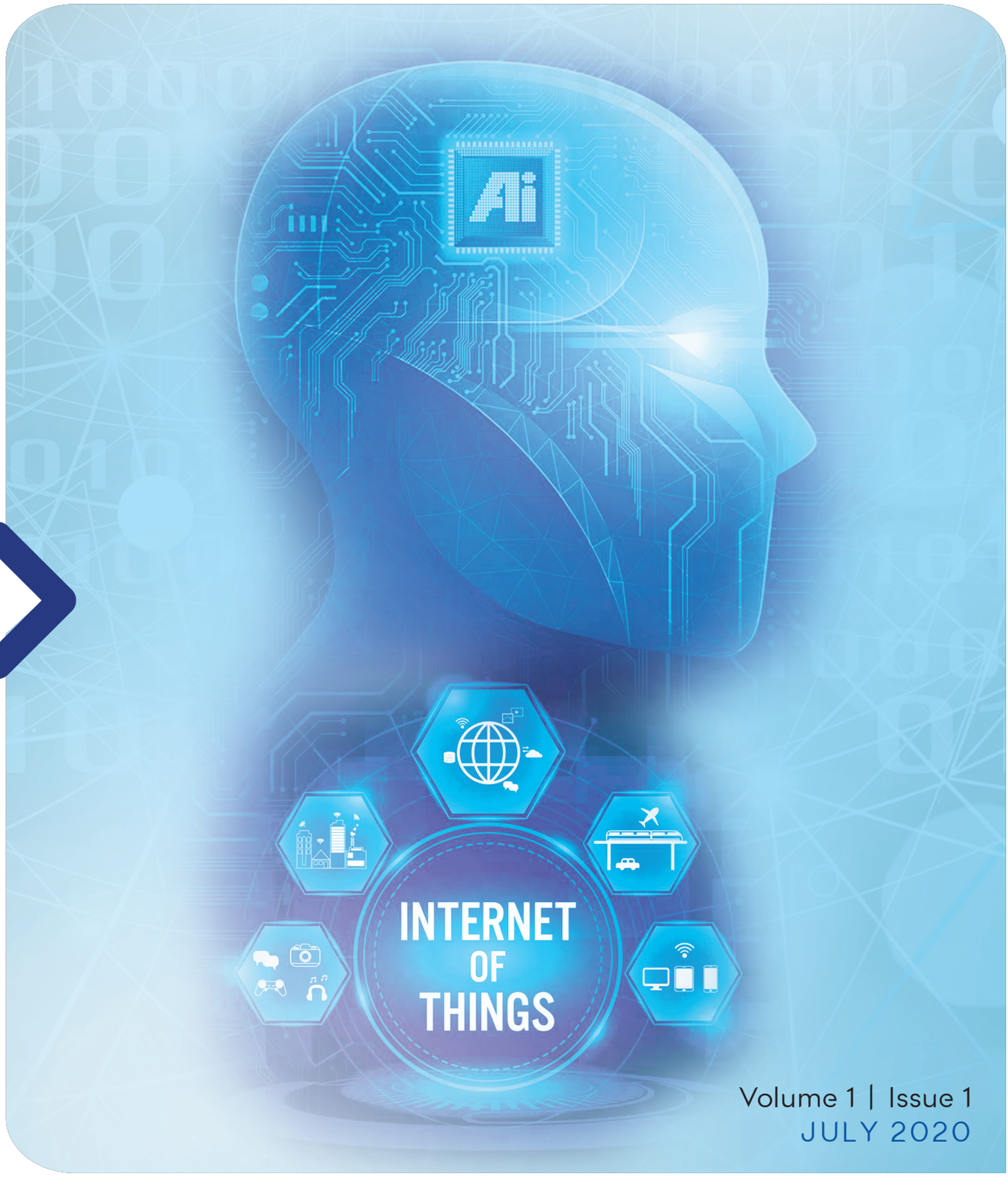
BROADBAND BITS & BYTES

BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

A BIF Bi-Annual Communique



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Dr. Rishi Bhatnagar
Chairman of AI & IoT Committee,
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President, Aeris Communications India Pvt. Ltd.

AI and IoT together are creating more value for businesses, customers and public services. The market prediction on the adoption of these technologies is also encouraging, thanks to the improvements in last mile connectivity, cheaper sensors, availability of low power technology, and longer lasting batteries which are making IoT solutions more relevant and affordable than a decade ago. AI is expected to more than double the rate of innovation and employee productivity in India by 2021. With 1.9 bn devices expected to be connected in India alone, by 2025, IoT and related technologies will assume unparalleled significance. Bain predicts the combined markets of the IoT will grow to about US$ 520 billion in 2021, more than double the US$ 235 billion spent in 2017.

While national programmes, such as Digital India and Smart Cities Mission are propelling the use of IoT technology in the country since 2016, enterprises are using the technology for providing remote services, real-time monitoring as well as tracking of services and systems across diverse industry verticals to reduce operational and manpower costs, improve operational efficiency, reduce time-to-market and enable new revenue streams. With data orchestration deployments, IoT is growing organically - from the devices and up. IoT orchestration offers the ability to integrate IoT with existing business workflows and systems and provides a single platform that unifies data from current and future connected devices and systems. Across sectors, we are seeing more and connected products and services, enabling workforce to do more meaningful, higher-level work. AI, Big Data analytics and cloud computing are changing job profiles for technology specialists worldwide.

I thank Broadband India Forum for doing a remarkable work in building technology ecosystem in the country by bringing leading think tanks and government bodies and private institutions together. The last year, IoT and AI committee at the Broadband India Forum in consultation with the Electronics Skill Council of India, the Agriculture Skill Council and the Healthcare Sector Skill Council, did an intensive study on potential of IoT in the two most important sectors in India – Healthcare and Agriculture. Healthcare is getting more accessible with connected hospital systems, smart wearables, home diagnostics and government's intention to rollout all-India electronic database system to reduce the burden of paper-based data collection, recording, and storage by 2020. Similarly, agriculture productivity will be significantly enhanced with technology adoption. Business Insider Intelligence projects there to be nearly 12 million agricultural sensors installed globally by 2023. A connected farm on an average can generate half a million data points per day. The combination of IoT and AI together will significantly allow farmers to easily modify their processes to achieve optimal output. IoT and AI will allow farmers to predict future patterns such as weather, pricing predictions, and even historic data, helping them improve yields and increase profits. The study revealed that IoT and AI-based applications will create over 28 lakh jobs in rural India over a period of eight to 10 years with an annual value of Rs. 60,000 crore.

However, we must not forget that unlocking value from any technology requires more than investments. Security, performance and standards implementation are key areas of concern where everyone in the IoT ecosystem, including the government, enterprises, technology providers and academia must collaborate. All stakeholders must look beyond the "wow" factor to ensure that they are investing in IoT solutions which are designed to solve real problems. This edition widely covers the views of various subject matter experts in these areas giving a fresh perspective and direction for a sustainable business growth enabled by IoT & AI.

I hope you find this edition insightful and look forward to your feedback and suggestions on how we can collaborate for technology led sustainable business development.

TV Ramachandran
President,
Broadband India Forum

Dear Readers,

The year 2020 arrived with an unprecedented predicament for the world, as in the beginning of the year itself, we witnessed some achievements as well as some great challenges, chiefly owing to the outbreak of the deadly Corona virus. The global pandemic forced the world to step back into physical isolation and look-up to innovation and technology to come forth and provide prudent and practical solutions to the unique crisis. And the digital communications sector has risen up to the occasion!

Digital Services are playing a significant role in aiding the frontline of medical and healthcare services in treating and containing the pandemic; while servicing other key services such as banking, insurance, supply chains and many more. The ICT sector is also helping to mitigate the adverse effects of the physical lockdown and social distancing measures in place, to enable near-normal operations for continued and sustainable livelihood of the people. Broadband is facilitating seamless and customised communications solutions via so many different ways: remote video and virtual connectivity applications/platforms, virtual medical consultations and counselling, e-classes for education, streaming services, digital means for dissemination of critical information/guidelines, digital payments for contactless transactions, etc. Acknowledgement, acceptance and appreciation for these Digital Services has now paved the path for new and evolving technologies to help ensure a progressive and secure future for the world. The opportunity within the adversity has been realised!

The role of future technologies has never been more relevant, as the entire globe is trying to establish advanced measures to prevent and counter such, or perhaps, any catastrophe in the future. The role of AI in predictions, analysis and cure in terms of both mapping, tracking, demographics, trends, as well as medical solutions for the virus is now the top priority research and deliberation. The role of IoT and M2M in operationalising and executing such research findings and solutions comes as the next important part of the equation. And all this is in addition to the regular evolution of these technologies in their respective commercial and enterprise applications, which continue along side.

It is against this relevant background, that I'm pleased to share with you the first edition of BIF's new bi-annual Communique - Bits & Bytes, which attempts to underline the growing importance of future technologies, especially AI & IoT, with views from various domain experts and vibrant members of the BIF family; apart from providing a sneak-peek into the latest activities and updates of the Forum.

Further, with BIF having stepped into its 5th year of operations, I would also like to take this opportunity to thank each and every esteemed member, valued associates & partners, our honourable advisors, and the dedicated Directorate team, for making this journey a remarkable one. I feel that a fair bit has been achieved by BIF as an organization in these 5 years. However, there is much more to be done, and I earnestly seek the support and participation of the entire BIF family in doing so. I am now eagerly looking forward to our celebrating this milestone along with all the relevant and vital stakeholders of BIF in the later part of the year.

