Telecom Regulatory Authority of India

Consultation Paper
on
Implementation Model
for
BharatNet

New Delhi

17.11.2015

Stakeholders are requested to furnish their comments to the Advisor (Networks, Spectrum & Licensing), TRAI by 07.12.2015. Stakeholders are advised not to request for extension of dates for submission of comments. Comments would be posted on TRAI's website www.trai.gov.in. The comments in electronic form may be sent by e-mail to kapilhanda@trai.gov.in. For any clarification/ information, Shri Arvind Kumar, Advisor (NSL) may be contacted at Tel. No. +91-11-23220209 Fax: +91-11-23230056.

CONTENTS

CHAPTER-I
Introduction and Background

A. Introduction

1. Providing universal and affordable access to broadband to every citizen of India is one of the most critical and important action item for Digital India. With broadband becoming the basic platform for provision of a number of services like e-gov, e-health, e-commerce, e-banking, music and entertainment, universal access to the Internet is a must to empower our citizens. It will not only enable them to connect with their friends, family and communities but also use the online tools and information to help find jobs, start businesses, access healthcare, education and financial services. They will be able to effectively participate in the digital economy.

2. Building the knowledge economy is the key to solving many of our social and economic challenges as it will help in creating new growth opportunities for the masses in general. A recent study by Deloitte found that the Internet is already an important driver of economic growth in many developing countries. Expanding internet access globally could create another 140 million new jobs, lift 160 million people out of poverty and reduce child mortality. Universal access isn't an end in itself, but it's a powerful tool for change and empowerment.

3. Historically, the Universal Access and Service (UAS) concept was developed to specifically meet the needs of people in urban and remote areas for communication services recognized and required to be universal at the national level. Establishment or adoption of existing UAS programmes for broadband delivery is one way to support the universality of broadband services. One of the principal objectives of broadband UAS is to minimize the digital divide between urban and rural and between affluent and poor areas; which also happens to be the most important prerequisite to realize the Digital India vision.

4. ITU defines universal access as the situation where "everyone can access the service somewhere at a public place, also called public, community or shared access". In India the concept of providing universal access was modified to democratize information and make it freely and easily available to the people at large in order to improve transparency, accountability, collaboration, cooperation, productivity and efficiency. Considering that at the core of governance structure in rural India are the 2,50,000 Gram Panchayats(GPs) which are the foundational nodes of information collection and dissemination and the service delivery points for Government administration, the National Optical Fibre Network (NOFN) project was approved on October 25, 2011.The main objective of the NOFN project was to extend the existing Optical Fibre Network to Panchayats by utilizing Universal Service Obligation Funds (USOF) and creating an institutional mechanism for management and operation of NOFN. Bharat Broadband Network Limited (BBNL) a Special Purpose Vehicle (SPV), was set up by the Government of India in 2011, for the establishment, management and operation of NOFN.

B. NOFN – As Envisaged Earlier

5. The salient features of the envisaged NOFN were as follows:
    (a) **2.4 km cable per GP.** Under NOFN it was planned to lay Optical Fibre Cable (OFC) connecting all the 2, 50,000 GPs of the country. The project was to use the existing OFC of BSNL, which is ready upto 6,500 odd Blocks. Only the incremental fibre averaging around 2.4 km per GP was planned to be laid.

    (b) **Users.** Using the fibre, bandwidth of 100 Mbps was planned to be provided to each GP for the use of local administration, panchayat, schools, colleges, hospitals, Primary Health Centres (PHCs), residents of the area and private parties etc.

    (c) **Implementation.** The project was to be implemented by BBNL which was to procure the equipment such as Gigabit Passive Optical Network (GPON) and the OFC. The laying of the cable was

2

planned to be done by three CPSUs – BSNL, RailTel and PGCIL who were assigned the work in the ratio of 70:15:15 respectively. BBNL was to act as a wholesale bandwidth provider and was granted NLDO license. Non-discriminatory access to the NOFN was to be provided to all Service Providers. The connectivity at the GP was proposed to be augmented in Government User Network (GUN) where backhaul from the block to the district, as well as last mile access to three Government institutions were proposed to be provided at Government cost.

C. Review of NOFN

6. The network was supposed to be commissioned in 2 years at a cost tentatively estimated at Rs. 20,000 crores. As per BBNL website, as on 02nd November 2015 only 3384 GPs have been connected. In the meanwhile, the Government of India has launched the Digital India programme with the vision of transforming India into a digitally empowered society and knowledge economy. Establishment of broadband highways forms the first pillar of Digital India which will depend on timely commissioning of NOFN.

7. In this backdrop, the Telecom Regulatory Authority of India (TRAI) came out with a Consultation Paper (CP) on 24th September 2014 on 'Delivering Broadband Quickly: What do we need to do?' In the CP, the following implementation and policy issues were raised:

- Are PSUs ideal choices for implementing the NOFN project?
- Should awarding of Engineering Procurement and Construction(EPC) turnkey contracts to private sector parties through International Competitive Bidding (ICB) be considered for the NOFN project?
- Should we not explore ways in which infrastructure development costs can be reduced? Is it possible to piggyback on the existing private sector access networks so as to minimize costs in reaching remote rural locations?

- What can the private sector do to reduce delivery costs?

8. The Authority in its Recommendations on 'Delivering Broadband Quickly: What do we need to do?' dated 17th April, 2015 covered various aspects on delivery of broadband. The specific action points with respect to NOFN project are as follows:

- *Institutional change: The multi-layered structure for decision-making is just not suitable for a project that needs to be executed in mission mode. The structure needs immediate overhaul. Quarterly timelines should be prescribed for each milestone to ensure timely corrective measures. It is also imperative to set up a monitoring mechanism for each stage of the project so that the outcomes are quantitatively measured after completion of each milestone. Stakeholders should be co-opted both for execution and most definitely for monitoring. In any event, full and transparent public disclosure of monitoring outcomes must be mandated.*

- *The bandwidth equipment for network planning needs to be re-assessed considering GP population and other relevant factors.*

- *BBNL needs to be professionally managed. The Delhi Metro Rail Corporation (DMRC) model is worthy of emulation.*

- *Project implementation on Centre State Public-Private Partnership (CSPPP) mode by involving State Governments and the private sector.*

- *To ensure redundancy and reliability, network planning would consider ring architecture for Districts in the first stage followed by Block rings and GP rings at subsequent stages.*

- *The sizing of Optical Fibre i.e. 24/48/96 core needs to be finalized based on requirement and carrying out a cost-benefit analysis.*

- *Award of EPC (turnkey) contracts by BBNL to private parties through international competitive bidding needs to be planned. Such contracts can be given region-wise with clear requirements for interconnection*

with other networks, as well as infrastructure sharing with other operators who would like to utilize this network. A commercial model around this will need to be suitably deployed.

- *NOFN involves laying of incremental OFC only (as indicated in green below). However, at various places, the problem of existing OFC (as indicated in red below) being in an unusable condition is being encountered which renders the OFC being laid of no use. Therefore, there is a need to cater for connecting the NOFN OFC directly to the PoP at District level in such cases.*

9. DoT vide its notification dated January 14, 2015 constituted a Committee to review the strategy and approach towards speedy implementation of NOFN. The 'Report of the Committee on National Optical Fibre Network (NOFN)' is available on the DoT's website.

