# *BHARATNET:A STUDY ON SOCIO-ECONOMIC OUTREACH*

**A dissertation submitted to the Punjab University, Chandigarh for the award of Master in Philosophy in Social Sciences, in partial fulfillment for the requirement for the Advanced Professional Programme in Public Administration (APPPA)**


**By**

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**45th Advanced Professional Programme in Public Administration**

**(2019-2020)**

# Certificate

I have the pleasure to certify that Shri Pramod Kumar Panda has pursued his research work and prepared the present Dissertation titled "BharatNet: A study on Socio Economic Outreach" under my Guidance and Supervision. The Dissertation is the result of his own research and to the best of my knowledge, no part of it has earlier comprised any other monograph, dissertation or book. This is being submitted to the Punjab University, Chandigarh for the purpose of Master of Philosophy in Social Sciences in partial Fulfilment of the requirement for the Advanced Professional Programme in Public Administration of Indian Institute of Public Administration (IIPA), New Delhi.

I Recommend that the Dissertation of Shri Pramod Kumar Panda is worthy for the award of M.Phil. degree of Punjab University, Chandigarh.

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# Acknowledgement

I sincerely thank my guide Dr. Kamla Kant Pandey, Professor, Indian Institute of Public Administration, New Delhi for his valuable guidance and continuous support at each and every stage of preparation of this Dissertation.

I also thank, Smt.Aruna Sundararajan, IAS (Retd.) & Ex. Secretary (Telecom) for providing valuable inputs, advices and supporting this dissertation without which this desecration cannot be possible. Major inputs of this dissertation particularly related to Policies, Implementation models, Services delivery models, Socio economic impacts were initiated during her period as Secretary Meity and Secretary (Telecom), Govt. of India. I am fortunate that I could get opportunity to work with her closely as OSD to Secretary Telecom and OSD to CMD BBNL for about 5 years during her tenure as Secretary Telecom, Govt. of India as well as Administrator USOF and CMD BBNL. This period was a great learning opportunity for me on Telecom and IT Policy and implementation.

My sincere and special thanks are also due to Sh. S.N. Tripathy, IAS (Retd.), and Director IIPA for his guidance from time to time .

My sincere thanks to Sh. Ranvijay Singh, Dy. Administrator ,Finance Universal Services Obligation Fund ,Sanchar Bhawan, New Delhi for providing me valuable inputs regarding BharatNet projects and its economic impact without which this dissertation work would not be possible.

Sr.Officers of BBNL particularly from BBNL CO, New Delhi and BBNL UP(East) unit, Lucknow provided me valuable inputs like implementation and O&M status, utilization etc regarding BharatNet projects without which this dissertation work would not be possible. Each

of them deserves special thanks for their valuable contribution in bringing out this Dissertation work.

Sh. Abhisek Singh, COO, CSC SPV and his CSC team have played key role in organizing field visits to Digital Village and demonstration of the service delivery models. They also provided me valuable inputs regarding CSC model, Digital Village and overall utilization without which this dissertation work would not be possible. They deserve my special thanks.

Professor Govind Bhattacharjee, Program Director and Professor Nitu Jain, Co Program Director provided me constant guidance and support at different stages of the Dissertation. They deserve my gratitude and special thanks.

I also thank Sh. Anil Sharma, Superintendent, Sh. Rajesh Kumar and Sh. Manish Rawat and other APPPA office staffs for their continuous support and help throughout the course.

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# Abbreviations:

| Sl. No. | Abbreviation | Description |
|---|---|---|
| 1 | BB | Broadband |
| 2 | BBNL | Bharat Broadband Network Limited |
| 3 | BIF | Broadband India Forum |
| 4 | BRI | Broadband Readiness Index |
| 5 | BSNL | Bharat Sanchar Nigam Limited |
| 6 | CPSU | Central Public Sector Undertaking |
| 7 | CSC | Common Services Centre |
| 8 | EPC | Engineering, Procurement and construction |
| 9 | GIS | Geographic Information System |
| 10 | GP | Gram Panchayat |
| 11 | ISP | Internet Service Provider |
| 12 | ICRIER | Indian Council for Research on International Economic Relations. ICRIER |
| 13 | ITU | International Telecommunication Union |
| 14 | MDG | Millennium Development Goal |
| 15 | NBM | National Broadband Mission |
| 16 | NDCP | National Digital Communications Policy |
| 17 | NOFN | National Optical Fibre Network |
| 18 | NTP | National Telecom Policy |
| 19 | OFC | Optical Fibre Cable |
| 20 | ROW | Rights of Way |
| 21 | SLA | Service Level Agreement |
| 22 | SPV | Special Purpose Vehicle |
| 23 | TRAI | Telecom Regulatory Authority of India |
| 24 | TSP | Telecom Service Provider |
| 25 | TD | Trillion Dollar |
| 26 | UN | United Nations |
| 27 | USOF | Universal Services Obligation Fund |
| 28 | VGF | Viability Gap Funding |