I hope you find this communique to be an interesting read, and wish this first edition of BIF's bi-annual communique for 2020, all the very best.

Rajat Mukarji
Director General,
Broadband India Forum

Dear All,

It is my pleasure and privilege as Director General of Broadband India Forum, to address all our members in this first edition of the 2020 bi-annual communique.

As most of you are already aware, the impact of the pandemic caused by the Corona virus pushed our entire country into a lockdown during the latter part of March 2020, just a few short weeks after my joining. The changed dynamics of having to work from home in a relatively new operational scenario, has sort of redefined my role in the midst of all this, as a 'trial by fire', if I may term it so. However, ably supported by the team, we have taken to the "Work From Home" rule, and have continued to contribute and add value to the primary goal of the Forum, to be an independent think tank for Digital Transformation.

Although I was looking forward to actively engaging with all of you through a personal and physical interaction, the limitations of the present circumstances have prevailed, and the process will have to be undertaken gradually, with the improving situation. What gives me comfort though, is the fact that although I have not had the opportunity to interact with all the stakeholders in my present role and capacity, as a long-time member of the communications industry, many of us are already known and connected to each other. Hence, what remains is to wait for the present situation to ease, and thereafter I will be in a better position to work more closely with each and every one of you in order to progress the core functional areas of the Forum, in Regulation, Policy and Standards.

It is an added pleasure to have become part of this incredible entity at a time when we are about to celebrate the Forum's 5th anniversary. I am enthused and excited by the opportunities and prospects of the Forum going forward, and believe we will jointly be able to achieve a lot in this journey ahead.

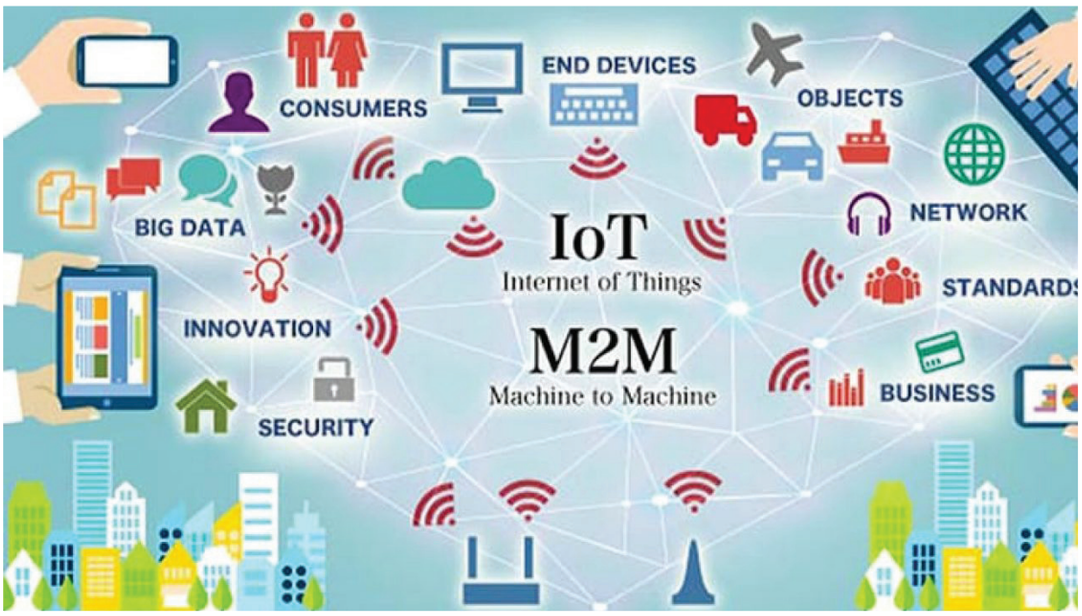
In regard to this particular edition of BIF's Bits & Bytes, I would like to take this opportunity to convey my thanks to all the participants and members, for their extremely valued contributions and support and for taking the time out to share the knowledge and insights on the very critical subject of the fast evolving AI & IoT technologies. My sincere thanks also to the President of BIF for his dynamic leadership and unfettering commitment to the Forum's objectives, even in the midst of such unfavourable circumstances.

Last but not the least, I would like to thank my able Directorate, a tremendously dedicated and talented team, who have been putting in tireless and relentless efforts to achieving the Forum's goals, in the interest of our members, and the entire broadband ecosystem in the country. It will continue to be my foremost objective to be able to add value and direction to this endeavour in the best possible manner, and I look forward to engaging with each of you to advance the interests of Broadband For All.

An overview of the M2M/IoT journey in India

Dinesh Chand Sharma
Director – Standards & Public Policy (SESEI)

India is at the cusp of a new era, a series of growth-oriented initiatives, driven by the Government are focused towards transforming an agrarian society into a new digital, smart and technology-oriented nation.



Internet of Things is envisaged to play a crucial role in India's transition to a digital economy, by supporting and nurturing a sustainable connected society. M2M/IoT is expected to play a pivotal role in key government programmes such as Digital India, Make in India and Smart Cities Mission.

As per the various reports and analysis, India is poised to have a minimum of 6% of the worldwide IoT/M2M devices. The Telecom Regulatory Authority of India (TRAI) envisages enabling access for connecting 1b M2M sensors/devices by 2020 and 5 billion by 2022. With significant investments and an enabling environment M2M has significant potential in India.

The journey of M2M/IoT started in 2012 with the National Telecom Policy 2012 (NTP 2012), in which M2M was mentioned as the future technology. However it was only in October 2014, MeitY released a draft policy for IoT, proposing a multi-pillar approach to its implementation, comprising of five verticals - demonstration centres, capacity building and incubation, R&D and innovation, incentives and engagements, and human resource

development - and two horizontal supports - standards and governance structure.

In 2015, the Department of Telecommunications (DoT) released the National Telecom M2M roadmap that focused on the communication aspects of M2M with the aim to have interoperable standards, policies and regulations suited for Indian conditions across sectors.

The National Digital Communications Policy-2018 is a testament of the significance and commitment of the Government towards creating a digitised society in which M2M/IoT will play a key role. One of the key objectives of this policy is to expand the IoT ecosystem to 5 billion connected devices.

OneM2M Release 3 will address various important functionality such as interworking with 3GPP C-IOT, Smart City use cases and best practices for use of oneM2M in smart cities; automotive as an important vertical, and advanced semantics which will act as an enabler to big data and analytics

The success of IoT is highly dependent on the development of interoperable global standards which are needed both within a particular application – to provide cost-effective realisations of solutions – and between domains – to enable cooperation between different applications covering a wide range of disciplines that are not considered part of the ICT domain. Apart from standardisation of communications and protocol standards, a major effort is needed to standardise system functions or system architectures supporting the Internet of Things.

With the Indian government focused on the creation of smart cities and a local IoT ecosystem, there is a strong demand for standardized IoT solutions, the Telecom Engineering Centre (TEC) has been entrusted to finalise the M2M and IoT standards for India. TEC has been able to achieve a significant amount of progress in finalisation of National Standards for IoT. Initially, TEC constituted M2M Working Groups and reports were prepared on used cases in various verticals of the Industry. The Telecom Standards Development Society of India (TSDSI), transposed the OneM2M Release 2 documents, having basic features. In order to help speed-up the National adoption process, the Telecommunication Engineering Centre organised workshops and seminars for training on oneM2M standards for industry experts to discuss developments in the implementation of oneM2M technology, its deployment in smart cities, along with the latest tools for testing and certification of oneM2M products and services. OneM2M common Service layer standards and specification will be used as the horizontal layer for smart cities mission in India.

OneM2M Release 3 will address various important functionality such as interworking with 3GPP C-IOT, Smart City use cases and best practices for use of oneM2M in smart cities; automotive as an important vertical and advanced semantics which will act as an enabler to big data and analytics. It is pertinent to mention that several open source foundations and projects have been actively using oneM2M standards in various applications and services since its first release in January 2015.

We are proud to say that last year CDOT has successfully built and demonstrated standards-based machine to machine (M2M) communications platform, backed by oneM2M, a worldwide standards initiative for a common M2M application. TEC is also in the final stages to make the oneM2M transposed specification by TSDSI as National Standards in India for its implementation as part of Smart Cities Mission.

ETSI along with its project SESEI and the India EU ICT standards collaboration project, supported by the European Commission, has steadfastly worked, with the Indian SDO's, primarily TSDSI, TEC and BIS, supporting them in their endeavour to establish a standardized framework for deployment of IoT in the country based on oneM2M specifications. ■

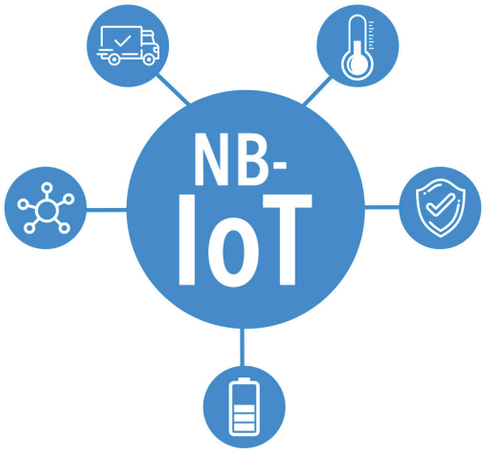
Setting the stage for the arrival of Cellular NB-IoT

Prof. Kiran Kuchi
IIT Hyderabad and Founding Director, WiSig Networks

> **Cellular IoT applications enabled by technologies like NB-IoT will not only be lucrative for our economy, but will also go a long way in enhancing the quality of life for our people**

The advent of 4G technology has led to radical changes all over the world, especially by way of smart phones that have had a staggering impact on our lives. Far from being a mere evolutionary successor of 4G, 5G technology is slated to revolutionize the telecommunications sector in the near future. 5G technology will go much beyond connecting people - 5G applications include integrating a whole range of machines into the internet, such as smart metering (electricity/water/gas), industrial sensors, tracking of people/assets, machined farming, agri-tech, perishable goods management, pollution monitoring, healthcare applications, etc.

