-proven 702 vehicle design hosting the U.S. Department of Defense's Wideband Global Satellite (WGS) constellation, and more than 40 other high-performing satellites, including ViaSat-2, Boeing's 702MP+ features all-electric propulsion for the first time aboard a 702MP, providing more sustained thrust and efficiency.

Boeing improved the platform's structure to support Viasat's large payload. The platform also accommodates the largest commercial satellite solar arrays Boeing-subsiary Spectrolab has ever produced, along with batteries and supporting electronics, which generate well over 30 kW of solar power.

The satellite has some of the largest reflectors ever sent to space and will be significantly larger than most geostationary satellites, requiring highly-refined, highly reliable hardware and software to maintain optimal satellite control. In addition to designing and manufacturing the platform, Boeing worked with Viasat to integrate the payload.



Spacepreneur Magazine editor Bethireddy Kartikeya in conversation with

MR. RADHAKRISHNAN DURAIRAJ, CHAIRMAN & MANAGING DIRECTOR NEW SPACE INDIA LIMITED (NSIL).

Q What are the key objectives of the NSIL? What are the new initiatives have been implemented so far since Reforms inception?

A NSIL got established during March 2019 as a fully owned Govt. of India company under Department of Space (DOS). Since Space Sector announced by Govt. of India during June 2020, NSIL mandate got significantly

enhanced. NSIL has the mandate to own, build and operate satellites; build launch vehicles ; build satellites for users; provide launch services ; provide satellite based services ; provide mission support services ; transfer of ISRO developed technologies to Indian Industry.

NSIL has made inroads in all its business verticals. Most significant achievements of

the company has been:

1) NSIL contracting with HAL and L&T consortia for end-to-end building of 5 nos of Polar Satellite Launch Vehicle (PSLV) through them. 1st fully industry produced launch vehicle would be ready during 1st half of 2024 and ISRO has been extending all support to Indian Industry in this regard.

2) NSIL as part of its mandate



has undertaken its 1st Demand Driven communication satellite mission GSAT-24 for meeting the DTH needs of M/s Tata Play. Entire mission has been funded and invested by NSIL

3) NSIL has sought orders from users for building communication satellites and earth observation satellite platforms through ISRO

4) NSIL has secured several dedicated launch service contracts for launching international customer satellites on-board PSLV and GSLV-MkIII (LVM3). As on date it has launched 50 plus international customer satellites on-board PSLV and 72 international customer satellites on-board GSLV-MkIII

5) NSIL presently owns 11 in-

orbit communication satellites and provides services to various user's for meeting the TV, DTH, VSAT, DSNB and other application needs

6) NSIL has transferred ISRO's small satellite BUS technology IMS-1 to Indian Industry partners

Q How India's space agency is capitalising on space sector growth in the next 3-5 years?

A NSIL through its commercial engagements with Indian and International users is enhancing the growth of space sector in the country. We envisage through our initiative to increase the participation of Indian Industry in end-to-end space related activities, the launch vehicle and satellite building capability of

Indian Industry would go to next level in the coming years.

Q What are the End-to-End Activities Providing by Nsil?

A NSIL is into end-to-end commercial space business. We undertake projects which involves right from design and building of satellites to providing launch service solutions leading to in-orbit delivery and in-orbit operational and maintenance related mission support until end-of-life of missions. In addition, we can also support end-to-end establishment of Ground Segment for the users.

Q How many commercial missions planned for next two years?



A This year we have already done 2 commercial missions using PSLV and GSLV-MkIII, we plan to undertake 2 more commercial launches during this year. Next year as of we have plans to undertake 2-3 commercial launches for our customers.

Q **How is the current competitive landscape of the space sector? What role can the private sector play in India's space journey?**

A Global Space economy is primarily driven by the downstream applications. India has the strength in meeting both the upstream and downstream requirements of the space sector. With the opening up of space sector in India, the upstream capability in



private industry would grow and become more stronger and reliable. We envisage Indian Rockets and Satellites would play a greater role in meeting Indian and International space needs.

Q **How NSIL is supporting startups? What is your message to youngsters who wish to be spacepreneur?**

A NSIL is in the forefront to support the growth of

Indian Industry. As mentioned we have already enabled private Indian Industry to undertake end-to-end manufacturing of PSLV rockets and we have plans to get the GSLV-MkIII (LVM3) built fully through Indian Industry under a partnership model. We are also exploring options to enable Indian private space start-ups in building smaller satellites for meeting the observational needs of the country.

As we mentioned, there is lot of revenue potential that exists in downstream part of space business, the space entrepreneurs should work towards tapping that market potential.



sistent surveillance. Additionally, the scalable and versatile design provides a new level of flexibility and the necessary power to quickly meet a wide range of customer needs and missions, including accelerating demand for more proliferated systems. The spacecraft also benefits from production capabilities such as augmented and virtual reality and artificial intelligence. With increased commonality, LM 400 reduces schedule and cost while also maintaining quality.

The multi-mission satellite offers:

- Versatility that can host a variety of payloads with limited or no changes in low, medium and geosynchronous earth orbits.
- Broad set of missions with pre-defined trim packages to meet specific mission needs.
- Joint all-domain operations and joint all-domain command and control with a Modular Open Systems Architecture.
- Greater mission adaptability and onboard «Edge» data processing with SmartSat™, Lockheed Martin's software-defined satellite architecture.
- High-rate production capability to meet large constellation needs.
- Cost and schedule efficiency enabled by supply chain agreements and automation throughout the product lifecycle, from inventory management to manufacturing and test.
- “The LM 400's digital design allows for multiple versions to be seamlessly produced – including a ‘flat satellite’ that will support rapid launching of up to six stackable space vehicles at a time,” adds Musawwir. “These types of 21st Century Security agile deterrence capabilities will provide our customers with maximum flexibility for their missions.”
- The LM 400 is already under several contracts, most recently being named as a satellite bus supporting U.S. Space Force's planned Missile Track Custody program in medium earth orbit.
- When launched, the LM 400 will feature a Lockheed Martin-produced Electronically Steered Array.

Lockheed Martin's First LM 400 Multi-Mission Space Vehicle Completes Demanding Testing Milestone

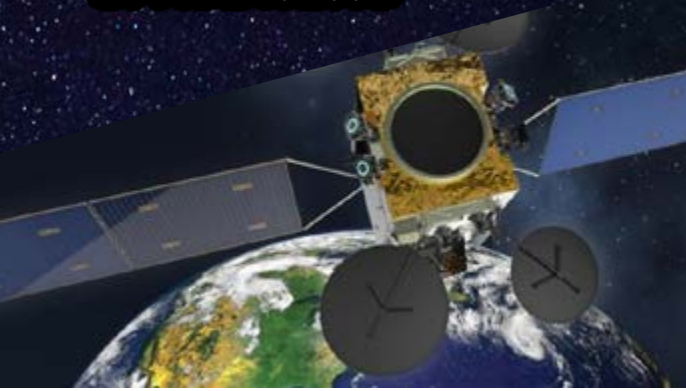
The first Lockheed Martin LMT LM 400, a versatile, mid-sized satellite which can be adapted for military, civil or commercial uses, has successfully completed Electromagnetic Interference/Electromagnetic Compatibility testing. This trial is crucial to ensure that signals from the satellite bus components will not interfere with critical payloads during operations. The spacecraft, which finished assembly in December, is also working toward completion of rigorous thermal vacuum (TVAC) testing.

“This successful testing of LM 400

helps prove the satellite's design integrity and operational capabilities,” said Malik Musawwir, Lockheed Martin Space's satellite center of excellence vice president. “This is a significant accomplishment for this new satellite and the space vehicles that will leverage this platform from our advanced digital LM 400 production line.”

LM 400 Spacecraft: Higher Power, More Mission Flexibility

The agile LM 400 spacecraft enables one platform to perform multiple missions, including remote sensing, communications, imaging, radar and per-



NRO Exercises Radio Frequency Contract Option with Maxar

Maxar Technologies provider of comprehensive space solutions and secure, precise, geospatial intelligence announced that Aurora Insight Inc., a company acquired by Maxar in December 2022, has received a Stage II contract extension from the National Reconnaissance Office (NRO) for commercial radio frequency (RF) remote sensing.