D. Structure of the Consultation Paper

10. The objective of this Consultation Paper (CP) is to discuss strategies to find best model for implementation of BharatNet. The CP is divided into 4 Chapters. This Chapter gives the introduction and background on NOFN. Chapter 2 lists the summary of various implementation models suggested in the 'Report of the Committee on National Optical Fibre Network (NOFN)'. Chapter 3 discusses an alternative implementation strategy (BOOT Model) for implementation. Chapter 4 lists out the issues for consultation.

CHAPTER - II

BharatNet-CPSU, State and Private-Led Implementation Models
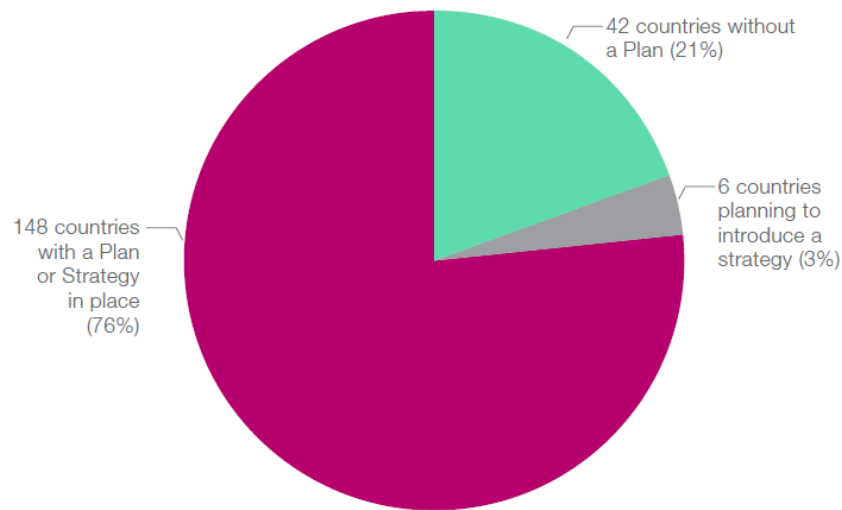
A.   The Broadband Plan

1.   National Telecom Policy (NTP) - 2012 has one of the goals as ***Broadband on Demand.*** It envisages leveraging telecom infrastructure to enable all citizens and businesses, both in rural and urban areas, to participate in the Internet and web economy thereby ensuring equitable and inclusive development. It provides the enabling framework for enhancing India's competitiveness in all spheres of the economy.

2.   The larger vision of NOFN was to improve the broadband ecosystem and promote rural broadband penetration to foster overall socio-economic development. The NOFN project and its reviewed implementation in terms of BharatNet generically can be termed as the National Broadband Plan (NBP) to expand the footprint of broadband networks nationally.

3.   According to a research conducted by Broadband Commission[1], the introduction or adoption of a broadband plan is associated with a 2.5 per cent higher fixed broadband penetration and 7.4 per cent higher mobile broadband penetration per year on an average. As per the State of Broadband 2015 Report[2], the number of countries with National Broadband Plans stands at 148 (refer figure below).

---

[1] ITU and UNESCO set up the Broadband Commission for Digital Development to meet the Millennium Development Goals (MDGs)

[2] . State of the Broadband Report – 2015 by Broadband Commission, ITU

Figure 1: Policy Leadership in National Broadband Plans

42 countries without a Plan (21%)

6 countries planning to introduce a strategy (3%)

148 countries with a Plan or Strategy in place (76%)

4.   In formulating its broadband plan, each country has to take into account overall national priorities, the socio-economic climate and geography, as well as levels of broadband awareness among key stakeholders (such as Government agencies, business and community leaders and the public).

5.   According to an International Telecommunication Union (ITU) Report[3], with the ever-escalating global demand for rapid and easy access to data, information and applications and the growing evidence of the economic and social benefits generated by broadband access and services, Universal Service Obligation Fund (USOF) is seen today as means to ensure that the majority of the population has access to affordable high-speed broadband-based services. In order to achieve this, it is important to put in place sound and clear framework of policies and strategies governing the implementation and operation of USOF and the digital agenda of the Government as a whole

6.   According to a research by ITU[4], a good broadband plan should:

---

[3] ITU (2013), USF and Digital Inclusion for all

[4] ITU/CISCO (2013), "Planning for Progress: Why National Broadband Plans Matter"

- Make the case for Broadband (BB) specific to the needs and economic structure of the country, based on thorough contextual market analysis and benchmarking;

- Escape 'Silo Thinking' and apply across a range of different sectors.

- Be engaged in consultation with a broad range of stakeholders. To ensure effective implementation, there should be a coordinating agency responsible for implementing the plan overall, in conjunction with other involved bodies.

- Consider the vital issue of enforceability/execution: Who is responsible for executing the plan? Who will monitor progress? How will implementation be funded?

- Keep in view both demand and supply side considerations. This may mean supporting the development of human skills, literacy and demand among, for example, schools and small and medium enterprises (SMEs), as well as taking into account the role of Government in driving demands.

- Have targets scheduled for a time period of about 3-5 years; targets with longer time horizons are elusive in a fast-changing industry.

- Be broadly technology neutral. Plans should have no major implications in terms of favouring specific technologies.

- Contain detailed measurable goals and strategies to allow evaluation of progress. Plans may also often contain consideration of 'special interest groups' such as schools, hospitals, universities, diverse languages and access by people with specific needs.

- Address related legislation – e.g. privacy and data protection, security and digital signatures, right of way, interoperability.

- Strike a balance between high-level strategic direction and detail. Plans should allow implementing agencies some flexibility in how they should go about implementation.

B.   General Approaches to Promoting Broadband

7.   National Broadband Plan is an important mechanism for Governments to set the vision and strategy of how technology can move their country

forward. Among ICTs, broadband adoption has demonstrated the greatest impact on GDP growth and the use of broadband at the individual level has changed our lives in a myriad ways. By prioritizing broadband and setting targets such as adoption, speed and quality, and identifying the critical policy measures to be implemented, Governments signal not only their intention to create a dynamic environment where broadband can grow, but also their commitment to serve their constituents. The general elements that Governments should be aware of as policies and strategies are mentioned below:

B.1 Establish Specific Plans and Policies

8. Based on an evaluation of the supply and demand challenges that exist in a country, the first step is to develop specific policies and strategies to address those challenges. This entails setting concrete, measurable objectives for improving the supply of broadband through infrastructure build-out as well as promoting demand for various services and applications. Setting specific plans or policies provide a clear sense of direction that will encourage investment as well as provide a blueprint for long-term action.

9. A good plan should aim to promote efficiency and equity, and help to support the social and economic goals of the country. It starts with a clear vision of what broadband development should be and contain well-articulated goals that can be used to develop specific strategies to achieve success. Such framework include definition of broadband, service goals (including national and rural coverage), transmission capacity required at various nodes, service quality, and demand-side issues such as need for imparting education and skills development. The government of the Republic of Korea, for example, was one of the early broadband leaders. It has developed six plans since the mid-1980s that have helped to shape broadband policy in the country. The Korea example shows that policy approaches can effectively move beyond network rollout and include research, manufacturing promotion, user awareness, and digital literacy. It also highlights the

possibilities for sector growth based on long-term interventions focused predominantly on opportunity generation rather than on direct public investment.