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# 1. Chapter

## 1.1. Overview:

During last 4-5 years, the pattern of Data growth seen in our country is about 30x times. 233 Mn. Internet users in 2014 to 615 Mn in 2019 with this exponential growth. This growth is highest in world in mobile data consumption which is more than US and China put together. However Internet and mobile broadband speed in India is one of the lowest in world. Internet penetration is only 29.5%, connectivity speed is very less. Average speed is only 9 Mbps.

### 1.1.1. Broadband Penetration in India

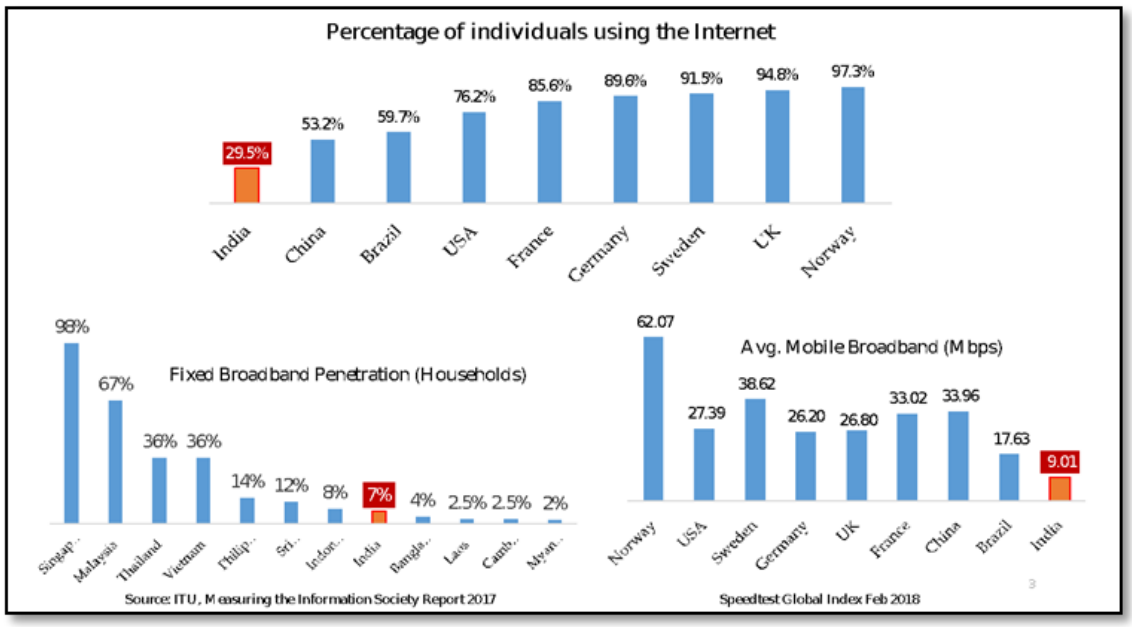



**Figure: 1 Internet Penetration among world countries**

The above figure shows the internet penetration of India vs a vs world:

Presently it is expected to have at least 100s of Gbps bandwidth at access level and 1000s of Gbps at aggregate level. About 6 Exa bits volume of data per month are presently aggregated at Network level. Digital infrastructure wise we are not ready at present. Presently India is ranked as no 1 in mobile data consumption @ 10 Gb per month per subscriber. Huge data is being flown over the network. Adding to this, Emerging technologies like AI, IOT, Machine learning, AR /VR /MR with 5G etc

with billions of IOT devices will throw any amount of data to the network which cannot be predicted The network is not ready to take the load of emerging ICT technologies. With coming up of the innovative technologies like 5G, AI, IOT, robotics, machine learning, AR /VR, block chain and their aggressive applications in various vertical sectors of agriculture , health education etc. can see huge data aggregated at network level which cannot be estimated presently. It can be any amount of huge data with added Security challenges. We need to strengthen our digital infrastructure accordingly.