Aurora Insight, now part of Maxar's Earth Intelligence business, was previously awarded the NRO's Strategic Commercial Enhancements Broad Agency Announcement (BAA) Framework Stage I contract, which focused on the modeling and simulation of its capabilities to support the U.S. government's current and future commercial RF reconnaissance needs. The Stage II option provides Maxar the opportunity to demonstrate real-world performance of its commercial RF constellation to support U.S. government missions.

Maxar will demonstrate how space-based mapping of the world's RF environment can enhance and augment existing capabilities. Maxar's RF measurements span a wide range of frequencies that include LTE, 5G, satellite communications, radars, GPS and other types of signals, and these measurements are being applied to commercial and government use cases. The Stage II award is an important step in getting commercial RF data to U.S. government users.

"We are honored to have the opportunity to demonstrate the value of commercial RF data to support key U.S. government mission needs," said Tony Frazier, Maxar's Executive Vice President and General Manager, Public Sector Earth Intelligence. "We are particularly excited to integrate RF capabilities with our industry-leading satellite imagery, 3D data, and analytics."

Jennifer Alvarez, co-founder and former CEO of Aurora Insight, who now leads Maxar's RF solutions program, is scheduled to speak on the topic of "Radio Frequency Data – the Soundtrack to a Silent Movie" at the GEOINT 2023 Symposium, taking place May 21-24 in St. Louis, Missouri.



Hughes Introduces Smart Network Edge Software for Mission-Critical DoD Communications

Hughes Network Systems, LLC (HUGHES), an EchoStar company, announced availability of Hughes Smart Network Edge software for defense network operations. Leveraging the company's experience managing widely distributed, multi-transport networks for commercial and government customers, the Hughes Smart Network Edge serves as a virtualized SD-WAN router, interconnecting at the management layer to enable network interoperability across carriers and vendors while meeting U.S. Department of Defense (DoD) security criteria.

Optimizing any combination of commercial and military communication networks – including cable, fiber, 5G, Geostationary satellite and Low Earth Orbit satellite – the Hughes Smart Network Edge remotely manages multi-transport modems, autonomously selecting routing paths and distributing packetized data across multiple networks based on policies and priorities. The software also collects Fault, Configuration, Accounting, Performance and Security (FCAPS) data for enhanced situational awareness and policy refinement.

"Hughes Smart Network Edge represents the culmination of years of work we've undertaken to help the DoD take advantage of equipment and transports from multiple providers combined with our extensive expertise managing large and diverse networks," said Rick Lober, vice president and general manager, Defense & Government Systems Division, Hughes. "It's software-defined networking in the very broadest sense, orchestrating typically stove-piped communications systems in use across the DoD to enable secure network interoperability and resiliency at scale."

Based on Simple Network Management Protocol (SNMP) and HTTP standards, among others, the Hughes Secure Network Edge is engineered for use across diverse network transports from multiple manufacturers and carriers of wired, wireless and satellite connectivity—such as the 5G and satellite terminals in the private 5G deployment Hughes is leading at the Naval Air Station in Whidbey Island. In addition to commercial satellite transports, the Smart Network Edge accommodates modems with anti-jam capabilities that are indispensable under rising threats from near peer states.

"As the DoD relies increasingly on redundant and interoperable terrestrial and satellite networks for mission-critical communications, our Smart Network Edge software automates the decision-making necessary to optimize the edge devices – whether a few or a few hundred," said Dr. Rajeev Gopal, vice president, Advanced Systems, Hughes. "In addition to powering decision-making across network terminals, the software integrates with management platforms, such as Enterprise Management & Control, and includes policy parameters such as cost, availability, speed and latency to meet operational objectives."



Airbus wins contract from Angola for Earth observation satellite Angeo-1

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SES's Fourth and Fifth C-band Satellites for the United States Successfully Launched

SES announced that the SES-18 and SES-19 satellites, designed and assembled by Northrop Grumman, were successfully launched by SpaceX's Falcon 9 rocket from Cape Canaveral Space Force Station in Florida, United States, at 7:38 pm local time on Friday, March 17.

The two American-made satellites are the fourth and fifth – and final – satellites to be launched as part of SES's C-band transition plan, following the launch of SES-22 in June 2022 and the tandem launch of SES-20 and SES-21 in October 2022. These satellites are essential parts of SES's plan to achieve the Federal Communications Commission's (FCC) program to clear C-band spectrum to enable wireless operators to deploy 5G services across the contiguous U.S. (CONUS) while ensuring that SES's existing customers continue to enjoy uninterrupted TV, radio, and critical data transmission services to millions of Americans.

Since 2020, SES, along with other satellite operators, has been clearing 300 MHz of C-band spectrum and transitioning customer services to the remaining allocated 200 MHz of spectrum by launching new satellites, building new ground stations and sending hundreds of satellite earth station technicians across the country to install new filters on customers' antennas.

By providing contractual service protections to customers who receive video services in the U.S., SES-18 and SES-19 will enable SES to safely clear C-band spectrum to help accomplish the FCC's ambitious goals for American 5G innovation. SES-18 is expected to begin operations in June 2023 at 103 degrees West replacing SES-3 C-band payload and SES-19 will be co-located with SES-22 at 135 degrees west.

"This successful launch marks one of the last remaining milestones on our journey to clear a portion of the C-band, and we are incredibly grateful to Northrop Grumman, SpaceX, and all of our partners who helped make this plan a reality," said Steve Collar, CEO of SES. "We are now on the home stretch in protecting our customers' broadcasts while freeing crucial 5G spectrum and we look forward to successfully concluding our work well before the FCC's December 2023 accelerated clearing deadline."



Hughes Launches New HughesNet Plans for Small Businesses

Hughes Network Systems, an EchoStar company announced new HughesNet® plans for small businesses in the U.S. The new satellite internet service plans include features like business-grade support, express repair and free installation to support the needs of small businesses for network availability and high performance. The plans also include low-latency HughesNet Fusion™ plans that seamlessly blend Geostationary (GEO) satellite and wireless technologies into a fast and responsive satellite internet experience, ideal for business applications like Teams, Zoom and Outlook.

“Late last year, we introduced HughesNet Fusion to the consumer market, offering rural Americans a high-speed, low-latency reliable internet service,” said Doug Medina, vice president, Hughes. “Now, we’re bringing the same multipath technology to the small business market, so companies beyond the reach of fiber and cable internet can choose the HughesNet plan that best meets their needs.”

HughesNet business plans come with built-in Wi-Fi, fast 25 Mbps download speeds, free professional installation and, for peace of mind, they also include premium repair service.

“For people working from home or running a small business, internet access is nothing short of essential,” added Medina. “That’s why we enhanced our HughesNet business plans with new features and plans that keep businesses connected to the critical applications they depend on.”



Maxar Rebrands Spacecraft Portfolio, Forming Flexible Family That Fits Any Mission

Maxar Technologies provider of comprehensive space solutions and secure, precise, geospatial intelligence announced a rebranded lineup of spacecraft platforms that reflects Maxar’s broad manufacturing capabilities and continuing investment to serve evolving commercial, civil and national security space missions.

The portfolio, which includes Maxar 300™ series, Maxar 500™ series and Maxar 1300™ series buses, reinforces Maxar’s 60-plus years of satellite manufacturing leadership. These flexible platforms are designed to serve a variety of missions, ranging from proliferated low Earth orbit constellations to multi-orbit systems.

“Customers can come to us with a wide array of critical missions, and our spacecraft family offers the right platforms to fit their needs,” said Chris Johnson, Senior Vice President and General Manager for Space at Maxar. “These products are rooted in Maxar’s deep legacy of manufacturing flexible, reliable spacecraft, and our investments ensure they are relevant now and well into the future.”

Maxar’s family of platforms complement each other, and in some cases collectively can be part of the same solution:

Maxar 300 series: First developed as the company’s proliferated low Earth orbit platform, the Maxar 300 series is our smallest and most modular bus. This platform is optimized for high-rate production, rapid constellation deployment and mission-level reliability. L3Harris selected this series as the bus for the Space Development Agency’s Tranche 1 Tracking constellation.

Maxar 500 series: A scalable mid-size platform designed for high stability and pointing accuracy. Maxar leveraged the investments and innovations on its WorldView Legion program to make this derivative bus, shaping the Maxar 500 series to be a solution that can be tailored for multiple missions and orbits.

