Broadband India Forum response to the TRAI Consultation Paper on Delivering Broadband Quickly: Consultation Paper No. 12/2014;

Q1. What immediate measures are required to promote wire line technologies in access networks? What is the cost per line for various wire line technologies and how can this cost beminimised? Please reply separately for each technology.

BIF Response:

BIF recommends the following:

a) Open Access on non-discriminatory basis.
b) Technology Neutrality.

The GPON technology being currently used for wireline access and backhaul over the FTTx network. BIF wishes to make a few points regarding the same:

Average incremental cost per home per line in urban areas for an intelligently designed FTTx network in most of the cases it is expected to be Rs. 15000/- including CPE but excludes ROW cost. This can be further reduced if over ground laying of OFC using electrical poles, wall brackets and/ or other suitable methods are permitted and allowed to be used. It may be less for those service providers who are present with their OFC in the vicinity e.g. LCOs who have laid an HFC network for delivering the Live TV broadcast.FTTH can be viable only in conjunction with other GPON-based services like 3G/4G backhaul, 3G-WiFi handoff etc. Particularly, FTTB/C (commercial broadband access on fibre to establishments can provide the infrastructure on which FTTH can ride

Liberalize and incentivize FDI in FTTx infrastructure Internet and Broadband infrastructure. This should include Data Centers , core networks, common carriers, Satellite operations for delivering Internet to rural communities and investment by cable companies in DOCSIS 3 and two-way digital network infrastructure. The phase 3 & 4 of DAS have been postponed, and this provides an opportunity to combine digital TV and broadband in the same infrastructure. Finance is a major hurdle, and there must be some ways worked out to finance DAS+Broadband in Phase 3 & 4. Collateralised long-term Capex financing is a solution.

Organizations/ Business houses investing in FTTH infrastructure should be allowed to deduct a part of investment from their income for the purpose of Income Tax. Since returns on investment will vary on infrastructure laid in large cities and small towns/ rural, semi urban areas more incentives will be required for less populated and less wealthy areas.

All MDUs being constructed must be cleared for occupation only when they have installed FTTH infrastructure like water and electricity. Statutory provision should be made. Already many communities are doing this. Instead, the large service organisations in campuses – like university campuses, SEZ/STPs, large research centres and hospitals must be provided incentives/ full budgetary support to implement local networks connected to broadband access gateways.

All departments of central, state, local self-Governments must identify the applications that are to be implemented for G2C and C2G on line transactions. It should be developed on open platform and available to all on non-discriminatory basis. They must take out tenders for their development. There is simply no expertise in these entities to do this. The Govt. has to work with state & local governments who should identify the areas needing services, and then a professional, private technical agency should design the network. The Functional design specifications of such applications can be drawn in consultation with DOE&IT. However if they do not get quick response from them they can appoint their own consultants from private sector and proceed without incurring delays. A harmonization process of these applications at state and/ or local self govt. (Municipalities, Zila Panchayats, Block Development/ Taluka / Tehsil) may be an activity as a part of the project plan.

BIF also recommends the following for penetration of BB:

Govt to enable/ lay shared OFC Networks for back-bone/ backhaul in urban areas as being done in other countries and being done for rural areas under NOFN

In line with the National Broadband policy, separation of Network and Services, i.e. mandatory unbundling of fixed line networks as in Europe.

Opening of domestic voice market for ISPs. The VOIP will bring value addition to the broadband service providers, as licensing condition provides level playing field under USL. However, necessary Inter-connection regime should be in place for smooth coalition

Q2. What are the impediments to the deployment of wireless technologies in the access network? How can these deployments be made faster?Please reply separately for each technology.

BIF Response:

WiFi

The Main impediments for deployment of WiFi networks: ISP licensing regime – high fees and absence of localized and rural licenses; cooperation from public entities (BSNL, etc.)should be improved, in particular on infrastructure sharing. Funding for rural drives should not be limited to large tender but can be extended to local, client-attainment based subsidies and payments. High bandwidth costs prevent faster uptake of clients and provision of bandwidth. Utilization of the public infrastructure and creation of better competition on the bandwidth provisioning side (e.g. through BBNL utilizing its newly-created network to provide upstream bandwidth at lower cost, and not just last mile physical pipes at lower cost. Availability of OFC for backhaul is very crucial; NOFN should be made available at low cost for backhaul.

Spectrum: for Access Technologies

Availability of adequate spectrum (Govt must ensure that adequate spectrum should be made available before auction so quick roll out could be made, non delivering of spectrum in time should be compensated

Price for Spectrum should be judicious and should not be look in to making money for the govt. exchequer this practice should be stopped immediately; the Govt is getting tax, levies and duties any way.

Satellite:

The biggest impediment is restrictive policies of Government. Its licensing should be brought under one window preferably DOT . ISRO is doing wonderful job and its country's proud what it deliver to make India shine. Commercial application of satellite for consumer need should be dealt with separate agency. We recommend DoT shouldbe a nodal agency for commercial usages of satellite.

We recommend that ISRO should makeKa band transponders available to the service providers as soon as possible either thru its own satellites or by coordinating with others till it comes with its own

The Telecom Regulatory Authority of India ("TRAI") on April 29, 2004 introduced "*Broadband India: Recommendations on Accelerating Growth of Internet and Broadband Penetration*" ("TRAI Recommendations"), which describes a comprehensive set of steps that must be taken to create an environment in which satellite-based Internet and broadband services can be delivered more effectively. Despite some progress since the TRAI Recommendations were issued in 2004, they have yet to be fully implemented by the Government of India – even as unmet demand for satellite-based broadband services continues to escalate amongst millions of consumers.[1]

BIF has made a draft paper on Satellite Communication –whose recommendations are attached herewith as Annexe.

Q3. The recommendations of the Authority on Microwave backhaul havebeen recently released. Are there any other issues which need to beaddressed to ensure availability of sufficient Microwave backhaulcapacity for the growth of broadband in the country?

BIF Response –TRAI recommendations of Aug 30th, 2014 on MWA & MWB carriers must be accepted and implemented in time bound manner by DOT/

[1] In fact, many the TRAI Recommendations pertaining to broadband over satellites were not accepted by the government. See, Telecom Regulatory Authority of India, "*Recommendations On Growth of Broadband*", January 2, 2008, at 91-92.

One of the important steps which is the need of hour and could easily achieve the objectives of 'Digital India' envisaged by Hon'ble Prime Minister is to license exempt V-Band (57-64 GHz). This millimeter-wave portion of the RF spectrum has been largely unexploited for commercial wireless applications despite the fact that it has impressive performance characteristics. Due to capacity of this band to provide short-range (1-2 Km) but high data rate communications it is being used as low-cost, high-capacity, short-range backhaul alternative to connect wireless broadband networks.

TRAI in its recommendations on "Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF Carriers dated 29th August 2014 also stated that E-band (71-76 / 81-86 GHz) and V-band (57-64 GHz) may be explored with the 'light touch' regulation and allotment should be on the 'link-to-link basis'.

It is highly recommended that a special cell in DoT be created for faster clearance of Link and fee etc. in case "Government would go with "Light Touch Regulation". However, complete de-licesing of V-band 57-64 GHz will be very helpful. The work should not be given to WPC Wing as it is already loaded with other work which has not been cleared for long time.

Q4. The pricing of Domestic Leased Circuits (DLC) have been reviewed inJuly 2014. Apart from pricing, are there any other issues which canimprove availability of DLC?

BIF Response:

BIF recommends that charging should be based on usage factor and not based on a flat charge. The cost of connectivity is already been made, there should be a formula for a basic fee and top up fee for extra usages. It has been noted that the usages of links are dynamic and should not be charges on flat fee be basis as it brings Opex high, it should be charge like other utilities pay as peruse basis.

Q5. What are the specific reasons that ISPs are proactively notconnecting with NIXI? What measures are required so that all ISPsare connected to the NIXI?

BIF Response

NIXI or other data exchanges should ensure all data, messages and content originating in & consumed in India needs to stay in India and should not have to go to overseas servers thus added to high cost. For this, it is essential to have large web servers in large data centers attached to Internet Exchanges. The scale of data centers in use by the Govt. or planned is absurdly low to service the massive demand for content delivery & distribution. One needs to look closely at the large data center providers in US, and also the web services provided by Social Media companies to understand the sizing, technology and applications. In the immediate future, Video will form the overwhelming % of data and broadband usage. The content aggregation and distribution networks will need heavy amounts of managed broadband. Without these components, no broadband planning can succeed. Peering of ISP with Large Data Centres will create dependency and much usage of NIXI.

