Broadband
India
Forum

BIF

...enhance, expand & usher the true value of broadband

5G

BROADBAND
Bits & Bytes

A BIF Communiqué

www.broadbandindiaforum.com

Contents

Dr. Kuldip Singh
Principal Adviser,
Broadband India Forum

Foreword

5G is the next generation of mobile data connectivity that will provide unbelievably fast broadband speeds ranging from 10 Gbps to 100 Gbps. However, more important than the speed, it is the ultra-low latency of the order of 1 ms to 10 ms provided by 5G, which will enable applications and services that require real time response.

The Internet of Things (IOT) will enable connection of smart gadgets and devices that will have unparalleled features. A conservative estimate is that by 2020, there will be 50 billion such connected devices worldwide. But IOT will require a large bandwidth, the need for which will continue to grow.

With the increasing popularity of video streaming services and 4K ultra HD formats, the 4G networks will have difficulty coping with the required data rates.

The 5G services will be needed not only to provide the millions of new connections to the devices but also to meet the requirements of high data rates and low latency.

Recognising the potential of 5G services and the need for India to play a leading role in the development of standards and deployment of 5G services, Broadband India Forum (BIF) has been actively involved in the process. It is a firm belief of the forum that 5G services will not only contribute significantly towards improving the quality of life of the citizens but also have a strong positive impact on the economy. To generate awareness and enable the country to play a leading role in the deployment of these services, BIF is planning to come with a number of papers on the subject. An event titled "5G India 2018" is also being held in Mumbai on May 18, in which BIF is a co-organizer.

We are happy to bring this present Quarterly Newsletter with the theme of 5G and hope that it will help generate inputs for the successful deployment of these services that are especially tailored to meet the requirements of this great nation.

"

BY 2020, THERE WILL BE 50 BILLION CONNECTED DEVICES WORLDWIDE."

TV Ramachandran
President,
Broadband India Forum

From the President's Desk

Dear Readers,

Welcome to the **Fourth Edition** of our Quarterly Newsletter – Broadband Bits & Bytes on trends and perspectives related to Broadband sector in India. The Newsletter focusses on all the key areas such as spectrum and licensing, content and applications, SatCom, infrastructure, security, new technologies and innovations, which could lead to proliferation of Broadband in India.

BIF is dedicated to enhance the potential of the entire ecosystem to deliver broadband across the whole of India. BIF's mission is to support and enhance all policy, regulatory & standards initiatives for the proliferation of high quality broadband in the country in a technology-neutral and all-inclusive manner. We have, in the short time frame of less than three years, contributed to several regulatory and policy consultations and been working closely with all concerned Government agencies providing credible inputs on Broadband to assist and facilitate the process of policy making.

The Newsletter is divided into several sections. In the **"Spotlight"** section, the focus for this Edition is 5G with a focus on regulation and policy. We discuss the key BIF recommendations on policy and regulatory aspects for making India 5G ready. We have views on how will 5G transform Digital communications as well as other verticals in the **"Industry Speak"** section, and I would like to thank the industry experts personally for sharing their valuable thoughts. In our **"Newsflash"** section, we have summarized the significant happenings in the Broadband sector over the last quarter. In the **"Events"** section, we give you a glimpse of the past and proposed BIF Events.

In an effort to make this newsletter more useful to you, we would appreciate your comments and suggestions that you may have on this issue as well as topics that you would like us to feature in the forthcoming issues.

We hope you enjoy reading this issue!

> **BIF IS DEDICATED TO SUPPORT AND ENHANCE POLICY, REGULATORY & STANDARDS INITIATIVES FOR PROLIFERATION OF BROADBAND IN THE COUNTRY"**

Spotlight: 5G needs extensive
FIBRE NETWORKS

It is recommended to lay fibre now to small and macro cells, if these cells are to be upgraded to 5G in the coming years. This is to cater to the immense amount of backhaul traffic that will be generated by a 5G BTS

The vision of a 5G network is usually that of an intricate wireless technology offering high data speeds and responsiveness on our mobile phones. Integral to the success of 5G technology is the extensive optic fibre cable (OFC) network that runs underground—5G's characteristic higher data speeds and throughputs are greatly influenced by these heavy-duty networks that impact both the wireless side and wireline side of the infrastructure. In fact, 5G's formidable network performance goals are heavily predicated on a massive availability of fibre connectivity, to cell sites and beyond.