### 1.1.2. India's Position Vis a Vis World

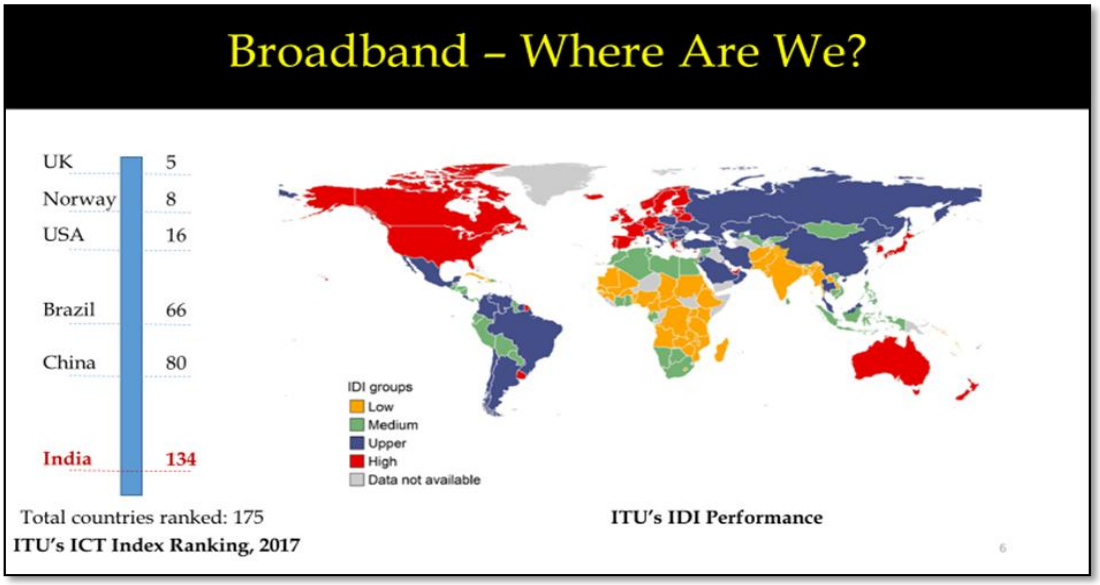



Figure 2: ITU's ICT Index ranking 2017

### 1.1.3. Broadband Where are we?

Presently we are at 134th position as per global ICT readiness Index. As per Mandate in NDCP we need to reach at 50 th position by 2022. NDCP 2018 calls for huge and roboust digital infrastructure to be built up in the country. It also stresses Broadband for all @ 50 Mbps minimum, with ambitious missions of Connect India, secure India and propel India . National Security being given as clear mandate in NDCP 2018 as strong points of secure India and digital sovereignty.

**Following table depicts the current status of Broadband in India:**

Information Note to the Press

TRAI

**TELECOM REGULATORY AUTHORITY OF INDIA**
New Delhi, 16th January, 2020
(www.trai.gov.in)

**Highlights of Telecom Subscription Data as on 30th November, 2019**

| Particulars | Wireless | Wireline | Total (Wireless+ Wireline) |
|---|---|---|---|
| **Total Telephone Subscribers** (Million) | **1154.59** | **21.29** | **1175.88** |
| Net Addition in November, 2019 (Million) | -28.82 | -0.16 | -28.97 |
| Monthly Growth Rate | -2.43% | -0.73% | -2.40% |
| **Urban Telephone Subscribers** (Million) | **647.33** | **18.66** | **665.99** |
| Net Addition in November, 2019 (Million) | -15.59 | -0.11 | -15.70 |
| Monthly Growth Rate | -2.35% | -0.58% | -2.30% |
| **Rural Telephone Subscribers** (Million) | **507.26** | **2.63** | **509.89** |
| Net Addition in November, 2019 (Million) | -13.22 | -0.05 | -13.27 |
| Monthly Growth Rate | -2.54% | -1.81% | -2.54% |
| **Overall Tele-density*(%)** | **87.29** | **1.61** | **88.90** |
| Urban Tele-density*(%) | 152.92 | 4.41 | 157.33 |
| Rural Tele-density*(%) | 56.40 | 0.29 | 56.69 |
| Share of Urban Subscribers | 56.07% | 87.63% | 56.64% |
| Share of Rural Subscribers | 43.93% | 12.37% | 43.36% |
| **Broadband Subscribers** (Million) | **642.14** | **19.13** | **661.27** |

