

SaT5G project announces successful demonstrations of 5G over satellite use cases at EuCNC 2019 event in Valencia.

VALENCIA, Spain – June 19th 2019: The SaT5G project today announced the operation of a number of successful demonstrations of 5G over satellite at the 2019 European Conference on Networks and Communications ([EuCNC 2019](#)) in Valencia, Spain.

The project vision is to develop a cost-effective plug-and-play satcom solution for 5G to enable mobile operators and network vendors to accelerate 5G deployment across all geographies and multiple use cases whilst at the same time creating new and growing market opportunities for satcom industry stakeholders.

Over-the-air MEC-based layered video streaming over a 5G multilink satellite and terrestrial network

The demonstration showcases a network which integrates 5G over parallel satellite and terrestrial delivery paths to provide enhanced Quality of Experience (QoE) for users consuming 4K video content. The innovative demonstration highlights how a Multi-access Edge Computing (MEC) proxy can incorporate bit-rate adaptation, link selection and enhance layered video streams for future satellite and terrestrial integrated networks. The demonstration is undertaken in partnership with [Avanti's](#) high-throughput HYLAS 4 GEO satellite capacity, [University of Surrey's 5G Innovation Centre](#) testbed network and [VT iDirect's](#) 5G-enabled satellite hub platform and satellite terminals.

Over-the-air multicast over satellite video for caching and live content delivery

The demonstration showcases over-the-air satellite multicast technology for the delivery of live channels using a MEC platform for Content Delivery Network (CDN) integration with efficient edge content delivery. The demonstration highlights the benefits, in terms of bandwidth efficiency and delivery cost, of using a satellite-enabled link for provisioning live content in a 5G system. The demonstration is undertaken in partnership with [Avanti's](#) high-throughput HYLAS 4 GEO satellite capacity, [Broadpeak's](#) CDN, [University of Surrey's 5G Innovation Centre](#) testbed network and [VT iDirect's](#) 5G-enabled satellite hub platform and satellite terminals.

Video demonstration for delivery of 5G connectivity services to airline passengers

The demonstration showcases 5G technology aboard aircraft, leveraging virtualized services for content distribution. An integrated approach for the delivery of 5G connectivity services based on a Medium Earth Orbit (MEO) satcom solution will be introduced. The innovation targets the next-generation inflight entertainment services to passengers and connectivity solutions for airplanes with a combined satellite and terrestrial 5G network. The demonstration is undertaken in partnership with [Zodiac Inflight Innovations'](#) virtualised A320 airplane cabin mock-up and connectivity infrastructure, [Broadpeak's](#) content delivery platform, [Gilat Satellite Networks'](#) Taurus VSAT unit and virtualised satellite hub, [i2CAT's](#) terrestrial satellite resource coordinator (TALENT), [Quortus'](#) mobile network core, and [SES's](#) low-latency high-throughput O3b MEO satellite constellation.

Demonstration of local (MEC) content caching in 5G with hybrid backhaul network

Using a satellite emulator testbed, [TNO](#) demonstrates local access using an established satellite and terrestrial backhaul link with User Plane Function (UPF) located at a MEC node for content delivery. The UPF in the MEC node is used to handle requests for the local content with the ability to optimally select between satellite or terrestrial links depending on available capacity, network policy, link performance and the type of end-user profile. The innovation lies with the ability to set up connections for downloading content with the DASH Enabled Network Element (DANE) collocated with UPF, which can now handle both satellite and terrestrial links simultaneously.

Video demonstration of 5G New Radio (NR) over satellite networks

The [University of Oulu](#) demonstration jointly defined with [Thales Alenia Space](#) shows that with some modifications, it is possible to apply 5G NR over satellite links for future satellite systems. As listed in [3GPP TR 38.811](#), the key issues that need addressing include higher latency and increased Doppler shift. The demo concentrates on the uplink random access process.