Given that critical national infrastructure such as electricity grids, and various public services offered by local Government bodies will soon run on 5G, security considerations are crucial in the selection and ownership of such technology, as it will have a bearing on the nation's ability to control the equipment as well as secure the delivery of such critical services. On



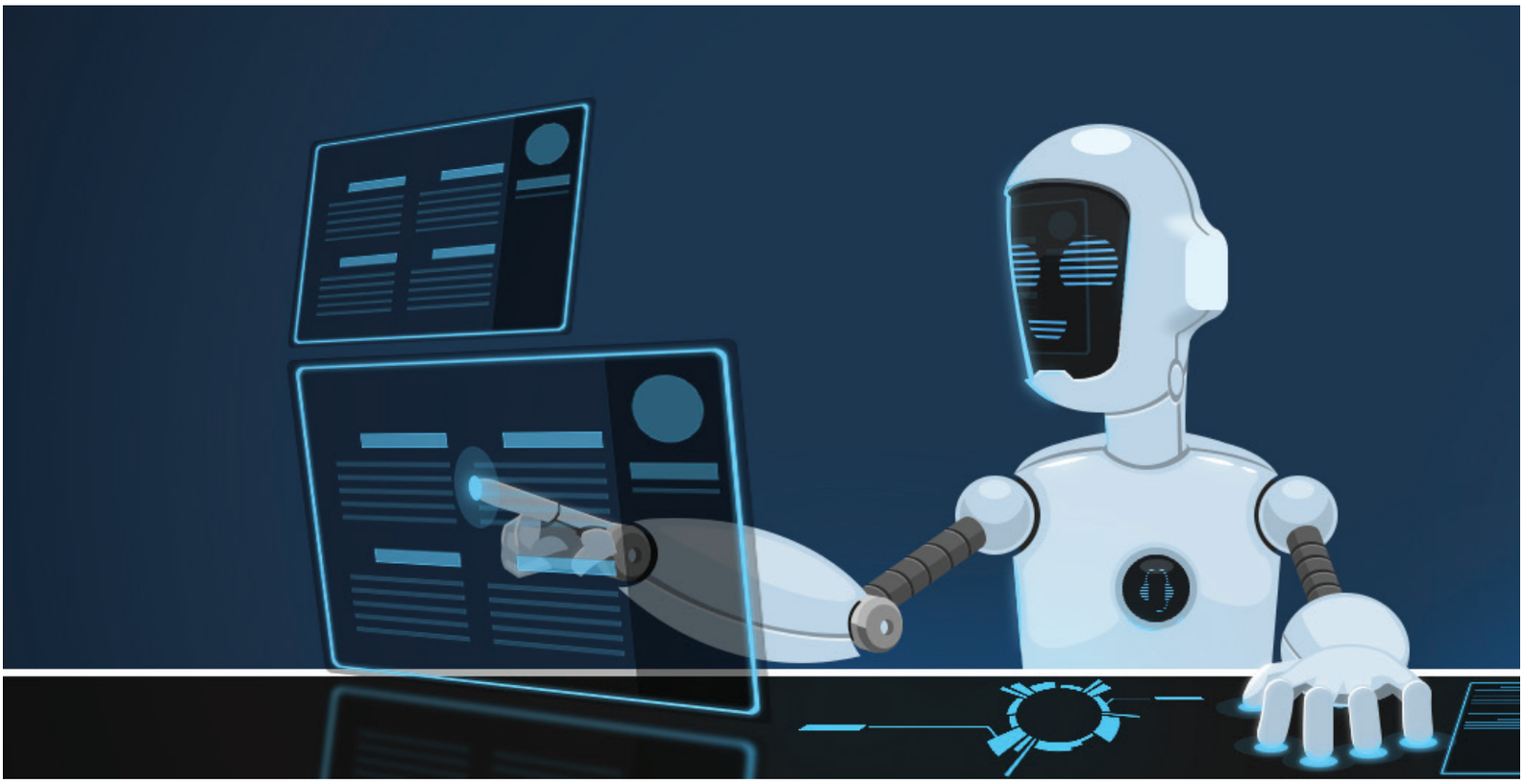
the economic front, within the next decade, 5G/IoT is expected to add hundreds of Trillions of USD to the world economy. This is an unprecedented economic opportunity that India cannot afford to let go of. So far, only a few Indian companies have begun to address such opportunities in the 5G/IoT space.

A vast IoT segment requires a few bits to be exchanged with the internet intermittently, however, over long distances. The key considerations with respect to these kinds of IoT devices are that they are ultra-low-cost, reach locations deep underground, and have a long battery life (up to 10 years). Narrowband IoT (NB-IoT) is quietly emerging as a killer application for IoT delivery in developing economies like India and China that are primed for its arrival. China has recently deployed over a 100 Million NB-IoT devices and Indian cellular operators are gearing up for the launch of NB-IoT services in 2020. Pan India NB-IoT coverage can be expected in 2021 so that current IoT deployments can bypass legacy GSM/GPRS networks, effectively enabling quick migration to NB technology. Overall, an exponential rise in NB applications is just around the corner.

For instance, location tracing apps are already at the heart of COVID-19 mitigation and NB-IoT devices equipped with GPS will soon be used widely. Further, in a recent announcement, Energy Efficiency Services Limited (EESL) mentioned that it has installed over 1.2 million smart meters in India under the Ministry of Power's (MoP) Smart Meter National Program (SMNP). Distribution companies (DISCOMs) have been able to generate a billing efficiency of 95% through the use of smart meters during the COVID lockdown, resulting in about 15-20% average increase in monthly revenue per consumer. Other benefits of connected meters include efficient use of power resources, dynamic pricing, etc.

Deployment of IoT based systems in and around industries can be useful in detecting harmful gas leakages or presence of industrial pollutants and prevent the loss of life & damage to the environment.

In conclusion, cellular IoT applications enabled by technologies like NB-IoT will not only be lucrative for our economy, but will also go a long way in enhancing the quality of life for our people. ■



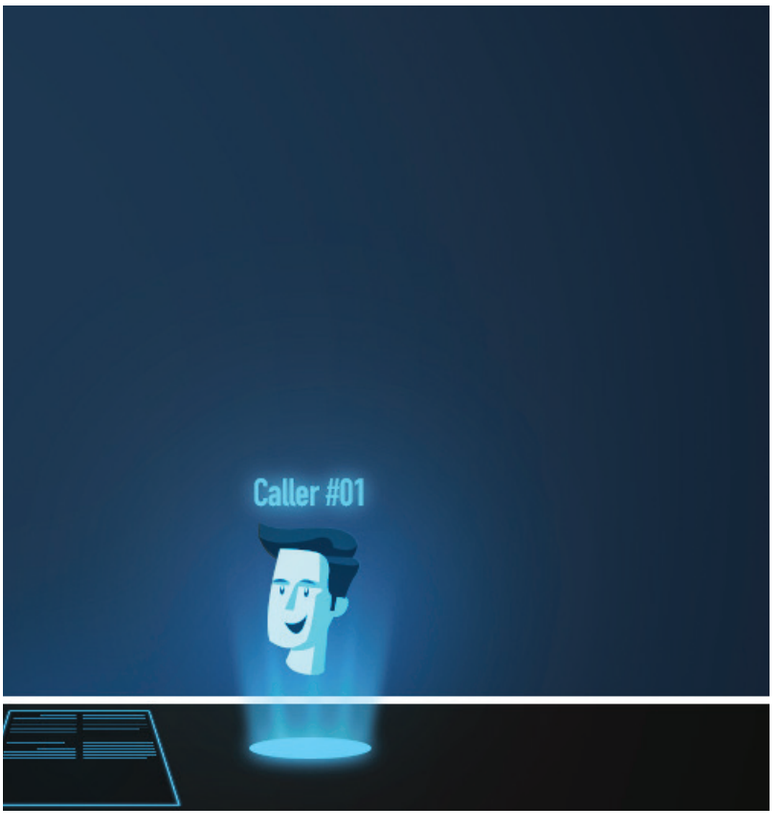
AI for Digital Customer Care

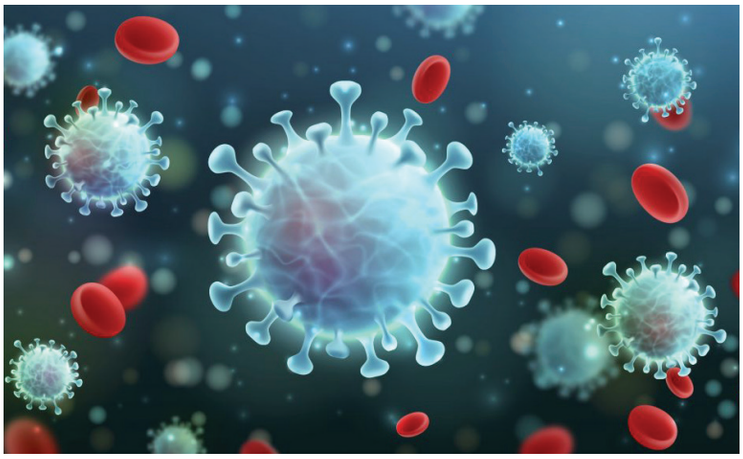
Tackling Covid-19 by leveraging AI and looking beyond into customer care

Anmol Chaturvedi
Head – Marketing and Communication, Mozark

Last 20 years have seen massive developments in the field of Artificial Intelligence (AI). Humans have come a long way from building IBM Deep Blue that defeated then Chess maestro Kasprov in '97, to seeing AI almost everywhere from markets to healthcare, cybersecurity to scientific research, employing complex technologies like Machine Learning (ML), Deep Learning, Image recognition, Speech recognition on huge data sets. At every step, machines have been built to learn from past combinations and results, thus constantly improving themselves and helping humankind progress ahead. Yet, humans are still far from General AI where machines can think and learn on their own, be a human in all sense except that they won't be made of flesh and blood.