**Table 1: Latest status on Broadband in country as per TRAI**

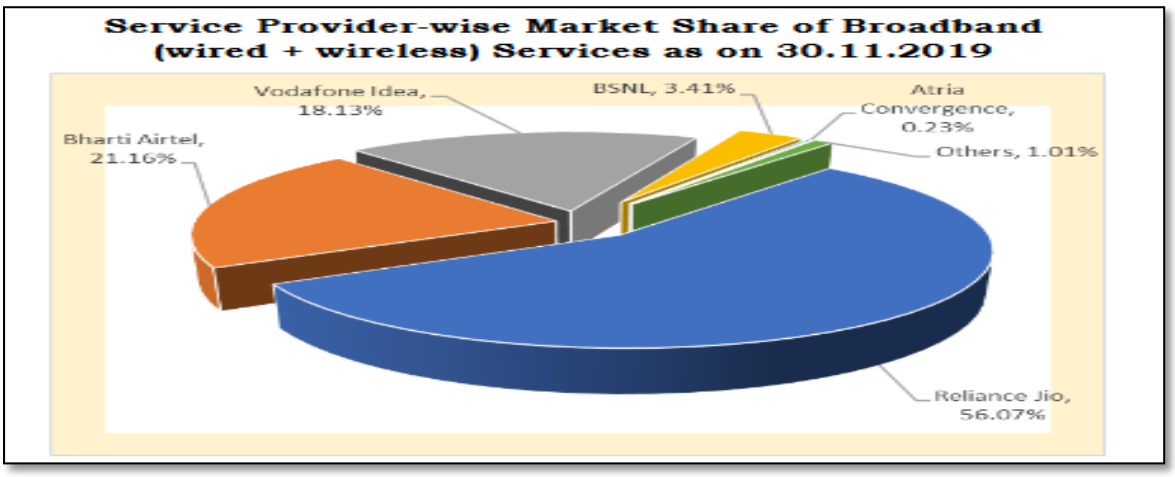
Broadband (≥ 512Kbps download): As per the reports received from 340operatorsin the month of November,2019,the number of broadband subscribers increased from 644.08millionat the end of Oct-19to 661.27million at the end of Nov-19with a monthly growth rate of 2.67%.Segment-wise broadband subscribers and their monthly growth rates are as below:

**Segment–wise Broadband Subscribers and Monthly Growth Rate in the month of November, 2019**

| Segment | Broadband subscribers (in million) | | Monthly growth rate in the month of Nov-19 |
|---|---|---|---|
| | As on 31st October, 2019 | As on 30th November, 2019 | |
| Wired subscribers | 19.08 | 19.13 | 0.28% |
| Mobile devices users (Phones and dongles) | 624.41 | 641.54 | 2.74% |
| Fixed Wireless subscribers (Wi-Fi, Wi-Max, Point-to-Point Radio & VSAT) | 0.59 | 0.60 | 0.47% |
| **Total** | **644.08** | **661.27** | **2.67%** |

## Table 2: Monthly growth rate of Broadband Subscriber

Top five service providers constituted 98.99%market share of the total broadband subscribers at the end of Nov-19.These service providers were Reliance Jio Infocomm Ltd (370.76million), Bharti Airtel (139.92million), Vodafone Idea (119.89million), BSNL(22.54million)and Atria Convergence (1.50million).




## Figure 3: Market Share of TSPs in Data Segment

As on 30th November, 2019, the top five Wired Broadband Service providers were BSNL(8.51million), Bharti, Airtel (2.41million),Atria Convergence

technologies(1.50million), Hathway Cable & Datacom (0.88million) and Reliance Jio Infocomm Ltd(0.83million).,As on 30thNovember, 2019, the top five Wireless Broadband Service providers were Reliance Jio Infocom Ltd (369.93million), Bharti Airtel (137.51million), Vodafone Idea (119.87million), BSNL(14.02million) and MTNL(0.20million).The **Telecom Regulatory Authority of India (Trai)**, in its monthly report, mentions the number of subscribers industry-wise for all the important industries like the broadband, wireless, DTH, FM Radio and more. The figures are very important and crucial for the industry because they help us track of the industry's health, consumer interest, companies, and other things. As per this report, for the month ending in October 2019, the broadband subscribers in India grew by 2.98% by 1.866 crore subscribers. As per the Trai data available on the matter, at the end of September 2019, the broadband industry in India had about 62.542 crore subscribers. However, in only a month, the number of these subscribers had grown to a whopping 64.408 crore subscribers. This is a massive figure for the broadband industry, and also happens to be the third-highest increase in the broadband subscribers if taken into consideration with a 22 month period.