Maxar 1300 series: A familiar name for the 1300-Class platform, which is the world’s most popular spacecraft with over 90 in orbit. The Maxar 1300 series is reliable and customizable, commonly serving higher-power missions. The company continues to develop new payload and bus technologies that boost its value to current and future customers, and Maxar evolved the platform so it can be applied in more ways than geostationary satellites. For example, it serves as the baseline for the world’s most powerful deep space engine—NASA’s Gateway Power and Propulsion Element.



Successful launch for 5 additional spare satellites of the upgraded iridium satellite constellation manufactured by thales alenia space

Five additional spare satellites part of the upgraded Iridium constellation of telecommunication satellites were successfully launched by a SpaceX Falcon 9 rocket from the Vandenberg Space Force Base in California. The entire constellation was developed and built by Thales Alenia Space, the joint company between Thales (67%) and Leonardo (33%), leading an industrial consortium. This batch of five satellites is following eight successful launches* between January 2017 and January 2019, a total of 75 Iridium satellites being already deployed to form a fully operational system in low Earth orbit (LEO) from an altitude of about 780 km. More specifically, the constellation operates with 66 satellites, distributed in six orbital planes of 11 satellites each, and will be now supported by 14 in-orbit spare satellites.

Thales Alenia Space, as prime con-

tractor for the Iridium NEXT campaign, was in charge of all engineering, production, procurement and integration operations, along with the ground and in-orbit testing of the constellation's overall performance. The volume production was conducted by Northrop Grumman at its Gilbert, Arizona facility where the five spares were stored.

“Engaged for 13 years alongside Iridium on its upgraded constellation, Thales Alenia Space is particularly proud to support Iridium in their resiliency for their blooming business”, commented Marc Henri Serre, EVP Telecommunications at Thales Alenia Space.

Iridium satellite constellation, the world's highest performance, most flexible and most sophisticated constellation. The Iridium satellite constellation represents the state of the art in terms of technology and flexibility. It features global coverage, with limited ground in-

80 satellites orbited in 9 launches:

9th launch – May 19, 2023 - 5 satellites

8th launch – January 11, 2019 - 10 satellites

7th launch – July 25, 2018 - 10 satellites

6th launch – May 23, 2018 - 5 satellites

5th launch – March 30, 2018 - 10 satellites

4th launch – December 23, 2017 - 10 satellites

3rd launch – October 9, 2017 - 10 satellites

2nd launch – June 26, 2017 - 10 satellites

1st launch – January 14, 2017 - 10 satellites

frastructure, since each satellite is linked to the four closest satellites, in front, behind, to the right and left. No matter where the user is located, there will always be at least one satellite visible from their position on Earth, enabling them to communicate. This type of direct satellite access, whether for transmission or reception, means that communications can be established at any given moment, even in the case of natural disasters or conflicts, in isolated areas, or to provide secure communications with protection against intrusion and piracy.



Israel Ministry of Defense and IAI successfully launched the “Ofek 13” satellite which has begun to orbit into space

Israel Ministry of Defense and IAI successfully launched the “Ofek 13” satellite which has begun to orbit into space. The IMoD Space and Satellite Administration in the Directorate of Defense Research & Development (DDR&D), the Israel Defense Forces (IDF), and Israel Aerospace Industries (IAI) successfully launched the “Ofek 13” satellite into space at 02:10 IST. The launch took place at a test site in central Israel using a “Shavit” launcher. The satellite successfully entered orbit, has begun transmitting data, and completed an initial series of inspections in accordance with original launch plans. IMoD and IAI engineers will continue pre-planned inspections before it begins full operational activity in the near future.

The “Ofek 13” satellite was developed based on the experience of the defense establishment and IAI in the production of earlier satellites in the “Ofek” series, which have been launched since 1988.

The IMoD’s Space and Satellite Administration has led the development and production of the satellite and its launcher. The development process also includes the IDF’s 9900 Intelligence Unit and the Israeli Air Force. IAI is the prime contractor for the development of the satellite, launcher, and ground station monitoring system. The

System Missiles and Space Group led by the Space division operates the project alongside with ELTA, an IAI subsidiary, and the MLM division. The launch engines were developed by Rafael Advanced Systems and Tomer, a government-owned company.

Once the satellite is deemed fully operational, the Ministry of Defense will deliver it to the IDF’s 9900 Intelligence Unit for operational use.

Defense Minister Yoav Galant, who was present during the launch: “The successful launch of the satellite is yet another important example of the Israeli defense establishment’s groundbreaking innovation. Israel has already proved its diverse space capabilities many times and is one of very few countries to possess such capabilities - capabilities that we continue to develop and strengthen. Our proud accomplishment today is first and foremost thanks to our engineers’ creativity, talent and consistency in addition to the hard work of outstanding professionals that took part in this operation. We will continue to prove that even the sky isn’t the limit for the Israeli defense establishment and that we continue to enhance its capabilities in every dimension in the face of various challenges.”

Head of the DDR&D, Brig. Gen. (Res.) Dr. Daniel Gold: We launched a SAR satellite

into space that is equipped with the utmost advanced abilities at the peak of global technology. The launch of “Ofek 13” has proven Israel’s superiority in the field of space yet again. It also constitutes a leap forward in operational and technological abilities for the preservation and improvement of Israel’s standing in space for the coming decades.”

Commander of Unit 9900, Brig. Gen. Erez Askal: “This successful launch is an important step for Israel’s defense establishment and for Unit 9900 specifically, and positions us as a regional and international space power. I would like to thank our partners in the space community; our work has only just begun. Our unit’s soldiers and commanders will continue to work around the clock to ensure the satellite’s successful operation and to provide a full operational intelligence picture.”

President and CEO of IAI, Boaz Levy: “The ‘Ofek 13’ satellite that was launched today is additional proof of IAI’s power as Israel’s space home and its significant contribution to the Israeli defense establishment. From now on, Israel will gain groundbreaking intelligence capabilities. The ‘Ofek 13’ is the most advanced of its kind with unique radar observation capabilities and will enable intelligence collection in any weather and conditions of visibility, thus enhancing strategic intelligence. The satellite is comprised of groundbreaking Israeli-made technologies and will join the IAI’s ‘Ofek’ series in space that operate to strengthen the defense establishment’s intelligence superiority. The launch concludes a long and complex process of developing and building the satellite led by the brightest minds in IAI together with the Israel Ministry of Defense’s DDR&D and additional defense industries.”

Head of the IMoD’s Space and Satellite Administration, Avi Berger: “Ofek 13” is a SAR satellite with the most advanced capabilities of its kind, entirely developed in Israel. The launch was successful, according to plan. Initial indications from the satellite are also very good. Within the coming weeks, we will complete technical tests and receive the first pictures before delivering the satellite for operational use by the IDF. ‘Ofek 13’ will join the additional Ofek satellites that the Ministry of Defense and the IDF have operated in space for many years. A SAR satellite will allow, among other things, day and nighttime imaging capabilities, and will drastically improve Israel’s intelligence capabilities from space for years to come.”



“

We are one of the first to successfully qualify and demonstrate this technology in our satellite size and weight class - our part in a growing trend, as the space industry is moving to optical links as the backbone for sending data. The successful execution of this programme at this accelerated timeline would not have been possible without the expert support of ESA and the UK Space Agency.

”

NANOSATS LAUNCHED THAT USE LIGHT TO TALK

The satellites were developed under an ESA Partnership Project with satellite manufacturer and operator Spire Global based in Glasgow in the UK. Spire Global's constellation of satellites provides global weather intelligence, ship and plane movements, and spoofing and jamming detection, to better predict how their patterns impact economies, global security, business operations and the environment.

The pair of satellites will use optical inter-satellite links to send information between themselves securely and almost instantaneously. To achieve this, they are designed to achieve the equivalent of using a laser pointer to link two satellites, each the size of a large box of cornflakes, placed 5000 km apart – equivalent to the distance from Glasgow to New York.

The pair of satellites will demonstrate the ability to send more than 1 GB of data securely between the two terminals during a short contact window when the spacecraft can see each other across the Earth. Spire Global used an agile development approach to developing its optical inter-satellite link technology, using successive iterations of the spacecraft to evolve the technology, all of which is manufactured in house.

