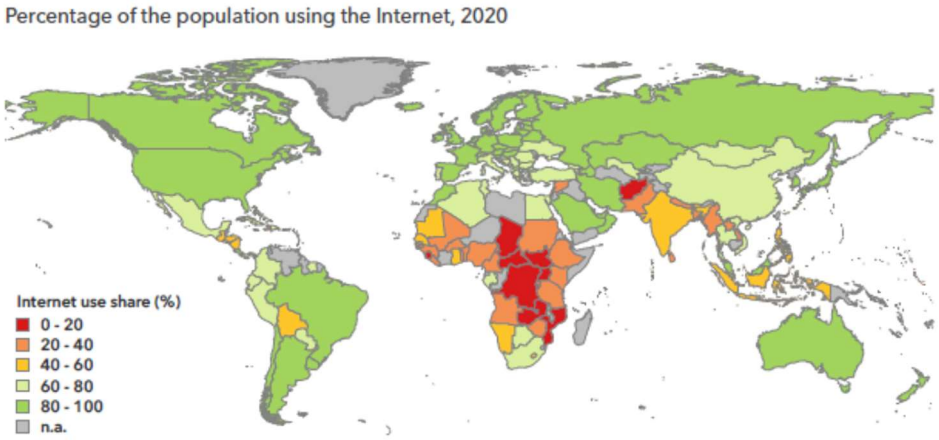
DIPAs Response to TRAI CP on Telecommunication Infrastructure Sharing, Spectrum Sharing, and Spectrum Leasing

PREAMBLE

1. At the outset, **DIPA lauds TRAI for coming up with a very important consultation paper on subjects of extreme contextual importance** as the country has taken a generational leap with launch of 5G services in the country. According to the **Global Connectivity Report 2022**[1] **published by the ITU** "*Promoting the sharing of infrastructure can reduce costs. Operators could, for example, share mobile towers and underground ducts. Network deployment investment is reduced by laying fibre-optic cable along railway lines, power transmission grids and pipelines. Estimates suggest that sharing antenna sites* ***can save operators up to 40 per cent on both capital expenditure and 5G deployment***". The report further states that "*Ensuring the supply of adequate, inexpensive spectrum* ***can help reduce coverage gaps****, ensure sufficient capacity and support the shift to new generations of mobile broadband.*"
2. Essentially going ahead infrastructure sharing and availability of spectrum at reasonable rates will be the fulcrum of **the journey to universal and meaningful connectivity.** A full one-third of the world's population remains *totally* offline, and many among the online population are not "meaningfully connected" because of connectivity that is too slow, or unreliable, or costly, or because they lack the digital skills needed to get the most out of devices and services. At the same time, the "missing link" has morphed into multiple divides: across and within countries; between men and women; between youth and older people; between cities and rural areas; between those linked to fibre and those who struggle on an intermittent 3G connection; and between the technology savvy and those who risk falling victim to the Internet's dark side.

[1] Global Connectivity Report 2022/ITU

3. The report further states that in 2021, an estimated 2.9 billion people were still offline. The bulk of the global offline population, **1.7 billion people, lives in Asia-Pacific and was concentrated in China and India**, followed by Africa with 738 million people offline. The combined offline population in the other four regions was 470 million people.



The Global Digital Divide

4. With a view to cater to the modern needs of the digital communications sector of India, the Union Cabinet approved the National Digital Communications Policy-2018 (NDCP-2018) on 26th September 2018. The policy aims to facilitate India's effective participation in the global digital economy. Under this policy, the government aims to provide universal broadband connectivity at 50 Mbps to every citizen. It has kept a target of providing 1 Gbps connectivity to all Gram Panchayats by 2020 and 10 Gbps by 2022. One of its objectives is to ensure connectivity to all uncovered areas and attract investments of $100 billion in the Digital Communications Sector. The NDCP, 2018 in its strategy for "Establishing a 'National Broadband Mission – Rashtriya Broadband Abhiyan' to secure universal broadband access" envisages enhancement in the scope of Infrastructure Providers in clause 1.1(f) reproduced below:

"Encourage and facilitate sharing of active infrastructure by enhancing the scope of Infrastructure Providers (IP) and promoting and incentivizing deployment of common sharable, passive as well as active, infrastructure."