B.2 Input from Stakeholders on Plans and Policies

10. The development of broadband plans should involve the participation of all relevant stakeholders, both public and private. As such, Governments should provide for a public consultation process that allows ample opportunities to all stakeholders like private sector, and citizen to give their inputs. Given the complexity, varied issues, and importance of broadband, these transparent discussions are an important part of bringing stakeholders to the table in an open, objective, and neutral manner so as to maximize cooperation between the public and private sectors. Such an approach will make it much easier for all parties, but particularly ordinary citizens, to learn about and comment on the issues being considered. A variety of mechanisms can be used to foster stakeholders input—presentation of filings by stakeholders, workshops, hearings, and inputs rendered through an online comment mechanism on a regulatory website or blog.

B.3 In-Built Incentive Approach

11. Building infrastructure at the national scale requires the implementation to be monitored closely to ensure that the quality of the work is not compromised. Monitoring therefore should be an integral part of broadband plans and strategies – providing an information base for the initial development of plans and strategies as well as for checking the progress of particular policies and programmes, and take reassessment of priorities and strategies. Performance monitoring helps to ensure that targets, costs, benefits and outcomes of projects are measured and programmes are well managed and mid-course corrections are administered if and when needed.

12. As per a Deloitte report on National Broadband Plans [5] inbuilt incentives serve the purpose to limit monitoring otherwise this would reflect a '**thick**' governance model. A '**thick**' model risks slowing down decision making and can lead to programme delay, cost over-run and reputational damage to all parties. As per the report, Governments are starting to adopt a '**thin'** oversight model with contractual responsibility for managing delivery being passed to 'Delivery Integration Partners (DIPs)'. This model requires the DIPs to take on a significant degree of risk on behalf of the State with often limited leverage over the wider group of delivery partners. This approach is therefore often likely to require adoption of an incentive- based approach for the DIP in the commercial model, which itself requires appropriate political support. In the UK, this approach is increasingly being adopted in several national communications and infrastructure projects, with incentives being established for DIPs to achieve key milestones including infrastructure coverage and timely network delivery.

B.4 Recognize that Implementation of the Plan will take Time and Persistence

13. In many cases, the success of programmes that have increased broadband adoption has simply been the result of longevity. Some countries prioritized broadband in the 1990s or early 2000s and have been promoting broadband for quite a number of years. Sustained, focused efforts with continual updates over a number of years contribute to the long-term success of any broadband strategy. Conversely, seeking a "one-shot" solution that can be achieved with minimal time and resources is not likely to produce the best long-term outcome.

---

[5] Deloitte National Broadband Plans – Realising the benefits through better governance - 2014

B.5 Develop Policies for Both Sides: Supply and Demand

14. While supply-side policies focus on promoting the build-out of the network infrastructure over which broadband applications and services can be delivered, the main goal of demand-side policies is to enhance the awareness and adoption of broadband services so that more people will make use of them.

Figure 2: Framework for Government Intervention to Facilitate Broadband Development
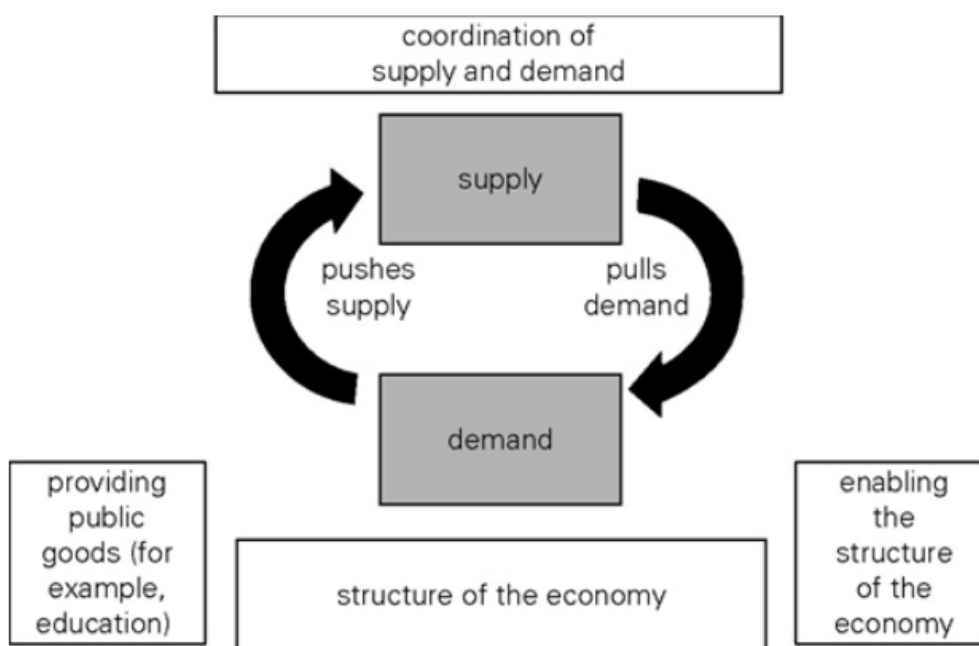
15. In its recommendations dated 17th April 2015, the Authority had mentioned that the oft challenged law of markets in classical economics i.e. the French economist J.B Say's Law which states that **'production is the source of demand'** i.e. supply creates its own demand is fundamentally flawed in case of broadband services. Technological progress in general and Information and Communication Technologies (ICT) progress in particular is providing society with new ways of completing the same tasks with less cost and effort. This is enabling the reallocation of resources to other, more productive uses. But the impact of ICT can go beyond simply improving production efficiency.

16. Maximizing the impact of National Broadband Plans, requires involvement of multiple stakeholders across both the demand and supply sides. In other words, the traditional '**build-it they-will-come**' approach to National Broadband Plans is not sufficient to achieve the long term socio-economic impact of ICT because such an objective requires a successful take-up of the new technologies to drive change in the economy.

B.6 Access to Infrastructure

17. Network operators and service providers wishing to enter the downstream market (that is, building access networks and offering services to customers) must either build their own backbone network or access the network of another operator. The terms under which operators can obtain access to the backbone networks of other operators will have a significant impact on the success of their business and will influence whether effective competition in the downstream market develops. At the same time, the demand created by these downstream operators will affect the financial viability of the backbone networks, since they are the entities that generate traffic and revenues on those networks. Thus, by promoting effective competition in the downstream market, governments will help to stimulate backbone network development. In addition, maintenance of the backbone networks so created will have to be ensured.

B.7 Encourage and Attract Private Sector Investment

18. It is generally accepted that the private sector should be the primary driver of broadband development in most cases. Particularly when Government resources are limited, sufficient public money may not be available for broadband infrastructure spending. Consequently, policy makers and regulators must consider how best to attract and encourage private sector involvement and investment in broadband. This, in turn, will require Governments to conduct an honest evaluation of the extent to which their country represents—or can be

made into—a profitable market opportunity for private sector investors and operators.