The two satellites follow the success of an earlier pair of spacecraft that were launched in June 2021. These have been used to develop core capabilities required for optical inter-satellites links, such as advanced spacecraft pointing and position control, along with the laser beam operation and optical receivers. The satellites were developed in partnership with ESA and the UK Space Agency within the Pioneer programme as part of ESA's programme of Advanced Research in Telecommunications Systems (ARTES).

Seven Pioneer Partnership Projects have now been signed.

Jeroen Cappaert, Chief Technology Officer and co-founder of Spire Global, said: “We are celebrating the culmination of more than three years of work in creating one of the most complex systems from both the hardware and mission perspectives. The use of optical links instead of traditional radio frequency links leads to higher resiliency to interference, higher security and higher efficiency.

Craig Brown, Director of Investment at the UK Space Agency, said: “The successful launch of these two Glasgow-made satellites

from Spire Global marks a milestone, not just for the company, but for how we look at intersatellite communications and make these technologies more efficient. Such leading-edge technology offers an exciting opportunity for the UK to thrive in the commercial space age while remaining committed to reducing impact on the planet.

“The UK Space Agency provided £2.9 million towards the project, which includes five satellites across three launches, through ESA's ARTES Pioneer Programme, dedicated to supporting new commercial opportunities in the telecommunications sector. We look forward to following the next steps of Spire Global's journey and seeing the results.”

Javier Benedicto, acting Director of Connectivity and Secure Communications at ESA, said: “ESA's Pioneer Partnership Projects increase the competitiveness of the European space industry by supporting the emergence of new space mission providers. We are delighted to work with Spire Global and the UK Space Agency to foster innovation to enable the European space industry to succeed in highly competitive global markets.”



“

“Thanks to BlackGEM, La Silla now has the potential to become a major contributor to transient research,” says Ivo Saviane, site manager at ESO’s La Silla Observatory. “We expect to see many outstanding results contributed by this project, which will expand the reach of the site for both the scientific community and the public at large.”

”

BLACKGEM TELESCOPES BEGIN HUNT FOR GRAVITATIONAL-WAVE SOURCES AT ESO’S LA SILLA OBSERVATORY

The BlackGEM array, consisting of three new telescopes located at ESO’s La Silla Observatory, has begun operations. The telescopes will scan the southern sky to hunt down the cosmic events that produce gravitational waves, such as the mergers of neutron stars and black holes. Some cataclysmic events in the Universe, such as the collision of black holes or neutron stars, create gravitational waves, ripples in the structure of time and space. Observatories like the Laser Interferometer Gravitational-Wave Observatory (LIGO) and the Virgo Interferometer are designed to detect these ripples. But they cannot pinpoint their origin very accurately nor see the fleeting light that results from the collisions between neutron stars and black holes. BlackGEM is dedicated to quickly scanning large areas of the sky to precisely hunt down gravitational-wave sources using visible light.

“With BlackGEM we aim to scale up the study of cosmic events with both gravitational waves and visible light,” says Paul Groot of Radboud University in the Netherlands, the project’s Principal Investigator. “The combination of the two tells us much more about these events than just one or the other.”

By detecting both gravitational waves and their visible counterparts, astronomers can confirm the nature of gravitational-wave sources and determine their precise locations. Using visible light also allows for detailed observations of the processes that occur in these mergers, such as the formation of heavy elements like gold and platinum. To date, however, only one visible counterpart to a gravitational-wave source has ever been detected. Furthermore, even the most advanced gravitational-wave detectors such as LIGO or Virgo cannot precisely identify their sources; at best, they can narrow the location of a source down to an area of approximately 400 full moons in the sky. BlackGEM will efficiently scan such large regions at high enough resolution to consistently locate gravitational-wave sources using visible light.

BlackGEM’s three constituent telescopes were built by a consortium of universities: Radboud University, the Netherlands Research School for Astronomy, and KU Leuven in Belgium. The telescopes are each 65 centimetres in diameter and can investigate different areas of the sky simultaneously; the collaboration eventually aims to ex-

pand the array to 15 telescopes, improving its scanning coverage even more. BlackGEM is hosted at ESO’s La Silla Observatory in Chile, making it the first array of its kind in the southern hemisphere.

“Despite the modest 65-centimetre primary mirror, we go as deep as some projects with much bigger mirrors, because we take full advantage of the excellent observing conditions at La Silla,” says Groot.

Once BlackGEM precisely identifies a source of gravitational waves, larger telescopes such as ESO’s Very Large Telescope or the future ESO Extremely Large Telescope can carry out detailed follow-up observations, which will help to shed light on some of the most extreme events in the cosmos. In addition to its search for the optical counterparts to gravitational waves, BlackGEM will also perform surveys of the southern sky. Its operations are fully automated, meaning the array can quickly find and observe ‘transient’ astronomical events, which appear suddenly and quickly fade out of view. This will give astronomers deeper insight into short-lived astronomical phenomena such as supernovae, the huge explosions that mark the end of a massive star’s life.



ROCKET LAB DEBUTS HASTE ROCKET WITH 1ST SUCCESSFUL SUBORBITAL LAUNCH FROM VIRGINIA

Rocket Lab USA, Inc. a global leader in launch services and space systems announced it successfully launched its first suborbital testbed launch vehicle, called HASTE (Hypersonic Accelerator Suborbital Test Electron) for a confidential customer.

The inaugural launch took place on June 17 at 21:24 Eastern local time (June 18, 01:24 UTC) from Rocket Lab's Launch Complex 2 at Virginia's Mid-Atlantic Regional Spaceport within NASA's Wallops Flight Facility.

The HASTE suborbital launch vehicle is derived from the Company's Electron rocket but has a modified Kick Stage for hypersonic payload deployment, a larger payload capacity of up to 700 kg / 1,540 lbs, and options for tailored fairings to accommodate larger payloads, including

air-breathing, ballistic re-entry, boost-glide, and space-based applications payloads. By leveraging the heritage of Rocket Lab's low-cost Electron – the world's most frequently launched commercial small launch vehicle – HASTE offers true commercial testing capability at a fraction of the cost of current full-scale tests.

HASTE will be primarily operat-

ed under Rocket Lab National Security (RLNS), the Company's wholly owned subsidiary created to serve the unique needs of the U.S. defense and intelligence community and its allies. Rocket Lab Launch Complex 2 within the Mid-Atlantic Regional Spaceport at NASA Wallops Flight Facility in Virginia is the launch site for HASTE.

“

The success of this mission demonstrates collaboration across government and industry partners to change the paradigm in hypersonic testing,” said Brian Rogers, Senior Director - Global Launch Services. “HASTE enables the frequent, affordable flight testing needed to advance the nation's hypersonic technology development, and we're proud to be delivering this vital capability. We thank our mission partners for entrusting us with this inaugural mission and look forward to continuing our partnership into the future.

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Rocket Lab Successfully Launches Second Batch of TROPICS Satellites for NASA

Rocket Lab USA, Inc a leading launch and space Systems Company successfully completed the second of two dedicated Electron launches to deploy a constellation of tropical cyclone monitoring satellites for NASA.

The Coming To A Storm Near You launch lifted-off on May 26 at 15:46 NZST (03:46 UTC) from Rocket Lab Launch Complex 1 on New Zealand's Mahia Peninsula, deploying the final two CubeSats of NASA's TROPICS constellation (Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats) to orbit. 'Coming to a Storm near You' is Rocket Lab's second of two TROPICS launches for NASA, following the first launch on May 8th NZST. Like the previous launch, 'Coming to a Storm near You' deployed a pair of shoebox-sized satellites to low Earth orbit to collect tropical storm data more frequently than other weather satellites. The constellation aims to help increase understanding of deadly storms and improve tropical cyclone forecasts

The TROPICS CubeSats required launch to a specific orbit at an altitude of 550 kilometers and inclination of about 30 degrees, with all four satellites needing to be deployed into their operational orbit within a 60-day period ahead. Rocket Lab has now launched all four satellites across two dedicated launches within 18 days, enabling the TROPICS satellites to settle into their orbits and begin commissioning ahead of the 2023 North American storm season which begins in June. While the TROPICS launches were Rocket Lab's 36th and 37th launches, they were unique from most of the Company's other missions to low Earth orbit due to the 30 degree inclination requirement. To reach such a low inclination from Launch Complex 1, Rocket Lab used Electron's second stage to place the Kick Stage and TROPICS satellites into a circular orbit, and the Kick Stage's Curie engine carried out a plane change maneuver to position the TROPICS satellites at 30 degrees.