The International Telecommunication Union (ITU) estimates ongoing capital investments related to fibre infrastructure will reach a staggering $144.2 billion between 2014 and 2019, in its "Trends in Telecommunication Reform 2017" report. A huge explosion of data, especially video, flowing from tomorrow's 5G radios and base transceiver stations (BTS) is the primary driver for this immense capital investment into fibre infrastructure deployments.

Mobile data traffic is growing rapidly. According to the Cisco Visual Networking Index, mobile data traffic has grown 4,000-fold over the past 10 years, and almost 400 million-fold over the past 15 years. In 2015 alone, 563 million mobile devices and connections were added to networks. All this usage puts immense pressure on our current wireless networks that are not built to withstand this level of user demand, thus the need for the next generation of wireless networks. So, since wireless is clearly the wave of the future, where does that leave fibre networks? As a matter of fact, we will see a growing demand for a greater optic fibre network to support 5G.

Traditionally, 2G and 3G mobile networks used microwave wireless backhaul to connect cell sites to the nearest mobile switching centre (MSC) over the air. Although this legacy architecture served the industry well for several decades, the advent of 4G and increased data flow has already triggered change. Backhaul upgrades are taking place with legacy copper- or microwave-based cell sites being replaced with IP-

based transport over fibre. This provides unlimited capacity to cater to the humongous amount of data being generated by the 4G LTE and LTE-advanced access technologies. These backhaul networks should be suitably leveraged by future 5G networks.

To improve coverage, capacity and overall Quality of Experience (QoE) of mobile users, telecommunications service providers (TSPs) are adopting small cells which strategically place the BTS closer to the users. Small cells can be backhauled either over copper, microwave or fibre. Fibre-based small cell is preferred wherever possible as fibre is scalable, secure and most cost-effective. However, in locations where deploying fibre is either not viable or feasible, they could be served by a number of wireless Gigabit backhaul options, such as E and V band, satellite and HAPS-based options in remote and far flung areas of the rural hinterland.

The math: 4G versus 5G speeds

Today, a typical modern macro-cell (BTS) is served by a 1Gb IP-based optical mobile backhaul network. The typical traffic over this 1Gb physical connection is about 200Mbps to 300Mbps, and leaves room for 4G network growth. Thus, the aggregate bandwidth consumed by all concurrent mobile users to a typical macro-cell is roughly equivalent to the maximum theoretical download speed of a single LTE-advanced (Release 8) user connection. Current mobile backhaul (MBH) networks would soon not suffice even

for 4G as it grows. With the expected access speeds and throughputs of 5G, we will inevitably choke existing backhaul networks very quickly.

TSPs connecting 3G and 4G cells using fibre also need to lay the foundation for 5G, which has maximum theoretical download speeds from 1Gbps for high-mobility users (for example, bullet train commuters) to 10Gbps for low-mobility users (those who are stationary or walking). Even if the maximum theoretical download speed of 10Gbps was scaled down by 90% to 1Gbps, the entire 1Gb throughput to a typical macro-cell today, intended to serve all concurrent 4G users, could be easily consumed by one bandwidth-hungry 5G user.

It is, therefore, recommended to lay fibre now to small and macro cells, wherever and whenever possible, if these cells are to be upgraded to 5G in the coming years. This is to cater to the immense amount of backhaul traffic that will be generated by a 5G BTS.

