



SIA-India Anniversary Conference 'Satellite Enabled 5G Applications and Services'

The year 2022 holds many promises and emerging new trends and business opportunities in the Indian Space and Satellite Industry. One such trend disrupting the market is the satellite integration with the 5G.

LEO/MEO Satellites will play a key part in extending cellular 5G networks to air, sea, and remote areas not covered by terrestrial networks. Integrating satellite and terrestrial systems will be critical to meet the future spectrum demands likely to be placed on networks and the policymakers need to be aware of the fact that 5G spectrum is not just for IMT, and many satellite services are providing 5G speed and latency.

On the occasion of its foundation day, SIA-India organized a hybrid conference on the topic '**Satellite Enabled 5G Applications and Services**' on Wednesday, 30th March 2022. The focus of the conference was to address matters viz., Satellite Integration in 5G, Satellite 5G use cases and spectrum allocation best practices. Satellite broadband carries a huge significance, and the conference focused on some of the opportunities, the technology enables to provide that complement other technologies in the communication infrastructure requirement in the country.

The Conference was a platform for key stakeholders to come together and discuss the emerging satellite 5G trends & potential in the SpaceCom sector along with addressing the critical issues and challenges. SIA-India conference holds a huge significance in defining the role of satellite technology to provide vital applications and services to connect the unconnected.

The time is near when the 5G signals will beam down from space in India and support the terrestrial 5G infrastructure with nearly ubiquitous, instantaneous, connectivity for large numbers of devices globally.

Inaugural Session

The Inaugural session flagged off with a Welcome Address by Dr. Subba Rao Pavuluri, President- SIA-India; and Chairman-Ananth Technologies Limited.

Dr. Rao stated that the year 2022 is a critical year for the SatCom industry, and a lot depends on a balanced Spectrum Policy, Ease of Doing Business with Open Sky Policy, and the liberalization of FDI norms. This would create a sustainable ecosystem for the businesses to thrive, eventually allowing the laws of economies to scale out, helping the service providers to take the satellite broadband to the unserved and underserved areas at very affordable rates bringing billions of \$ in FDI and raising employability within the country. The end benefit would be passed on to the user and the economy as a whole.

He emphasized that Rightful Spectrum is not just the fundamental prerequisite for the Space communication service providers but is also crucial for ISRO, R&D institutes, academia, and startups to carry on their projects seamlessly.

"India has been a founding member of ITU and has been an active member since 1869. India's presence in the council of the global body helps the country have a strategic role in the creation of global standards for technology. This is the first time that ITU is opening an office in the South Asia region with India as the host country. SIA-India is looking forward to working closely with ITU on multiple developments to help the space sector startups, MSMEs and companies to engage more vigorously in the development of global standards." _Dr. Subba Rao Pavuluri, President SIA-India



Keynote Address - Ms. Aarti Holla Maini, Secretary-General, GSOA

Ms Maini highlighted GSOA,'s active support & promotion of awareness & understanding of 5G projects funded by ESA & the EU. She stressed upon 5G Use Cases developed in the European context benefitting India in bridging Digital Divide / minimizing a 5G divide through modern broadband satellite systems operating across orbits. Other Benefits involve:

- The role of cloud computing/edge computing to support India's huge media market and to deliver Industrial IoT-based solutions to verticals like agriculture, mining, transport & logistics.
- Partnering with MNOs on Connected Vehicles to drive efficiencies through seamless connectivity over long distances - E.g. to support mobile banking, mobile healthcare, etc.
- Supporting passenger connectivity for aeronautical & maritime broadband
- Enabling mobile backhaul & fixed broadband services in support of government universal service programs, connecting schools, hospitals, government offices and businesses
- Ensuring continuity of service & vital connectivity at times of disaster

Special Guest of Honour: Shri RK Saxena, Wireless Advisor to GOI,

Shri Saxena emphasized upon the critical role Satellite communication technology is poised to play in improving the digital architecture of the country. He said each technology has its advantages and strengths and has a complementary and supplementary role to play in achieving the Digital India goals of India.

Where the terrestrial technologies have a massive role, the satellites have a promising role to play as well. Any policy would have to account for the difference in dynamics of providing connectivity in rural and remote areas from those of urban areas and the strategies, which work in urban areas, are not suited for the rural areas.

He said "The need for satellite communication becomes evident when we want to transmit the signal to far-off places. The satellite technologies have immense capabilities in harnessing new age digital technologies and are an excellent platform to unleash their potential to reach underserved markets with access to high speed, reliable broadband services."

Chief Guest: Shri AS Kiran Kumar, Former Secretary, DoS, and Chairman, ISRO

There is immense potential with space sector with new innovative disruptive technologies to capture a substantial market share of the global space economy which is all set to be a \$1 Trillion market by 2030. The industry, Government and Academia need to work in constant synergy to carve out effective solutions for the sector.