The global pandemic caused by Covid-19 has not only forced a majority of us into being locked at our homes, but also changed the way we knew our world, the way we lived and worked. Governments of many countries





have made contact tracing apps and/or partnered with Tech companies (DoT, India partnered with MOZARK to make a Covid tracing and tracking platform) to monitor the spread of the virus and establish containment zones. Employing AI into such platforms to predict the pattern of spread by combining factors like number of patients, demography and likeliness of following social distancing norms could give an edge to authorities and may help them be better prepared for a second wave of the novel coronavirus. MOZARK's Covid-19 tracing and tracking platform works on collecting data records from telco OSSs and BSSs, and has enough data to predict the spread of virus by leveraging ML and AI. The platform itself is highly secure and is GDPR compliant.

AI holds solutions to many problems of human society, but it is supremely important to make use of this powerful technology in the right way

Another area where AI can make a huge impact is the experience of staying connected at home. The number of smart devices in our homes are increasing day by day – every appliance can be connected to the internet and controlled remotely and all such appliances need high data bandwidth and network availability to operate. Add to it the fact that humans will be spending more time at home and consuming more data as several organizations go into a Work From Home (WFH) model, experience on smart devices at home is going to degrade. Network unavailability can pose a serious challenge in the operation of smart devices and has a great impact on connected experience at home. At times, even the device itself can go faulty due to a problem in its hardware or software and lead to customer frustration. It is imperative for the smart device manufacturers and care service providers to know the real experience beforehand so that they can take action proactively.

Here's where AI comes in play – MOZARK's Connected device care solution continuously monitors the device's health, collecting network data by employing Deep Packet Inspection (DPI) to collect logs on MAC, IP and Application layers, and device data by using TR369. All the data that is collected is fed into complex ML algorithms to train a machine in detecting patterns leading to dip in device performance. Coupled with CRM data like past purchases and complaint history, the AI platform can create profiles for each customer and classify them on a quantitative scale or index called the Customer Experience Index (CEI). CEI generated from the AI can empower Customer Care command centres with rich insights and allow them to take action even before a customer raises a complaint.

AI holds solutions to many problems of human society, but it is supremely important to make use of this powerful technology in the right way. At MOZARK, we are committed to help enterprises measure real customer experience and improve care offerings to increase customer satisfaction by leveraging our AI platform and solutions. Our AI platform can help not only device owners, but Media and entertainment apps, real estate companies, ISPs, regulators and banks. ■

Securing Internet of Things (IoT) for a safe & accelerated adoption in India

Alok Gupta
Principal Advisor - BIF and Founder and CEO, Pyramid Cyber Security & Forensic Pvt. Ltd.

Simply speaking IoT is a network of internet connected objects that can sense, collect, and transfer data without requiring human interaction. An IoT system consists of sensors/devices, network for transmission and cloud for processing, storing, and analysing large amount of data thus generated.

IoT has been a rising star as a disruptive technology that has a potential to deliver tremendous economic value in developing economies such as India over the next decade or so. IoT systems have thousands of applications and can convert homes, cities, healthcare, retail, supply chains, transportation, manufacturing, electricity grids, factories, farming, etc. into "smart" thereby benefiting consumers and businesses alike.

Driven by demand from various such use cases, IoT ecosystem in India is attracting investors and encouraging hundreds of start-ups to mushroom and develop hardware and software products and solutions to leverage a large predicted market potential.

Like any other innovation and disruption in technology, IoT also comes with its share of challenges around security and privacy. These challenges and concerns have now become part of boardroom discussions.

As the number of IoT connected devices are rising, so is the number of malware and ransomware used to exploit them. The ransomware attacks are targeted limiting and/or disabling device functionality and stealing user data at the same time.

The heated mining competition coupled with rising cryptocurrency valuations is encouraging hackers to use IoT devices as botnets to mine cryptocurrency. Brute-forcing and using default passwords is the most common method of gaining silent access to millions of IoT devices to launch massive scale DDoS attacks.

Cyber criminals, hackers and adversaries always target the weakest links and most vulnerable entry

> **Costs of securing IoT systems should not become a deterrent for adoption, we must strike a balance between strengthening the defences while managing costs of securing IoT systems to fuel the adoption**

points to compromise networks and systems to steal confidential information and sensitive data. Therefore, it is essential to adequately protect sensitive and business critical data generated by IoT systems while making the users aware, what data of theirs is being used or processed.

Moreover, any vulnerability exploitation, security configuration gap in critical components of IoT system can also lead to compromise of the other core systems connected to them.

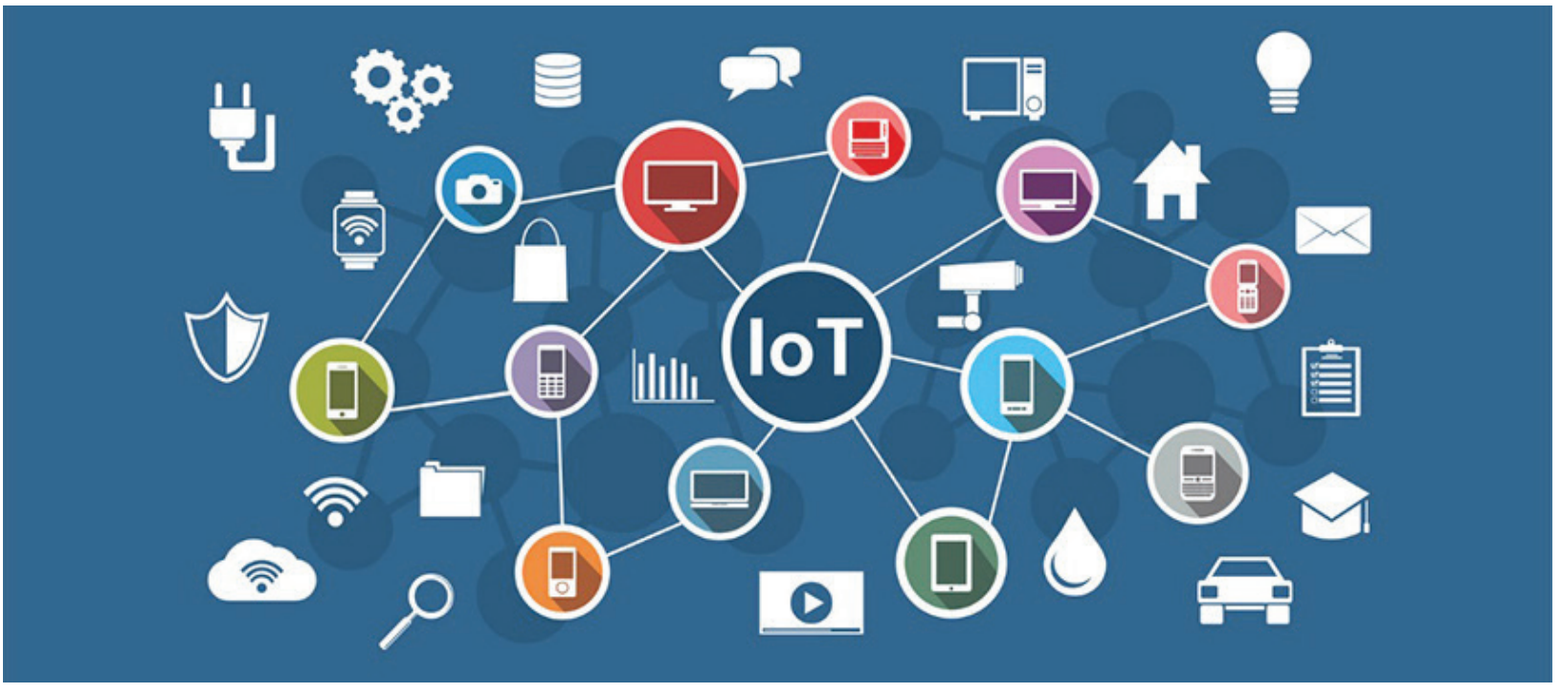
IoT takes advantage of low-cost sensors, affordable wireless technology, economies of scale offered by cloud & AI derived analytics and hence cyber security & privacy must be rightly sized, affordable and should last for its entire life cycle.

Bulletproof Security is ideal but unreal and impractical, what is “safe & secure” today may not remain same tomorrow. The “good state” changes with time due to so many moving parts & environmental factors surrounding it. Costs of securing IoT systems should not become a deterrent for adoption, we must strike a balance between strengthening the defences while managing costs of securing IoT systems to fuel the adoption.

Before we start discussing the challenges and solutions for securing IoT systems let us first understand the components of IoT Ecosystem.

Sensors and embedded components are used for acquisition of data such as pressure, velocity, temperature, light, motion, imagery, pulse, electromechanical, etc. from various data points and form the basic building blocks of IoT ecosystem. This collected data is then transported using the connectivity layer, which can be sent over the TCP/IP protocols over internet or intranets. Edge IT is the consolidated architecture of software and hardware gateways used to collect and pre-process raw data from sensors.