### 1.1.4. Broadband Subscribers Growth Picks Up

If speaking in percentage terms, the broadband subscribers' growth in India was the 9th highest one over the entire period of consideration. As for the wireless broadband subscribers in India which includes users on mobile phones and dongles, Trai reported that the industry added 1.857 crore subscribers in the month of October 2019. In percentage terms, this is a 3.06% increase in the subscriber base, and it takes the total subscriber base to 60.584 crores. As for the wired broadband internet segment, the growth witnessed on that front was 0.007 crore. Also, as for the fixed Wi-Fi segment which includes Wi-Fi, WiMax, Point to Point and others, the subscribers grew by

0.002 crore in the October 2019 period. This showed a 4.22% increase as compared to the figures for the previous month.

**Current Broadband and Internet Status in India:**
TRAI report dated 8th January 2020
(Data as on Q.E. 30thSeptember,2019)

| Internet/Broadband Subscribers | |
|---|---|
| Total Internet Subscribers | 687.62 Million |
| % change over previous quarter | 3.35% |
| Narrowband subscribers | 62.20 Million |
| Broadband subscribers | 625.42 Million |
| Wired Internet Subscribers | 22.26 Million |
| Wireless Internet Subscribers | 665.37 Million |
| Urban Internet Subscribers | 439.99 Million |
| Rural Internet Subscribers | 247.63 Million |
| Total Internet Subscribers per 100 population | 52.08 |
| Urban Internet Subscribers per 100 population | 104.25 |
| Rural Internet Subscribers per 100 population | 27.57 |

**Table 3: Internet subscribers as on 30th Sept 2019 as per TRAI**

## 1.2.Socio Economic Impact of Broadband:

The contribution of our ICT sector is projected to be 20% of 5 TD economy ie 1 trillion dollar economy. In digital India/ new India, ICT is to be ultimate tool for good governance. While Telecom sector will provide horizontal platform ,all other sectors ie IT, health, agriculture, education, judiciary, Foreign affairs, State Govts etc. will be vertical sectors will use this digital infrastructure offered by Telecom .Lot of things are being envisaged around DATA. Now data is being started seen worldwide as new oil/new gold. Trade-wars already started between US and China on data. Everywhere Govt policies of world countries are being made data oriented. We are talking about data mining, data storage, data refinery , cloud computing data localization, data

privacy and data security .There are millennium development goals/2030 global goasl and objectives to be met by each country .There are total 17 different goals known as sustainable Development Goals SDG's on overall wellbeing and good governance and have to be met by world countries by 2030. NiTi Ayog has already started monitoring regularly. In turn states have been given targets for each of these goals. In view of 17 sustainable development goals for which UN and ITU have jointly started action plans at the international level for achieving by 2030 .In the Artificial Intelligence repository of ITU there are number of international projects going on for transformation of various sectors using ICT technologies including Artificial intelligence.

BharatNet is meant for providing a Very High speed Broadband Network in our country. It has been built up with sustainable, robust Telecom and IT infrastructure, plays a very important role in Digital India to happen. BharatNet can play major role in Socio Economic development of the country and contributes significantly to 5TD economy.

Source:Melty report [8] and NDCP [4],[16]

## 1.3. Statement of the problem:

1. There is a huge gap in broadband connectivity in many countries of world vs India. Presently India is placed at 134th position in ICT index of world.
2. Huge gap of Broadband Connectivity in Urban Vs Rural Sectors of India which have created huge digital divide among Urban and Rural parts of India.
3. Huge gap of Broadband connectivity for recent trend in data consumption in India ie. Largest consumption of mobile Data in world with exponential growth.
4. There is a huge inter country gap in broadband connectivity
5. These are the barriers in the socio-economic outreach and hence barrier in socio-economic growth of country.