"Electron was developed for exactly these kinds of missions – to deploy spacecraft reliably and on rapid timelines to precise and bespoke orbits, so we're proud to have delivered that for NASA across both TROPICS launches and meet the deadline for getting TROPICS to orbit in time for the 2023 storm season," said Rocket Lab founder and CEO Peter Beck. "Thank you to the team at NASA for entrusting us with such an important science mission, we're grateful to be your mission launch providers once again."

"We needed multiple launches for this mission," said Dr. Will McCarty, program scientist, NASA's Earth Science Division. "Rocket Lab provided the ability to have the TROPICS CubeSats serve as that primary payload and thus define the orbit based on our scientific objectives."

'Coming to a Storm near You' was Rocket Lab's fifth mission for 2023 and the Company's 37th Electron mission overall. It brings the total number of satellites launched to orbit by Rocket Lab to 163.



Arabsat Badr-8 Successfully Launched: Featuring Airbus' Innovative Optical Communications Payload TELEO

The Airbus-built Arabsat Badr-8 telecommunications satellite has been successfully launched from Cape Canaveral, Florida. Based on Airbus' latest geostationary Eurostar Neo satellite, Badr-8 will provide connectivity for users across Europe, Middle East, Africa, and central Asia.

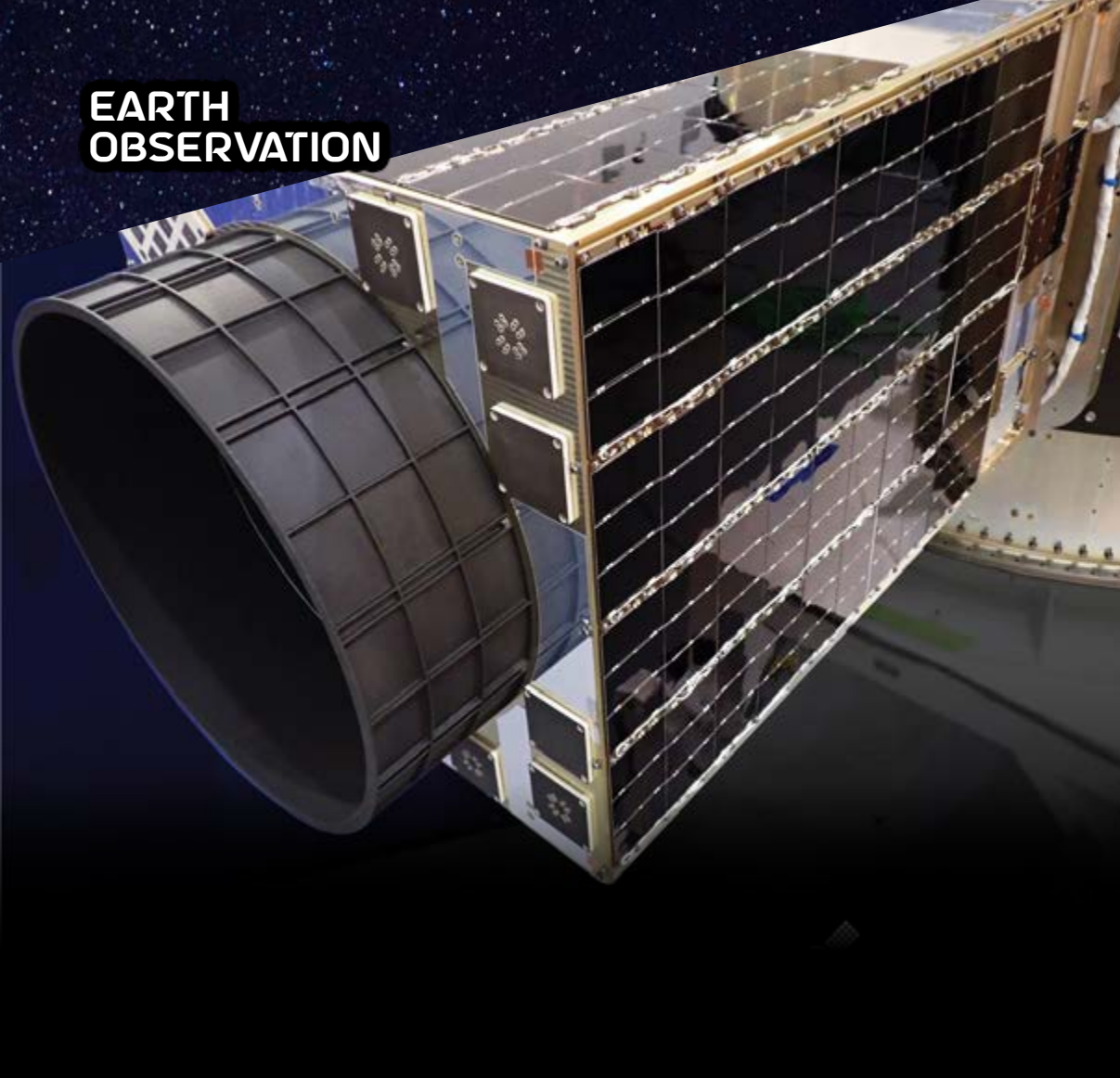
The spacecraft is also equipped with a world first, Airbus' innovative space demonstrator TELEO to provide space to ground optical communications at gigabit speeds. The TELEO demonstrator payload is designed to facilitate very high capacity optical feeder link communications, playing a crucial role in Airbus' development of a new generation of optical communications technology in space.

Jean Marc Nasr, Head of Space Systems said: "Marking our third successful launch of the Eurostar Neo series and our eighth spacecraft built for Arabsat, Badr-8, equipped with the very innovative TELEO payload, is the latest major milestone for our telecoms business. Featuring increased payload capacity and more efficient power and thermal control systems, Badr-8 will replace and increase Arabsat's capacity.

Following the successful launch and separation, Badr-8 is using its electric propulsion system to reach geostationary orbit at 36,000 km. The satellite will then undergo a comprehensive testing period in geostationary orbit before entering full service. With a launch mass of 4.5 tons and 17.8 kW of power, the satellite is designed to operate in orbit for 15 years. Airbus' ultra-reliable geostationary telecommunications satellites have achieved more than 1,300 years of service in orbit.

Airbus' Eurostar Neo platform has been developed in the frame of the European Space Agency's (ESA) Partnership Projects, together with the French space agency CNES, and strongly supported by the UK Space Agency and other agencies across Europe. The TELEO demonstrator payload was developed with support from CNES.

EARTH OBSERVATION



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“Terran Orbital is ecstatic to announce Runner-1’s upcoming launch,” said Terran Orbital Co-Founder, Chairman, and Chief Executive Officer Marc Bell. “RUNNER-1’s rapid response capabilities will change the world. Working with ISI and the Chilean Space program to develop this revolutionary satellite has been an absolute joy. We look forward to continuing to work with ISI and the Chilean Space Program in the future.”

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TERRAN ORBITAL AND ISI PREPARE FOR THE LAUNCH OF THE RUNNER-1 EARTH OBSERVATION SATELLITE

Terran Orbital Corporation, a global leader in satellite-based solutions primarily serving the aerospace and defense industries, announced final launch preparations for the RUNNER-1 satellite. The satellite will be launched aboard the SpaceX Falcon 9 rocket as part of the Transporter-8 rideshare mission scheduled from SLC-4E at Vandenberg Space Force Base in California, USA.

RUNNER-1, developed jointly by Terran Orbital and ImageSat International Ltd. (TASE:ISI) (“ImageSat International” or “ISI”), Israel’s largest space company and a world leader in space-based intelligence solutions, is a multi-purpose remote sensing satellite capable of sub-meter high-resolution multi-spectral imaging and color

video.

The satellite is slated to join ISI’s constellation of satellites and provide services to the Chilean Government as part of the contract awarded to ISI to build out the country’s national space program.