Gateways are used for monitoring and managing traffic between IoT devices and connected networks, Gateways can also be used for blocking specific IP’s, protocols and even application layer components. Once the raw data is transported to the public or private cloud infrastructure, it is processed, stored, and analysed using software applications and deep learning algorithms for providing business insights.



Smart devices like smartphones, tablets, PDA, etc. are end components of an IoT ecosystem and are connected to the IoT computational engine.

With so many components in the IoT ecosystem it becomes important to think security right from the beginning which involves “security by design”. It is important to keep comprehensive security considerations in mind while the IoT systems are being designed and architected aligned to the intended use case scenario. Trust & privacy must be an integral part of the overall architecture and design process and not an afterthought. Identify potential attack surfaces and provision appropriate protection with a wholistic 360-degree security view in mind.

Privacy is another important factor while designing a secured IoT ecosystem. The users want to enjoy the benefits from IoT but are wary of their private & sensitive data being compromised and would want providers to ensure privacy and make them aware of the impact of denying it, allowing users to implement localised security policies and hygiene.

IoT Systems collect and process different types of data. Data Classification comes handy in making clear which systems and services have access to which types of data and also identifying & separating PII and business critical data from non-sensitive data helping users to isolate and protect only that data which needs to be protected from privacy and regulatory purposes thereby reducing costs of data leakage protection significantly.

Product and solution providers should remove identifiers and anonymise personally identifiable information (PII) to address private data being compromised. Encryption and managing keys securely during the entire lifecycle is a good practice.

“Security is an ongoing battle and the protectors need to be vigilant all the time to protect themselves from the adversaries. Reasonably secured IoT Ecosystem will build confidence amongst the business and user communities helping accelerate adoption and growth of IoT

Prevention of manipulation, modification, and destruction of data during transmission is equally important and needs to be protected from man-in-the-middle attacks by malicious attackers or mishandling of incorrectly configured devices by ensuring integrity and trust.

It is important to ensure that the IoT software applications are completely secure. Secure development is a good practice to ensure that the code and processes that go into developing applications are secure. Secure development entails the utilization of several processes, including the

implementation of a Security Development Lifecycle (SDL) and secure coding itself.

Multifactor Authentication protection should be in place for identification, verification and authorisation of devices and data, and to prevent sophisticated attacks only known software be allowed to run on devices which will build confidence of the users that it is coming from trusted and known sources. This will also help in blocking and revocation of devices that are either compromised, misconfigured or not functioning properly.

Vulnerability Assessment and Penetration testing of critical IoT subsystems is necessary on a periodic basis to not only comply with audit requirements but ensuring any critical and high security gaps or vulnerabilities are identified and remediated before they are exploited or compromised by the hackers. Many sophisticated and business critical IoT implementations are now engaging Expert Red Teams to test resilience at their end as well as preparedness and readiness of their blue teams to deal with massive scale attacks and unauthorised break-ins.

With so many moving parts and players in the IoT ecosystem, automated continuous and comprehensive configuration and patch management of IoT subsystems during the entire life cycle of devices software and systems is necessary to ensure timely patch updates and correction of misconfigurations thereby preventing back doors, unauthorised access, breaches and attacks.

The need of the hour is to leverage use of either a dedicated or shared Security Operations Centre (SOC) which can be instrumental in 24x7 monitoring of security threats for IoT subsystems. A SOC will help security analysts and security governance teams to identify & remediate breaches, threats, and attacks on a continuous basis by detecting, correlating and analysing logs, net flow and vulnerability scan data from a variety of devices in the IoT subsystems, including correlating them with historic threat feeds and live threat intel. Machine learning models and AI algorithms are being used for not only helping security operation teams to proactively predict threat vectors and potential attacks but also automating response leading to effective business-driven security incident management.

Establishing well defined and universally adopted policies and guidelines will enable more secure IoT ecosystems. Governments can act as a catalyst for development of IoT Security best practices and industry standards working together with standards certifying bodies and private sector players to establish the necessary policies, guidelines, and practices to encourage security, privacy, and safety.

Broadband India Forum (BIF) through its various initiatives, research studies, expert group ideation and advocacy, is assisting the government to come up with conducive and growth-oriented policies for the industry to thrive.

Security is an ongoing battle and the protectors need to be vigilant all the time to protect themselves from the adversaries. Reasonably secured IoT Ecosystem will build confidence amongst the business and user communities helping accelerate adoption and growth of IoT. ■

Q How do you view the importance of 6 GHz Wi-Fi?

Ashwani Rana
Vice President – BIF and Director of Public Policy @ Facebook (India, South & Central Asia)

A Wi-Fi has been a great democratizing technology, thanks to a few fundamental and distinct advantages – easy setup, protocol fault tolerance, open and unlicensed spectrum, and a large supplier base to help drive low costs and high innovation. These advantages, combined with fast evolving standards (Wi-Fi 6 now), and easy to deploy Cloud scale Wi-Fi networks-as-service have led to rapid adoption across Consumer, Enterprise and Service provider segments, around the world. Wi-Fi is everywhere.

A great public testimony to Wi-Fi's impact has been during the recent Covid-19 restrictions put in place around the world. ABI research reported an 80% surge in Wi-Fi originated traffic during Covid-19. With so many people working remotely around the globe, many workplaces are now relying on at-home Wi-Fi to power their workforces and keep their businesses going. That's a great testimony for the ubiquitous presence of Wi-Fi and its impact on a global scale.

The proliferation of 6 GHz Wi-Fi will help further lower the cost of high throughput broadband solutions to connect more people and will be a critical complement to broader 5G deployment. Existing Wi-Fi spectrum has helped open up all kinds of connectivity, but as we look ahead to 5G deployments, 6 GHz Wi-Fi is a key tool for operators to keep up with surging demand. New spectrum allows for high-throughput offload and low latency to support the next generation of services in indoor and dense spaces, and it's an important complement to 5G networks. It should help lower the cost of providing, and increase the demand of many of these new use cases.

6 GHz is also essential for the future of Wi-Fi. Adding 1200 MHz of spectrum in the 6 GHz band will spur massive investment in unlicensed equipment and products, both to bring more people online and expand into new use cases. More spectrum helps support the growing number of dense public deployments, brings new opportunities for neutral host networks, and hopefully we'll see more creative uses in the future as we have with in-home and outdoor Wi-Fi meshing in the past few years. Unlicensed equipment has always been a huge democratizer of high-throughput connectivity, and we have yet to see what products and uses will emerge out of the bandwidth and latency improvements enabled by seven new ultra wide channels

Finally, you can't speak about 6 GHz Wi-Fi without mentioning Wi-Fi 6. Wi-Fi 6 lets devices share spectrum better with its introduction of OFDMA and improvements to MU-MIMO. Doing so in clean channels in the 6 GHz band will be a noticeable improvement for folks suffering from interference in unplanned networks. Especially for the growing number of devices at home, the clean slate of Wi-Fi 6 running on 6 GHz will be welcome. ■

Q: What is your take on the state of Wi-Fi 6 from the perspective of standardisation, certification, availability of devices and network implementation?

S N Gupta
Treasurer - BIF and Chairman of the Board, Bluetown India

A:

The most common set of IEEE Wi-Fi standards is the IEEE 802.11 Wireless LAN (WLAN) & Mesh. Wi-Fi Alliance, is the international agency to handle certification program for Wi-Fi devices and networks ecosystem based on IEEE standards. For Wi-Fi 6 their industry certification program is Wi-Fi CERTIFIED 6, which is based on the IEEE 802.11ax standard. Wi-Fi CERTIFIED 6 devices meet the highest standards for security and interoperability, and enable lower power consumption, making it a natural choice for any environment, including the Internet of Things (IoT).

For the easy naming of IEEE Wi-Fi standards, the Wi-Fi Alliance has announced a new way to label Wi-Fi standards, simply by referring to the number of the generation. This is applied to newly launched IEEE 802.11ax Wi-Fi standard, which is named as Wi-Fi 6, and also be retroactive, applying to older standards. For example: 802.11n (2009) = Wi-Fi 4, 802.11ac (2014) = Wi-Fi 5, and so on.

Wi-Fi 6E, is another update to the Wi-Fi 6 and an industry name for users to determine the devices supporting the 6 GHz frequency band. Being an update, it retains all advantages as Wi-Fi 6 and improves upon the speeds.

This next big wave of technology – Wi-Fi 6, is going to become more commonplace in enterprise installations over the course. The most common scenario will be businesses waiting for a refresh cycle, testing the new technology and then rolling it out.

Wi-Fi 6 devices have eight radios inside them hence, MIMO and Beamforming will still mean a performance upgrade, since they will handle multiple connections. A critical point is that some connected devices on even older 802.11 versions – n, g, and even b in some cases – will not be able to benefit from the numerous technological upgrades of the new standard.

Moreover, this scenario is quite usual for new technology adoption. But the incorporation of the all-new 6 GHz band in Wi-Fi 6 marks the most significant major update to Wi-Fi since 1989. With Wi-Fi 6 and Wi-Fi 6E coming into the picture, one can forget about the congestions that arise on the current spectrum offerings (both 2.4 GHz and 5 GHz) and expect a stable connection with seamless speeds and much lower latency.

Wi-Fi 6E updated standard has so huge potential, that it can transform entire Wi-Fi industry. For utilizing its potential, on 23rd April 2020, FCC, USA signed new regulation releasing 1.2 GHz of new spectrum to Wi-Fi and other unlicensed usage in the 6 GHz band.