***Q6. Would the hosting of content within the country help in reduction ofthe cost of* broadband to a subscriber? If yes, what measures arerequired to encourage content service providers to host content inthe data centre situated within India?**

BIF Response:

Obviously Yes. Content provider will host here if they are sure that they can sell profitably, they get access to a network which can reduce the cost of Distribution, protect their IPR also and Govt. is supportive. The Network as mentioned in response to the questions above will facilitate it. Indeed if suggestions made under Q5 are implemented the Content providers will get encouraged to host locally their content,

Q7. Are PSUs ideal choices for implementing the National Optical FibreNetwork (NOFN) project?

BIF Response:

PSU has got lot of experience in deploying the fibre and access network for their own usages, but it has seen that they are rather slow in deploying other network, they definitely have a huge resource but need to channelize with the help of private sector specialised execution agencies viz. EPC contractors.

Q8. Should awarding of EPC turnkey contracts to private sector partiesthrough International Competitive Bidding (ICB) be considered forthe NOFN project?

BIF Response:

Yes, ICB could be one possible way to salvage the project. In the first instance OSP should have been on "Tern Key basis". Even now that can be done with the provision that whatever material has been procured by BBNL will be used by the turn key contractor and the rest of the requirement would be procured by him. Time & cost should be the main criterion for making the decision beside the usual PQR for such contracts/ it is understood that supplies have been delayed and if these delays are attributable to suppliers the orders must be cancelled and they should be penalized in accordance with the terms of the contract.

Q9. Are there any ways in which infrastructure development costs can be reduced? Is it possible to piggyback on the existing private sectoraccess networks so as to minimize costs in reaching remote rurallocations?

BIF Response:

Yes there are several ways. Piggybacking on the other service providers Network is one. BBNL is a fitting case by piggy backing on the BSNL network on a National Scale connecting all districts and all blocks. It is therefore considering only connecting blocks with Village Panchayats in

which it has miserably failed. Failures of delivering the services to the rural population are so obvious since there will not be any access network in those villages. PPP model is another way to reduce the cost. Tenders could be invited from interested parties. This could have been explored Entertainment is the key for Broadband internet penetration. MSOs might have considered coming along BBNL to a large number of villages if they could be assured the availability of a National backbone. BBNL could Lay down its conditions and choose partners for different areas on non discriminatory and transparent basis.

A direct buried Armoured OFC can be laid at a lower cost for cross country application as compared to ducted Cable. Ducted cables are recommended for urban areas. Ducts need to be used when crossing a railway line, a road, a river/ a water body, an area which is prone to be flooded and when it is to be tied up with a bridge.

Reducing the depth of the trench in normal fertile soil from 1.6 Mtr is not recommended and any such attempt to reduce the cost would be ill advised. Depth can be reduced in rocky areas, those areas where disintegrated rock or very hard soil is encountered.

Over ground cable is cheaper to lay than underground. ADSS cable along the LT rural feeders could be cheaper, faster and easier solution.

Q10. What can the private sector do to reduce delivery costs? Pleaseprovide specific examples.

BIF Response:

Private sector has lower Overheads as compared to Govt. It takes faster decisions to remove bottlenecks. It has better skills to negotiate and bargain with the suppliers and subcontractors. In the present situation it seems to be too late to think of this option.

Private sector involvement in provisioning should be made easier legally. At present there are barriers to entry in the form of high entry fees (licenses) and lack of mechanism for small scale funding or subsidies for select preferred areas (e.g. remote rural). The private sector can be an excellent partner to public-driven projects such as NOFN. In an ideal situation, the government should limit its role to creating physical infrastructure and overcoming various market failure issues related to this, and then make it available to the private sector whose job it will be to acquire and service users. Further, the government should create the legal conditions to ensure national security, proper client experience and proper operation environment for the private sector. Should this be achieved it will be a win-win-win for the Gov., client, and providers. The living example of this is the way WiFi (despite the limitations described earlier) has been instrumental in bringing connectivity to uncovered areas within urban environments and in rural areas. Releasing additional spectrum for un-licensed use (e.g. so-called white spaces) will create similar results allowing many private sector players to expand the scope and scale of their operations.

Q11. What are the major issues in obtaining right of way for laying opticalfibre? What are the applicable charges/ constraints imposed byvarious bodies who grant permission of right of way? In your opinionwhat is the feasible solution?

BIF Response:

Robust wire line for delivery of broadband content to the subscriber is OF Cable. In the Access Network its existence is minimal, only in small pockets of Metros. Every one wishes that this situation is reversed and FTTX be converted to FTTH, FTTB, FTTP etc yet it is various segments of our state Governments, local self Governments who are the biggest impediment and also responsible for pushing up the cost per home. Over ground OFC laying can reduce the cost yet utilities Electricity Distribution Cos(popularly called Discoms) are not supportive. Municipalities are also non supportive.

RoW is the biggest hindrance not only for OFC network but also for any wire line technology. Govt. (Central Govt.) is fully aware of this fact, yet it appears to be helpless, clueless and /or unwilling to act. Unless Govt. brings a central legislation on the lines of Indian minerals and petroleum pipe lines act which binds all Govt's, statutory bodies to grant RoW without hassles and within two weeks of a formal ON Line application for it and charging a nominal fee as determined by a central RoW Regulating Authority which shall be created through this legislation, the wire line broadband infrastructure cannot be developed.

In Our opinion the solution is as follows:

Recommendations:

1. Central government should act enact on a national level RoW Regulation Act. which should have a jurisdiction across the country. Today, RoW is the domain of local bodies, which in turn are part of the States. So, no amount of central legislation can help. What would help is if the Central and State Govt. Representatives should get together at the operating and policy levels and evolved jointly common policies for RoW which will bind the entire agency and there should be one stop shop for clearance.

2. Under the act there should be a provision for having an ROW Regulator for the purpose of :

- Laying down the guidelines for granting ROW to service providers
- Standardizing the process and templates for ROW
- Review and regulate the rates / prices in different geographical areas
- Regulate the rates and charges for sharing the infrastructure
- Adjudicate in case of conflicts
- Ensure non-discriminatory policies
- Advice state governments and municipal bodies from time to time on matters for facilitating the ROW and processes

3. Creation of state level nodal agency

4. Creation of district level nodal agencies to co-ordinate between various government bodies and various service providers for smooth right of way fixing the reasonable compensation to be paid to statutory authorities

5. Nodal agencies to ensure that the environmental issues are settled within the government agencies and service providers get a single window clearance

6. Creation of online easy and convenient process for obtaining ROW and related permissions

7. Emphasis on sharing the existing infrastructure and related regulations

8. The broadband infrastructure may be created by licensed service providers, government bodies or PPP entities viz. utilities. However the infrastructure sharing must be allowed license free.

Q12. Should the Government consider framing guidelines to mandatecompulsory deployment of duct space for fibre/ telecommunicationscables and space for telecommunication towers in all major physicalinfrastructure construction projects such as building or upgradinghighways, inner-city metros, railways or sewer networks?

BIF Response:

Yes.

Q13. What are the impediments to the provision of Broadband by Cableoperators? Please suggest measures (including policy changes) to betaken for promoting broadband through the cable network.

BIF Response:

This is most desirable, faster, cost effective and easy to implement way for providing broadband Internet at least to the 75-100 Mn homes where this technology reaches.Particularly in the areas where digitalization has already taken place and those where it is being done right now. All operators -MSO or LCO, know that data is very profitable. Major MSOs can derive almost 40% of their profits from broadband. Many small LCOs use fiber to home in a crude but effective fiber-over-the rooftop technique. To reach homes on fiber, where the media convertor is used to convert optical signal to Twisted-pair- CAT6 cabling.

Classically LCOs have worked so far in small geographical areas and have been operating on a micro/ very small scale. They did not possess high engineering skills in the ICT sector either. Barring a few exceptions, most of them lack management skills.The process of Digitisation was initially perceived as a disruptive business change for the small LCO but LCOs gradually realized that they will not have much problem as far as they are concerned since MSO will have to take responsibility for HeadEnd ,SMS and other activities.