Demonstration of Hybrid 5G Backhauling to extend services for rural markets and large-gathering events

The [Ekinops](#) demonstration showcases how a standard 5G User Equipment (UE) leverages a hybrid backhaul and validates the performance required by 5G services, including packet loss mitigation and remediation. The solution provides tangible measurements of very high QoE achieved by combining satellite-terrestrial links bandwidths for fast upload and download traffic and the terrestrial link low latency for interactive traffic. The demonstrated 5G-hybrid backhaul relies on state-of-the-art multipath protocols and shows satellite as a viable backhaul link for 5G service.

Please visit the SaT5G website [link](#) for a detail description of the demonstrations.

INdran Sivarajah, Project Director of SaT5G said: *“SaT5G is a bold project and our goal is to ensure that with the roll-out of 5G networks, the gap between the unconnected and connected world does not further widen. For mobile operators, these underserved markets are seen as key to accessing the last remaining 1.6 billion subscribers and satcoms are well positioned to play a major role here. We want to build an attractive plug-and-play satcom solution with 5G for telcos and network vendors to accelerate 5G deployment and at the same time creating new and growing market opportunities for the satcom industry”.*

Mike Fitch, Technical Manager of SaT5G said: *“SaT5G is about integrating satellite links with heavy emphasis on standardisation to allow trusted operation and to facilitate industry adoption. The focus is on eMBB to fixed and mobile networks, including support for orchestration and slicing, with the satellite links providing backhaul connectivity either alone or in parallel (multilink) connectivity with terrestrial links. Innovations from the project include satellite modem VNFs, business process modelling including brokers, and improved multicast and multilink algorithms for use with satellite”.*

Ends.

About SaT5G consortium

The Satellite and Terrestrial Network for 5G (SaT5G) consortium consists of 16 partners: Avanti Communications (Project Coordinator), Thales Alenia Space France, University of Surrey, SES, Airbus Defence and Space, Ekinops SA, TNO (Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek), British Telecommunications plc, Zodiac Inflight Innovations, Broadpeak, Gilat Satellite Networks, VT iDirect, imec, Fundacio Privada i2CAT, Internet I Innovacio Digital A Catalunya, University of Oulu, and Quortus. The SaT5G project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 761413.

Contact

To find out more information visit www.sat5g-project.eu or contact us at info@sat5g-project.eu.

Partners involved in SaT5G

Avanti Communications

Avanti (www.avantiplc.com) connects people wherever they are. Through the HYLAS satellite fleet and partners in 118 countries, Avanti's network provides ubiquitous internet service to an end market of over 1.7bn people. Avanti works together with like-minded people and organizations to go the extra mile, developing new, innovative and pioneering satellite solutions that help to liberate the potential of people, businesses and government departments across EMEA. Avanti has invested \$1.2bn in the latest Ka-band satellite technology and shaped it to meet customers' aspirations. Avanti Communications is listed in London on AIM (AVN: LSE)

Broadpeak™

Broadpeak® (www.broadpeak.tv) designs and manufactures video delivery components for content providers and network service providers deploying IPTV, cable, OTT, and mobile services. Its portfolio of solutions and technologies powers the delivery of movies, television programming, and other video content over managed networks and the Internet for viewing on any type of device. The company's systems and services help operators increase market share and improve subscriber loyalty with superior quality of experience. Broadpeak supports all of its customers worldwide, from simple installations to large delivery systems reaching capacities of several million of simultaneous streams. The company is headquartered in Cesson-Sevigné, France.

Ekinops SA

EKINOPS is a leading provider of open and fully interoperable layer 1, 2 and 3 solutions to service providers, Over-the-Top/Managed Service Providers, cable MSOs, data centre providers and mobile service providers around the world. Its product portfolio consists of two highly complementary product sets. EKINOPS 360 is a single, fully integrated platform for Metro, Regional, and Long-Haul applications up to 400G. OneAccess provides a wide choice of carrier-grade physical and virtualized deployment options for enterprise services requiring layer 2 and layer 3 network functions, including WAN Optimization for satellite and SD-WAN, on white-box CPE, multi-service routers, Ethernet access devices; and also as integrated or standalone virtualized network functions.