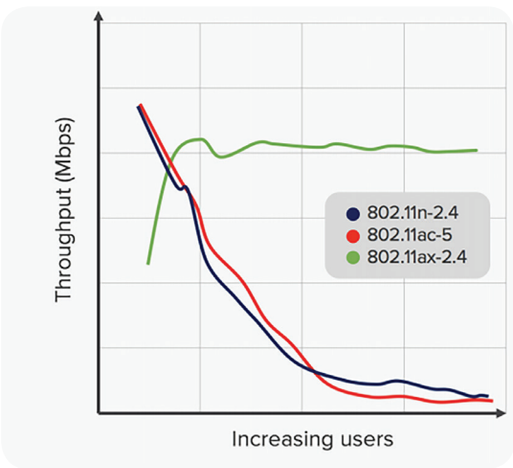
Our country needs to adopt the learnings from all these international developments and should move ahead in this direction not only for the adoption of Wi-Fi 6E but also to fulfil our ambitious Wi-Fi goals as captured in our NDCP-2018. Such steps as taken by US are bold, praiseworthy, and very much essential for efficient performance of networks. Let us not miss the Wi-Fi bus again. ■

Q Wi-Fi 6 networks: Is it a challenge to 5G deployments?

Satish Jamadagni
VP, Reliance Jio; Vice Chair, TSDSI and Chair of BIF's Startup & MSME Committee

A Wi-Fi 6 is the commercial name for the next-generation 802.11ax standard. Wi-Fi 6 is already supported in a host of mobile phones such as the iPhone 11 series and the Samsung Galaxy 10 series. The Access Point (AP) eco system is mature as well. As the number of IOT connections are expected to raise and is expected to represent half of all devices globally, Wi-Fi 6 will play an important role. The post Covid work place (home to a large extent) will also be instrumental in fueling the growth of Wi-Fi 6. Inside homes, the AR/VR traffic is expected to grow by up to 12 folds by some estimates.

Some of the Core Technologies of Wi-Fi 6 are the following: UL/DL MU-MIMO technology, Higher-order modulation, Spatial Reuse (SR) & basic service set (BSS) and Extended range (ER). One key factor that makes Wi-Fi 6 networks more interesting than the previous versions is its ability to support increased client density without a loss in throughput. As the number of devices increase, Wi-Fi 6 will be able to support a more consistent data throughput than the previous 802.11 specifications.



Source: Cisco research

MULTI-USER MIMO (MU-MIMO) gives an AP the ability to serve multiple devices at the same time across channels. MU-MIMO was supported in 11ac as well but the adoption was low due to cost factors but now as the radio technologies have improved 8x8 is expected to be supported across most 11ax chipsets. Though MU MIMO was supported in 802.11ac as well, uplink MU MIMO is now supported in 11ax. Uplink MIMO is useful for uplink-heavy applications such as peer to peer content sharing and video calls. This results in a better user experience when uploading content. Uplink MU-MIMO is not yet supported across all device / client manufacturers and this is expected to change over time.

Some of the other aspects of Wi-Fi 6 are the support of higher constellation density (1024 QAM). The previous versions of Wi-Fi were supporting up to 256 QAM. This translates to an increase in throughput of up to 2.5x at the client side.

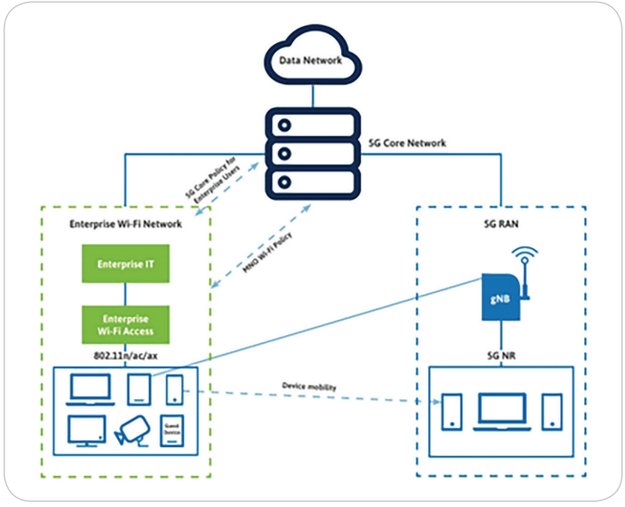
Extended Range (ER) support has been provided in Wi-Fi 6 to support large cells. With this, Wi-Fi 6 cells are expected to have a larger coverage area. This is especially important for industrial IOT applications.

Wi-Fi 6 or 5G?

With the support of the above new features in Wi-Fi 6, it is pertinent to ask the question if Wi-Fi 6 poses any challenge to 5G especially when 5G is deployed in the mmWave bands where coverage of Wi-Fi 6 and 5G could be comparable. On the user experience front, 5G and Wi-Fi 6 can both achieve comparable throughputs and latency.

Some operators like AT&T and Comcast are showing increasing interest in Wi-FI 6. The

WBA has been strongly advocating the convergence of 5G and Wi-Fi 6. The WBA has also partnered with the Next Generation Mobile Networks (NGMN) Alliance to take the convergence story forward.



Wi-Fi 6 and 5G Convergence (Source: WBA / NGMN Alliance)

When 5G is deployed in Lower and Mid bands (Sub 6 Ghz bands), much of the differential between them will disappear and 5G will remain a cellular technology and Wi-Fi 6 will remain indoors. The Factory floors is where the dispute will be put to test. Recently the Wireless Broadband Alliance (WBA) has announced that it has completed the Wi-Fi 6 infrastructure and services trials with Mettis Aerospace. A key aspect that has come of this trial is the importance of maintaining throughput with increase in client density. Wi-Fi 6 addresses this very well and with this Mettis factory environment has shown speeds of 700 Mbps when using 80 MHz channels. Low latency applications from the industrial floor seem to have worked well as well with average latency figures of below 6ms.

The 5G "Non Public Networks" standards are yet to freeze, the 5G IOT technologies are still evolving in the specification groups, Narrow Band IOT (Cellular IOT) adoption is yet to be seen whereas Wi-Fi 6 already has the advantages of well understood integration with traditional enterprise IT networks. Wi-Fi also has the advantages of lower cost of deployment, maintenance and scale

The 5G "Non Public Networks" standards are yet to freeze, the 5G IOT technologies are still evolving in the specification groups, Narrow Band IOT (Cellular IOT) adoption is yet to be seen whereas Wi-Fi 6 already has the advantages of well understood integration with traditional enterprise IT networks. Wi-Fi also has the advantages of lower cost of deployment, maintenance and scale.

In conclusion *Wi-Fi 6 includes features to improve the coverage, capacity and spectral efficiency over previous generation of Wi-Fi. Wi-Fi 6 provides technologies that could challenge 5G at least indoors, especially in the industrial IOT space. With 5G specifications now focused on the "Vertical Industries" and Industry 4.0, Wi-Fi 6 has a head start.* ■

Membership and Associates:

- New members who joined the BIF family:
  - Patrons: **ITIL and RailTel**
  - Startups, Academia & Professionals: **Bharti School of Telecommunications Technology & Management (IIT D); IIT Kanpur; SASTRA University; IIT Roorkee; UR Consultancy; I2TB and Excitel Broadband Pvt. Ltd.**
- **Mr. Alok Gupta** joined as Honorary Principal Advisor – Cyber Security, BIF
- **Professor Rekha Jain** (IIM Ahmedabad) joined BIF as Honorary Principal Advisor

Awards & Recognitions:

- **Mr. Satya N. Gupta, Treasurer, BIF,** was conferred with the prestigious "IPv6 Hall of Fame" award by the IPv6 Forum
- **Dr. Rishi Bhatnagar, Chair of BIF's AI & IoT Committee,** has been conferred the prestigious 2019 Business Leader of The Year award in the Internet of Things category by ET Now
- **BIF Member SASTRA University developed ventilator splits –** an innovative solution to help augment the existing capacities of ventilators in hospitals, making them a vital and much required solution in the wake of the COVID-19 crisis
- **BIF** conferred a special commemorative plaque to outgoing **Special Secretary, Logistics & former Special Secretary, Telecom, Shri N. Sivasailam,** for his outstanding contributions and achievements for the sectors on 30th April, 2020

Key update on BIF Functioning:

- The revised Rules and Regulations of the IPTV Society were proposed, discussed, passed and endorsed by the Members, via a series of Extraordinary General Meetings, to enable smoother functioning of BIF
- **Mr. Rajat Mukarji** joined BIF as **Director General**

BIF Committees:

- **BIF Working Group on General Policy & Regulations (GPR) elevated to GPR Committee, with the mandate to cover a larger range of issues for the implementation of the NDCP 2018**
- **New Committee on Wi-Fi formed and Device Smart Phone Manufacturing Committee reconstituted as Device Ecosystems Committee: to be led by Patron Members RailTel and ITI Limited respectively**

The Digital Dialogues:

BIF, in May 2020, launched **The Digital Dialogues series, a signature digital platform** created in association with Bharat Exhibitions, as part of BIF's efforts towards enhancing its thought leadership role. This ongoing series would comprise of **high-level online engagements via virtual conferences on issues of relevance** to the BIF membership and objectives. The primary focus would be on facilitating **insightful, knowledgeable and fruitful discussions on critical industry issues** with highly reputed and esteemed national as well as international experts and stakeholders.