Both terrestrial and satellite sectors need to work in tandem towards improving the digital architecture of India, and we need to take advantage of both. The pandemic has changed the whole scenario of communication. In the context of 5G and 6G standards, high speed internet can be harnessed by space and terrestrial technologies provided the government also takes care of the commercial success of pvt enterprise.



SIA-India work is prominent in providing a platform for such critical discussion.

“SIA-India, along with ISRO and InSpace, can conduct experiments to support 5G opportunities and demonstrate solutions on how India can become a leading player in leading technologies”.

Panel Discussion 1- Satellite 5G Use Cases:

The panel focused on satellites unlocking new use cases by leveraging the 5G framework and technological advancements in SatCom technology for integrating all communication technologies. The session showcased some of these use cases, applications and services.

Chair: Shri M K Patnaik, Sr Dy. Wireless Advisor, WPC, Department of Telecom

Satellite 5G is going to bring major transformational changes in providing enhanced broadband capabilities to make smart homes, smart cities and smart industries. The discussion focused on the need for massive investments and returns to create a feasible business ecosystem. He said “It’s high time we bring satellite into 5G discussion to set the narrative right. Satellite is already complementing the 3G and 4G, through backhaul connectivity, which was permitted last year, the govt. is already doing its bit to make it affordable by removing the barriers, and a lot more reforms are underway to support the sector”.

The satellite tech will not be able to compete with the terrestrial services, but they can still retain critical and life-saving communication services during disasters. LEO satellite constellations will supplement terrestrial 5G infrastructure to increase network coverage and provide a backup in the event of natural disasters like tropical storms, earthquakes, floods and hurricanes. They are going to serve the remote and difficult geographies where the terrestrial networks will not be capable to serve the areas.

Mr. Bashir Patel, Sr. Regional Advisor Policy and Regulatory, Inmarsat

In his keynote address, Mr. Bashir Patel explained that Satellite Systems are key enablers of universal connectivity. He said “No single technology can satisfy all telecommunication needs, and hence, preserving access to satellite allocated spectrum also for 5G satellite solutions is critical.” It is essential and highly relevant towards a harmonized National 5G strategy that the 5G networks should be forward compatible with satellites. Embedding satellite into critical parts of terrestrial infrastructure Satellites allow, amongst other things a rapid rollout of broadband across India / Asia-Pacific highly competitive backhauling solutions for rural/remote connectivity. LEO Satellites will play a key part in extending cellular 5G networks to air, sea and other remote areas.

Mr Bashir said the Satellite capacity will also be key for extending 5G backhauling into more rural/remote areas supporting data delivery at the edge and enabling network availability for communications on moving platforms.

Beyond 5G backhauling, satellite systems can support a wide range of new 5G applications such as connected vehicles and autonomous driving, satellite systems could efficiently support the firmware or software over-the-air (“FOTA/SOTA”) updates, map updates and real-time traffic conditions and parking availability. Very high-speed satellite links (up to 1 Gbps or more) direct to plane, train, car or vessel, from geostationary and/or non-geostationary satellites can enable High-speed two-way broadband connectivity (HD/UHD video and non-video data) where it is not otherwise possible.



Mr. Brian Pemberton, Vice President, Omnispace

Mr Brian spoke about Hybrid mobile network architecture that combines global NGSO coverage and mobile network roaming is the future solution for Mobile. India needs to augment in this technology to redefine the mobile connectivity solutions for Consumer, Enterprise and Government Users.

With an integrated satellite-terrestrial solution, the additional capacity can be used as an IoT backup or supplementing congested data traffic.

Panel Discussion 2- Balanced Approach for Spectrum Allocations.

This panel highlighted the importance of 5G advances used by Satellite broadband and on the importance of spectrum allocations and planning. The international best practice for rationally planning spectrum use for different applications examines alternative uses to identify which use maximizes the value of that spectrum. The session highlighted the best practices adopted globally, for a balanced spectrum allocation policy planning for India.

Mr. Sunil, Additional Director General, Prasar Bharati

Mr Sunil, Additional DG, Prasar Bharati said "Availability of the spectrum is crucial, and a holistic study of spectrum requirement for both IMT and Satellite is necessary. No one solution can fill the broadband connectivity gap, a right mix of all access technologies is required for omnipresent connectivity in the country".

Talking about the SIA-India Study Paper 'A Balanced Approach for Spectrum Allocation', Mr. Sunil said the need is to promote the adoption of a non-discriminatory, technology-neutral spectrum policy with the hope that this will help create policies to facilitate the entry of new technologies and competitors into the market, encouraging and promoting innovation.