Most bandwidth consumed over mobile networks is related to video-centric content flowing from a distant data centre located across a city or elsewhere. If 5G is aggressively rolled out and delivers real-world access speeds significantly faster to today's 3G/4G networks, all parts of the wired network connected to the 5G BTS will be affected by the deluge of content flowing to and from data centres. The only transport media capable of scaling to these demands is optical fibre, particularly in the BTS to the hundreds of thousands of small and macro cells deployed.

5G for fixed broadband

5G could serve as a great replacement for fixed broadband access. Deployments of fixed 5G wireless broadband access should be quicker and easier than deploying fibre to the premises. One impact of the demand for 5G is the need to push fibre closer and closer to the user. Technology allowed us to do this incrementally over the years, and the industry advanced from fibre-to-the-neighbourhood, then fibre-to-the-curb and now fibre-to-the-home/building. While this sounds like a logical next step, fibre connectivity has historically been challenging, both from a civil works perspective and on the technology front.

Typically, deploying fibre close to the user has meant significant disruption, expense and time. For 5G services to meet their potential, all these challenges with fibre deployment would need to be resolved. Areas targeted for 5G coverage require fibre to be successful, not just for capacity reasons, but to meet the other formidable 5G performance goals of network diversity, availability and coverage. All three goals are achieved through a greater number of interconnected paths of fibre.

Challenges in bringing 5G to India

The global roll-out of 5G commercial services is expected to commence in 2019-20 and India aims to be at the forefront. There is much excitement in the regulatory industry and academia ecosystem, but there are formidable handicaps to be overcome. The percentage of fiberisation of mobile is an illustrative handicap. While comparable regimes like the US and China have over 80% of their towers fiberised, India experiences the inverse—only around 20-25% of towers are fiberised. For 5G, 100% of the towers would need to be fiberised.

From another perspective, the US has installed over 400 million km of fibre for less than one-third of our population and China has over a billion km of fibre, while India has deployed only about a 100 million km; i.e. just a tenth of what they have achieved. While India deploys only 15 million km of fibre per year, China adds about 150 million km of fibre per year. Thus, the existing gap only keeps getting wider and wider every year and India is falling further behind. Even the current 250 million Indian 4G subscribers are greatly underserved and increasing fibre optic networks is the optimal solution.

The future is about 5G with its promise of less than 1ms latency and 1,000 times the capacity of 4G. If Indian operators plan to stand head-to-head with the Americans and Chinese, they need to accelerate the percentage of towers fiberised and roll out more OFC to leverage both fibre and wireless technology, and deliver 5G to consumers cost-effectively. Or risk being left behind.

Author *is President of Broadband India Forum. Views are personal.*

Industry Speak:
How will 5g transform digital communications as well as other verticals?

"5G will spur the revolution of IOT and M2M. Data intensive Networks will become our main fabric and the need for optical fiber is now even more critical. Fiber in food and fiber in 5G, is a given."

Swati Rangchari
Chief Corporate Affairs Officer, Sterlite Technologies Limited

"5G will not only enable the operators with new revenue generating opportunities but also open new possibilities for the consumers to experience new enriching services."

Parag Kar
Vice President, Government Affairs, India & South Asia, Qualcomm

"5G presents a unique opportunity for India to become not just an early adopter but also define the global ecosystem for the standards. The Government of India has taken encouraging steps by constituting the 5G High Level Forum to develop a 5G roadmap and by proactively participating in the international standardization processes. India can be a strong magnet attracting new technology trials, innovative services and business models. A bold policy approach that encourages experimentation and risk taking rather than restrictive regulations will help India take a lead in this emerging industry space. It will bring the benefits of this new technology along with new business and employment opportunities."

Ashwani Rana
Head of Connectivity Policy, South & Central Asia, Facebook

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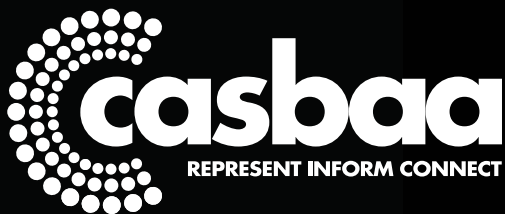
Satellite Industry Forum 2018
25 June 2018, Four Seasons Hotel Singapore   #casbaasif

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the industry to deal with crucial issues
in a full day of panel discussions.