C.   BharatNet Implementation Strategy

19.   The "Report on National Optical Fibre Network (NOFN)" is available at http://www.dot.gov.in/reports-statistics/report-committee-nofn.   The report envisages a multiple model approach that spreads risks and builds on available capacities would be the most appropriate way of working out an implementation strategy. The three models suggested are:

(a) CPSU-led
(b) State Government-led
(c) Private sector-led (EPC/Consortia)

20.   The summary of implementation model as suggested in the Committee report, their advantages and risks are as follows :

C.1   CPSU-Led Model

21.   The CPSU would be required to complete the entire network segment on a turnkey basis.   Post commissioning of the network, necessary monitoring operations would be carried out through a centralized Network Operation Centre (NOC) facility under the management and control of BBNL.

22.   The choice of States for the CPSU-led model is based on three grounds:

(a) Where the private sector may either seek a premium on projected costs in the bidding process or be unwilling to implement the project due to the law & order situation in a State e.g. Chhattisgarh, Jharkhand, Jammu & Kashmir, Nagaland, Manipur.

(b) Where the geographical terrain requires alternatives to optical fibre media to be adopted across a significant part of the State or laying of aerial optical fibre using the electricity transmission infrastructure would need to be explored e.g.

Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Meghalaya, Mizoram, Tripura, Union Territories of Andaman & Nicobar Islands, Lakshadweep, Daman & Diu.

(c) Where the CPSUs have completed a significant part of work in the State in Phase-I of the project currently under implementation e.g. Kerala, Karnataka, Haryana and Punjab.

23. The CPSU-led model is summarized in Figure 3:

Figure 3: CPSU-led Implementation Model
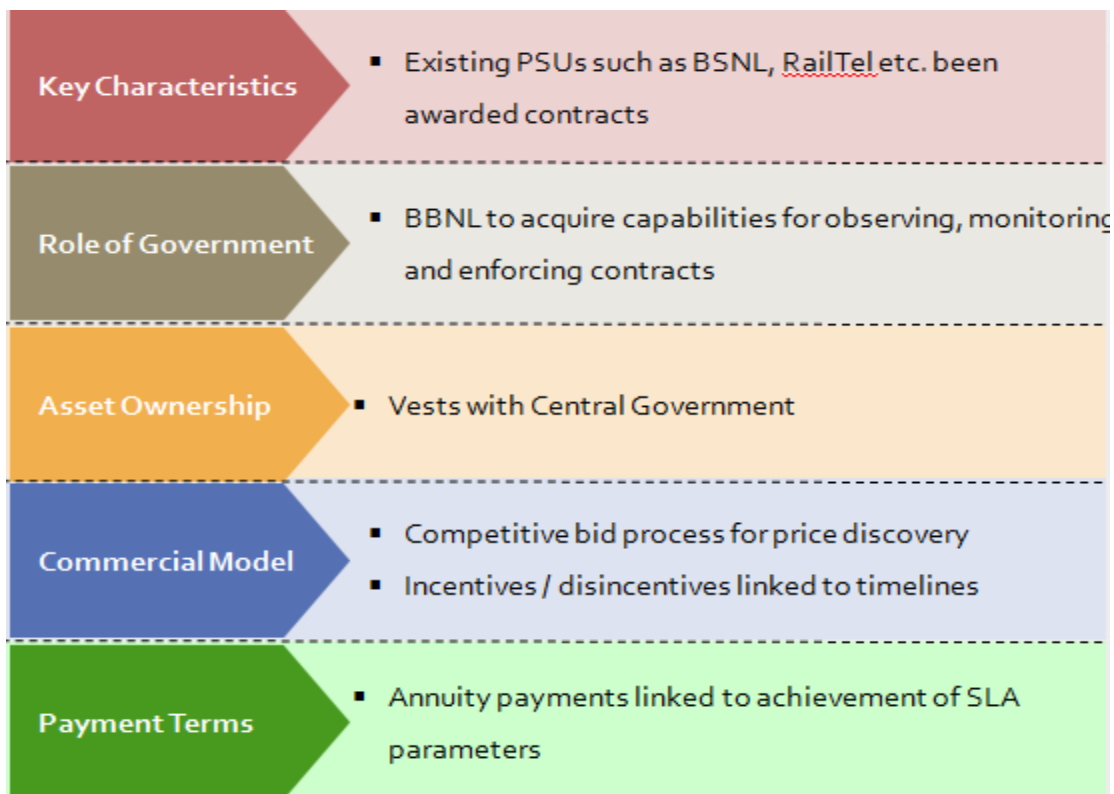
24. Advantages

- The indirect support of the State machinery to CPSUs would be useful in States where law & order issues are likely to inhibit project implementation if the private-sector model is adopted.

- CPSUs would be in a better position to handle deviations from the buried optical fibre architecture especially where radio or satellite

media or aerial optical fibre riding on other infrastructure is to be attempted.

- The incentives and disincentives built into project structure and the linkage of performance in project commissioning as key indicator in performance evaluation of the CMD, Director-in-charge and the project head in-charge in the concerned State would bring necessary accountability and ownership in implementation, a factor missing in the present design.

- Since CPSUs have to necessarily comply with the requirements of competitive procurement and contracting process being a State-entity, the risk of project cost escalation can be shifted away from the CPSU leaving the incentive structure clearly oriented to timely execution through better project management.

25. Risks

- The failure of accountability mechanisms

- Non-enforcement of the incentive structure

C.2 State Government-Led Model

26. In the State Government-led implementation model, the State Government shall design, customize according to its requirements, implement, commission, manage and operate the network. For the purpose the State Government shall create or assign a State Special Purpose Vehicle (SPV) for carrying out all project activities.

27. The State-led model is summarized in Figure 4:

Figure 4: State-led Implementation Model

Key Characteristics	▪ States to establishing SPVs with equity participation of Central Government to establish, operate and maintain the project.
Role of Government	▪ The Central Government through BBNL to retain capabilities for monitoring the project and issuing directions, if required
Asset Ownership	▪ Vests with SPV
Commercial Model	▪ Same as CPSU model ▪ If Revenue < Cost, Central Government funds O&M else State SPV can retail additional revenues
Payment Terms	▪ Not mentioned

28. Advantages

- State Governments are the principal carrier of Government services and incentivizing States in participation in the project may lead to better delivery of Government services.

- Co-ordination with State Government agencies can be best managed by States leading to better project outcomes.