A balanced and multi-technology approach would enable the creation of ubiquitous connectivity infrastructure in the country for achieving 'Digital India' and 'Broadband for All' targets.

The cost and viability of satellite services are dependent on the amount of spectrum available. Having full access to the 28 GHz band will bring about economies of scale. Satellite broadband can bring high-speed low latency internet in a more cost-effective way. Any allocation of the premium 28GHz spectrum for 5G services would undermine satellite operations in India which can bridge the digital divide as almost 75% of rural India doesn't have broadband access and many locations still go without terrestrial connectivity.

He asserted that more than 120 countries are expressing their intention to follow the ITU decisions and preserve the 27.5-31 GHz band for satellite broadband services as the global consensus continues to be affirmed. A large amount of investments have been made by several start-ups, MSMEs, manufacturing industries, Pvt Companies' and ISRO's, and their decisions depend on a conducive spectrum environment.

Doordarshan and All India Radio disseminate information to a massive viewership. Both the verticals are heavily dependent on satellite spectrum. The impact of the loss of C-band spectrum in the 3.6-3.67 GHz band alone will be felt across the entire INR 700 Bn Indian broadcasting industry carrying 900+ registered channels to 21 Cr Households in urban and rural India through 1730+ digital platform operators and 50000+ cable operators, provides direct and indirect employment to 1.83 M people.



Dr. Laura Roberti, Spectrum and Market Access Director, Telesat

Dr. Roberti also stated that No single technology can satisfy all telecommunication needs. No global, regional or even national entity can follow a ‘one-size-fits-all’ solution. Backhaul via satellite can extend the connectivity reach of telecoms operators and lowers the risk on investments. It would eliminate large infrastructure deployments and would allow for revenue generation in new, hard hard-to-reach markets. Satellite is the answer to the rapid rollout of broadband across India Direct Connectivity Community Wi-Fi Mobile backhaul E-services (healthcare, etc.)

However, synergy is needed between satellite and terrestrial operators, in terms of spectrum use. Spectrum for terrestrial mobile services spectrum cannot be shared amongst the operators however in the case of satellites, the same microwave spectrum can be (and is) used by multiple operators to serve the same geographic area. Hence, assignment of spectrum for satellite by auction would lead to unnecessary spectrum segmentation and, therefore, a very inefficient use of spectrum. It would put an artificial limitation on the range of satellite services available to customers.

“There are no precedents of microwave satellite spectrum assignment by auction 28 GHz band auction for terrestrial 5G. Due to the terrestrial propagation, this band can be used for 5G deployment only in limited areas. Exclusive nationwide allocation to terrestrial 5G would unnecessarily sterilize valuable spectrum in areas where terrestrial 5G will/can never be deployed. Spectrum denial to satellites which, in turn, can provide instant national (and global) coverage in the same band would be a deterrent to the digital India goals of India.” She asserted

.

Mr. Mehul Bhandari, Sr. Advisor Policy and Regulatory, Viasat

Government policy can enable bridging the digital divide with spectrum access for satellite broadband. The key Recommendations:

- India can accommodate the 5G mobile in a separate spectrum in 26 GHz (right spectrum, harmonized by ITU WRC-19)
- Allow advanced satellite systems to use the 28 GHz band (right amount, 27.5 – 29.5 GHz). Spectrum globally used by FSS and ESIM
- Avoid costly and complex arrangements in the 28 GHz band. IMT systems are incompatible, particularly considering 28 GHz global use by ubiquitous land, sea, and air ESIM (right conditions)
- Authorize globally available satellite capacity to serve India

“India is set to be one of the largest digital economies in the world and will require a mix of technologies. Satellite broadband in 28 GHz band will accelerate digital policy goals. The licensing of NGSO LEO mega-constellations needs to be carefully considered for India to have future-proof access to LEO.”

Mr. Mohaned Juwad, Director Spectrum Policy, Intelsat

Mr. Junwad said “Success isn’t just about allocating new spectrum bands, getting 5G spectrum licensing right is most important”. Satellite continues to provide critical services that cannot be provided by other means. A balanced approach is needed between wider geographic areas and ultra-high speeds and the



lowest latencies. Soon in cities in Europe, North America and China, mmWave will be used to provide a cost-effective solution for high-speed 5G. Regulators in India too can assign mmWave spectrum knowing there will be an ecosystem in place. There is an urgent need to prioritize mobile broadband services – above revenue maximization – when awarding new frequencies.

He said “India should look at future spectrum use based on not only the demand for spectrum but also on economic & social value. Not all of the spectrum licensed to mobile operators is actually used to provide services to users. IMT can still grow and serve the existing spectrum.” Mobile connectivity challenges are not caused by spectrum shortage – it is infrastructure, affordability, and coverage.