In most of the areas LCOs have adopted HFC (hybrid Fibre Coax) topology for their Networks. The optical Node is getting closer and closer to the subscriber homes. In good networks average distance between the node and last home served does not exceed 1Km. It would therefore be easier to connect such homes with Fiber which either replaces fibre for all services including Cable TV or will be an additional cable connecting home for broadband internet and other services. LCO will prefer the second option until the MSO delivers IPTV and related value added services such as TSTV(Time Shift TV), VOD etc

It is widely accepted that if we bundle broadband with Cable TV delivery either on HFC or FTTH network, the penetration will be high with much superior user experience than what one gets from wireless access in a shared medium. 95 million homes which are connected with cable can bring a sea change in the way the country uses Internet. This itself will involve huge investment. However if this is to be spread over 60,000 cable operators, per LCO investment estimated to be around Rs. 4 lakhs only. This will appear hypothetical but is very close to reality. Challenge lies in educating them. People involved in Cable TV Industry need training and educating them is the real challenge.

BIF recommends that the National Skill Development Program of Government of India can complement the skill development/ upgradation requirement of the LCOs.

Like Mobile VAS, TV VAS has been successfully adopted by DTH Service Providers which makes them to generate extra and profitable revenue; the same model should be adopted by Cable TV VAS. The Technologies, platform is available in the country.

Presently, the only issue for cable industry that inhibits broadband deployment is finance. Also, regulatory issues pertaining to cable broadband need to be eased or completely removed. As for content delivery, there is little deployment of Subscriber Management Systems that would not only address individual customers but also provide active real-time content management and access. Here again, the Govt. has not paid attention to the need for SMS when DAS is deployed, with the result that almost 10 million STBs are incapable of addressability and content management

On the policy front, Govt. needs to see that MSO, LCO are treated at par with other Network Service Providers.(UAL/UASL) They should be granted similar facilities as are enjoyed by other infrastructure providers. Banks should extend support in granting loans for upgrades needed in the Networks and investment in CPEs after due diligence. ROW hindrances are suffered by MSOs and LCOs as much as by others TSPs.

An important impediment which have been discouraging LCOs particularly in smaller towns and villages, is the issue of CAGR which an LCO has to pay if he takes an ISP license even for class C areas; because he will have to pay the fee even on his cable TV revenue in which he has a small share. In order to make him interested he would rather need incentives. Since, the larger ISP is paying CAGR in any case, reseller should be exempted provided the reseller happen to be a small entity in a small geography located in a class C area.A small LCO operating from a district and becoming a reseller of a large ISP / TSP cannot maintain large infrastructure for SMS / legal interception, other security related requirements which in any case are being taken care of by the

large ISP/TSP from whom he has been obtaining the internet bandwidth for retail distribution. These provisions require a review.

Usually LCOs are proprietorship / partnership companies either singly owned or by multiple partners which are not registered/ incorporated under the Indian Companies ACT. This becomes a hurdle in obtaining a license under UASL regime. These requirements need to be relaxed for local/small internet service providers in Class C areas.

The Govt. has taken a decision to enhance the penetration of broadband services to every nook and corner of the country which shall enable and facilitate e-Governance, e-Health, e-Education etc. to build a strong digital nation and hence all those who make it possible need to be supported and incentives, there is need to motivate them to do so.

It is therefore recommended that these LCOs whose operations are confined within a district are provided licenses in a hassle free manner, eg. Online License is granted. An exemption from service tax for at least next five years may be considered.

In order to promote FTTH conversion of the present HFC network by these cable operators, **the test equipments (OTDR, Power Meter etc) and equipments like splicing machines along with other tool and tackles are allowed to be imported on zero custom duty.** This will enable penetration of fibre and thus shall open the doors for increased penetration of true broadband to the home.

Q14. What measures are required to reduce the cost and create a propereco system for deployment of FTTH in the access network?

BIF response:

Most of the issues and initiatives that need to be taken are already covered in Response to Q11 above. Measures viz. attractive financing, FDI , long term loans could be considered to offset high Capex costs . Cost reduction is possible thru PPP, reduction in ROW charges, allowing of Overhead Cabling, etc. State Electricity Boards & Municipalities should permit usage of their poles for this purpose at little/no charge, besides laying ADSS OFC along with LT power supply.

Q15. Are there any regulatory issues in providing internet facility throughWi-Fi Hotspots? What are the reasons that installation of Wi-Fihotspots has not picked up in the country? What type of businessmodel needs to be adopted to create more Wi-Fi hotspots?

BIF Response:

There are no significant regulatory issues. The reasons for poor uptake are mainly due to issues of perception. Entrepreneurs have not been able to work out a business model that could show them the ROI. Secondly Mobile back haul continues to be a major problem. Leasing infrastructure for backhaul in Metros and large cities is a significant cost. Unless high revenue generating applications are launched, returns will not be satisfactory.

Q16. What are other spectrum bands which can be unlicensed for usage ofWi-Fi technology or any other technology for provision of broadband?

BIF Response:

Other spectrum bands for usage of WiFi technology have been mentioned in our response to Q18 below.

As regards to new technologies for provision of broadband, BIF recommendation is as given below:

As we move towards convergence, the distinction between cellular technologies and broadcasting are getting blurred. In fact today's 4th generation cellular technologies viz. LTE are capable of broadcast and a new algorithm called LTE-broadcast has been specially developed to cater to the broadcast and the Mobile TV & Live Video Streaming market. We all know the story of the 700MHz auction which was earlier the safe haven of broadcasters until recently.

Similarly, thedigital terrestrial broadcast technologies of today are capable of

- Live Video streaming
- Data multicasting from one to many
- Multiple screens –fixed, portable, mobile
- Two way internet access including broadband Technologies which are now driving these applications & services are available and being deployed in other parts of the world on a rapid scale. The successful technologies that are commercially deployed are ISDBT , CMMB etc (as compared to the DVBT2 chosen by PB/DD)

To enable usage of such technologies for deployment of broadband with broadcasting/multicasting , the UHF band needs to be opened up for use by others and/or the public broadcaster (PB) needs to be encouraged to share their existing UHF spectrum in a PPP mode by joining hands with FDI pumping international consortiums for deploying commercially viable digital terrestrial technology to enable broadcast /multicast of the Internet to rural & remote areas at very low costs.

There is a brilliant example which has been followed in the US , where the FCC permitted hundreds of " Low-Power TV stations " to be set up on regional/local /community basis all across the US . What these stations have done is that they bought the UHF spectrum for low-cost community TV broadcast business which can then be scaled up to a full fledged 4G/multicast business . Using some of the latest state of the art technologies viz. "Multi-frequency cellular terrestrial technology, these low cost community broadcasters can bring about true **convergence between cellular and broadcast world. Such technologies if deployed in the rural areas could bring about a merger of broadcasting and Data multicasting and could accelerate the broadband deployment in the rural areas.**

2. Another media which, if properly managed, distributed and then opened up could be the area of Satellite Communication. The bandwidth intensive Ka band which has the advantages of low cost/MB , low form factor/MB etc and could complement the existing efforts of the country in a very big way**. BIF recommends liberalisation of the Satcom Policy coupled with opening up of the Ka band**(in line with the international best practices) to provide low cost broadband access to remote and rural areas.(Please refer to BIF recommendations on new Satcom Policy attached herewith)

3.Another technology that is fast catching up and needs to be exploited in India is that of **" TV White Space technolog**y " which essentially uses the unutilised and " free " portion of the UHF band for propagation of broadband & broadcasting.

Q17.How much spectrum will be required in the immediate future and inthe long term to meet the target of broadband penetration? Whatinitiatives are required to make available the required spectrum?

BIF Response: To keep in view Govt policy to provide broadband to 600Mn users by 2020 as per NTP 2012 and ultimately broadband to all, more and more spectrum should be made available to the operators in different bands in close co-ordination with all agencies in the long term. To begin with , BIF congratulates TRAI plan to release 1500 Mhz in different spectrum bands for auction in FY 2015-16 . This will give a big boost to broadband access in the short term and will help operators plan their networks better, thereby leading to better efficiency.

Initiatives viz. better co-ordination amongst users, a liberalised and pro-active mindset, industry friendly policies viz. spectrum trading, spectrum sharing (active) etc. will be required to make more spectrum available for commercial use.

Q18. Are there any other spectrum bands apart from the ones mentionedin Chapter-2 to be identified for provision of wireless broadbandservices?

BIF Response:

TRAI recommendations for opening up of E band (71-76Ghz and 81-86Ghz) vide their recommendations dated 30th August must be approved and accepted by Telecom Commission & implemented at the earliest.However, V-band (57-64 GHz) may be considered for totally de-licensing for faster rollout and provision of cost effective broadband services.

Additionally BIF recommends opening up of UHF band (470-640 Mhz) as explained in response to Q16 above. Also 5470-5725Mhz (for unlicensed Wifi). Also 5150-5350Mhz and 5725-5850Mhz may also be allowed for Wifi .