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http://casbaaevent.com/events/casbaa-satellite-industry-forum-2018/

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Newsflash: Updates and Achievements

GENERAL

❖ Reliance Jio and Viacom18 have joined BIF as Corporate Patron Members.

❖ BIF-TARI report on, 'Mobile Telephony in India' in January 2018.

❖ TRAI issued recommendations for formulation of NTP 2018.

❖ BIF submitted inputs on TRAI consultation paper on promoting local telecom equipment manufacturing, next generation PPDR networks and Volte.

❖ BIF submitted its input to TRAI Consultation Paper on In-Flight Connectivity.

❖ BIF participated in TRAI Open House on making ICT accessible for persons with disability.

SATCOM & BROADCASTING

❖ TRAI issued recommendations on Issues Related to Digital Radio Broadcasting.

❖ TRAI issued recommendations on Ease of Doing Business in the Broadcasting Sector.

❖ A New Satcom event - India Satcom 2018 will be hosted by BIF on Nov 20 & 21, 2018 at the Shangi-la, New Delhi. BIF plans to organise a curtain raiser in Bangalore.

❖ BIF made a submission to TRAI & Secretary-T on Issues arising out of Uplinking & Downlinking of TV Channels including need for having a holistic Satcom Policy to take care of both broadband & broadcasting.

CONTENT & APPLICATION

❖ BIF has submitted its input to TRAI Consultation Paper on Privacy, Security & Ownership of Data in the Telecom Sector.

❖ BIF attended TRAI open house on Privacy, Security & Ownership of Data in the Telecom Sector.

❖ BIF submitted its input on Srikrishna Committee's white paper on data protection framework.

SPECTRUM & LICENSING

❖ BIF along with Bharat Exhibitions is hosting the 2nd International Conference on 5G India 2018. The event is being held at The Leela, Mumbai on 17th and 18th May 2018.

❖ BIF will also launch white papers and reports on 5G during the 5G India 2018 event.

❖ BIF has submitted its input to TRAI Consultation Paper on Method of Allocation of Spectrum for PMRTS.

BIG NEWS

Reports & White Papers from BIF
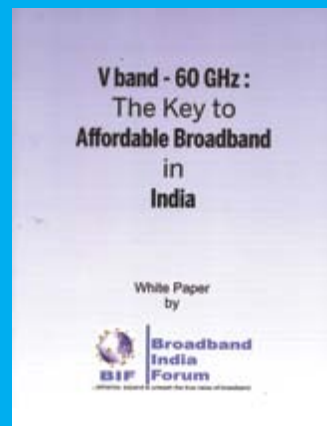
Interesting Articles

- ❖ Towards realizing Digital India goals. [LINK]
- ❖ Blockchain is here to stay. [LINK]
- ❖ 5G needs extensive fibre networks. [LINK]
- ❖ NTP 2018: Unleashing the power of Cable Broadband. [LINK]
- ❖ The digital transformation of Indian ICT: A skill gap perspective. [LINK]

FEW OTHER ARTICLES THAT YOU MAY FIND INTERESTING:

- ❖ How telecom has become driver of economic change in India. [LINK]
- ❖ India's Digital Divide: How broadband speed splits the nation. [LINK]
- ❖ 60 GHz-(v-band): Why should it be delicensed? [LINK]
- ❖ Are current spectrum prices distorted? [LINK]
- ❖ Managing 5G spectrum. [LINK]
- ❖ NTP 2018: Government aims to provide 50 Mbps Broadband Connection to every citizen by 2020. [LINK]
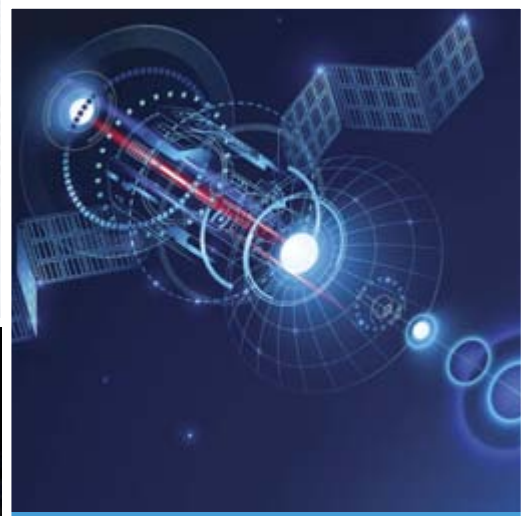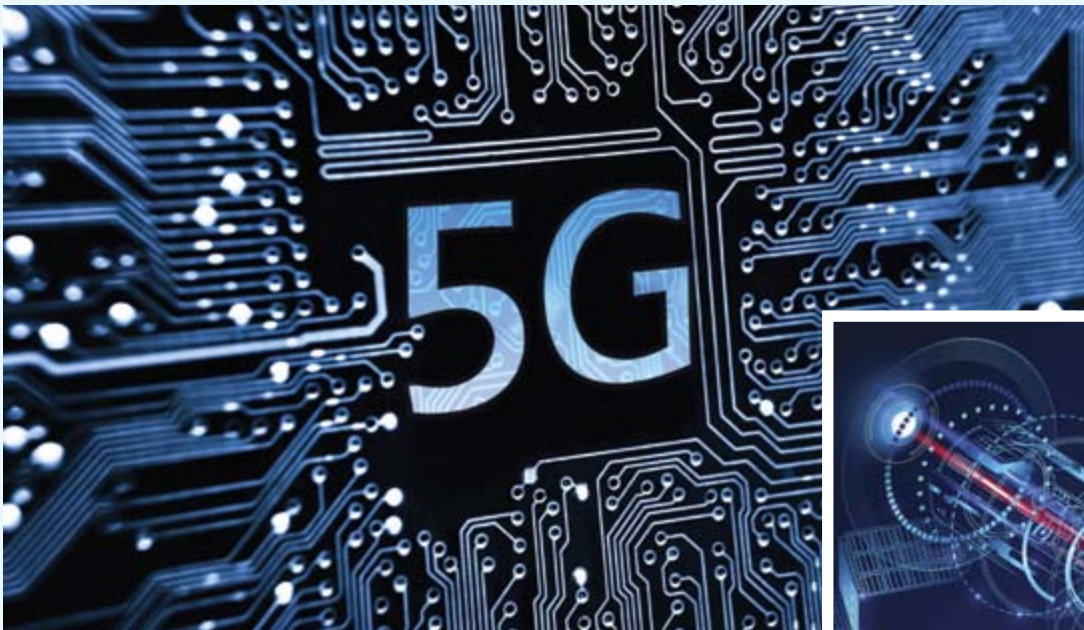
Events:
Past Events

India Satcom 2017

- ❖ The event was graced by the VVIPs - Shri Manoj Sinha, Hon'ble Minister of Communications (IC) & MOS, Ministry of Railways, Shri R S Sharma - Chairperson, TRAI, Smt. Aruna Sundararajan, Secretary, DoT and other leading diginatories.

- ❖ Participation from the Government, Regulator, Academia, Satellite Operators, Teleports, VSAT players, Broadcasters, etc.

- ❖ More than 100 delegates participated the summit from all around the globe.

- ❖ The 1st International Satcom Industry CXO roundtable with Indian Government was held where CXOs from more than 10 International companies participated. The extremely vibrant and interactive CXO roundtable enabled CXOs to address their issues and concerns as well as their wish list face to face with Secretary, DoT.

- ❖ Highly educative & interactive session on In-flight Connectivity.