Gilat Satellite Networks

Gilat Satellite Networks Ltd. (NASDAQ: GILT, TASE: GILT) is a leading global provider of satellite-based broadband communications. With 30 years of experience, we design and manufacture cutting-edge ground segment equipment, and provide comprehensive solutions and end-to-end services, powered by our innovative technology. Delivering high value competitive solutions, our portfolio comprises of a cloud-based VSAT network platform, high-speed modems, high performance on-the-move antennas and high efficiency, high power Solid State Amplifiers (SSPA) and Block Upconverters (BUC). Gilat's comprehensive solutions support multiple applications with a full portfolio of products to address key applications including broadband access, cellular backhaul, enterprise, in-flight connectivity, maritime, trains, defense and public safety, all while meeting the most stringent service level requirements. Gilat controlling shareholders are the FIMI Private Equity Funds. For more information, please visit: www.gilat.com

i2CAT

i2CAT Foundation is a non-profit research and innovation centre that promotes mission-oriented R&D activities on advanced Internet architectures, applications and services. The centre stands for a new open innovation framework, fostering the collaboration between companies, public administration, the academic environment and end-users. Internet has produced a superabundance of data, information and networks. The next step is to advance in the research and innovation of an Internet based on intelligent systems and smart technologies. The Internet of knowledge and creativity is the new challenge to face. i2CAT's vision for the next 10 years is a networked smart world, a co-laboratory based on a new generation of networked intelligent technologies and systems, a co-creating platform between machines, people and the environment for a sustainable and smart future. www.i2cat.net

Quortus

Quortus provides software defined core networks which implement standards-conforming 5G, 4G and 3G cellular network functions. Highly scalable, they can be hosted anywhere – in the cloud, at the network edge, or deeply embedded alongside a cellular radio in a single-chip implementation. Our software enables flexible, agile mobile communications networks that provide a foundation for innovative and highly cost-effective services to a diverse range of end customers across enterprises, vertical industry specialists, private cellular networks and MEC. From established service providers to new entrants leveraging new 5G-aligned technologies, we have achieved a hard-won reputation for innovation through involvement in government sponsored projects such as AutoAir, where Quortus is able to showcase its ability to understand and work with cutting edge technologies. www.quortus.com

SES

SES is the world's leading satellite operator with over 70 satellites in two different orbits, Geostationary Orbit (GEO) and Medium Earth Orbit (MEO). It provides a diverse range of customers with global video distribution and data connectivity services through two business units: SES Video and SES Networks. SES Video reaches over 355 million TV homes, through Direct-to-Home (DTH) platforms and cable, terrestrial, and IPTV networks globally. The SES Video portfolio includes MX1, a leading media service provider offering a full suite of innovative services for both linear and digital distribution, and the ASTRA satellite system, which has the largest DTH television reach in Europe. SES Networks provides global managed data services, connecting people in a variety of sectors including telecommunications, maritime, aeronautical, and energy, as well as governments and institutions across the world. The SES Networks portfolio includes GovSat, a 50/50 public-private partnership between SES and the Luxembourg government, and O3b, the only non-geostationary system delivering fibre-like broadband services today. Further information is available at: www.ses.com

Thales Alenia Space

Thales Alenia Space, Combining 40 years of experience and a unique diversity of expertise, talents and cultures, Thales Alenia Space architects design and deliver high technology solutions for telecommunications, navigation, Earth observation, environmental management, exploration, science and orbital infrastructures. Governments, institutions and companies rely on Thales Alenia Space to design, operate and deliver satellite-based systems that help them position and connect anyone or anything, everywhere, help observe our planet, help optimize the use of our planet's – and our solar system's – resources. Thales Alenia Space believes in space as humankind's new horizon, which will enable to build a better, more sustainable life on Earth. A joint venture between Thales (67%) and Leonardo (33%), Thales Alenia Space also teams up with Telespazio to form the parent companies' Space Alliance, which offers a complete range of services and solutions. www.thalesaleniaspace.com