The NDCP, 2018 lists its strategy on Spectrum as **Recognizing Spectrum as a key natural resource for public benefit to achieve India's socio-economic goals, ensure transparency in allocation and optimise availability and utilization.** Towards this it proposes to **Further liberalize the spectrum sharing, leasing and trading regime**

5. The telecom industry worldwide is following the trend of infrastructure sharing as a business process to keep their investments low and to compete for the economy of scale. Although there are minor differences in the definition of active or passive infrastructure across the world, there are mainly two kinds of infrastructure sharing possible and deployed worldwide.

   a. **Passive infrastructure sharing** allows operators to share the non-electrical, civil engineering elements of telecommunication networks. This might include rights of way or easements, ducts, pylons, masts, trenches, towers, poles, equipment rooms and related power supplies, air conditioning, and security systems.

   b. **Active infrastructure sharing** involves sharing the active electronic network elements – the intelligence in the network – embodied in base stations and other equipment for mobile networks and access node switches and management systems for fibre networks. Sharing active infrastructure is a much more contested issue, as it goes to the heart of the value-producing elements of a business.

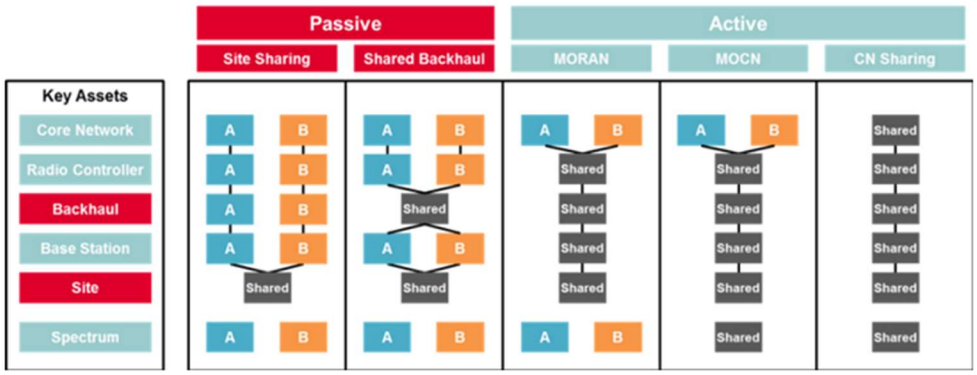


Figure 2: Technical classification of infrastructure sharing

Q1. Should passive infrastructure sharing be permitted across all telecommunication service licenses/ authorizations? Kindly justify your response.

DIPAs Response

6. Passive infrastructure sharing is where non-electronic infrastructure at a cell site, such as power supply and management system, and physical elements such backhaul transport networks are shared. This form can be further classified into site sharing, where physical sites of base stations are shared and shared backhaul, where transport networks from radio controller to base stations are shared.

7. Passive infrastructure sharing is the simplest and can be implemented per sites, which enables operators to easily share sites and maintain their strategic competitiveness depending on the sites shared. Operation is also easier with this form of sharing because network equipment remains separated.

8. The Pros of Passive sharing[2] are given as under:

Sharing Form	Pros
Passive infrastructure sharing	• Significant CAPEX/OPEX savings • Lowered risk of site acquisition • Full differentiation and complete control of spectrum • Control over sites to be shared • No/little regulatory obstacles • Easy migration to other sharing forms. • Environmental benefits

9. Considering the vast number of advantages as listed above it would be reasonable to permit passive infrastructure sharing for all forms of **telecommunication service licenses/ authorizations.**

[2] GSMA Whitepaper- Infrastructure Sharing an Overview

Q.2 Should other active infrastructure elements deployed by service providers under various licenses/ authorizations, which are not permitted to be shared at present, be permitted to be shared among licensees of telecommunication services?

DIPAs Response

10. Active infrastructure sharing is sharing of electronic infrastructure of the network including radio access network (consists of antennas/transceivers, base station, backhaul networks and controllers) and core network (servers and core network functionalities). This form can be further classified into MORAN (Multi-Operator Radio Access Network), where radio access networks are shared and dedicated spectrum is used by each sharing operator, MOCN (Multi-Operator Core Network), where radio access networks and spectrum are shared, and core network sharing, where servers and core network functionalities are shared.