Separately BIF also recommends opening up of Kaband for the purpose of highbandwidth broadbandaccess to remote and rural areas being a viable complimentary to the 3G/4G Mobile backhaul .

Q19.What are the measures required to encourage Government agenciesto surrender spectrum occupied by them in IMT bands?

BIF Response: Refer to response to Q17 above.

Q20. What should be the time frame for auctioning the spectrum in 700MHz band?

BIF Response: As Mobile broadband (4G/LTE) is economically viable at 700 Mhz, it should be auctioned ASAP.

Q21. Do you agree with the demand side issues discussed in Chapter 5and Chapter 6? How these issues can be addressed? Please alsoindicate any other demand side issues which are not covered in theCP.

BIF Response: The issues have been analysed very well. We agree. Addressing these issues is a big challenge. Each issue requires serious, sustained effort and a project plan. Every issue needs to be dealt in details with the stakeholders getting involved.

Q22. Please give your comments on any related matter, not covered above.

BIF Response:

BIF is very encouraged with the initiative taken by the Regulator to increase and accelerate Broadband penetration in the country. BIF had pioneered the cause of "Broadband for all " immediately upon formation of new government. A copy of the letter forwarded to the PMO outlining the **TEN PRINCIPLES** of spreading Broadband for all by 2020 is attached herewith.

The ten principles that were mooted by BIF and presented before PMO are:

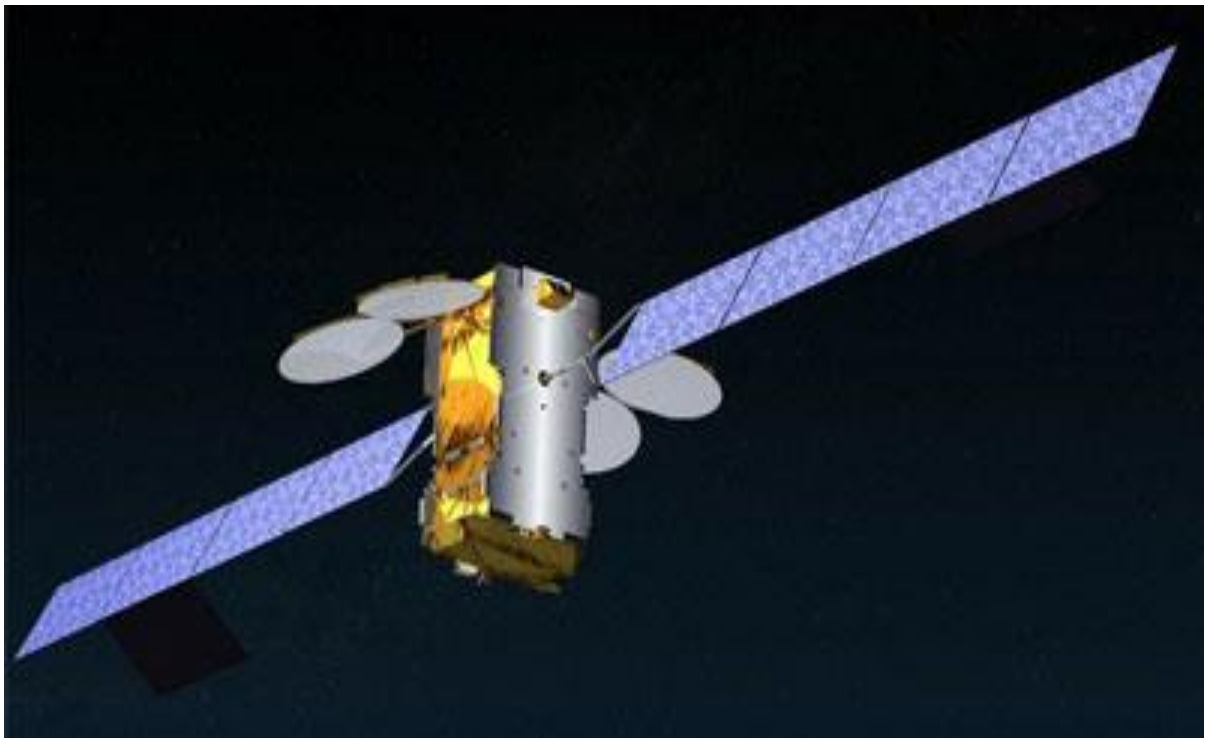
1. Key issues and their solutions for driving & accelerating the National Broadband infrastructure roll-out.
2. BBNL
3. De-licensing DECT spectrum from 1800-1900 Mhz
4. Revenue share mechanism between the operators and the Government depending on the type of service area
5. Spectrum streamlining for Defence
6. CATV Digitisation
7. MVNO License
8. Liberalisation of Satcom Policy
9. Mobile Apps & services including G2C Services for safety & security
10. Convergence of Networks & Services.

BIF is also seized of the issues that affect NOFN project. In particular the project is beset with issues as regards to its mandate-which ends at the GP level and does not include an upstream agreement for connectivity to the MPLS cloud.

BIF would also like to highlight the tenuous issues affecting the Satellite Communication sector. BIF has attached two documents in this regard:

-BIF recommendations for Satcom Policy (copy attached)

-BIF in conjunction with GVF (Global VSAT forum) and VSAI (VSAT Service providers association of India) has made some regulatory recommendations to the Govt. of India for Satcom (Copy is attached) for which we truly support.



White Paper on Satellite Policy in India

By

Broadband India Forum

October, 2014

Contents

Background

The scope of this paper is to provide recommendations to TRAI in order to insert inside its coming new Broadband policy paper. The paper focuses on the satellite communication industry, its structure, the current challenges and recommendations.

Satellite Communication Industry in India

The Indian satellite industry consists of the SSO (Satellite Service Operators), the VSAT service providers, the satellite equipment vendors, the DTH (Dish To Home) providers, the Regulator and the Licensor and Policy maker.

The SSO:

The main SSO in India ISRO. In fact since the current satellite communication policy in 1997, ISRO provides majority of the satellite communication transponders in India. Once an ISP (Internet Service Provider) or DTH provider wants a capacity from a satellite, it approaches ISRO and its commercial arm, ANTRIX in order to provide capacity. But to C band broadcasting services, the ISP and DTH providers are compelled to channel their request to ISRO and ANTRIX and only they can approach a foreign SSO to provide extra capacity that ISRO cannot provide with its constellation. This approach leads to huge shortage of satellite capacity and to slow down of introduction of new services to India and especially to rural India. Only in C band broadcasting, the DTH provider can approach the foreign SSO directly with minimal coordination with ISRO. As part of the foreign SSO operating via ANTRIX RFPs are : Thaicom, Asiasat, Measat, Intelsat, Inmarsat etc.

The VSAT service providers market:

As for the Euroconsultant's 2014 report, the VSAT market reached in 2012 an equipment sales of 40M USD sales. The main players are BSNL, HCIL , Airtel, Infinium, HFCL, Reliance Communication and Tata Nelco. The VSAT providers are usually bundling their projects with satellite capacity deals which increase significantly the sales revenues. The Broadband market is divided into four parts: capacity for rural mobile backhauling, capacity for enterprise applications in non-fiber and microwave places (such as for remote ATMs), capacity for rural e government application such as e education, e health etc and finally for consumer connectivity. The main SSPs are BSNL, Airtel, Hughes and Reliance Communication. The main mobile operators are using satellite based broadband connections to backhaul their base stations in sub urban and rural places where neither fiber nor microwave technology is deployed. The whole capacity for e government rural application are supplied by ISRO INSAT systems. Due to the high cost C band and Ku band, the consumer market is quite limited. Enterprises like banks for ATM are one of the major consumers in rural places. The C band amd Ku band prices are priced in range of 2,800 – 3,500 USD per Mhz per month. The Ka band, which is yet to be regulated in India for instance, is priced in less than 1,000 USD per Mhz per month and there are cases where price might even drop below 500 USD per Mbps per month!

The equipment vendors market:

The main VSAT equipment vendors are Viasat, Hughes, Gilat and Commtech.

The DTH:

The main DTH providers are Dish TV, Tata Sky, DD, Sun direct, Bharti Telemedia, Reliance. The DTH providers provide linear services and non –linear services such as VOD. The non linear services are provided by external landline or external broadband connections. Since C band capacity is almost exhausted, lots of more Ku band transponders are required where ISRO cannot meet with its current constellation as well as with its future programs. Therefore ISRO and ANTRIX float from time to time a RFP to lease capacity from foreign satellite. The DTH industry globally accounts to more than 80% of the satellite communication market and transponders capacity. Therefore the main focus also in India was on the DTH industry requirement.