- ❖ White Paper on Satellite Broadband & Digital India was released.

Launch of BIF-Wik Report - The Economic And Societal Value of Rich Interaction Applications In India

Launch of BIF-TARI Report - Mobile Telephony in India

Signing of MoU with Macquarie University

Signing of MoU with The European Telecommunications Standards Institute

BIF Rural Workshop

BIF represented at APG-3 (ITU) event in Perth, Australia

Events:
Upcoming Events

5G India 2018

India Satcom 2018

SUPPORTED BY:

India Satcom 2018

Broadband India Forum (BIF)
...enhance, expand & usher the true value of broadband

20th & 21st November 2018
Le Meridien - New Delhi

Mainstreaming Satcom-Connecting the Unconnected

Chief Guest*

MR. MANOJ SINHA
Hon'ble Minister of Communications (IC) & MOS, Ministry of Railways

SPECIAL GUESTS OF HONOR*

Mr. R S Sharma
Chairman, TRAI

Mr. Amitabh Kant
CEO, NITI Aayog

Ms. Aruna Sundararajan
Chairman, Telecom Commission & Secretary, Telecom

Other Eminent Speakers*

Shri N. Sivasailam
Special Secretary, Telecom

Shri S K Gupta
Secretary, TRAI

Mr. U K Srivastava
Pr. Advisor, (NSL) TRAI

Mr. K Krishna
Vice President and CTO, Hughes Communications

Mr. Abhishekh Malhotra
Bharucha & Partners

Shri Joe Welch
Chairman, CASBAA

Shri Paritosh Saha
Vice President, STAR India

Shri P J Nath
Managing Director, Nelco Ltd.

Shri Gaurav Kharod
Country Head, Intelsat India

Shri Sathya Narayanaswamy
Country Manager, Viasat

Vern Fotheringham
Executive Chairman V Satcast

David Hartshorn
Secretary General, GVF

*Invited

India Satcom 2018 organized by Broadband India Forum (BIF) offers you a unique opportunity to access key decision makers and business leaders driving the development of satellite broadband in India. Register today to gain the knowledge and contacts you will need to make your organisation part of this growing market for satellite communications services in India.

Join Us in New Delhi for India Satcom 2018 to:

❖ Learn about opportunities to provide Satellite Broadband across urban and rural India.

❖ Talk with key Government decision makers on policy formation, regulations and infrastructure rollouts.

❖ Attend sessions which deliberate upon Role of Satellite Communications for Digital India, Satcom Innovations: New Markets, Applications & Technologies, Satcom Mobility: Planes, Ships, Trains & Connected Cars, LEOs, MEOs & More: Next Generation Satellite Constellation & Affordable Broadband, FDI & Local Manufacturing (Make in India), CXO Roundtable, Space Activities - Laws & Regulations, Ease of Doing Business and other topics.

Why Attend?

❖ Unique networking opportunities with government officials, business leaders and executives from the world's major satellite operators, manufacturers and equipment providers.

❖ Create awareness within the Government at all levels regarding importance of the role of Satcom in providing broadband pan India including rural India.

❖ Get access to key decision makers in the Government on matters related to policy, regulation & business opportunities in Satellite Communications.

❖ Attend panel discussions on Market Growth, Policy & Regulatory Issues, Role of Satcom in Digital India, Ease of Doing Business, Satcom Mobility & other related topics.

Who Should Attend?