11. As in the case of site sharing, MORAN and MOCN can be implemented per sites and enables strategic differentiation. However, operation of network equipment needs to be shared (or at least issues must be shared with participants) and therefore increases the complexity of sharing relative to site sharing. The cost-saving potential is greater than site sharing. Core network enables greater cost-saving potential but is complicated to operate and to maintain strategic differentiation. It is important to note that core network sharing has not been popular and only a few cases have been suspected to be so. In this document, core network sharing is considered to present the full theoretical picture of infrastructure sharing.

Sharing form	Pros	Cons
MORAN,MOCN	• Limited marginal CAPEX savings compared to Site Sharing • Substantial marginal OPEX savings compared to passive infrastructure sharing	• Regulatory approval necessary • Complexity of operation • Requires long term commitment between operators • Difficult to exit from sharing

	• Control over base stations to be shared • Reduction of network footprint by sharing operators	
Core network sharing	• Further CAPEX/OPEX savings compared to MORAN/MOCN • Significant investment can be diverted to services • Maximum sharing for operators sharing existing infrastructure	• Regulatory approval necessary • Complexity of operation and tight integration • Challenging to differentiate quality of service

12. Sharing the existing infrastructure or the costs of deploying new networks **may significantly improve the business case for the less-covered rural areas**, where demand for internet services and purchasing power are lower and the per capita cost of broadband network deployment is higher.

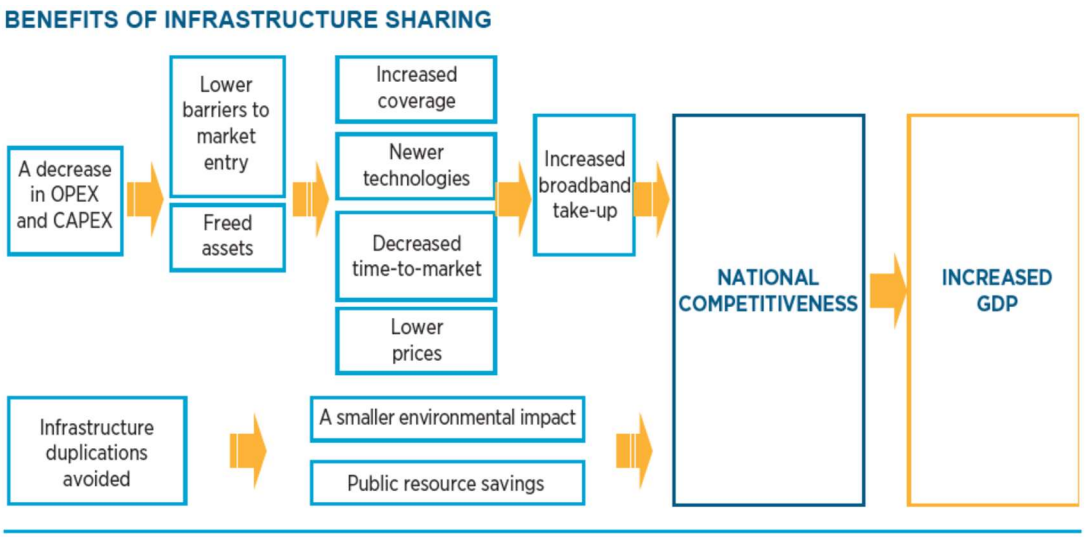


Figure 3 Benefits of telecom infrastructure sharing

13. The benefits of infrastructure sharing are highlighted above. It leads to **enhanced competitiveness and increased GDP.** Also the cost savings as per various studies are enumerated in the table below:-

Study	% Savings	Summary
Analysys Mason, "The Costs of Deploying Fiber-Based Next-Generation Broadband Infrastructure" (2008)	16–24	Potential cost savings from the reuse of infrastructure owned by utilities depend on the areas covered (urban vs. national) and technologies chosen (FTTC vs. FTTP).
Analysys Mason, "PIA Versus Self-Build Fiber in the Final Third: Digging into the Financials" (2012)	29–58	Cost savings that may be achieved by using passive infrastructure sharing in the UK depend on areas covered and additional works to be done. Savings could range from 29% in relatively densely populated areas using a combination of infrastructure sharing and traditional trenching to 58% in sparsely populated areas using the cheaper slot-cutting trenching approach.
OFCOM/CSMG, "Economics of Shared Infrastructure Access" (2010)	57–67	Sharing infrastructure networks such as reusing existing ducts where possible could result in upto 57% cost savings in urban and 67% in suburban areas
EC, "Impact Assessment" (2013)	75	The initial cost of network deployment in Western Europe using existing ducts ranges €20–25 per meter compared to an average of €80–100 per meter for deployments that require digging.
BEREC, "Report on Infrastructure Sharing" (2018)	16–35	Cost savings depend on the type of sharing: passive sharing cost savings are 16–35% of capital expenditures (CAPEX) and 16–35% of operating expenditures (OPEX); active sharing (excluding spectrum) cost savings are 33–35% of CAPEX and 25–33% of OPEX.