The Regulator and Policy making roles:

India satellite policy is divided among few ministries:

1. The DOS (Department of Space) – Satcom guidelines
2. The DOT (Department of Telecommunication) – Satellite service provider policy
3. The MIB (Ministry of Information and Broadcasting) – broadcasting policy and landing stations uplinking policy.
4. The MHA (Ministry of Home Affairs) – security guidelines

Other entities involved:

5. TRAI (Telecom Regulator Authority of India) – Regulates and provides consultation paper on satellites policy
6. WPC (Wireless Planning Committee) – coordination on frequency allocation
7. ISRO (India Space Research Agency) – Developing, launching and operating the INSAT satellites constellation. Additionally, ISRO coordinates the orbital slots with foreign satellites.
8. ANTRIX Corporation PV LTD – the commercial arm of ISRO which floats the RFP for leasing capacity from foreign satellites as for India policy from 1997.

The fact that the Indian satellite communication policy is spread across so many stake holders causes slow decision making, unnecessary bureaucracy challenges as well as inherent collision of conflicts between the industry requirement and the policy and regulator makers where the same person functions as Chairman Space Commission & ex-officio Secretary to Department of Space and Chairman & MD of Antrix and also as Chairman, ISRO.

Regulation/Policy-last policy made in 1997.

National treatment

India is a restrictive market for foreign satellite operators. While regulations indicate that end users in India can uplink signals from India (using either C- or Ku-band) via Indian as well as foreign satellites, "*proposals envisaging use of Indiansatellites will be accorded preferential treatment*."
The Indian Space Research Organization ("ISRO"), the primary space agency of the Indian government, and Antrix Corporation Limited ("Antrix"), the commercial wing of ISRO, play the role of "middleman" in the provision of satellite services in India. ISRO was established in 1969 to supersede the Indian National Committee for Space Research ("INCOSPAR"), and is under the administrative control of the Department of Space ("DOS"). ISRO operates the Indian National Satellite System ("INSAT"), as well as the Polar Satellite Launch Vehicle ("PSLV") and the Geosynchronous Satellite Launch Vehicle ("GSLV"), which are used for putting satellites into polar orbits and geostationary orbits, respectively. Antrix, a wholly owned Government of India Company under the administrative control of DOS, was incorporated in 1992 as a private limited company. Antrix serves as the marketing arm of ISRO for the promotion and commercial exploitation of space products, technical consultancy services and transfer of technologies developed by ISRO. In addition, Antrix offers transponder lease services. For C-band VSAT services on a foreign satellite, regulations in India effectively require that VSAT operators route their connectivity through ISRO. Media applications in Cband using a foreign satellite are authorized, but unlike Indian operators, foreign satellite operators must first seek clearance for these offerings, and the end user must obtain a Wireless Operation License from the Ministry of Communications & IT ("WPC license").

The general terms and conditions for uplinking a channel (distribution) and/or for using satellite capacity for contribution/satellite news gathering purposes require a WPC license, in addition to an uplink license (news and non-news). Effectively, the procedure prevents a foreign satellite operator from providing occasional use capacity (C- and/or Ku-band) to end users in India as a minimum of two weeks are required for the end user to obtain a temporary uplink license and another two to three weeks to obtain a WPC license. For Ku-band services, end users in India are only allowed to uplink through Indian satellites. No foreign satellite operator is allowed to provide any Ku-band capacity to an end user in India unless it does so via ISRO, an entity with which foreign satellite operators are in direct competition.

Restrictions on the use of foreign satellite capacity for direct-to-home ("DTH") services.

India's Ministry of Information and Broadcasting ("MIB") has established guidelines that establish a preference for Indian satellites to provide capacity for delivery of Direct-to- Home subscription television services ("DTH"). While these guidelines do allow the use of foreign satellites if the foreign satellite has completed the international frequency coordination process with the INSAT satellite system, in practice, authorized DTH licensees have not been permitted to contract directly with foreign operators even if the frequency coordination has been completed. Instead, any foreign satellite capacity must be procured through ISRO which, in turn, only permits such procurements if it does not have available capacity on its own system. If ISRO cannot meet the DTH requirement, the foreign satellite operator first must sell its capacity to ISRO, a direct competitor, which then resells it to the consumer, creating a middleman scenario with the following effects: (i) additional costs are created for the consumer through markups by ISRO; (ii) ISRO is able to structure contracts with the goal

(sometimes explicitly stated) of moving the service to one of ISRO's satellites once capacity is available; and (iii) ISRO determines the rate at which the market grows.

De facto monopoly due to a pyramid structure.

Indian regulations restrict the provision of satellite services by foreign satellite operators directly to end users in the country. A true "open skies" policy should be adopted for the provision of satellite services in India, without preferences for the Indian government's space agency or commercial arm. Local users in India should be allowed to contract directly with any satellite operator for any satellite capacity that has the ability to serve India, and not be constrained by regulatory policies that establish a "preference" for a domestic operator or service provider, or that constrain the use of the satellite capacity in the country. The fact that the same person functions as Chairman Space Commission & ex-officio Secretary to Department of Space and Chairman & MD of Antrix and also as Chairman, ISRO results in inherent conflicts between the industry needs to the ISRO – ANTRIX – DOS needs.

Lack of clarity regarding the role of the Department of Space.

The Indian Department of Telecommunication's New Telecom Policy of 1999 stated that users of transponder capacity would be able to access both domestic and foreign satellites, in consultation with the DOS. While it might be necessary for the DOS to ensure that foreign satellites are completing international coordination agreements with the INSAT system, requirements that foreign satellite capacity be procured through ISRO, a direct competitor of foreign satellite operators, have no technical or market basis. The "middleman" role of ISRO results in a competitive advantage for the domestic Indian satellite system.

Market access.

The *Guidelines for Uplinking from India* require media content providers that down-link programming from a satellite into the country to establish a registered office in India or designate a local agent. India cites greater oversight over programming content as its rationale for such a requirement, but it could instead control content through its licensed entities such as cable companies or DTH providers. The policy is overly burdensome and effectively requires companies to establish a taxable presence in India. India limits foreign direct and indirect investment in companies engaged in uplinking to satellites to a maximum of 49 percent, negatively impacting the ability of U.S.
companies to invest.

Security concerns.

TRAI has recommended as part of its consultation paper in 2008 to review the satellite policy and to reconsider open skies policy for foreign satellites. Nevertheless, the TRAI's initative by the DOT and DOS ministers whom brought up security reasons to continue adopting the 1997 policy. The BIF believes that India security measures should not be compromised, nevertheless there could be set of measures that a foreign satellite operator will have to take to qualify in order to provide service in India which shall enable VSAT and DTH providers to contact directly the foreign satellite operators as well. . In addition, security restrictions on mobile satellite services ("MSS") operators were added which restricted the introduction of such services in India.

New Technologies in Satcom

Introduction of Ka band

Ka-band is the next frequency band that the satellite industry is currently moving to as the availability of spectrum at C-band and Ku-band diminishes and nears saturation. Ka-band is expected to transform satellite communications, in much the same way that Ku-band completely changed the original C-band industry some two decades ago. Ka-band will trigger a similar step-change in the satellite communications industry, but the impact will be much bigger, presenting challenges for some existing operators, Ka-band is the logical successor to Ku-band and will evolve into the delivery mechanism of choice for emerging markets and high-demand regions throughout the world.

The formal spectrum allocation for Ka-band is from 18 - 40GHz.

When looking at a simplified comparison where, in each case, no beams overlap, only a single polarisation is used and there are no frequency coordination restraints, a C-band satellite with two hemi beams can support 2 x 500MHz = 1GHz of bandwidth. A Ku-band satellite at the same orbital position, but with two regional beams and four large spot beams could support 6 x 500MHz = 3GHz of bandwidth. Theoretically, a Ka-band satellite with two regional beams, two steerable beams and twenty multi-spot beams could well support up to 24 x 1GHz = 24GHz. That's 24 times the bandwidth of the C-band and 8 times the bandwidth of the Ku-band satellite.