The first of The Digital Dialogues series was organised on **15th May 2020, in celebration of the World Telecommunication & Information Society Day (WTISD 2020) on the theme "Connect 2030: ICTs for the Sustainable Development Goals (SDGs)".** The session included esteemed International and National Speakers such as **Mr. Mats Granryd, Director General, GSMA; Shri Hari Ranjan Rao, JST, DoT, GoI; Dr. Malcolm Johnson, Deputy Secretary General, ITU; and Dr. R.S. Sharma, Chairman, TRAI**.

New Partnerships and Engagements:

- BIF and the prestigious ADBI continue to work together actively on the prospects of developing efficient digital infrastructure in India
- BIF has engaged with ICANN for progressive work in the cybersecurity domain. An agreement has also been signed with ICANN formalizing the same
- BIF has started to work very closely with NASSCOM on several industry issues of common interest
- An MoU has been signed with VNOAI
- An MoU with IEEE has also been finalized

Reports/White Papers in the pipeline:

- Report on Internet and Broadband in Rural India (ICRIER-BIF)
- White papers on
  - Proliferation of Broadband through Public Wi-Fi
  - Accessibility for Persons with Disabilities (PwDs)
  - Internet Governance

White Papers released

- BIF-ICRIER White Paper on "***Liberalising Satellite Communications in India: Opportunities for enhanced economic growth***" released at India SatCom 2019 on 28th November 2019, by Dr. RS Sharma, Chairman, TRAI and Shri Rakesh Sasibhushan, CMD, Antrix

Submissions and Interactions with Government

- BIF submitted letter to DOT & TRAI requesting for **need to adopt the WANI architecture to enable seamless Wi-Fi Roaming and inter-operability** amongst different IoT standards/protocols. The latter termed as WANI 2.0 could then support device-to-device communication, which could be extremely useful in proliferation of IoT
- BIF submitted letter to MIB and TRAI, **urging the Government not to impose added regulations on the Broadcasting & Cable Services Sector** and to **keep the Consumer Tariffs under forbearance**
- BIF submitted recommendations to Ministry of Finance (MoF) as part of Pre-Budget consultation for Union Budget 2020-21
- BIF submitted suggestions to the Ministry of Corporate Affairs on the proposed **Competition Amendment Bill**
- BIF submitted comments and views to the **Joint Parliamentary Committee** on the **Personal Data Protection Bill, 2019**
- BIF made submissions to MoC&IT, MoF and MeitY for **review of GST on telecom services as well as mobile devices/handsets**
- Post the outbreak of the Covid19 pandemic and the announcement of nation-wide lockdown in India, **BIF took a proactive approach and initiated coordination and liaison with the Government on several issues and aspects** concerning the industry, members as well as in the interest of the people, including:
    - Submissions to DoT and MeitY suggesting **use of Digital Applications to control and overcome COVID19**
    - Wrote to key Government Departments with **suggestions towards use of digital technology tools & apps to control and overcome the COVID19 crisis**
    - Seeking **support for the Satcom (VSAT) industry** in terms of moratoriums/deferments to statutory payments, etc., while meeting their commitments, amidst COVID 19 crisis
    - Submissions to relevant Government Ministries, **requesting to consider deferment of the consultation on the proposed IT Act amendment, till after the Covid19 situation is resolved**
    - Participated actively in the **MeitY/DoT joint consultation on measures to mitigate impact of COVID-19 and interaction with Secretary, MeitY and Secretary, DoT on Work From Home measures with regard to the OSPs held** on 27th April 2020, and presented BIF's principles and views to augment the Digital Infrastructure using Wi-Fi, E & V bands and Satcom in the short and medium term, to complement FTTX and Mobile broadband in the long term
    - **Participated in Meeting on Work From Home aspects and other measures required to be taken to mitigate impact of COVID-19, chaired by the Hon'ble Minister for Communications and Electronics & IT, in the presence of Secretary, MeitY and Secretary, DoT, held** on 29th April 2020, and reiterated BIF's position on augmenting Digital Infrastructure in the country

- Submission made by BIF to **DoT and MeitY on Work from Home - The New Reality as** Follow Up Action to the **MeitY/DoT joint consultation**
- Submissions to TRAI and MIB **requesting Special Regulatory Assistance during the Covid-affected Environment for uninterrupted cash flow for the Cable & Broadcasting Services sector**
- Wrote to NITI Aayog, various Ministries and SIDBI requesting for **support to Startups/ MSMEs in the Digital Communications space**
- Wrote to Finance Ministry & various other Ministries on the **Economic Stimulus packages announced towards liberalisation of Space activities**, including Satcom
- Suggested **measures to provide various IoT Solutions** in the wake of Covid-19 to MeitY

- BIF wrote letters to relevant departments and personnel of the Government, **recommending urgent and essential implementation of the NDCP**
- BIF wrote to DoT on **Auction/Allotment of mmWave spectrum in 26 GHz (24.25-27.5 GHz) band for 5G deployment** as per TRAI recommendations

Submissions to TRAI

- BIF wrote to TRAI, **seeking support for expanding broadband network and penetration for uninterrupted connectivity to citizens amidst COVID19 crisis**
- BIF made submission to TRAI requesting **Special Regulatory Assistance** during the Covid-affected Environment for uninterrupted cash flow **for the Cable & Broadcasting Services sector**
- BIF participated actively in the OHD held virtually by TRAI on the '**Provision of Cellular backhaul connectivity via Satellite through VSAT under Commercial VSAT CUG Service Authorization**'
- BIF made submissions to TRAI Consultation/pre-consultation papers on the following issues:
  - **Review of Interconnection Usage Charges**
  - **Cloud Services**
  - **Traffic Management Practices (TMP) & Multi-Stakeholder Body for Net Neutrality**
  - **Tariff Issues of Telecom Services**
  - **Provision of Cellular backhaul connectivity via Satellite through VSAT under Commercial VSAT CUG Service Authorization**
  - **Enabling Unbundling of Different Layers Through Differential Licensing**
  - **Framework for Technical Compliance of Conditional Access System (CAS) and Subscriber Management Systems (SMS) for Broadcasting & Cable Services**
  - **Methodology of applying Spectrum Usage Charges (SUC) under the weighted average method of SUC assessment, in cases of Spectrum Sharing**

(August, 2019)

20th August, 2019:

AGM (2018-2019) of IPTV Society (BIF)

Interactive Session on Priorities for Digital Communications

Organised Interactive session on Priorities of Digital Communications with Shri Anshu Prakash, Secretary (Telecom) and Chairman, Digital Communications Council on 20th August 2019

Annual Function in honour of Smt. Aruna Sundararajan IAS (Retd.) - 20th August, 2019

26th August, 2019:

BIF - IEEE Engagement on Wi-Fi growth in India

(September, 2019)

6th September, 2019:

Mr. TV Ramachandran, President, BIF, participated as eminent panellist at the CII Telecom Convergence Summit, New Delhi

27th September 2019:

3rd Edition FTTH India Summit 2019

(October, 2019)

16th October, 2019:

Roundtable discussion under Chatham House rules on Cyber Security & IoT chaired by Sr. PMO official and theme address by Mr. Ashwin Rangan, SVP, Engineering and Chief Information Officer (CIO), ICANN, USA

(November, 2019)

20th November, 2019:

Data Centre India 2019

BIF-BE 6th International Conference on Data Centre India 2019, organised at Hotel Shangri-La, New Delhi on 20th November, 2019, wherein Mr. TV Ramachandran, President, BIF, delivered the Welcome Address

27th – 28th November 2019:

India Satcom 2019

5th International India Satcom 2019 Summit: "Satellite Applications for Inclusive Growth", organised successfully at Hotel Shangri-La, New Delhi

- Exclusive CXO Interaction with Shri Rakesh Sasibhushan, CMD Antrix, organised on 27th November 2019
- Main SatCom Summit held on 28th November 2019

(December, 2019)

5th December 2019: **Roundtable discussion under Chatham House rules on Infosec & Root Server Systems, with participation from Senior DoT officials and theme address by Mr. Terry Manderson, Senior Director, Security and Network Engineering, The Internet Corporation for Assigned Names and Numbers (ICANN), USA**

(January, 2020)

31st January 2020: **Mr. TV Ramachandran, President, BIF, participated as eminent panellist in the session on Rx for Financial Health of Telcos at the 19th edition Voice&Data Telecom Leadership Forum, ShangriLa-Eros, New Delhi on**

31st January 2020: **Globsyn Conference, Kolkata: Mr. Debashish Bhattacharya, DDG, BIF, on behalf of Mr. TV Ramachandran, President, BIF, participated and presented BIF position on 'Universal Impact of Emerging Technologies on Management and Society' at The International Vision Seminar 2020**

(February, 2020)

5th-6th February 2020: **BIF co-organised the 5G Huddle 2020 – 5G as a Catalyst for Digital Transformation in partnership with WWRF, TSDSI & ITU-APT Foundation of India**

18th February 2020: **High-Level interactive session under Chatham House rules on *"Facilitating USD 100 billion for World Class Digital Infrastructure in India"* organised on 18th February 2020: Chaired by Shri Amitabh Kant, CEO NITI Aayog, with special presentation on "IT Infrastructure Investment" by Dr. Naoyuki Yoshino, Dean & CEO, Asian Development Bank Institute** (named world's #1 'government affiliated think tank' according to the 2019 Global Go To Think Tank Index Report from the University of Pennsylvania Think Tanks and Civil Societies Program)

27th February 2020: **BIF lecture at CCI**

BIF President Mr. TV Ramachandran delivered a lecture on Importance of Competition Aspects for Developing Digital Infrastructure to the Competition Commission of India (CCI) leadership and officials, on CCI's invitation, as part of its "Distinguished Visitor Knowledge Sharing Series"