(Note – these are in addition to the BEREC report and the ITU recommendation ITU-T D.264 (04/2020) as quoted in the CP)

14. **Considering the benefits of increase of GDP and saving in costs it would be prudent to permit active infrastructure elements deployed by service providers under various licenses/ authorizations.to be shared among licensees of telecommunication services**

Q3. If your response to the Q2 is in the negative, which active infrastructure elements should not be permitted to be shared? Further, which active infrastructure elements should be permitted to be shared with which licensees/ authorization holders? kindly provide details for each authorization with detailed justification.

15. **Not Applicable**

Q4. In case it is decided to permit sharing of any additional active infrastructure elements among licensees,
(a) What precautionary conditions should be put in place to avoid disruption in telecommunication services due to any unforeseen situation? The response may be provided for each active infrastructure element.
(b) Whether there is a need to have a provision for permission from/ intimation to the Licensor before commencement of such sharing? If yes, what provisions and timelines need to be prescribed for each active infrastructure element?

16. **No Comments**

Q5. Whether any other amendment is required to be made in the telecommunication services licenses/ authorizations with respect to the provisions relating to both active and passive infrastructure sharing to bring clarity and remove anomaly? If yes, clause-wise suggestions in the telecommunication services licenses/ authorizations may kindly be made with detailed justification.

17. Infrastructure **sharing is usually driven by two different factors**:
    a. **Economic interest,** which encourages operators to collaborate and/or to use alternative infrastructure due to the potential cost savings and accelerated time to market.
    b. **Regulatory requirements**, where regulators seek to address imbalances in the market resulting from the power of dominant operators, and/or to require more efficient use of public resources such as land and radio spectrum, and/or to require or compensate the operators of alternative infrastructure to help

ensure they make provisions to share among telecommunications operators.

18. In India, IPs-I provide assets such as Dark Fibre, Right of Way, Duct space, and Tower on lease/rent-out/sale basis to the licensees of the telecom services on mutually agreed terms and conditions. These IPs-I registered companies are not allowed to operate telegraph or provide telecommunications service, including end to end bandwidth.

19. IPs-I played a significant role in making affordable telecom services available in India. The deployment of shared tower infrastructure by IPs-I led to rapid growth of mobile networks. **Over the years, the telecom tower industry in India has emerged as a trendsetter in the infrastructure sharing.** Some of the Telecom Service Providers (TSPs) hived off their passive infrastructure into separate entities; and these hived-off entities have obtained IP-I registration.

20. The National Digital Communications Policy-2018(NDCP-2018) envisages enhancement in the scope of Infrastructure Providers as it lists ***"Encourage and facilitate sharing of active infrastructure by enhancing the scope of Infrastructure Providers (IP) and promoting and incentivizing deployment of common sharable, passive as well as active, infrastructure."*** **It is reiterated that NDCP -2018 has been published vide Gazette Notification dated 22 October, 2018.**

21. In its Recommendations on Enhancement of Scope of Infrastructure Providers Category-I (IP-I) Registration dated 13th March 2020, TRAI has unambiguously stated that "*the Authority is of the view that the eligibility to obtain telegraph infrastructure items, equipment and systems on lease/sale/rent basis from IPs-I should not be restricted to TSPs holding licence from DoT alone.* ***By encouraging sharing of infrastructure with more players in the telecom ecosystem the benefits of***

economies of scale and scope would increase further. The Authority is of the view that any service provider who has valid authorization from Government of India to establish, maintain, and work a telegraph to deliver telecommunication services, within any part of India, should be eligible to obtain such a telegraph on lease/rent/sale basis from IPs-I registration holder. The IPs-I should be allowed to provide such infrastructure items, equipment and systems on mutually agreed terms and conditions to eligible service provider in fair, reasonable and non-discriminatory manner." TRAI goes on to recommend that "**the scope of Infrastructure Providers Category – I (IPs-I) Registration should be expanded to satisfy the present need for telegraph in the country". Further, the recommendation has been reiterated vide Recommendations on Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed dated 31st August 2021.**