## 1.4.Literature Reviews:

Following Literatures have been reviewed at initial level:

1. TRAI recommendation (2010 ,12.8) page 9-10 on National Broadband Plan
2. TRAI recommendation (2016,Feb 01) Page 14-15 on Implementation strategy of BharatNet TRAI website: http//www.trai.gov.in/writereaddata/whatsnew/documents /recommendations_bharatnet.pdf
3. Report of the Committee on National Optical Fibre Network (NOFN) 31st March 2015
4. Digital India vision document from Digital India web site
5. Growth Dividends of Digital Communications The Case for India

   December 2018: Report of ICRIER/BIF
6. India Trillion Dollar Business opportunities: Report from MeItY.
7. BharatNet :Implementation and utilization issues: dissertation by Mr Rupendra Kumar in year 2017-18 ,43rd APPPA
8. Implementation of BharatNet challenges and Issues Dissertation by Mr Ram Kailash Meena in year 2015-16 ,41st APPPA

| Year | Author | Issue Discussed | Findings | Research Gap Identified |
|---|---|---|---|---|
| 2010 | TRAI | TRAI recommendation (2010, 12.8) page 9-10 on National Broadband Plan | TRAI gave its recommendations on National Broadband Plan for creation of roboust broadband infrastructure in the country.<br>The authority recommended that Broadband target in upcoming National Broadband Policy | The literature has not done adequate analysis on socio economic outreach of BharatNet.<br>It has only given some recommendation regarding need Broadband plan for the country. |
| 2016 | TRAI | TRAI recommendation (2016,Feb 01) Page 14-15 on Implementation strategy of BharatNet TRAI | TRAI recommendation (2016,Feb 01) Page 14-15 on Implementation strategy of BharatNet | The literature has not done adequate analysis on socio economic outreach on BharatNet.<br>It has discussed only Implementation strategy of BharatNet |

| | | | | |
|---|---|---|---|---|
| | | website:http//www.traigov.in/writereaddata/whatsnew/documents/recommendations bharatnet.pdf BharatNet | | |
| 2015 | High Level Committee constituted by DoT | Report of the Committee on National Optical Fibre Network (NOFN) 31st March 2015 | Effective Implementation of NOFN and way forward | The literature has not done adequate analysis on socio economic outreach on BharatNet and its socio Economic Impact |
| 2015 | Digital India/ MeItY | Digital India Vision document from Digital India web site | Digital India vision | The literature gives the digital vision of the country. Also it discusses the socio economic impact of Broadband and Digital India in genera. Although it has no focused in particular on BharatNet |
| 218 | ICRIERR/ BIF | Growth Dividends of Digital Communications The Case for India December 2018: Report of ICRIERR/BIF | Economic impact of Digital India | The Literature discussed the socio economic impact of Broadband and Digital India in general Although It has not focussed in particular on BharatNet |
| 2018 | Digital Indian/ MeItY | India Trillion Dollar Business opportunities: Report from MeIty | Economic Impact of Digital India | The Literature discussed the socio economic impact of Broadband and Digital India in general Although It has not focused in particular on BharatNet |
| 2018 | Mr.Rupendra Kumar in year 2017-18, 43rd APPPA | Implementation BharatNet and utilization issues: dissertation by Mr Rupendra kumar in year 2017-18,43d APPPA | BharatNet: Implementation and utilization issues | The Dissertation discusses about Implementation and Utilization of BharatNet. It is not discussed the Outreach and Socio/Economic impact of Bharatnet in depth. |
| 2016 | Mr.Ram Kailash Meena in year 2015-16, 41st APPPA | Implementation of BharatNet challenges and issues Dissertation by Mr.Ram Kailash Meena in year 2015-16, 41st APPPA | Implementation challenges and issues of BharatNet | The Dissertation discusses about implementation challenges and issues of BharatNet. It has not discussed the Outreach and Socio/ Economic impact of BharatNet in depth. |

**Table 4: Literature Review**

## 1.5. Objectives:

The primary objectives of the current research study are to:

1. Examine the Broadband Penetration with a particular reference to digital divide in urban and rural India
2. Study of National Digital Communications Policy NDCP 2018 in relation to its socio-economic impact.
3. List out the various technology models for rural broadband provisioning across the countries.
4. Discussing the economic growth due to Broadband penetration with traditional formula of World bank and the new formula of industry is evolving
5. Explain role of BharatNet along with latest model of CSC in the outreach of Broadband
6. Analysis of Broadband penetration Vs socio Economic Impact with both formulae.