One of the biggest impacts of Ka-band on ground terminals is antenna size. The equivalent of a 1.8m diameter antenna at Ku-band need be only 1m or less at Ka-band. The comparison with C-band antenna sizes is even more significant. Given the higher satellite EIRP and G/T levels of the Ka-band beams, reliable, high capacity Ka-band services are available from antennas with diameters of only
80-100cm compared to 2.4 – 3.0m antennas needed at C-band. This is excellent news for system suppliers, network operators and terminal installers. Logistics and cost savings when installing a terminal with an 80-100cm antenna compared with a 1.8m antenna (or larger) are obvious, driving down the overall cost of network deployments. The nature of the mobility market depends upon stabilised terminal antennas that instantaneously track the satellite as the vehicle moves. The use of small, 80- 100cm antennas, phased-array solution or cost effective metamaterial solution in such communications-on the-move (COTM) applications, be they on a ground vehicle, ship, aircraft or a
UAV (Unmanned Aerial Vehicle), significantly eases the challenges. As stated elsewhere, the integration of adaptive coding and modulation (ACM) using DVB-S2 and other advanced modem techniques, such as seamless hand off between spot beams, provides the customer with a choice of advanced, compatible terminals available from a range of manufacturers today.

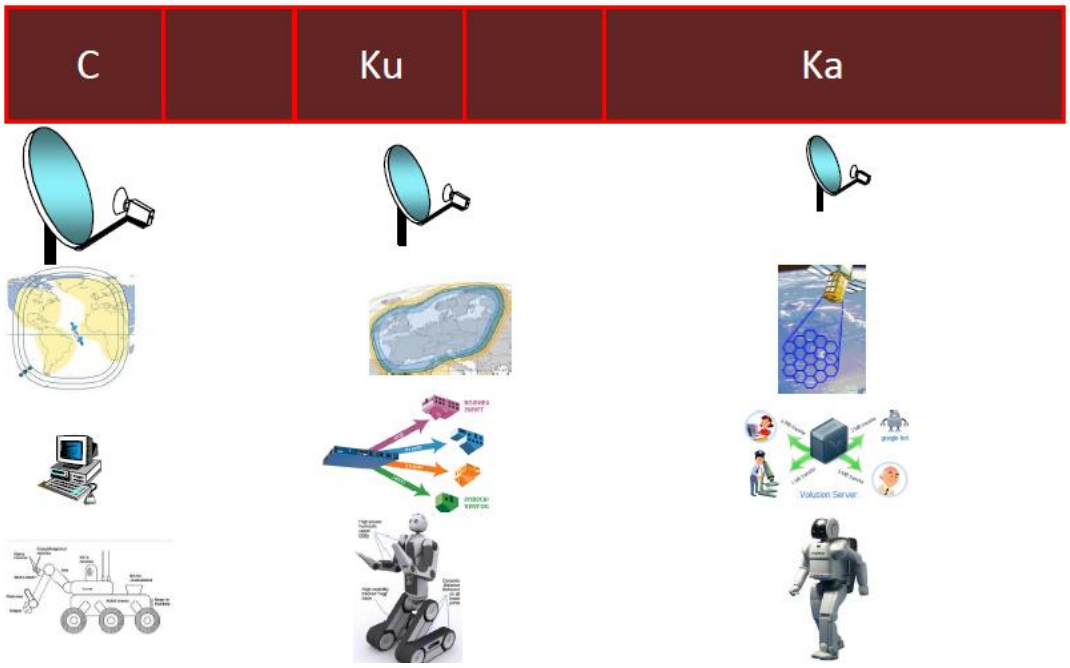


Figure 1 – comparison of C, Ku, Ka band characteristics

Ka band architecture is a mature architecture and already being implemented globally in many places. Even the rain fade fears due to the intensive raining during Monsoon time have been addressed properly. Propagation studies carried out in many regions of the world over 30 years have yielded a very comprehensive understanding of the effects of rain and other phenomena on Ku-band and Ka-band signals. As one goes up in frequency the effects of rain become more noticeable. Signal fading and de-polarisation caused by rain is not much of an issue at C-band, but it has to be taken into account at Ku band frequencies and the terminal design and link budgets accommodate this. For Ka-band links in general, fade countermeasures need to be considered; the nature and extent differing depending upon the climatic region and the type of service is being provided. This is not new and is a challenge also faced by terrestrial microwave links operating in the 20GHz and 30GHz bands. Even with their link margins, backhaul links for broadband internet make use of adaptive schemes, and end-user data rates diminish when the link is badly affected by heavy rain. Similarly for satellite links, current modems employing adaptive coding and modulation (ACM) seamlessly change their mode of operation to reduce user data rates as the carrier-to-noise ratio (C/N) falls during fades. The use of
larger antennas, uplink power control (ULPC) and even site diversity can also be considered, depending on the climatic region and the quality of service required. Airborne applications (above the weather) and deserts are ideal for Ka-band. Whilst tropical climates are challenging for both Ku- and Ka-band, there are proven solutions through advancements in ground technology which have enabled the deployment of high availability systems.

Indicative List of Planned and Launched Commercial Satellites with Ka-band

Indicative List of Launched Commercial Satellites With Ka-band	
Company	**Satellite System**
Arabsat	Arabsat-5B, Arabsat 5C
Avanti	HYLAS-1 / HYLAS-2
Eutelsat	Eutelsat-W3 series, Ka-Sat, Hotbird
Hispasat	Spainsat, Hispasat-1E
Hughes	Spaceway-3 / Jupiter-1
Intelsat	IAS-28 / Intelsat-20
Ipstar	Ipstar
Iridium	Iridium (LEO)
JAXA/NICT	Winds
Nilesat	Nilesat 201
SES	ASTRA 1H, ASTRA-1L, ASTRA-3B, ASTRA 4A, AMC-15, AMC-16, NSS-6
Spacecom	Amos 3
Telesat Canada	Nimiq 4
ViaSat	ViaSat-1, Wildblue -1, Anik-F2
Yahsat	Yahsat 1A (government) / Yahsat-1B
ABS	ABS-7, ABS-2
Arabsat	BADR 7
Avanti	HYLAS-3
Eutelsat	W3C, EUTELSAT-3B
Eutelsat / ictQATAR	ES'HAIL
Hispasat	Hispasat AG1, Amazonas-3
Inmarsat	Global Xpress F1/F2/F3
Inmarsat	Alphasat 1-XL
ISRO	G-Sat 14
Measat	Measat -5
NBN Co	NBN-1 / NBN-2
NewSat	Jabiru 1
O3B Networks Limited	O3b Networks (MEO)
RSCC	Express AM5 & AM6 & AM7
SES	Astra 2E, ASTRA 2F, ASTRA 2G, ASTRA 4B, ASTRA 5B
Russia RTCom	National Systems
Spacecom	Amos 4 & 6
Telenor	Thor-7
Turksat	Turksat 4A / Turksat 4B

Figure 2 – List of planned and launched Ka band satellites

Ka band is indicated in IND77 (NFAP-2011) however yet to be regulated.

Introduction of NGSO to India

NGSO (Non Geo Satellite Operator) enables introduction of LEO and MEO constellation into India commercial market. The main famous constellations of LEO satellites globally are Iridium and Globalstar. These constellations provide MSS services (Mobile Satellite Services). There are few more future LEO constellations such as players like Facebook and Google are planning accordingly these days. The Facebook and Google ones are meant more for FSS application. The most famous MEO constellation is the O3B one. O3B provides trunking connectivity as well as connectivity for mobile backhauling with very low latency and lower bandwidth cost comparing to GEO Ka band constellation.

The advantage of LEO and MEO satellites as compared to GEO satellites are as following:

1. The total cost of ownership is lower in comparison to GEO satellite which leads to lower bandwidth prices.
2. The time to market is much faster in comparison to GEO satellite
3. Since LEO are launched to 600 – 2,000 Km in comparison to MEO which are launched to 8,000 – 10,000 Km in comparison of GEO which are launched to 36,000 KM, the latency is 5 – 10ms, 150 ms and 500 ms respectively. When it comes to 3G and 4G networks it becomes very crucial parameter which dictates much better user experience.

The main disadvantage of MEO and LEO satellites are the smaller footprint payload as well as lower altitude which dictates lower throughput, lower life span and narrower beam which covers smaller areas.

Nevertheless the advantages which LEO and MEO constellation provides in bandwidth costs as well as in lower latency which is crucial for the user experience makes the NGSO an important constellation for mobile backhauling.

Currently NGSO is not regulated at all in India. NGSO regulation is very common globally. In fact it started when Teledisc a NGSO FSS operator in the late 90s approaches ITU-R as well as several other countries and promote its plan to deploy 288 LEO satellites. Despite the satellites were never launched, the regulation of the NGSO FSS services are regulated in many countries. Based on this regulation O3B launched their MEO constellation. As said the O3B constellation's main application is mobile backhauling.

The decision related to NGSO FSS which were taken in the ITU – R were WRC-97 Resolutions 130 and 538.

BIF recommends to regulate the usage of NGSO in India and to let the VSAT service providers as well as the cellular operator to decide with which constellation to use whether GSO or NGSO one.