22. As per a paper titled '**Accelerating Digital Connectivity Through Infrastructure Sharing**'[3] "*an estimated 70 percent of countries reported mandated infrastructure sharing,* ***and just 44 percent in the Asia-Pacific region, the lowest among regions worldwide****. Sharing of mobile network elements, including towers and spectrum, is rising but at a slow pace*". There is thus a need to provide impetus to infrastructure sharing in this region which **can be accomplished by enhancement of scope of IPs-1**. **In fact, Telecom Infrastructure Sharing is a panacea for Sustainability, Cost and Network Performance**

Sharing of Government Funded Infrastructure

Q6. Should there be any obligation on telecom service providers to share infrastructure that has been funded, either partially or fully, by the Government through Universal Service Obligation (USO) Fund or otherwise, with other telecom service providers? Kindly justify your response.

[3] Accelerating Digital Connectivity through Infrastructure Sharing/February 2020/Davide Strusani and Georges V. Houngbonon

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Q7. In case it is decided to impose some obligations on telecom service providers to share the infrastructure funded by Government with other telecom service providers, is there a need to provide a broad framework for sharing of such infrastructure? If yes, kindly suggest the key aspects of such framework with detailed justification.

DIPAs Response

23. The Universal Service Obligation and Universal Service Obligation Fund became the part of the Indian telecom policy framework through the New Telecom Policy 1999 [NTP '99]. NTP'99 envisaged provision of access to basic telecom services to all at affordable and reasonable prices.

24. In common parlance, Universal service is understood to mean the minimum set of telecom services that ought to be accessible to everyone. From a technical and regulatory angle, ITU has described the concept as "**universal service is the long-term objective of making communication facilities available to every member of society on an individual or household basis, and it is used in particular in the regulatory-legislative framework to indicate the obligation of telecommunication operators to provide their services to the entire population**."

25. ITU has, however, refrained from using any one single definition for Universal Service and stated that, *"The term may mean different things in different countries and regions, and different things in different contexts within each country. It has been a changing concept over time as technology develops and expectations consequently alter. At its narrowest, it involves plain old telephone service (POTS); at its broadest, it involves interconnectivity in the provision of all types of services, with all the sophisticated technology that implies. Politically, it can come to be regarded as an entitlement, the content of which changes. Now, newer technologies such as cellular and new satellite and wireless technologies may transform the feasibility of universal service, and make telecommunication service economically viable in many more communities,*

and thus widening the geographic reach of the public network, particularly in the developing countries."

26. The Indian Telegraph Act 1885 (as amended in 2003 and 2006) defines USO as access to telegraph services to people in rural and remote areas at affordable and reasonable prices. Indisputably, the underlying concept of Universal Service, is to ensure that telecom services are accessible to the widest number of people (and communities) at affordable prices. The three core principles of Universal Service Policy are:

    Availability: The level of service is the same for all users in their place of work or residence, at all times and without geographical discrimination

    Affordability: For all users, the price of the service should not be a factor that limits service access

    Accessibility: All telephone subscribers should be treated in a non-discriminatory manner with respect to price, service and quality of service, in all places, without distinction of race, sex, religion, etc.

27. During the initial years of the evolution of the universal service concept, in most countries, the obligation to provide a minimum level of telecom services was continued to mean the provision of basic fixed telephony in ways, such as fixed line connection, subsidizing phone usage, access to emergency services and providing payphones. However, developments in Information and Communications Technology [ICT] and its deep impact on social and economic development led to a significant broadening in the understanding of the term telecommunication services. This led to an expansion of the scope of the USO in several countries, viz. bringing mobile telephony and broadband within its ambit. Many universal service funds undertake ICT outreach programmes in education and e-governance.

28. As per a Study[4] certain countries have a provision where **they can designate an operator as a universal service provider** who would then have an obligation to provide universal services on a nation-wide basis or in a specified universal service area and ought to establish a mechanism for sharing the net costs of supporting the universal service obligation (i.e., difference between the net cost of operating for an operator with the universal service obligation and operating without the universal service obligation) such that the universal service obligation does not represent an unfair burden. Presently in India the TSPs are solely responsible for infrastructure building through USO Fund where as internationally some countries are assigning this responsibility to the infrastructure providers also**. However, as an underlying principle it should be ensured that infrastructure created out of USO Fund should be shared on FRAND i.e. fair, reasonable and non-discriminatory basis to meet its objectives.**

Q8. Any other suggestion to facilitate infrastructure sharing may kindly be made with proper explanation and justification.