- Multiple models managed by multiple interested stakeholders may lead to better project management and timely completion by leveraging project management resources available at the State-level.
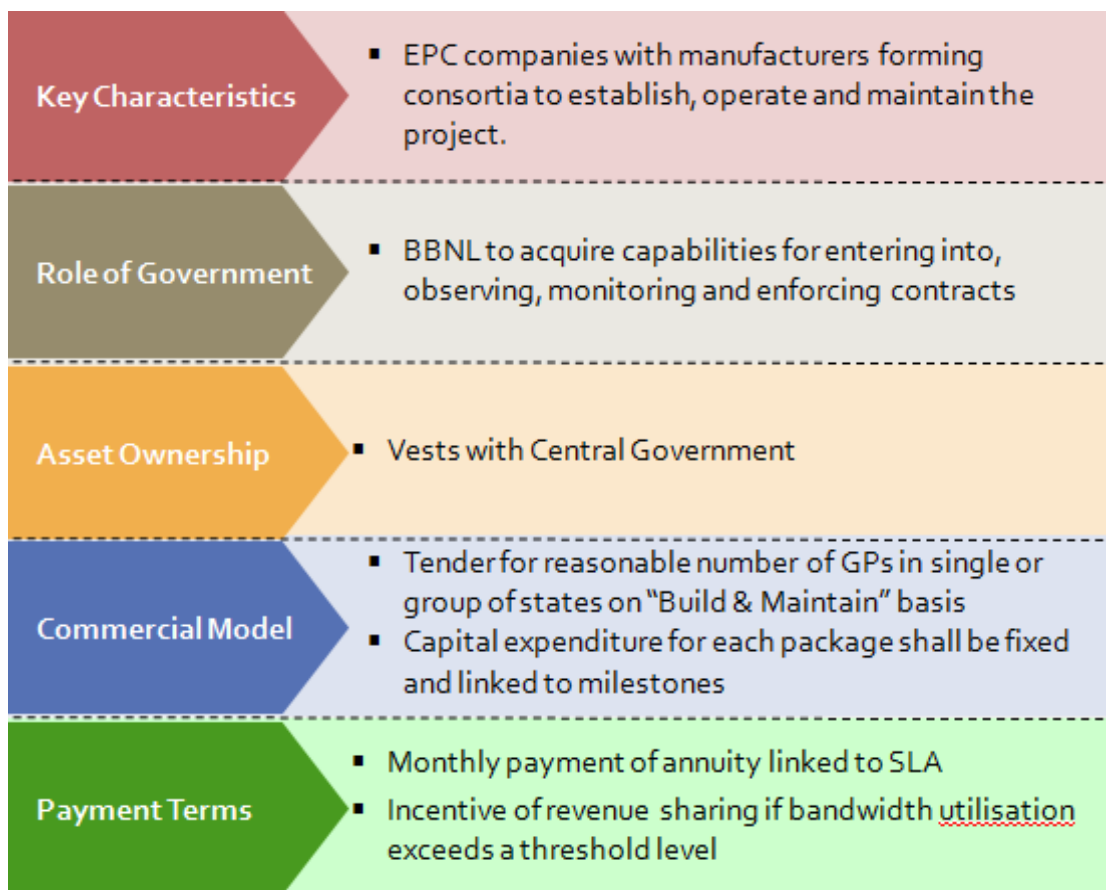
29. Risk

- Availability of project management capacities in the communication space so as to technically design and manage a project of the complexity envisioned.

C.3 Private Sector-Led Model (EPC/Consortia)

30. In the Private Sector-Led model bids will be invited from a consortium on a 'Build and Maintain' basis with the lead bidder for single window clearance. The consortium should include Engineering Procurement and Construction (EPC), Network Original Equipment Manufacturer (OEM) or System integrator and managed services provider.

31. The Private sector-led (EPC/Consortia) model is summarized in Figure5:

Figure 5: Private Sector-led (EPC/Consortia) Implementation Model

Key Characteristics	▪ EPC companies with manufacturers forming consortia to establish, operate and maintain the project.
Role of Government	▪ BBNL to acquire capabilities for entering into, observing, monitoring and enforcing contracts
Asset Ownership	▪ Vests with Central Government
Commercial Model	▪ Tender for reasonable number of GPs in single or group of states on "Build & Maintain" basis ▪ Capital expenditure for each package shall be fixed and linked to milestones
Payment Terms	▪ Monthly payment of annuity linked to SLA ▪ Incentive of revenue sharing if bandwidth utilisation exceeds a threshold level

32. Advantages

- The package approach optimizes network rollout by ensuring parallel execution across multiple packages through different Implementation Partners. This reduces risk by distributing the work across different packages. Further the success/failure of any package does not impinge upon the implementation of other packages.

- Fixed capex would provide the incentive for the Implementation Partner to optimize design architecture of the network to achieve the required Service Level Agreements (SLAs).

- Multiple packages would entail partnering with different Implementation Partners thus providing a platform to leverage the strength of the Private Industry.

- Since the package is structured on a turnkey basis, the complexities of managing dependencies across different agencies are handled by the Implementation Partner. This enables BBNL to concentrate on project monitoring, ensuring deliverables and enforcing SLAs.

- The bundling of Managed Services Portion as part of the package overcomes the problem of non-availability of resources within BBNL.

33. Risks

- Since multiple packages are proposed, it would involve capacity building in BBNL to manage, monitor and enforce several bid processes.

- While there are an adequate number of system integrators in industry, the success of this project would also hinge upon the willingness of companies to participate in the bidding process to ensure adequate competition.

- Since the network is proposed to be implemented through multiple packages, it is inevitable that the inventory supplied will vary

significantly across each package. This adds complexity while provisioning through a centralized NOC.

34. Although the Committee while reviewing the NOFN project has recommended changes with respect to various aspects, views have been expressed that certain core issues remain unaddressed due to which the planned BharatNet appears to be an extension of NOFN project and the implementation risks associated with NOFN could continue and pose serious implementation hurdles to BharatNet. Multilayered structure, may be in limited manner, of NOFN has continued in the present suggested models. The need of the hour is to create scalable, commercially feasible business models considering both the criteria of speed and quality of implementation.

35. One view is that the proposed model in the report enunciate that Network is to be built/owned/operated by different parties and services on the network will be provided by some other TSP/MSO. Therefore there is no alignment of interest of the stakeholders in the execution of the whole project. The agency that is laying fibre has no incentive to complete the project in time. As there are too many external variables such as provisioning of RoW, the implementation entity may get easy and legitimate excuses for delaying the project. Further, the implementation entity is also neither providing the service directly nor marketing it. Therefore, it will not have any incentive to do quality construction which may lead to quality risk also. In addition close supervision/monitoring at large number of locations by a single agency or by subletting the monitoring is likely to pose a big challenge to the Government.

36. It appears that over-riding concern to curb unfair business practices and to discourage a monopolistic behaviour by the implementation entity could have led to recommendation wherein the Government has high-degree of control on the implementation of the project as well as the auction process. Generally, in public-sector projects the long-term needs of the citizens are prioritized over the commercial aims of private

partners, and for this reason Government tend to favour those models which give the public sector a greater degree of control over the operations of the project. However, these approaches may give rise to certain other risks in implementation of the project.

Issues for Consultation

Q.1 The "**Report of the Committee on NOFN" has recommended three models and risks/advantages associated with these models. In your opinion what are the other challenges with these models?**

Q.2 Do you think that these three models along with implementation strategy as indicated in the report would be able to deliver the project within the costs and time-line as envisaged in the report? If not, please elucidate.

CHAPTER – III

BharatNet- BOOT Model

A. BOOT Model

1. Build-Own-Operate-Transfer model is a form of concession in which a public authority makes an agreement with a private company (concessionaire) to Design, Build, Own and Operate a specific piece of an infrastructure such as a power plant, road, a bridge, a telecom network etc. along with the right to earn income from the facility for a pre-decided period of time (concession period approximately 15-25 years), and later transferring it back into public ownership.