## 1.6. Rationale:

- Use of Broadband is seen as Socio Economic development driver for any country. In order country to grow from its developing status to developed nation
- Economic survey 2019 as well as Budget 2019 envisage the total 5 Trillion Dollar Economy by 2025.
- BharatNet being first Pillar of Digital India in providing a Very High speed Broadband Network built up with sustainable, roboust Telecom and IT infrastructure plays very important role in Digital India to happen . This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy.

## 1.7. Research Questions:

**The Research study tries to answer the following questions:**

- RQ1. Why the services of BharatNet are not being properly utilized.

- RQ2. How far the new emerging growth formula of 3.34% GDP growth Vs existing World bank formula of 1.24% growth per 10% increase in Broadband connectivity?
- RQ3, Whether BharatNet as Ist Pillar of Digital India, can provide its Share of economic growth to Digital India's targeted share of 1 TD by 2025 towards ultimate country goal of 5 TD.
- RQ4. 5G is going to unpredicted ecosystem, Ecosystem can grow unlimitedly with huge data speed of 10s and 100s Gbps speed per subscribers with unprecedented traffic in the network. Billions of IOTs, sensors used in different sectors applications, M2M, robotics. AI, VR, AR, Drone etc will throw huge amount of data to network also download huge data which is beyond prediction. This disruption in ICT sectors can trigger enormous economic growth.

## 1.8. Research Hypothesis:

- Hypothesis1: CSC has so far has no or very little expertise in Fiber maintenance also does not have large skilled/unskilled manpower and resources to maintain such huge complex network ,the decision in giving O&M of BharatNet may lead to failure of Utilization model also. Taking away O&M from BSNL which has huge expertise in O&M of Fibre and giving away to CSC may have chance of failure in utilization overall.
- Hypothesis2: CSCs being custodian and first and mandatory utilization centre at GP level with large VLE model make the BharatNet utilization a grand success.

## 1.9. Research Methodology

- Descriptive/Exploratory
- Critical review of secondary data
- Information collated from the primary/secondary source will be interpreted and analysed to impart a logical flow of thought & arrive at specific recommendations

**Major Research gaps noticed are as under:**

The above literatures were reviewed at initial level. Research gaps were indicated in the last column of the above tables. Most of the have literatures have not done adequate analysis on socio economic outreach particularly on BharatNet. They have analysed socio economic development analysis in very general way.

## 1.10. Research Strategy – Qualitative Approach

- The statistical data collected from primary as well as secondary sources will be analysed using different statistical tools through data analysis focus group, content analysis, NOC, analysis of Data of CSCs etc.

## 1.11. Research Design – Descriptive and Exploratory in nature

- Review of secondary data to from various reports available from BBNL,CSCs ,world bank, Industry, ITU, Various sector ministries, State Govt, Union Govt reports, Ministry of Finance reports, DOT. MeItY etc.
- Interview of CSC's ,BBNL field units , BBNL NOC data ,corporate/retail subscribers, rural citizens, all stake holders including subject experts

## 1.12. Data Source

- Primary data will be collected directly from BBNL NOC, CSC ,by interview of rural citizens, State Govt ,all stake holders including subject experts
- Secondary data available in public domain i.e. reports released by Govt of India, DOT, MOF, TRAI, MeItY, DOT, MOWC, MHA,,MOR&D. Ministry Of Panchayatiraj other organisations/agencies /Industries like Broadband India Forum, ASSOCHM, COAI,GSMA, etc. CPSUs like BBNL, BSNL, PGCIL, RailTel, State Govts etc.
- Secondary data also available in world bank, ITU, UN, periodicals, national & international journals, published articles in newspapers & magazines, internet sites, Discussion with policy makers of Govt of India etc.

# 2. Chapter
# BharatNet

## 2.1. BharatNet: Overiew

### 2.1.1.

This chapter describes the National Optic Fibre Networks (NOFN) or its later version known as BharatNet. Initial part of the chapter gives brief on Evolution of BharatNet. Then Implementation aspects of NOFN/BharatNet has been discussed covering phases of implantation, models of implementation etc. Current status of Implementation has been presented in the subsequent para. Further the Operation and maintenance (O&M) modalities of BharatNet are described finally towards end of this chapter brief on Utilization aspects also has been mentioned. Last but not least Broadband for all and Push for Digital India has been stressed upon.