Satellite backhauling for 3G and 4G networks

The main applications of the Indian VSAT industry are the banking industry (ATMs), Oil & Gas and government application for rural places. However like the global trend of expanding premium services like 3G networks and 4G networks in the future into sub urban and rural locations, connectivity to base stations in these locations will become very vital. There are three main bandwidth requirements of 3G and 4G base stations:

1. 3G base station in rural place – 10 Mbps downlink (D) and uplink (U) of 2 Mbps
2. 3G aggregation of several base stations in rural places – 20 – 30 Mbps in total D + U
3. 4G base station in rural place – 100 Mbps D + 20 Mbps U.

BIF predicts that in the coming 2 – 3 years the first case of 3G with 10 Mbps D and 2 Mbps U will be the more common situation. In places where nor fiber neither MW technology is cost effective to deploy the only solution will be based on satellite. With current C band and Ku band bandwidth costs the cellular operators will pay between 400,000 USD to 500,000 USD per base station annually which kills the business case for rural locations. However providing India will introduce the Ka band as well as NGSO constellation as well as open the market into competition so the price can drop gradually to below 50,000 USD per base station annually!

Additional important factor would be the latency. As 3G and 4G application becomes more and more sensitive to latency, GSO might be to slow with latency of 500 ms. The cellular operators globally define the user experience as one of the most important parameter for returning customers! Imagine yourself browsing in a web page which comes up every 10 seconds in compared to web page which comes up within 3 - 4 seconds. The latency contributes a lot to this experience.

The introduction of NGSO will enable mobile operators to provide their customer better user experience.

Another trend which becomes more common is the base stations caching. As part of the user experience improvement there are several global cellular vendors such as NSN, Huawei and Samsung which declared their base stations solution for 4G base stations. These solutions are caching data such as videos, maps and huge amount of web pages based on caching algorithm. The caching enables to reduce the backhauling capacity by up to 35% and the overall TCO by upto 15%. However the main advantage is the huge improvement in user experience where web page which was loaded in few seconds could be loaded almost immediately due to caching in base station. It enables all kind of services, especially 3D services which were capacity consuming before and were congesting the backhauling to be practically deployed once the information is cached at base station level. However even the caching solution for base stations requires thick and expensive backhauling architecture which will apply to rural India. BIF predicts that the future to deploy advanced networks like 4G networks in rural India will require extensive backhauling which might not be justified by low ARPU. However future solutions based on Data Multicasting based via satellite might provide the solution. BIF recommends the satellite Data multicasting backhauling. Researches shows that majority of bandwidth is occupied by Video (Youtube, Sports, Bollywood movies, E learning etc) , audio files (Bollywood songs). Provided these content will be off loaded from the main backhauling pipeline, 4G networks and 3G networks will be capable of being deployed with very lean backhauling links either based on un licensed bands or low cost MW/MM links. Since the caching engine can predicts quite well in rural places (upto 40% and more) the amount of Videos/Audio to be consumed, these data can multicast to the caching base station. In multicasting environment, the satellite becomes the most efficient solution as it can cover huge areas. For instance a beam of 400 Mbps can be sold in annual rate 4 - 2.5 M USD in Ka band. However in coverage area of diameter of 1,500 km to 700 km, providing there are 10,000 base stations the cost per link drops down to 400 – 250 USD per base station per annum!

Therefore BIF recommends the following:

1. Regulation of Data multicasting via satellites
2. USOF to review and enhance the role of providing subsidy to also include satellite operators who will provide backhaul for 3G/4G networks in rural India

Conclusions and recommendations:

a. Assign ONE empowered agency, independent of the regulatory, licensing and operating function to issue all approvals and licenses, w.r.t satellite communication policy. This will ensure that clearances/approvals are granted expeditiously and in a transparent manner which will usher in competition and thereby price reduction for the end consumer.
b. Review of the current roles of DOS, Space Commission, ISRO & Antrix , which creates and causes " conflict of interest "
c. “Open Sky Policy " to be enunciated , thereby easing the barriers for foreign satellite operators to operate out of India.
d. Defining security measures transparently which shall while preserving the security interests of India, will not act as a hindrance for foreign satellite companies
e. Increase the license period/term for foreign satellite licensees from 3 years (currently) to 10 years. This will enable domestic VSAT and DTH service providers to align themselves from one satellite to another and also have the option to migrate from GSO to NGSO
f.
g. Definition of eligibility criteria and low annual fee charges for foreign SSO in order to motivate competition and significant drop in bandwidth charges in order to encourage Broadband penetration into rural India.
h. Satellite spectrum should be leased for a fixed term to the service providers and should not be auctioned. This is because most of the bandwidth would be used to provide broadband penetration in rural India for delivering e-governance, health, education to the masses.

i. Regulation of Ka band. This will enable the cellular and satellite industry to achieve major cost reduction in broadband penetration in rural areas and enable operators to drastically reduce their Opex.
j. Regulation of use of NGSO. This will enable the satellite and cellular operator to have a choice between GSO and NGSO.
k. Regulation of Data multicasting via satellites
l. USOF to review and enhance their role in providing subsidy to also include satellite operators who will provide backhaul for 3G/4G networks in rural India.
m. To address the present satellite capacity scarcity for various satellite application like TV distribution, contribution, DTH, HITS, VSAT, cellular backhaul, SNG, broadband via satellite application in C, KU, KA band and to set competition, DOS should speed up to consider & award of ISS license to those applied or consider those shown interested for the growth of the satellite industry & economy of India
n. Defining time frame, wishfully of up to six months, to award the applicant company who fulfills the license conditions.
o. The ISS Licensee should be provided with the orbital slot for launching a satellite as early as possible. That will help the licensee to make new capacity available for use over India and support various applications.
p. The ISS Licensee shall be allowed to make a filing through Indian administration (WPC), to ITU for a fresh orbital spectrum for future satellites.
q. The ISS Licensee should be encouraged and allowed to bring-in any existing orbital slot/spectrum held by any other administration, for use over India on a mutually cooperation

basis in the larger interest of getting more spectrum over India. India should be more business friendly, get benefits to Indian consumers, than being silent and adopting 'go-slow' attitude.

r. The ISS license should not pose any restrictions on the types of payload to be deployed (such as C band, Ku band, S band, Ka band) and also there shall not be any restrictions on the spectrum usage namely, FSS, BSS, etc.

s. Since the satellites will be operated as per ITU regulations on non-interference basis adhering to international coordination requirements, ISS license should not put any restrictions on the frequency to be deployed.

Regulatory Reform Recommendations to Promote Broadband Satellite Services in India

June 2014

This paper addresses issues and recommendations on how best to facilitate expanded access to affordable satellite-based broadband video, voice, and data services throughout India, including to consumers residing outside high-density population centres.

The starting point of this paper is the stated policy of the Government of India of creating an environment conducive to the delivery of cost-effective broadband communications throughout the nation. To this end, the Telecom Regulatory Authority of India ("TRAI") on April 29, 2004 introduced "*Broadband India: Recommendations on Accelerating Growth of Internet and Broadband Penetration*" ("TRAI Recommendations"), which describes a comprehensive set of steps that must be taken to create an environment in which satellite-based Internet and broadband services can be delivered more effectively. Despite some progress since the TRAI Recommendations were issued in 2004, they have yet to be fully implemented by the Government of India – even as unmet demand for satellite-based broadband services continues to escalate amongst millions of consumers.[1]

Enhanced Competition and Access to Services

According to the above-noted TRAI Recommendations, strong gains were realised in India's mobile sector by introducing enhanced competition: an eight-fold increase in new subscribers was realised between April 2002-2004. By contrast, in the same period, while India recorded 0.4 Internet connections and 0.02 broadband connections per 100 persons, countries like Korea, China and Malaysia were doubling and tripling the size of their Internet and broadband subscriber base. This was directly due to the introduction of regulatory and licensing reforms expressly designed to foster and expedite such growth.

The TRAI Recommendations cite regulatory restrictions that prevent or inhibit the use of satellite-based broadcasting and telecommunications services as a key factor in hindering the delivery of Internet and broadband solutions in India. Further, TRAI notes that the Recommendations, if implemented, would enable India to reach broadband penetration levels that are "50 times where we are today within a couple of years".[2] In addition, satellite broadcasting services would be able to more effectively provide millions of consumers throughout the entire Indian Sub-continent with receive-only broadband solutions.