2. The quest for efficiency in the cost and time as well as the reduction of burden on strained public resource has made PPP an attractive and viable model for building infrastructure for public use. In order to maximize scarce public resources, there is a need to look for alternative infrastructure funding mechanisms that will promote efficiency in public infrastructure delivery, enable prudent utilization of financial investment and appropriate control to the most qualified sector.

3. In the BOOT model, the Government is not directly involved in the day to day implementation issues of the projects, but subsidizes one market actor to upgrade its own infrastructure or build new one. Government only provides the Viability Gap Funding (VGF) to make it commercially viable to the operator. The advantages of this model lie in comparatively simple contractual arrangements, outcome oriented, the potential for relatively rapid deployment and the offset of risks to the grant recipient / operator. This model may also have certain shortcomings such as lack of interest in investing in rural areas by private firms and risk of monopolization of the network by the private entity. However, an appropriate regulatory framework towards access control, price control, transparency and non-discrimination can be put in place to address the issue of monopolization by a private entity.

Private firms can also be encouraged to participate by providing some non-financial incentives such as assured RoW.

4. The liberalization of basic Government controlled monopolies was mainly driven by the quest for the economic and technical efficiency in the development and delivery of infrastructure. This quest led to various forms of privatization which eventually resulted in the development of various forms of PPP. This was largely driven by the need to deliver public infrastructure in a manner that will not be detrimental to the annual budget of the country. Hence the BOOT model became a handy public financing initiative. The advantages of BOOT model in the delivery of technically and economically efficient infrastructure is buttressed by the following perceived advantages:

(a) The model is perceived as an institutional arrangement as it is believed to remedy the lack of dynamism in traditional public service delivery. This perception is centred on efficiency in public savings as well as reduction of the burden on strained public resources.

(b) The model enables the inflow of private financing for expanding public services. The involvement of the private sector involves clearer objectives, innovation, flexibility, better planning and improved incentives for competitive tendering and greater value for money for public services. Further, private sector participation leads to the lowering of cost and the risk for the public sector.

(c) The model enables both public and private sector to synergise their strengths in building/developing the infrastructure to the mutual advantage of both. For the public sector, there is improvement on the programme performance, cost efficiencies, better service provision and the appropriate allocation of risks and responsibilities. For the private sector, because of a better investment potential, it provides them an opportunity to make a reasonable profit and expand their business.

(d) The model brings out the best of both the public and private sector. Whereas it reduces the burden on public budget for infrastructure

development, it mitigates risks through the involvement of multiple agencies; it encourages private investment and transfer of technology and know-how. Under the right conditions such a model can leverage relative strength of public and private sector to achieve the goal.

5. Numbers of successful projects have been implemented through the BOOT model both nationally as well as at the international level. The building of the English Channel is one of the examples of BOOT Model internationally. The Indian Government is promoting BOOT model at home also for development of airports in India. Bangalore International Airport Ltd (BIAL) is the recently developed green field project in India. It has been developed under BOOT model. The concession period of the airport has been kept as 30 years which is extendable up to 60 years. Development of BIAL is a good example of airport development in public-private partnership. It was the first airport project in India where private sector has shown its capacity to execute big projects in a time bound manner with its own financial sources. The concession agreement and shareholders agreement were used to distribute project risk among the partners, based on their ability. BIAL is a perfect example of two sided market. Only a part cost of the airport development is recovered through tariff. The loss incurred in providing airport services at a reasonable rate is to be recovered through income from non-aeronautical services like retail activity, real estate rentals, restaurants, hotels, parking charges, advertisements, convention centre etc.

6. The proposed scheme of BOOT model will broadly be as follows:

    (a) Executing agency will be selected on basis of competitive bidding for a licensed service area (LSA) or State or combination of both.

    (b) The agency will be selected on the basis of minimum VGF bidding

    (c) The agency will build and operate the network. The agency will own the network during the concession period.

(d) The agency will be entitled for proceed of revenue earned due to sale of dark fibre/bandwidth.

(e) At the end of the concession period the infrastructure created shall stand transferred to the Government (T of the BOOT model).

7. In contrast, three models suggested in the report envisage that network is to be built/owned/operated by different entities and once infrastructure is created, BBNL/ SPV will auction dark fibres to TSPs/MSOs/ISPs. Considering the possible social impact of BharatNet and the economic advantages likely to accrue, adopting the right implementation strategy is of utmost importance.

Issues for Consultation

Q.3 Do you think that alternate implementation strategy of BOOT model as discussed in the paper will be more suitable (in terms of cost, execution and quality of construction) for completing the project in time? If yes, please justify.

Q.4 What are the advantages and challenges associated with the BOOT model?

8. One apprehension raised in the BOOT Model is that, if executing agency which is also providing retail services is selected for the project, it may like to vertically integrate its services and monopolize the market which may defeat the basic purpose of affordable broadband in rural areas. Therefore, there is a need to put in place certain conditions so that conflict of interest can be avoided. In this context, the eligibility criteria and selection process for the executing agency becomes very important.

Issues for Consultation

Q.5 What should be the eligibility criteria for the executing agency so that conflict of interest can be avoided?

Q.6 Should there be a cap on number of States/ licensed service area to be bid by the executing agency?

Q.7 What measures are required to be taken to avoid monopolistic behaviour of executing agency?

9. Even if the executing agency is not directly providing the retail services, it may have certain vested interests due to which it may not provide services in fair, transparent and non-discriminatory manner to all stakeholders. As public money is also involved in the project, it requires equal treatment to all service providers in fair and transparent manner. There may be need to put ex-ante regulation such as price control to ensure fair treatment and non-discriminatory access to all stakeholders for service provisioning.

Issue for Consultation

Q.8 What terms and conditions should be imposed on the executing agency so that it provides bandwidth/fibre in fair, transparent and non-discriminatory manner?

10. The BOOT model is outcome oriented and the selected agency is required to deliver desired outcome in a given time frame. The executing agency may require flexibility to survey the route plan for laying optical fibre to minimize its cost. The existing agency may also like to use technology of its own choice and like to upgrade the technology with time. The topology of BharatNet has been explained in detail in the report of the Committee on NOFN. However, the selected executing agency may not consider it as a most appropriate and efficient way for completing the project in a time bound manner. There may be a need to give flexibility to the executing agency in terms of selection of route of laying optical fibre, construction, topology and deployment of technology.

Q.9 What flexibility should be given to the agency in terms of selection of route of laying optical fibre, construction, topology and deployment of technology?

11. Many of the service areas may not be lucrative for private service provider for the project. Therefore, Government may require giving some fund in the form of Viability Gap Funding (VGF). The moot question is how the VGF should be determined and what should be the maximum value of the VGF that can be given to any agency for a particular State/ service area. One of the concerns is that if VGF is provided upfront then the selected agency may not have any interest to complete the project in time and therefore, VGF should be linked to the completion of the project.

Issues for Consultation

Q.10 What should be the methodology of funding the project? In case of VGF, what should be the method to determine the maximum value of VGF for each State/ service area and what should be the terms and conditions for making payments?

Q.11 What kind of fiscal incentive and disincentive be imposed on the agency for completing the project in time/early and delaying the project?