The RUNNER-1 satellite is based on Terran Orbital’s advanced avionics platform and a unique electro-optical mission system developed by ISI. Along with a ground control system and advanced AI capabilities, the RUNNER-1 system enables effective collection and analysis of information and provides a rapid response for various scenarios, including infrastructure monitoring, natural disasters, security events, climate change, and more.

RUNNER-1 will also serve the Chilean

government in its national space development program, which was awarded to ISI following an extensive international tender process. The satellite, domestically called FASat Delta, is a key component of the Chilean national space program vision.

Chile’s national space program (“Sistema Nacional Espacial”) is a holistic program for the construction of a future space-based ecosystem, created to generate public value, social development, and increased wealth for the country, as part of which ISI will provide an extensive national infrastructure, including geo-location data management systems, development, science, education, a provision for AI capabilities, and advanced space-based technology solutions.



Northrop Grumman Rapidly Completes Critical Design Review for Tranche 1 Transport Layer

Northrop Grumman Corporation recently completed a critical design review for its Tranche 1 Transport Layer (T1TL), part of Space Development Agency's (SDA) low-earth orbit network designed to communicate vital information to wherever it's needed to support U.S. troops on the ground quickly and securely.

The Tranche 1 Transport Layer (T1TL) communication satellites will provide resilient, low-latency, high-volume data transport supporting U.S. military missions around the world. Designed to connect elements of an integrated sensing architecture, the network will deliver persistent, secure connectivity, and serve as a critical element for advancing the U.S. Department of Defense's vision for Joint All Domain Command and Control.

"We are leveraging our commercial marketplace partnerships to deliver a rapid, affordable, highly effective solution for SDA," said Blake Bullock, vice president, communication systems, strategic space systems, Northrop Grumman. "Our T1TL solution builds on our decades of end-to-end mission expertise. We are uniquely capable of delivering a credible capability to support the warfighter."

SDA formerly announced that Northrop Grumman is under contract to provide the agency with 56 satellites, including the 42 communication satellites in the Tranche 1 Transport layer and 14 for the Tranche 1 Tracking layer, which includes an infrared sensor payload. The Tracking layer program recently completed its preliminary design review. Northrop Grumman is also providing the ground system for both its Transport and Tracking constellations.



European Space and Telecoms Players Sign Partnership Agreement to Bid for IRIS2 Constellation

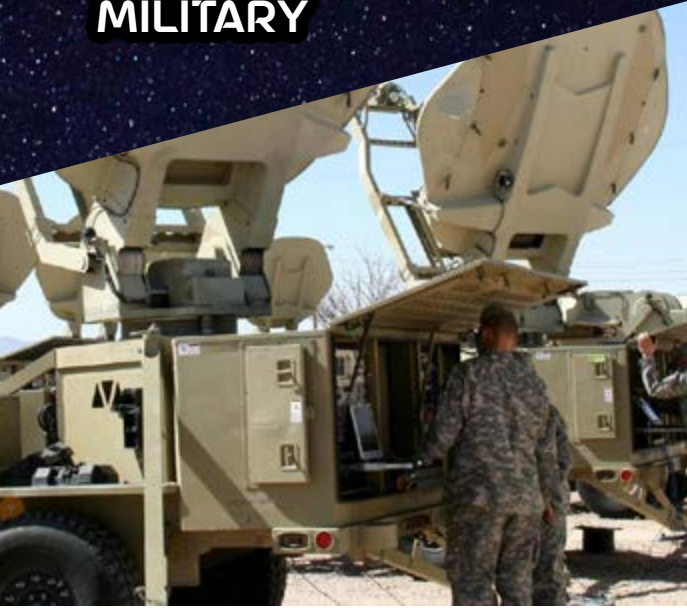
A group of European space and telecommunications players have come together to form a partnership to respond to the European Commission's call for tender related to the future European satellite constellation IRIS² (Infrastructure for Resilience, Interconnectivity and Security by Satellite). IRIS² aims to bring a new secure and resilient connectivity infrastructure to European governments, businesses and citizens.

The open consortium will be governed by Airbus Defence and Space, Eutelsat, Hispasat, SES and Thales Alenia Space. The consortium will also rely on the core team of the following companies: Deutsche Telekom, OHB, Orange, Hisdesat, Telespazio, and Thales. Together, they will aim to create a state-of-the-art satellite constellation based on a multi-orbit architecture that would be interoperable with the terrestrial ecosystem.

This partnership will set up an integrated best-in-class European space and telecoms team across these companies to leverage the expertise and capabilities in the field of secure satellite communications solutions. The consortium will encourage start-ups, mid-Caps and SMEs to join the partnership, resulting in a more innovative and competitive European space sector where new business models will emerge.

The integrated team aims to foster collaboration among all European space players across the whole connectivity value chain with a view to enabling EU's strategic autonomy through the delivery of sovereign, secure and resilient government services to protect European citizens. The team will leverage synergies between government and commercial infrastructures. The teaming partners are also well positioned to provide commercial services to bridge the digital divide across European territories and to increase Europe's global outreach and competitiveness as a space and digital power on the global market.

IRIS² will deliver resilient and secure connectivity solutions to governments to protect European citizens and will provide commercial services in the interest of European economies and societies. It will also bolster the EU partnership policy by offering its infrastructure abroad. IRIS² is the EU's new flagship space programme for a digital, resilient and safer Europe.



US Space Force and DISA Awards USD 27.54 Million CTC Contract to SES Space & Defense

SES Space & Defense, a wholly-owned subsidiary of SES, will provide satellite communications capabilities in support of the U.S. Army Warfighter Information Network-Tactical (WINT-T) training activities. The five-year Commercial Satellite Communications (COMSATCOM) Transponded Capacity (CTC) contract worth USD 27.54 million has been awarded by the U.S. Space Force's Commercial SATCOM Communication Office (CSCO) through Defense Information Systems Agency's (DISA) Defense Information Technology Contracting Organization (DITCO).

Leveraging SES's global satellite fleet, SES Space & Defense will provide capabilities for the U.S. Army Network Enterprise Technology Command (NETCOM) and the U.S. Army Forces Command (FORSCOM) units to train and prepare a combat-ready, globally responsive Total Force. This will allow the U.S. Army to continue to build and sustain combatant command readiness requirements, as well as enable research and development activities for testing new applications for mobile missions.

"SES Space & Defense has a longstanding relationship with the U.S. Army and has been supporting the WINT-T program's evolving needs for over a decade," said SES Space & Defense President and CEO David Fields. "As the U.S. DoD adopts new and more advanced information technology capabilities, it is key that we support them with the much-needed resilient and secure satellite communications in multiple orbits and bands. Combine that with our extensive experience in network integration, we can ensure our customers' advantage in any critical mission scenarios."



Boeing's New Military Satellite Integrates Anti-Jam Payload for Enhanced Battlefield Communication

Boeing unveiled its Protected Wideband Satellite (PWS) design featuring Boeing's Protected Tactical SATCOM Prototype (PTS-P) payload hosted aboard the U.S. Space Force's Wideband Global SATCOM (WGS)-11 spacecraft.

"The joint force is relying on us to deploy capabilities that enable secure communications in a prolific jamming environment," said Charlotte Gerhart, Space Systems Command's Tactical SATCOM division chief at the U.S. Space Force. "We also need mission-relevant speed and affordability, while being mindful of the evolving threat in the battlefield. The Boeing PTS-Prototype payload hosted on WGS-11 is an exciting leap forward for new warfighter capabilities."

The combination of military satellite communications (MILSATCOM) and anti-jam capabilities underpin the PWS design. Both programs are based on Boeing's 702X software-driven technology enabling real-time and automated beam-forming for improved stand-off performance and signal protection.

"The Protected Wideband Satellite combines significantly upgraded WGS capability with PTS-P's automated anti-jam features," said Michelle Parker, vice president of Boeing's Space Mission Systems. "This capability sets the stage for future generations of protected wideband systems that can operate in both legacy transponded and new onboard processed modes."

The program is scheduled for launch in 2024, with on-orbit testing slated for 2025. After on-orbit demonstration, the PTS-P payload will be available to transition for operational use. The PTS-P design features automated anti-jam capabilities, including jammer geolocation, real-time adaptive nulling, frequency hopping and other techniques, harnessing the power of the U.S. military's Protected Tactical Waveform (PTW) to ensure the warfighter can stay connected in a contested environment.