---

[1] In fact, many the TRAI Recommendations pertaining to broadband over satellites were not accepted by the government. See, Telecom Regulatory Authority of India, "*Recommendations On Growth of Broadband*", January 2, 2008, at 91-92.

[2] TRAI Recommendations, at 6.

The Case for an 'Open Sky' policy

A central area of concern in developing competition in the provision of broadband services by satellite networks in India is the existence of restrictions on competitively provided satellite bandwidth. At present, for example, India's regulations require VSAT operators to route their connectivity through ISRO. VSAT operators have submitted to TRAI that the current tariffs being offered by international operators, without accounting for special commercial arrangements for payment schemes, etc., would net a VSAT operator more than 35 percent (35%) total costs savings per Kbps, which could be passed on to end-customers.

Several representations have been made by the VSAT operators within India on the need for an "Open Sky Policy". The New Telecom Policy of 1999 envisaged that VSAT operators would be permitted to secure capacity on domestic/foreign satellites in consultation with Department of Space ("DoS"), which has played a key role in coordinating foreign satellites for Indian usage. The consultative role of the DoS slowly turned into a canalizing role whereby DoS/Antrix effectively became permanent "middle-men" to every contractual arrangement. This process has led to an artificial shortage of capacity as key satellite operators have either delayed or cancelled plans to launch satellites with beams serving India due to the substantial time and administrative burden required to sell the capacity. For the VSAT operators, this process has created significant contractual difficulties as the capacity shortage makes it hard for them to fulfill fixed term contracts with Governmental and corporate customers. Further, due to the lack of market access reform, satellite operators are reducing the amount of capacity that can be made available in India, to the detriment of VSAT operators.

Similarly, the current license terms for DTH operators state in Article 11.1 that "proposals envisaging use of Indian satellites will be extended preferential treatment", and in Article 11.2 that "[t]he Licensee shall ensure that its operation will conform to the provisions of inter-system co-ordination agreement between INSAT and the satellite being used by the Licensee."[3] ISRO has done a remarkable job in building and operating a high quality domestic satellite system, an achievement that is rightly a source of pride to all Indians. It should be noted, however, that in no single market can a single satellite operator satisfy the total demand. An example was provided of the introduction of an Open Sky policy in Australia in 1997, following which the size of the satellite market more than doubled. The incumbent (formerly monopoly) satellite operator not maintained its entire then-existing customer base, but it also participated actively in the servicing of this new growth.

A persistent argument against an Open Sky policy relates to concerns about the security of using foreign-licensed satellites to provide domestic service. Such security concerns, however, are unsubstantiated. As noted in the TRAI Recommendations, in VSAT or DTH deployments utilizing a foreign satellite, the hub-station may still be in Indian territory, with the signal being routed in India and only going abroad through an international gateway. In other satellite architectures, the customer terminal equipment is fully capable of providing the monitoring and

[3] Ministry of Information and Broadcasting, "Guidelines for Obtaining License for Providing Direct-To-Home (DTH) Broadcasting Service in India" (2000).

interception facilities that the government might require of its licensees, alleviating the need for the satellite's hub to be in-country. Such terminal equipment and software addresses the security concerns that may arise and alleviates the need to monitor each remote-station or the hub-station, since all international gateways already have regulations governing their monitoring. In this regard, the TRAI's Recommendations urge that "[a]n Open Sky policy should be adopted for VSAT and DTH operators, similar to what is available to ISP's and broadcasters. VSAT and DTH service providers should be allowed to work directly with any international satellite."[4]

It is notable that, although the Government of India is supporting a satellite-based educational initiative in Africa – where Open Sky policies are the norm – an Open Sky policy has yet to be implemented in India, where more than 6 million villages remain to be provided with education, health and other vital communications services. The conclusion that an Open Sky policy should be implemented in India is further supported by two reports:

1) ITU-D, Study Group 1, "Report on satellite regulation in developing countries" (2004)[5]. This ITU report surveys successful satellite regulatory practices on a global basis, one of which is the application of Open Sky policies. According to the report, this approach has been proven to be very effective in expanding access to communications services.

2) "India Satellite Services and Regulatory Overview".[6] This report was authored by Loft Communications, an independent consulting company, on behalf of the Global VSAT Forum ("GVF") and the Cable & Satellite Broadcasting Association of Asia ("CASBAA"). The report demonstrates that there is at present and in the future more demand for satellite capacity to support Indian broadband services than there is supply. The report concludes that the most effective solution to address this imbalance is to immediately implement an Open Sky policy.

Satellite Regulation: Less is More

The Government of India is to be applauded for having previously implemented improvements that partially addressed regulatory "bottlenecks". These changes, while they were viewed to have been too limited to be fully effective, had nonetheless proven the positive impact that streamlined regulations have on increasing access to satellite services in India. Among these new regulations was not only a partial Open Sky policy for ISP's holding International Gateway Licenses, but also improvements to India's satellite regulations pertaining to licensing, fees calculations, permitted data rates, connectivity, and more. In these respects, the TRAI Recommendations accurately portray the importance of building upon India's previous policy success by implementing more comprehensive satellite regulatory improvements.

---

[4] TRAI Recommendations, at 33.

[5] *See* http://www.itu.int/dms_pub/itu-d/opb/stg/D-STG-SG01.17-2006-PDF-E.pdf.

[6] India Satellite Services and Regulatory Overview, Loft Communications. 2006, prepared by the Cable and Satellite Broadcasting Association of India & GVF, 14 Feb. 2006

In the broadcast and DTH sectors, the requirement to use Insat capacity as a preference can only serve to stifle growth, since the supply of Ku-band capacity is significantly less than the total demand. The TRAI Recommendations also noted that the present arrangements, whereby ISRO can source non-domestic capacity to satisfy shortfalls in supply, are not desirable for the following reasons:

- Such arrangements are short term (usually 2 years)
- There is a requirement to transfer to an Insat satellite when capacity becomes available. This creates a significant cost in re-pointing existing antennas. Statistically an average of 10 percent (10%) of all customers are lost in churn in any repointing exercise.
- A lack of a direct relationship with the non-domestic supplier leads to problems with technical support; and
- There are no guarantees that non-domestic satellite operators will continue to make available footprints designed specifically for India (indeed, there are strong signs that such operators are now abandoning such plans in new designs).

According to recent estimates, the Indian Pay TV market has the potential to reach a value of US$10.5 Billion by 2015, but this growth potential is inextricably linked to a sufficient supply of satellite capacity, without which this potential cannot be reached. Thus, a key recurring theme of the TRAI Recommendations was that "less is more", or that the application of "light-touch" regulatory approaches would enable the private sector to more fully address the public sector's policy goals of increasing access to broadband services, regardless of proximity to cities. Key among these approaches are the following TRAI Recommendations:

- Implementation of Open Sky Policy for VSAT and DTH Operators;
- Permitting of VSAT and DTH Licensees to Provide ISP Services;
- Streamlining of VSAT and DTH Installation Clearances; and
- Exempting DTH Operators from Spectrum Royalty Fees for Uplinking from within India.

The Indian Government may also consider permitting private companies to set up and operate satellite systems, per the procedures that were approved by the government in 2000.

Authorizing Additional Satellite Services

In order to further stimulate the growth and diversity of commercial satellite services in India, the Indian Government should adopt a regulatory and licensing framework that permits the provision of satellite services to the maritime sector and the mobile transport sector (such as trucks, busses, trains, and aircraft) using both mobile and fixed satellite service networks. Current regulations in India greatly restrict the provision of such satellite communications services to these rapidly growing market segments, particularly the use of small earth stations for mobile platforms (be they on land or sea), even though the technology to provide such services is both mature and widely in use in other countries.

Conclusion

Implementation of an Open Sky policy as well as the other streamlined regulatory approaches identified in the TRAI Recommendations is of paramount importance in enabling the realization of India's ambitious goals of providing communications to millions of unserved villagers. All agencies of the Indian Government involved in deciding whether to implement the TRAI Recommendations are invited to relate any outstanding questions to us so that the Government's deliberations can be brought to an expeditious and successful conclusion without any further delay.

Contact Information

VSAI
Wg. Cdr. (Ret'd.) B.G. Bhalla
Secretary General
VSAI
103 Ashoka Estate
24 Barakhamba Road
New Delhi 110 001
India

Tel: +91 (011) 335 0633
Fax: +91 (011) 372 3909
E: bbhalla@luthra.com
Web: www.vsatindia.org

GVF
David Hartshorn
Secretary General
GVF
51 Louisiana Avenue, NW
Washington, D.C. 20001
United States

Tel: +1 202 390 1885
E: david.hartshorn@gvf.org
Web: www.gvf.org