Panel Discussion 3- Satellite Integration in 5G:

This session focused on the service requirements established in the 3GPP standardization group, which specify explicitly that the 5th Generation (5G) telecommunication system shall be able to provide services using satellite access. A space-based 5G NTN as specified in 3GPP Release 17 and beyond is characterized by continuity, scalability, and ubiquity while converging towards a future Satcom technology roadmap in line with the emerging 6G concepts.

Chair: Prof Abhay Karandikar, Director, IIT-Kanpur

3GPP standardization has taken steps for integrating satellite services into 5G IMT. We have results of 5G backhaul which provides a speed of 900mbits/s and is very encouraging. Prof Karandikar stated “Satellite integration with 5G, where Satellite Access can work just as one of the radio access spectra as a single unified 5G access technology. 5G tech enables the integration of various radio access technology into a single core technology. Such seamless integration of technologies would define the new generation of connectivity in India”.

Mr. Daniel Mah, Vice President, Legal and Regulatory Affairs, SES Satellites

Satellites have the proven ability to extend 3G and 4G network coverage, including in such diverse countries as Brazil, the DRC, and Papua New Guinea. Modern High Throughput Satellites stand ready to extend 5G mobile networks so that the benefits of 5G are available to all

Even before Release 17 of the 5G NTN standards from 3GPP, the satellite industry has been actively engaged in efforts to seamlessly integrate satellite backhaul into 5G core networks. These efforts have resulted in the development of satellite backhaul solutions that support all the key 5G usage scenarios (eMBB, uRLLC, mMTC) and technological features (SDN, NFV, MEC). Satellite 5G solutions have moved from proof-of-concept to real-world trials with mobile operators.

He spoke of SES’s work with a U.S. mobile network operator in 2021 to conduct a week-long test of the capabilities of the Ka-band O3b MEO system to support their 5G network. The test was a success which measured various 4G LTE and 5G voice and data scenarios to test quality and stress load capacity and performance.

Integrating satellites with 5G infrastructure improves the Quality of Experience (QoE) of high-capacity applications by intelligently routing and offloading traffic. “The MEO constellation delivered a fiber-like



QoE throughout the duration of the call—with no perceivable lags or delays caused by waving the devices around. In other words the MEO system delivered an outstanding capacity and performance of the voice and data tests and the quality of the 5G video call was a high quality 5G experience over satellite.”

The key ingredient for success for India is a liberalized Space Policy and Balanced Spectrum Policy.

On Spectrum matter related to mmWave band, Mr. Mah pointed out that there is enough spectrum in the 26Ghz Band for the 5G IMT and satellite services can use the 28Ghz band, for both services to coexist effectively.

Mr. K Krishna, Vice President & CTO, Hughes in India

There is an Access-Stratum and Non-Access Stratum. The Access stratum is optimized for satellite whereas the Non-Access Stratum is based on terrestrial standards. Mr. Krishna pointed out that Hughes has been developing both backhaul and access mechanisms for cellular networks by the use of Satellite as an access medium where the Satellite base stations are integrated with terrestrial core and UTs are integrated with terrestrial NAS. This has reduced bandwidth usage by effective compression and optimization techniques. This feature has been vastly implemented using GEO satellites. LEO will further bring down the latency and is more suitable as a backhaul medium.

Some of the 5G features relevant for satellites are Network slicing, Network function virtualization, Finer granular QoS, Multiple RAT operations, Advanced LDPC coding etc. Role of satellite in 5G is important in content distribution to 5G terrestrial network edges taking advantage of broadcast/multicast capabilities of satellite.

Mr. Jitender Ahuja, Vice President – Product & Solutions, Nelco Limited

We are in a transformational stage in both broadband and narrowband. India with diverse geographic locations such as islands, Himalayas, northeast, etc needs robust connectivity. 5G has a very important role to play in terms of high-speed low latency broadband, however, the reach of 4G has been limited. 4G hasn't been successful to spread to remote locations. Due to lack of fiberisation, satellites can be the only savior. Backhauling 5G by satellites will work very well.

Requirement of sufficient spectrum in a balanced manner is very critical. 3GPP integration of terrestrial and nonterrestrial would enable coming up of handsets which would support both terrestrial and non-terrestrial network. It will open up so many options which would manage connectivity to cars, vessels, airplanes, and other IoT devices in remote and rural areas. The satellite IoT and M2M, while small in nature, the aggregated quantity of this M2M and IoT connectivity will have a significant effect as a whole.

Closing Remarks by Mr. Anil Prakash, DG, SIA-India

The task ahead for SIA-India is huge and we would continue to work with full commitment to strategizing our next action plan for the year ahead. Stay tuned for our next event, details of which will be posted on our website and in our periodic Newsletter.