By flying PTS-P on the WGS-11 spacecraft as part of the WGS constellation, PWS works seamlessly with all the existing WGS user terminals, while allowing gradual fielding of PTW modems in a theater of operation. WGS provides the Department of Defense with a broad majority of tactical communications going through the constellation that currently includes 10 satellites.



NASA's Voyager Will Do More Science with New Power Strategy

The plan will keep Voyager 2's science instruments turned on a few years longer than previously anticipated, enabling yet more revelations from interstellar space.

Launched in 1977, the Voyager 2 spacecraft is more than 12 billion miles (20 billion kilometers) from Earth, using five science instruments to study interstellar space. To help keep those instruments operating despite a diminishing power supply, the aging spacecraft has begun using a small reservoir of backup power set aside as part of an onboard safety mechanism. The move will enable the mission to postpone shutting down a science instrument until 2026, rather than this year.

Voyager 2 and its twin Voyager 1 are the only spacecraft ever to operate outside the heliosphere, the protective bubble of particles and magnetic fields generated by the Sun. The probes are helping scientists answer questions about the shape of the heliosphere and its role in protecting Earth from the energetic particles and other radiation found in the interstellar environment.

"The science data that the Voyagers are

returning gets more valuable the farther away from the Sun they go, so we are definitely interested in keeping as many science instruments operating as long as possible," said Linda Spilker, Voyager's project scientist at NASA's Jet Propulsion Laboratory in Southern California, which manages the mission for NASA.

Power to the Probes

Both Voyager probes power themselves with radioisotope thermoelectric generators (RTGs), which convert heat from decaying plutonium into electricity. The continual decay process means the generator produces slightly less power each year. So far, the declining power supply hasn't impacted the mission's science output, but to compensate for the loss, engineers have turned off heaters and other systems that are not essential to keeping the spacecraft flying.

With those options now exhausted on Voyager 2, one of the spacecraft's five science instruments was next on their list. (Voyager 1

is operating one less science instrument than its twin because an instrument failed early in the mission. As a result, the decision about whether to turn off an instrument on Voyager 1 won't come until sometime next year.)

In search of a way to avoid shutting down a Voyager 2 science instrument, the team took a closer look at a safety mechanism designed to protect the instruments in case the spacecraft's voltage – the flow of electricity – changes significantly. Because a fluctuation in voltage could damage the instruments, Voyager is equipped with a voltage regulator that triggers a backup circuit in such an event. The circuit can access a small amount of power from the RTG that's set aside for this purpose. Instead of reserving that power, the mission will now be using it to keep the science instruments operating.

Although the spacecraft's voltage will not be tightly regulated as a result, even after more than 45 years in flight, the electrical systems on both probes remain relatively stable, minimizing the need for a safety net. The engineering team is also able to monitor the voltage and respond if it fluctuates too much. If the new approach works well for Voyager 2, the team may implement it on Voyager 1 as well.

"Variable voltages pose a risk to the instruments, but we've determined that it's a small risk, and the alternative offers a big reward of being able to keep the science instruments turned on longer," said Suzanne Dodd, Voyager's project manager at JPL. "We've been monitoring the spacecraft for a few weeks, and it seems like this new approach is working."

The Voyager mission was originally scheduled to last only four years, sending both probes past Saturn and Jupiter. NASA extended the mission so that Voyager 2 could visit Neptune and Uranus; it is still the only spacecraft ever to have encountered the ice giants. In 1990, NASA extended the mission again, this time with the goal of sending the probes outside the heliosphere. Voyager 1 reached the boundary in 2012, while Voyager 2 (traveling slower and in a different direction than its twin) reached it in 2018.

More about the Mission

A division of Caltech in Pasadena, JPL built and operates the Voyager spacecraft. The Voyager missions are a part of the NASA Heliophysics System Observatory, sponsored by the Heliophysics Division of the Science Mission Directorate in Washington.

APPOINTMENTS



SES CEO Steve Collar to Step Down

SES announces that Steve Collar, Chief Executive Officer (CEO), will be stepping down at the end of June 2023 to pursue other professional and personal endeavours. The search for a successor is underway and Ruy Pinto, currently Chief Technology Officer of SES, will assume the role of CEO until a permanent successor is announced.

Frank Esser, Chairman of the SES Board of Directors, said, "We would like to thank Steve for his significant contribution to SES over a period of more than 20 years. As CEO, Steve successfully steered SES, leaving the business in a strong position for the future with a differentiated multi-orbit capability, world-class set of customer solutions, a simplified and market-centric organization, and a strong balance sheet set to be further strengthened from the execution of C-band clearing. The current market environment is rapidly changing, and I welcome Ruy Pinto, who leads over half of the SES workforce today and has substantial industry experience, as we address the challenges and capture further opportunities in the market. The Board has full confidence in Ruy and our management's engagement on continued strong execution as we embark on a new phase of success for SES."

Steve Collar commented, "It has been the greatest honor of my life to lead the incredible people at SES. SES has been the benchmark in the industry for decades and I leave the company as its leader and go back to being a huge supporter, admirer and fan and will be cheering Ruy and the Management Team on from the side-lines. With O3b mPOWER launching, the company performing well and C-band all but delivered, the future is bright, and I wish the Board and everyone at SES every success."

Ruy Pinto joined SES in February 2017 and was appointed Chief Technology Officer in January 2019, driving the differentiation in multi-orbit capabilities and the cloudification of SES. Prior to SES, Ruy spent over 25 years at Inmarsat in various lead technical and managerial roles.

Ruy Pinto commented, "I am delighted to be leading SES and working with our teams around the world through a transition period, progressing SES into a phase where we will continue to grow on a strong value creation trajectory for our stakeholders, executing strongly, simplifying our business and optimizing our cost base."



Quantum Space Names Kerry Wisnosky President and CEO

Quantum Space announced industry veteran and current Chief Operating Officer, Kerry Wisnosky, has been named president and CEO of the company.

"I'm pleased to announce the appointment of Kerry Wisnosky as president and CEO for Quantum Space. He is a visionary leader renowned for his ability to drive transformative growth and foster a culture of excellence," said Dr. Kam Ghaffarian, co-founder and executive chairman, Quantum Space. "Steve Jurczyk, as IBX Executive Vice-President will continue to be engaged as a significant advisor to me, the portfolio companies, and the Quantum Space leadership team."

As a proven aerospace executive and entrepreneur for more than 25 years, Kerry co-founded a multitude of highly successful engineering and technology companies, highlighted by Millennium Engineering and Integration, leading its merger with QuantiTech in 2021. In this new role, he will now be responsible for Quantum Space's strategic direction moving forward as the company prepares for the inaugural launch of its Ranger multi-purpose vehicle in early 2025.

"I could not be more honored to accept the position of president and CEO at such a pivotal period of growth and opportunity for our company," said Wisnosky. "I am looking forward to executing on our bold vision for transforming how organizations access and operate in GEO and beyond. Furthermore, I am genuinely excited to continue working with our talented team at Quantum Space as we build upon the exceptional foundation that has been established."

Quantum Space is poised to deliver payloads and hosted assets direct-to-GEO and cislunar orbits, via its Ranger multi-purpose vehicle and will collect unique and valuable data in cislunar space via the Scout spacecraft.



New Head of Telstra International Appointed

Telstra's Finance and Strategy Executive Director Roary Stasko has been appointed as the new CEO of Telstra's International business, starting 1 July. Telstra Enterprise Group Executive David Burns said he was thrilled to appoint Mr Stasko, who brings a wealth of experience and passion for international markets, to the role.

"Roary is a proven leader within Telstra, having spent more than five years at the business in a variety of different roles including Head of Corporate Strategy as well as Head of Finance for Telstra's Consumer and Small Business function," Burns said.

"He is the right person to lead Telstra International as the business continues its exciting growth trajectory."

Burns said Stasko's background in emerging markets would be invaluable in his new role. He said Stasko would start in the role on 1 July to ensure a smooth transition with current Head of Telstra International Oliver Camplin-Warner, who will be moving to head up the Telstra Purple business in the new financial year. Stasko will continue to hold his position on the Digicel Pacific Board, and will be based out of San Francisco, California, USA.