12. Optical Fibre Cable because of its characteristics of low cost and huge transmission capability is the medium used for extension of broadband infrastructure globally. Nowadays, with the improved design and increased reliability, fibre life span is taken as 20 to 25 years. In the Committee report it has been mentioned that the period of lease of dark fibre shall be for a period of 10 years and at the end of the leased period the fibre shall revert to BBNL/State SPV. In case of BOOT model, the executing agency will have more incentive to bid for the project in case it is able to retain its ownership for a longer period and may require lower VGF as the

executing agency may foresee more revenue as the period is long. However, it would be difficult for either executing agency or the Government to foresee such a long period as the technology is advancing rapidly in the telecom sector in contrast to other sectors. Therefore, there is a possibility that in case the Government forecast regarding business potential is wrong, the executing agency may make higher than expected profits in the long run. As it involves public money, there is a need to deliberate on the measures to be put in place so that there is no loss to the exchequer.

Issues for Consultation

Q.12 What should be the tenure/period after which the ownership of the project should be transferred to the Government?

Q 13 Do you think that some measures are to be put in place in case the executing agency earns windfall profits? How should windfall profits be defined?

13. The Committee on Review of NOFN has recommended that not less than 50% pairs of dark fibre at GP be set aside for allocation to telecom service providers, multi-system operators, local cable operators, Internet service providers and other service providers through forward-cum-reverse auction process. 4 pairs of dark fibre shall be provisioned for bandwidth by the CPSU, State Government SPV or Implementation Partner in the three implementation models. Of this, at least some fibre pairs or bandwidth must be dedicated for Government services usage. As the BOOT model is outcome oriented, therefore, it is most important that output should be quantifiable either in terms of dark optical fibre or bandwidth or both.

14. Affordable broadband services can be provided through use of innovative technology as well as competition in provisioning bandwidth to the retail telecom service providers. Affordability is increasingly identified as critical in expanding access to broadband in developing countries. Due to broadband's importance, there have

been calls to view broadband as a public good in order to ensure affordable universal access and spread the benefits across the full range of economic sectors. Based at least partially on a public goods analysis, some countries have taken more direct action to promote broadband development, establishing initiatives and strategies where the Government intervenes more directly to promote, oversee and universalize their broadband markets. State Governments will also be buying bandwidth from the executing agency for G2C projects meant for socio-economic development.

Issues for Consultation

Q.14 Whether there is a need to mandate the number of fibres to be offered as a dark fibre to other operators to ensure more than one operator is available for providing bandwidth at GP level?

Q.15 What measures are required so that broadband services remain affordable to the public at large?

15. One of the possible causes for delay in project implementation could be hold ups caused due to Right of Way (RoW) approvals. Tripartite agreements have been signed between the Department of Telecommunications, State Governments and BBNL to facilitate free RoW for laying optical fibre. However, the actual implementation of existing NOFN has thrown up issues that have to be addressed if implementation delays are to be curtailed.

16. RoW approvals are not limited to State Governments. There are Central Government bodies such as National Highway Authority of India (NHAI), Indian Railways, Oil and Natural Gas Corporation (ONGC), Gas Authority of India Limited (GAIL) etc and Forest clearances where problems have been encountered by BBNL and the Implementing CPSUs.

17. The Central or State Government can facilitate execution of the project on best effort basis. Externalities like provision of power or

space at PoP level would lead to contentions and delay in execution of the project.

Issue for Consultation

Q.16 What safeguards are to be incorporated in the agreement entered between Government and executing agencies if RoW is not being granted to the executing agency in time?

18. There are three critical stake-holders in the broadband ecosystem – the Public Sector, the Private Sector, and the Panchayats – who need to come together to build sustainable business models that guarantee significant commercial (business feasibility) and social returns (inclusive growth, rural skill-building and employment generation). The private sector has to show commitment and faith in the 'inclusive growth' agenda by making investments, which may not be attractive in the short term, but which, with time, would scale up and become profitable, while discharging important social responsibility. Some stakeholders have expressed apprehensions that though BOOT model can deliver project in cost effective manner with minimum risk to the Government but participation by the private operators in the BOOT model will be limited to a few States only. Therefore, there may be need to take some other measures to maximize participation in non-lucrative States.

Issue for Consultation

Q.17 The success of BOOT Model depends on participation of private entities which will encourage competition. What measures should be adopted to ensure large scale participation by them?

19. The PPP model has also been used for provision of broadband services by number of countries to create broadband network in the country. The International practices of National Broadband Plans of some of the countries are annexed as Annexure I.

Q.18 Please give your comments on any other related matter not covered above.

CHAPTER-IV

Issues for Consultation

Q.1   The "Report of the Committee on NOFN" has recommended three models and risks/advantages associated with these models. In your opinion what are the other challenges with these models?

Q.2   Do you think that these three models along with implementation strategy as indicated in the report would be able to deliver the project within the costs and time-line as envisaged in the report? If not, please elucidate.

Q.3   Do you think that alternate implementation strategy of BOOT model as discussed in the paper will be more suitable (in terms of cost, execution and quality of construction) for completing the project in time? If yes, please justify.

Q.4 What are the advantages and challenges associated with the BOOT model?

Q.5   What should be the eligibility criteria for the executing agency so that conflict of interest can be avoided?

Q.6 Should there be a cap on number of States/ licensed service area to be bid by the executing agency?

Q.7   What measures are required to be taken to avoid monopolistic behaviour of executing agency?

Q.8   What terms and conditions should be imposed on the executing agency so that it provides bandwidth/fibre in fair, transparent and non-discriminatory manner?

Q.9   What flexibility should be given to the agency in terms of selection of route of laying optical fibre, construction, topology and deployment of technology?

Q.10 What should be the methodology of funding the project? In case of VGF, what should be the method to determine the maximum value of VGF for each State/ service area and what should be the terms and conditions for making payments?

Q.11 What kind of fiscal incentive and disincentive be imposed on the agency for completing the project in time/early and delaying the project?

Q.12 What should be the tenure/period after which the ownership of the project should be transferred to the Government?

Q 13 Do you think that some measures are to be put in place in case the executing agency earns windfall profits? How should windfall profits be defined?

Q.14 Whether there is a need to mandate the number of fibres to be offered as a dark fibre to other operators to ensure more than one operator is available for providing bandwidth at GP level?

Q.15 What measures are required so that broadband services remain affordable to the public at large?

Q.16 What safeguards are to be incorporated in the agreement entered between Government and executing agencies if RoW is not being granted to the executing agency in time?

Q.17 The success of BOOT Model depends on participation of private entities which will encourage competition. What measures should be adopted to ensure large scale participation by them?

Q.18 Please give your comments on any other related matter not covered above.

International Practices for Implementation of National Broadband Plan

A. Malaysia

1. In 2008 a Private Public Partnership (PPP) agreement was signed between the Malaysian Government and Telekom Malaysia (TM) to build a High Speed Broadband (HSBB) Network. It was estimated to cost MYR 11.3 billion (USD 3.5 billion) with the Government funding MYR 2.4 billion (USD 740 million). During Phase 1, 1.3 million premises were to be passed by FTTH (Fibre-To-The-Home) while residential high rise buildings in the industrial areas around Kuala Lumpur were to be connected with VDSL2 (Very high bit rate digital subscriber line).