(April, 2020)

7th April 2020: Mr. Rajat Mukarji, DG and Mr. Debashish Bhattacharya, DDG represented BIF in the **3GPP: PCG#44 & OP#43 e-Meetings**

24th April 2020: Mr. TV Ramachandran, President, BIF **addressed the IET Future Tech Panel meet** via Virtual Conference as Global Advisory Board Member

(May, 2020)

15th May 2020: **Celebrating World Telecommunications and Information Society Day (WTISD) 2020**

BIF celebrated the World Telecommunication & Information Society Day (WTISD 2020) by organizing a virtual conference on the theme "Connect 2030: ICTs for the Sustainable Development Goals (SDGs)" on Friday, 15th May 2020 at 1130 hrs under The Digital Dialogues series, a signature digital platform created by BIF. The session included esteemed International and National Speakers such as Mr. Mats Granryd, Director General, GSMA; Shri Hari Ranjan Rao, JST, DoT, GoI; Dr. Malcolm Johnson, Deputy Secretary General, ITU; and Dr. R.S. Sharma, Chairman, TRAI

21st May 2020:

Mr. TV Ramachandran, President, BIF and Dr. Rishi Bhatnagar, Chair of BIF's AI & IoT Committee, participated as **eminent speakers at NASSCOM's CoE Industry Digital Innovation Consortium's (IndDIC) remote conference on "Voice of Manufacturing – Reboot Post Lockdown Edition 2"**

Mediascape

Snapshots of some prominent Media Coverage received by BIF

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ECONOMICS, INDUSTRY AND TRADE, INFORMATION AND COMMUNICATIONS TECHNOLOGY

The spillover effects of digital platforms

"Over-the-top" (OTT) service providers are referred to as so because they allegedly ride exclusively on top of the infrastructure laid by telecommunications service providers. Hidden behind the term OTT is the notion that such providers ... infrastructure ... telecom ... this may ... cursory examination of the marketplace, what such numerous "edge-of-the-network" investments by OTT

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Business Standard

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Mon, 16 Dec-19; Business Standard - Delhi; Size : 458 sq.cm.; Circulation:108165; Page : 8

CIRRUS

INSIGHT

For whom the bell tolls

No new policy but major policy decisions at the highest level are necessary to save ...

TRAI-ING TIMES

Why deny broadcasting telecom-like success?

TV RAMACHANDRAN

...India Forum for implementation ...mmendations on public Wi-Fi

The demand from Broadband India Forum came after Trai refused to entertain suggestions from the department of telecommunications around the public Wi-Fi

cence, similar to internet service providers and virtual network operators. But Trai reiterated its suggestions.

BIF president TV Ramachandran said that Trai's recommendations on public Wi-Fi will encourage village-level entrepreneurship and provide large employment opportunities at local level, especially in rural areas, thus propelling socio-economic development and inclusion, as well as rural digital connectivity.

"This is a historic step forward in the cause of liberalisation and the achievement of the vision of 'Broadband for All' that will unleash immeasurable benefits to the citizens of India, the economy and the entire nation," Ramachandran added.

Reiterating its recommendations, Trai last week said asking PDOAs to operate under unified licence (VNO-ISP), which is designed to regulate integrated internet service providers (ISPs), would defeat the whole purpose of this exercise and kill the innovation at initial stage itself.

Trai has argued that regulating PDOAs through the existing unified licence or VNO licence norms would not be feasible as aggregators would not be able to comply with many terms and conditions of such licence.

Mon, 08 June 2020
https://epaper.financialexpress.com/c/52609083

FINANCIAL EXPRESS

TV RAMACHANDRAN

GLOBAL DIGITAL LEADERSHIP

A trifecta for India: 4G, 5G & 6G

India must establish its own use-cases prior to its 5G rollout along with tapping into the potential of 4.5G, and engaging in 6G research to secure its future digital economy

- In the last auction, more than 1,300 MHz of radio spectrum (approximately 50 percent) remained unsold
- India had 763 million active mobile connections in 2016, served by over 3600 MHz of spectrum
- The amount of spectrum being made available for 5G in India is 175 MHz, which is almost half of USA

The Economic Times

Internet

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FB-Jio deal a positive; concerns around flouting of net neutrality, data safety norms unfounded: BIF

Net neutrality rules are now unambiguously written into the telecom service providers' licences, it said.

PTI | Last Updated: Apr 27, 2020, 09:26 PM IST

THE TIMES OF INDIA

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Fri, 29 Nov-19; Times Of India - Pune; Size : 94 sq.cm.; Circulation ...
Page : 10

Industry role key to raising share in sat mkt: Antrix CMD

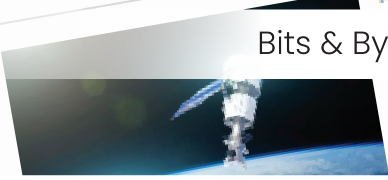
ETT SPECIAL

Private players should be encouraged to use satcom: BIF

The telecom industry is under immense pressure and needs to be supported for which satellite communication can be looked as an alternative to solving rural connectivity woes, T.V Ramachandran, president of Broadband India Forum told ETT.

Tina Gumaney • ETTelecom • Updated: November 20, 2019, 13:06 IST

NEW DELHI: The telecom industry is under immense ... communication ... an alternative to solving rural connectivity woes, T.V Ramachandran, president of Broadband India Forum told



Sakal Times

Fri, 29 Nov-19; Sakal Times - Pune; Size : 151 sq.cm.; Circulation:125000; Page : 7

'Unleash mkt forces to see full potential of satellites'

GOVT STAND
TRAI Chairman Sharma said the government and TRAI are cognizant for unleashing ...

PTI

NEW DELHI: Telecom and broadcasting regulator TRAI on Thursday advocated ...

... and also a part of the National Digital Communications Policy.

"We need to implement the open sky policy in letter and spirit," Sharma said addressing the India SatCom 2019 organised by Broadband India Forum.

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Device Ecosystems
GPR
ICT for Inclusive Ability (PwD)
Manufacturing/ Network
HI LEVEL COMMITTEES
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Rural Digital Initiatives
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manufacturing in India
under the GST regime
December 2016
A STUDY ON
JOB CREATION POTENTIAL
FOR
Indian AGRICULTURE & HEALTHCARE Sector
THROUGH ADOPTION OF
INTERNET OF THINGS &
ARTIFICIAL INTELLIGENCE
GROWTH DIVIDENDS OF
DIGITAL COMMUNICATIONS
The Case for India
December 2018
Democratisation of Public Wifi in India
with delicensing of 5Ghz spectrum band
February 2019

Partnerships & Engagements

ADBInstitute

3GPP A GLOBAL INITIATIVE

5G IA

CUTS International

ESSCI Skilling India in Electronics

ETSI World Class Standards

IEEE Advancing Technology for Humanity

IET The Institution of Engineering and Technology

MACQUARIE University SYDNEY·AUSTRALIA

tsdsi India's Telecom SDO

VNO AI

Supported by ICANN

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Mohit Kumar
Jr. Executive – Administration

About BIF

Broadband India Forum (BIF) functions as an independent policy forum and think-tank that works for the development & enhancement of the entire broadband ecosystem in a holistic, technology-neutral and service-neutral manner. BIF's endeavour is to promote, support and enhance all policy, regulatory & standards initiatives for the proliferation of high-quality broadband in the country to empower consumers with efficient and economical broadband to realize the true Digital India.

Formed in October 2015, BIF is a dedicated forum with participation from all stake holders, including Technology Providers, Telecom Operators, Internet Service Providers, Value-Added Service Providers, Satellite Operators and service providers, MSOs, Startups and professional entities, as well as seasoned Industry professionals who are familiar with different technologies, operations, regulations and policies. BIF has, in this short period of time, established itself as a thought leader, having contributed significantly to regulatory and policy consultations, and built up a good level of credibility, reputation and standing with key institutions in India.

BIF functions through its **Hi-Level Specialist Committees** on various subjects such as 5G, SatCom, Content & Applications, AI & IoT, Networks, Spectrum & Licensing, Device Ecosystems, Wi-Fi, New Technologies & Innovations, Academia & Standards, Rural Digital Initiatives, ICT for Inclusive Ability (PwDs), Technology, Media & Telecom (TMT), Broadband Infrastructure, etc.

Other significant activities of the Forum broadly relate to coordination, promotion and formulation of expert opinion on topical subjects related to Broadband; act as a credible and reliable platform for Industry, Government, Regulatory and Standards agencies; spearhead independent and non-partisan work in several areas related to policy, regulation and standards; conducting conferences, seminars and knowledge events; writing research papers and white papers in collaboration with reputed research institutes; running awareness campaigns; releasing media articles on issues pertinent to broadband and telecom in India, and conducting R&D Projects in partnerships with leading consumer organisations as part of an overall Consumer Awareness Program.

Please visit the BIF website:
www.broadbandindiaforum.com
for further information.

BIF

BROADBAND INDIA FORUM

"Think Tank for Digital Transformation"

ORIGIN

Formed in 2015 and acknowledged as a Credible Thought Leader

PROFILE

An Independent Policy Forum and Think Tank for Digital Transformation

VISION

Empowering Consumers with Efficient and Economical Broadband

MISSION

Proliferation of high quality broadband in the country in a technology-neutral, service-neutral and all-inclusive manner

OBJECTIVE

Promote, Support and Enhance all policy, regulatory & standards initiatives for the development & enhancement of the entire broadband ecosystem in the country

BIF

BROADBAND INDIA FORUM

"Think Tank for Digital Transformation"

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