APSCC Appoints Membership Sales Representative

The Asia-Pacific Satellite Communications Council (APSCC) announced the appointment of Vishaal Mathur as membership sales representative, augmenting its reach to the space and satellite industry in South Asia. The appointment is part of the organization's initiative to substantially expand its membership and to strengthen representation in the region.

Vishaal brings with him almost 24 years of experience in the satellite, aerospace and broadcasting industry in the Asia Pacific region. He has led the sales & marketing, business development, strategic planning and regulatory approval efforts of broadcasters such as ESPN Star Sports Channel and ZEE Telefilms, and satellite services providers including MEASAT, SES, and Kacific Broadband Satellite during his illustrious career. Vishaal is currently engaged with PT TelkomSAT of Indonesia on an advisory role for the South Asia region.

"APSCC is excited to announce the appointment," said APSCC President Terry Bleakley. "Vishaal's extensive background in the industry will help APSCC strengthen channel partnerships and expand our presence in South Asia. As the pre-eminent voice of the satellite industry in the Asia-Pacific region, APSCC strives to promote the mutual interests of all its members, from across the region and around the world."





Terry Bleakley appointed as APSCC President

In an election taking place over in April, the membership of the Asia-Pacific Satellite Communications Council (APSCC) has appointed Terry Bleakley as APSCC President. The appointment takes effect immediately and continues through the end of April 2025. Bleakley assumes the leadership of APSCC, succeeding Gregg Daffner in the position.

“It is an exciting time in the APAC satellite industry, with so much going on in new space and so many emerging commercial space endeavors,” Bleakley said. “I am looking forward, with the support of APSCC members and the Board, to actively engaging in and taking a more prominent role in promoting the mutual interests of the entire industry as well as in helping the Organization achieve its goal to enter a new era.”

Bleakley has extensive management experience and expertise in the satellite industry of the Asia-Pacific region. He currently serves in a senior advisory role for Intelsat, based out of New Zealand, involved in strategic initiatives within the company.

Bleakley began serving as Intelsat’s Regional Vice President, Asia-Pacific in November 2010. In the role, he was responsible for the management of Intelsat’s sales and marketing activities throughout the Asia-Pacific region. Prior to the position, Bleakley served as Vice President Sales and Marketing and Vice President, Commercial Operations for MEASAT from 2006 to 2010.



Charlotta Sund appointed new CEO of Swedish Space Corporation

The Board of Swedish Space Corporation (SSC) has appointed Charlotta Sund as the new President and CEO of the SSC Group. She will take office during the autumn of 2023, and succeeds the current CEO Stefan Gardefjord who retires after twelve years in the company.

“Sweden can take a leading role in the global space development – with our engineering expertise, our geographical location between the Baltic Sea, the Atlantic and the North Pole, our global presence on all continents, and with Esrange Space Center as the EU’s only mainland-based spaceport. Therefore, I am pleased that the SSC Board has decided to employ a CEO with solid experience both from commercial and international business operations as well as from critical societal infrastructure. Both these aspects will be needed to lead SSC to the next level,” says Anna Kinberg Batra, SSC Chair of the Board.

Since 2018, Charlotta Sund is the President and CEO of Tekniska verken in Linköping, an industrial group tasked by regional community owners with creating resource-efficient energy systems for a sustainable society. There, she has led the organization through times of change, during the current energy crisis, as well as adapted to new regulations and expectations from both private and commercial actors on sustainable, safe and secure services.

Her background also includes a vast experience from Ericsson, a global telecom group where she held several senior positions. From this period of her career, she brings a customer focused mindset and deep knowledge on how to integrate sustainable innovation into the core business and use it as a tool to attract new customers.

Today, she also has board assignments for Swedish companies Enea and Hexatron. She was born and raised in Gothenburg and holds a Master of Science in Industrial Engineering & Management from Linköping University. In April this year, Charlotta was also appointed an honorary Doctor of Technology at Linköping University.

“It feels incredible to join the space industry during this historic period in time. As space infrastructure gets increasingly important for our modern societies on Earth, SSC is truly establishing itself as a societal builder. I hope to combine my background in digitalization and sustainable innovation with the deep knowledge and experience that I know exist in SSC. And I will bring my passion for leadership and organizational development to this exciting journey,” says Charlotta Sund.

Charlotta will officially take office during the autumn of 2023, according to an agreement between the SSC Board and the retiring CEO Stefan Gardefjord.

“The inauguration of Spaceport Esrange in January brought worldwide attention to our company. But none of that could have happened without the decisive efforts and hard work of our retiring CEO Stefan Gardefjord. I want to thank him for his meritorious efforts for both the company and for Swedish space operations,” says Anna Kinberg Batra.

APPOINTMENTS



ABS appoints Ramsey Khanfour as Chief Commercial Officer

ABS, a global satellite operator, announced that Ramsey Khanfour has been appointed as the company's Chief Commercial Officer (CCO), based at the head office in Dubai, UAE. Ramsey will be a key addition to the executive management team and will oversee global sales and marketing activities to drive the company's next phase of growth as it navigates new markets, solutions and business models.

Ramsey brings over 20 years of international experience spanning business development, sales, and strategy, with a long track record in the industry in senior leadership positions as well as a strong foundation in consulting and network engineering for fixed and wireless technologies including satellite and optical networks.

Amit Somani, CEO of ABS, commented: "Ramsey brings a myriad of experience and expertise that will help us drive innovative growth in key sectors such as government, telecommunications, mobility and media, leveraging various business models and capitalizing on existing and new partnerships. His wide range of experience perfectly complements the ABS team and strategy, and we look forward to working with him to drive future successes for ABS, and for our partners and customers across the globe."

Commenting on his new appointment, Ramsey Khanfour said: "I am very excited to be appointed as the CCO of ABS at this transformative time when the industry is constantly evolving. A big part of my role is to continue to align and build on the company's momentum to strengthen and extend ABS's current business for our evolving customers, partners, markets and technologies."

Prior to joining ABS, Ramsey was VP of Sales and Business Development at SES, focusing on government, Telcos/MNOs, cloud, energy, mobility and media verticals amongst others for satellite solutions and space development. He previously held senior roles with Booz & Co, STC, Orange Business services, and Nortel Networks in the GCC and North America. Ramsey holds an Electrical Engineering degree in telecommunications from Polytechnique de Montréal University in Canada. He is fluent in English, French and Arabic.



ST Engineering iDirect announces Strategic Leadership Appointments

ST Engineering iDirect, a global leader in satellite communications, has announced four new strategic appointments, as the business strengthens its global leadership team.

Tim Verschage, a satcom industry veteran, has been appointed as Senior Vice President of Product Strategy and Development. He will concentrate on ensuring that ST Engineering iDirect technology is aligned in a way which fast-tracks innovation to meet a variety of new satellite applications. Previously Director of Business Development at Intelsat General Corporation, Verschage brings over 30 years of experience in engineering, systems integration and product and program management.

Emma Park has been appointed as Senior Vice President of Market and Growth Strategy, and will redefine the company's go-to-market strategy in response to the evolving and dynamic market and customer requirements. Park brings over 25 years of experience in sales, business development and strategy in telecommunications, satellite and IoT.

Dean Buckley has been appointed Chief Operating Officer, and will be laser focused on customer-centricity ensuring execution and committed delivery of the company's products and solutions. In his 18 years with the company, Buckley has managed several of its key operational and customer-facing teams and has been responsible for positioning the company for scalable growth.

Julie Bettinger has been appointed as Chief Marketing Officer, having led ST Engineering iDirect's marketing team for nearly two decades. Bettinger will be focused on strengthening ST Engineering iDirect's brand positioning and will also play a critical role in continued strategic engagement with customers and the market.

In their new positions, these industry experts will support recently appointed CEO Don Claussen and the rest of the executive team, in leading the company in expanding its global leadership and technology vision against a backdrop of rapid satcom industry transformation.

Don Claussen, CEO of ST Engineering iDirect, said, "We are delighted to have Tim and Emma join our senior leadership team, as well as Dean and Julie moving into their new roles. With their strong credentials and a wealth of industry experience, they will be instrumental in planning and delivering ST Engineering iDirect's future vision."

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