TNO

TNO, the Netherlands Organization for applied scientific research TNO, was founded by law in 1932 to enable business and government to apply knowledge. As an organization regulated by public law, it is independent: not part of any government, university or company. TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way. The research activities concentrate on developing, integrating and applying knowledge and generate creative and practicable innovations as new products, services and processes, fully customized for business and government. TNO consists of nine core areas that work together on several central research themes, among which are 5G, satellites and 5G verticals. Each of TNO's units interfaces with the different core areas and contributes to the comprehensive and inter-disciplinary approach of TNO research. For more information please visit www.tno.nl.

VT iDirect

VT iDirect, a subsidiary of VT Systems, is a global leader in IP-based satellite communications providing technology and solutions that enable our partners worldwide to optimize their networks, differentiate their services and profitably expand their businesses. For more than 20 years, the VT iDirect organization has focused on meeting the economic and technology challenges across the satellite industry. Today, the product portfolio, branded under the name iDirect, sets new standards in performance and efficiency, making it possible to deliver voice, video and data connectivity anywhere in the world. VT iDirect is the world's largest TDMA enterprise VSAT manufacturer and is the leader in key industries including mobility, military/government and cellular backhaul. For more information please visit www.idirect.net.

About Zodiac Inflight Innovations

Zodiac Inflight Innovations (ZII) provides innovative, intuitive and trusted IFEC (Inflight Entertainment and Connectivity) systems such as the RAVE™ family of products that have been providing passenger and flight crew satisfaction for more than 20 years. ZII is a chosen IFEC partner for several leading airlines and aircraft manufacturers worldwide. ZII is a business unit of Safran Passenger Solutions within the Safran Group.

University of Oulu

University of Oulu (UOULU, www.oulu.fi/yliopisto) is an international research and innovation university engaged in multidisciplinary basic and applied research and academic education. UOULU is located in the city of Oulu, Finland. In SaT5G, the work is done in the project team known as Centre for Wireless Communications (CWC). CWC provides high quality master and doctoral level education in Wireless Communications Engineering. The fundamental research focuses on signal processing and radio engineering, radio access and network topologies and future wireless internetworking. In application oriented research new technologies, such as 5G, disaster prevention and recovery ICT, test environments for 5G, cognitive networking and medical ICT are identified as strong future opportunities. New emerging openings include also smart energy grids and mobile clouds. CWC employs a staff of 170 including 11 professors, 27 postdoctoral researchers and 64 doctoral students. CWC has built and operates a 5G test network (5GTN) <https://5gtn.fi/> that is a part of 5G Test Network Finland (5GTNF) <http://5gtnf.fi>. It has been and will be used in several projects for measurements and demonstrations and also by industry to their own testing purposes. Last year CWC and partners started Finnish Academia Flagship project 6Genesis <https://www.oulu.fi/6gflagship/> that aims to develop technology for the future 6G wireless technology, i.e., technology to be used in 2030's.

University of Surrey

The University of Surrey has an International reputation for research and innovation in Satellite and Mobile communications. Its Institute for Communication Systems research also houses the 5G Innovation Centre (5GIC) which is a partnership between industry and academia to promote and exploit 5G research. The partnership involves 26 major mobile players including the leading operators and equipment manufacturers and over 250 SME's. 5GIC have established one of the world's first 3GPP-compliant 5G test networks developing the core network themselves and implementing over 70 small-cell sites around the campus and surrounds. Within the SaT5G project they have extended this to satellite and demonstrated the first 5G GEO satellite link in 2018. Recently they have also established the world's first LEO 5G satellite link in partnership with Telesat and Vodafone. 5GIC are partnering UK Government in flowing out 5G trials in three regions of the UK.