DIPAs Response

29. India has a powerful platform in the form of Forum of Indian Regulators (FOIR). The same needs to be effectively utilised for **pushing ahead cross-sector infrastructure sharing**. Some global examples in this regard are listed in the Study report by Broadband Commission of ITU titled **21st Century Financing Models for Bridging Broadband Connectivity Gaps[5]**. The same are reproduced below:-

[4] Universal Service Fund Study Conducted on behalf of the GSMA/April 2013

[5] 21st Century Financing Models for Bridging Broadband Connectivity Gaps/October2021/Broadband Commission

Country/Organisation	Cross Sector Infrastructure Sharing Measures
PIDA(Program for Infrastructure Development in Africa)	PIDA has announced a priority action plan to enable fibre deployment along energy transmission lines, railways and roads.
Germany	The Federal Network Agency has introduced a centralized database, the 'Infrastructure Atlas': • The Atlas maps all the existing infrastructure that can be used to roll out fibre Data for this Atlas are collected from companies in the telecommunication, transport, and energy sectors • Access to this database is exclusively granted to operators and government agencies
Italy	In the measures for facilitating infrastructure roll-out, which form part of Italy's second national broadband plan, the government passed regulations for, and drove the implementation of, a nationwide cadastre (i.e. register) of all telecommunication and non-telecommunication infrastructure belonging to publicly owned entities or utility providers
Chad and Cameroon	The Doba-Kribi oil pipeline between Chad and Cameroon also involved fibre deployment
Kenya and Tanzania	Energy/power utilities are deploying and selling fibre capacity to MNOs and ISPs
Turkey and Poland	Infrastructure maps are available for sharing through a centralized database

Connectivity Issues Faced by the Subscribers in Remote and Far-flung Areas of the Country

Q9. What measures could be taken to encourage roaming arrangements among telecom service providers in remote and far-flung areas? What could be the associated regulatory concerns and what steps could be taken to address such concerns? Kindly provide details on each of the suggested measures with justification.

DIPAs Response

No Comments as Question pertains to TSPs

Q10. What could be the other ways to ease out the hardship faced by the subscribers in remote and far-flung areas due to connectivity issues of the home network provider? Kindly provide detailed response with justification.

DIPAs Response

30. In India, because of its diverse geographical regions there are many remote and far-flung regions in the country. **The UTs of Andaman & Nicobar Islands, Jammu & Kashmir, Ladakh, Lakshadweep and large parts of North East** comprise of remote and far-flung regions in the country. Then there are the **States of Himachal Pradesh and Uttarakhand** where certain districts fall under this classification. It is of significance that **all these regions are at the borders of India hence making them strategically significant.**

31. The Government has implemented the Digital India Programme envisioning creation of opportunities for all our citizens by harnessing digital technologies, thus transforming our nation. The objective is to empower every citizen through access to digital services, knowledge and information. Tools such as e-governance, e-kranti, e-banking, etc. require effective and efficient mobile connectivity all over India, including the remote areas, making the presence of a robust broadband and telecom network a critical national priority.

32. There are many explanations for sluggish penetration of telecom and internet services regardless of the evidence that it could tremendously improve quality of life in the remote areas. Several obvious

characteristics of remote areas make it unprofitable for service providers to develop necessary telecommunication infrastructures. These factors include **low-income residents, scattered settlements of villages, severe geographical or topographical conditions, and partial or total lack of public services such as access roads and regular transport facilities.** In order for a telecommunication project to be successful, it must be provided to an area that has an adequate existing backbone and transportation infrastructures and is densely populated and developed enough to justify the investment decision.

33. A primary barrier to proliferation of these services in rural areas is the **lack of the most important element to support the operation, namely, electricity**. In order for the Internet to be usable and sustained over the long period of time, reliable local power supply first must be provided. In addition, suitable applications must be developed and made available to residents. Once these ingredients are in place, an overall improvement in education, employment, literacy rate, economic activities, market access, and health care should result.

34. Other aspects such as timely RoW permissions/ incentivisation measures by the Govt will significantly mitigate the connectivity hardships of remote and far flung areas.

Q 11 to Q 21

No Comments as spectrum is not in the scope of IPs-1