2. Phase 1 of the Malaysian HSBB network implementation was launched in 2010 in a record 18 month period and 1.4 million premises were passed by 2012. The take up of HSBB was also impressive with over 600,000 subscriptions (i.e. 43% take up of houses / premises passed) by June 2013. Four major operators had signed up for HSBB access services where HSBB is repackaged and sold to their own customers, and 19 had signed up for HSBB transmission services used to enhance their own backhaul network.

3. In March 2012, other operators such as REDtone signed an agreement to access the HSBB network on a wholesale basis in order to provide services to business customers.

B. Singapore

4. The network is being built and operated by OpenNet, a consortium of the main fixed operator SingTel (30%), Axia NetMedia (30%), Singapore Press Holdings (25%) and Singapore Power Telecommunications (15%). OpenNet makes use of SingTel's existing passive infrastructure assets,

such as ducts, manholes and exchanges – SingTel has transferred these assets to a neutral party (the Asset Company or AssetCo), an independent and separately managed company owned by a registered business trust. OpenNet will be subject to a universal service obligation to install fibre to end-customer points. It began offering wholesale services on 31 August 2010. Retail services providers are responsible for selling services to end users and businesses.

C. Germany

5. The German Broadband Strategy was released in February 2009. The strategy defines two overarching targets. First, gaps in broadband penetration are to be eliminated, and capable broadband, defined as at least 1 Mbps, is to be made available nationwide by the end of 2010. Second, a total of 75% of all German households are to have Internet access with speeds of at least 50 Mbps by 2014. The Government describes its approach as "incentive-oriented." In the short-term it will focus mainly on financial support for local authorities and improving financial options available to companies. In the long-term, it will focus on incentives within the overall EU regulatory framework and provide stimulus where it can promote synergies from infrastructure projects. Specific measures include optimizing shared use of existing infrastructure and facilities and compiling a broadband map and a database of construction sites.

D. United Kingdom (Superfast Conwall)

6. Private design, build and operate with a public grant, aiming for high level of FTTP. It plans to extend connectivity to predominantly rural and economically under developed premises by 2015. British Telecom(BT) won a public tender to provide fast fibre optic based broadband services to more than 2,66,000 premises including 30,000 businesses in Cornwall Investment of GBP 132 million (out of which 53.5 million are supported by European Regional Development Fund) in providing the network infrastructure which will then be available to third party service providers on a wholesale basis.

E. Catalonia's Fiber Broadband Network (Spain)

7. Catalonia is an autonomous region of Spain located in the North East of the country. It exercises its self-government, in accordance with the Spanish constitution. Selection of the Telecommunication Infrastructure Provider (GIT, Gestor d'Infraestructures de Telecomunicacions) that is responsible for the construction and exploitation of the network, through a concession contract. Concession contract period can extend up to 30 years. The Network Property will be private initially and public at the end of the concession period. Private sector has to set-up a new company .

F. Qatar

8. The Ministry of Information and Communications Technology (MICT) has developed the National Broadband Plan jointly with relevant stakeholders, with its broad objective to promote broadband market development and provide high-quality, high-speed, and affordable services to all. The activities to be undertaken in order to ensure the successful implementation of the policy actions are:

   - MICT to set up a task force that will be responsible for coordination of the effort of all stakeholders, ensure progress in the Plan's implementation, monitor progress for the fulfillment of the initiatives throughout the Plan's lifetime and ensure targets are met. The task force is empowered to make necessary decisions pertaining to the prioritization or eventual amendments of policy actions, and will benefit from direct support from the executive authority.

   - Form consortia or committees with stakeholders from the same industry, with common identified policy objectives – universities, cable operators, real estate developers.

   - Set up cross-sectoral working groups, which will be responsible for carrying out the initiatives contained in the Plan. The working

groups will be composed of the stakeholders' broadband champions who need to interact for the fulfillment of the relevant policy actions.

G. Denmark

9. Denmark has long been a leader in take-up of broadband services, as well as in fibre. According to the telecom regulator, telecom services in Denmark may be provided by any person, without the need to obtain a licence, registration or other requirements.

10. Both public (eg TRE-FOR) and private (eg DONG Energy) utilities have FTTH deployments. According to the Danish Competition Authority, the utility companies plan to cover around one million households (40%) at a cost of DKK9.5 billion. TRE-FOR has deployed an open-access network. It has also signed partnership agreements with neighbouring utilities companies Energi Horsens and Oestjysk Energi, offering services under the Profiber brand. Their aim is to provide FTTH to all 4,00,000 subscribers of the three companies. The fully privatised TDC is deploying a FTTN+VDSL network. However, the company notes that competition by the utility companies may force it to invest more heavily in FTTN and FTTH.

H. Canada

11. The Canadian Government has implemented several Internet related initiatives, through its department Industry Canada.

12. One particularly successful example of a community broadband deployment can be found in Fredericton, New Brunswick. The City Council came to the realisation that waiting for existing broadband suppliers to come to Fredericton was not a viable option, so took it upon itself to develop the infrastructure. In order to comply with broadband provider licensing requirements the council incorporated a wholly owned company, e-Novations ComNet Inc, which became accredited as a non-dominant telecommunications carrier. Based on this validation, a sustainable business model was developed. A fibre

optic Community Network would be built forming a ring around the city, with access granted on an annual membership basis. Funding for the network was obtained from the community, with the City Council providing e-Novations a CND65,000 loan to be repaid over three years and Smartforce, an e-Learning company providing a CND50,000 forgivable loan. BrunNet, the largest independent ISP in the province at the time, and the University of New Brunswick each agreed to prepay three years of membership fees. The common requirement of dedicated Internet access was leveraged by pooling the bandwidth needed and purchasing in bulk, with e-Novations effectively becoming a commercial ISP.

List of Acronyms

S. No.	Acronym	Description
1	BB	Broadband
2	BBNL	Bharat Broadband Network Limited
3	BIAL	Bangalore International Airport Ltd
4	BOOT	Build-Own-Operate-Transfer
5	CPSU	Central Public Sector Undertaking
6	EPC	Engineering Procurement and Construction
7	FTTH	Fibre-To-The-Home
8	GAIL	Gas Authority of India Limited
9	GP	Gram Panchayats
10	GPON	Gigabit Passive Optical Network
11	GUN	Government User Network
12	HSBB	High Speed Broadband
13	ICB	International Competitive Bidding
14	ISP	Internet Service Provider
15	ITU	International Telecommunication Union
16	LSA	Licensed Service Area
17	MSO	Multi System Operator
18	NHAI	National Highway Authority of India
19	NOC	Network Operation Centre
20	NOFN	National Optical Fibre Network
21	OEM	Original Equipment Manufacturer
22	OFC	Optical Fibre Cable
23	ONGC	Oil and Natural Gas Corporation
24	PHCs	Primary Health Centres
25	PPP	Private Public Partnership
26	RoW	Right of Way
27	SLA	Service Level Agreement
28	SMEs	Small and Medium Enterprises

29	SPV	Special Purpose Vehicle
30	TSP	Telecom Service Provider
31	UAS	Universal Access and Service
32	USOF	Universal Service Obligation Funds
33	VDSL	Very high bit rate digital subscriber line
34	VGF	Viability Gap Funding