❖ Satellite Operators
❖ Satellite Manufacturers
❖ Broadband Service Providers
❖ Internet Service Providers
❖ VSAT Manufacturers & Distributors
❖ Value-added Service Providers
❖ Manufacturers

❖ User Organizations (Banks, Oil & Gas, Defense, Security Forces, etc.)
❖ DTH Service Providers
❖ Government Representatives
❖ Spectrum & Regulatory Experts
❖ Attorneys & Consultants
❖ Telecom Service Providers
❖ Broadcasters

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Panel of Principal Advisers

 Mr. P K Garg
 Dr. Kuldip Singh
 Mr. B K Syngal
 Dr. Mahesh Uppal
 Dr. B M Baveja
 Mr. Sudhir Gupta

 Mr. J V Ramamurthy
 Mr. D P Singh
 Mr. Abhishek Malhotra
 Mr. Rajesh Mehrotra
 Mr. K V Seshasayee

BIF High Level Committees

S.No.	High Level Committees	Chair and Co-Chair	Mentor (Pr. Advisor)
1	Spectrum, Regulatory Framework & Standardisation	Chair: Parag Kar, VP, Govt. Affairs, India & South Asia, Qualcomm, Co-Chair: Naveen Tandon, Director, International External Affairs, AT&T India Co-Chair: Avinash Ramachandra, Director Public Policy, Amazon India Convener: Garima Kapoor, Director, Research and Communication	Dr. Kuldip Singh, former Member TDSAT & CMD, MTNL Shri PK Garg, former Wireless Advisor to Govt. of India & former Chairman RRB-ITU Shri Rajesh Mehrotra, former Expert Dr. Mahesh Uppal, Sr. Telecom Consultant
2	Broadband Infrastructure	Chair: Swati Rangachari, Chief of Corporate Affairs, Sterlite Technologies Co-Chair: SN Gupta, MD, Blue Town-India Convener: Kartik Berry, Director, Research & Analysis	Shri Umang Das, Chief Mentor ATC & Vice-Chairman, TAIPA
3	Manufacturing	Chair: Harish Krishnan, Managing Director at Cisco Systems India and SAARC Co-Founder Public Affairs Forum of India Co-Chair: Parag Kar, VP Govt. Affairs, India & South Asia, Qualcomm, Convener: Debashish Bhattacharya, Sr. Director, Technology & Policy	Shri BK Syngal, former CMD, VSNL Shri JV Ramamurthy, former Director, HCL,
4	Content & Application	Chair: Ashwani Rana, Head of Connectivity Policy, Facebook Co-Chair: Rahul Jain, India Manager-Public Policy, Google India Co-Chair: Avinash Ramachandra, Director Public Policy, Amazon India Co-Chair: Ms. Kshipra Jatana, Group General Counsel, Viacom18 Convener: Arun Mukarji, Director Operations	Dr. Mahesh Uppal, Sr. Telecom Consultant Shri Umang Das, Chief Mentor ATC & Vice-Chairman, TAIPA Dr. Kuldip Singh, Former Member TDSAT & CMD, MTNL Shri Rajesh Mehrotra, former Expert Radiocommunications at ITU, Geneva
5	SatCom & Broadcasting	Chair: PJ Nath, MD & CEO, Nelco Ltd Co-Chair: Gaurav Kharod, Country Manager India, Intelsat Co-Chair: K Aravamudhan, Senior Vice President, Star India Private Limited Convener: Debashish Bhattacharya, Sr. Director, Technology & Policy	Shri Rajesh Mehrotra, former Expert Radiocommunications at ITU, Geneva Shri PK Garg, former Wireless Advisor to Govt. of India & former Chairman RRB-ITU Shri BK Syngal, former CMD, VSNL
6	Rural Digital Initiatives	Chair: Reliance Jio Co-Chair: SN Gupta Co-Chair: Shefali Mishra, Senior Vice President at Star TV Network (21CF), India Convener: Debashish Bhattacharya Sr. Director, Technology & Policy	Shri KV Seshasayee, MD, Win Broadband, former Chairman, Hinduja TMT
7	5G	Chair: Mathew Oomen, President, Network, Global Strategy and Service Development, Reliance Jio Co-Chair: Rahul Jain, India Manager-Public Policy, Google India Co-Chair: Jitendra Singh, Sr. Director, GA, Qualcomm India Convener: Debashish Bhattacharya Sr. Director, Technology & Policy	Dr. BM Baveja, former Sr. Director MeitY and currently Consultant MeitY
8	New Technologies & Innovations (Robotics, AI, Cloud Computing)	Chair: Vipin Tyagi, ED-C-DOT Co-Chair: Rishabh Dara, Public Policy, Manager, Facebook, India	Dr. BM Baveja, former Sr. Director MeitY and currently Consultant MeitY
9	IoT (Big Data, Analytics, MTC) (New Committee)	Chair: Dr Rishi Bhatnagar, President, Aries Communication & Chairman IOT Congress Co-Chair: Naveen Tandon, Director, International External Affairs, AT&T India Convener: Anand Gupta, Dy. Director, Govt. Relations	Dr. BM Baveja, former Sr. Director MeitY and currently Consultant MeitY
10	ICT for Inclusive Ability (New Committee)	Chair: Dr. Nirmita Narasimhan, Sr. Fellow and Program Director G3ict Co-Chair: Mr. Dinesh Chand Sharma, Director – Standardization, Policy and Regulation in EU Project SESEI Co-Chair: Karishma Chhabra, Microsoft Convener: Anil Prakash, Director General	Shri PK Garg, former Wireless Advisor to Govt. of India & former Chairman RRB-ITU Shri Rajesh Mehrotra, former Expert Radiocommunications at ITU, Geneva
11	BIF Communication Working Group	Chair: Avi Gutgold Convener: Garima Kapoor	

About Broadband India Forum

Mr. Anil Prakash
Director General
Broadband India Forum

Broadband India Forum (BIF) functions as a 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 seeks to be a thought leader and a credible and effective voice to help propel the nation to achieve the country's ambitious vision of creating a Digital India. To achieve this, BIF works to promote the rapid development of policies to promote affordable and high speed ubiquitous broadband throughout the country.

Registered as IPTV Society, its brand - BIF was formed in October 2015 and is a fairly nascent but 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, MSO, Broadcasters, startups and professional entities as well as seasoned Industry professionals who are familiar with different technologies, operations, regulations and policies.

The Forum's senior leadership team includes renowned and respected professionals from background of Industry, Regulator and Government.

1. Mr. Shyamal Ghosh, Former Secretary-Telecom and co-founder of IPTV Society, is the Chairman Emeritus.

2. Mr. M. F. Farooqui, IAS (Retd.), former Secretary-Telecom, is the current Chairman

3. Mr. T. V. Ramachandran, Hon. Fellow of the IET (London), former Resident Director-Regulatory Affairs and Government Relations, Vodafone, and first Director General of COAI, is the President of the Forum.

4. Mr. Parag Kar, Sr. VP Govt. Affairs, India and South Asia-Qualcomm and Mr. Ashwani Rana, Head Connectivity Policy-Facebook are current Vice Presidents.

5. Mr Anil Prakash is the Director General.

6. Mr. S. N. Gupta, seasoned technocrat and senior luminary who has worked in DoT and as a Principal Adviser to TRAI (Regulator) is the Treasurer.

BIF functions through many specialist committees for the advocacy, coordination, facilitation and promotion of all activities with the objective of furthering the goals of the National Telecom Policy in Spectrum, Licensing and Standardisation, Broadband Infrastructure, Manufacturing Rural Digital Initiatives, Content & Applications, SatCom & Broadcasting, 5G, New Technology & Innovations, IoT and ICT for Inclusive Ability.

The activities of the Forum broadly relate to coordination, promotion and formulation of expert opinion on topical subjects related to Broadband. To act as a bridge between Industry on one side and Government and the Regulatory Bodies on the other, front ending several issues related to policy & regulation.

> *"We present you the fourth Edition of the Newsletter, Broadband – Bits and Bytes. Our endeavor is to keep you updated with latest technology, standards, innovation, policy and regulation, which embark on and facilitate speedy and affordable broadband proliferation in the country."*
>
> *- Anil Prakash*

Broadband India Forum

...enhance, expand & usher the true value of broadband

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