## 2.2. Evolution

The report of the UN summit on Millennium Development Goals 2010 finalizing a global action plan to achieve eight anti-poverty goals by 2015 says:

"A challenge in bringing more people online in developing countries is the limited availability of Broadband networks. Many of the most effective development of ICT, such as telemedicine, e-commerce, e-banking and e-governance are only available through a high speed Internet connection. But a significant divide exists between those who enjoys fast access to an online world increasingly rich in multimedia content and those still struggling with slow ,shared dial up links,"

As per recent TRAI report June 2019, the country witnessed tremendous increase in voice telephony and the teledensity has reached to 90.11 per 100 citizens as on 30.06.2019. In the recent years, in Data Segment India has seen disruption with unprecedented growth rate in demand .Data grows with explosive speed with3x growth in recent 4-5 years. 594.59 Million Subscribers have broadband connectivity

(>512 Kbps) as on 30.06.2019 as per TRAI report. India being the Highest mobile data user in the world 8-10 Gb per user per month.

However the Data segment could not see same success during year 2010 with total broadband subscription of less than 2%, Most of these subscribers are concentrated in urban areas.

For creation of robust broadband infrastructure in the country, TRAI gave its recommendations on National Broadband Plan in December 2010 after extensive consultation with stake holders. The authority recommended that Broadband target in National Broadband Policy as 75 million broadband connections by end of year 2012 and 160 million broadband connections by the end of 2014.

While demand for data is huge in India, India does not have sufficient broadband infrastructure for increasing the Broadband Internet connectivity.

Similarly National Telecom Policy 2012 has a goal of Broadband on Demand and envisages leveraging of telecom infrastructure to enable all citizens and business both in rural and urban areas, to participate in Internet and Web economy thereby ensuring equitable and inclusive development.

**Some of the major targets and strategies envisaged are as under:[10].[12]**

1. Provide affordable and reliable broadband -on-demand by the year 2015 and to achieve 175 million broadband connections by the year 2017 and 600 million by the year 2020 at minimum of 2 Mbps download speed and making available higher speeds of 100 Mbps on demand.
2. Provide High speed and high quality broadband access to all village panchayats through a combination of technologies by the year 2014 and progressively to all villages by 2020.

As per TRAI recommendation, creation of a National Optical Fibre Network to be shared by all service providers. A 100% central govt company to be created which would plan, establish, operate and maintain the National Optical Fibre Network. For this purpose, the Company to arrange and manage funds from the Govt programmes like Universal Service Obligation Fund (USOF). Accordingly a SPV called as Bharat Broadband Network Ltd (BBNL) to handle NOFN was incorporated on 25.12.2012 under Company act.

Based on TRAI recommendation ,The Department Of Telecommunications (DOT) proposed setting up of National optical Fibre Network (NOFN).Union cabinet approved the setting up of National Optical Fibre Network (NOFN) on 25/10/2011 to provide connectivity to 2,50,000 Gram Panchayat of the country, to ensure high speed broadband connectivity with a direction to complete the project in 2 years .

NOFN to facilitate, Information, communication Technology applications such as e-Commerce, e-Banking, e-Governance, e-education and Telemedicine require high speed connectivity.

- Various G2G, G2C, B2C, B2B etc. services are envisaged in this platform. NOFN to facilitate, Information, communication Technology applications such as e-Commerce, e-Banking, e-Governance-education and Telemedicine require high speed connectivity.
- Various G2G, G2C, B2C, B2B etc services are envisaged in this platform.

BharatNet project was approved by the Union Cabinet in 2011 with the earlier name called National Optical Fibre Network (NOFN). The aim of BharatNet is to provide broadband connectivity to all Gram Panchayats through optical fibre cable (OFC). In the approval of Union Cabinet (year 2011), the features like utilization of the created

infrastructure and its operations and maintenance was not envisaged. The pace of the NOFN project was also minimal during year 2012-13 & 13-14. Thus, a Committee named NOFN Committee was constituted to submit its reports on a modified implementation strategy of NOFN. Based on the recommendations of the Committee, the Union Cabinet approved the "*modified implementation strategy of BharatNet towards realisation of vision of Digital India*" on 11th July 2017. The current approval of Union Cabinet dated 11/07/2017 mentions about operations and maintenance and the utilization of created infrastructure. Rs. 6046 crore and Rs. 4066 crores have been provisioned for O&M and utilization through broadband connectivity respectively.

Union Cabinet in 2017 has approved the funds for two Wi-Fi hotspots or any other suitable broadband connection at each GPs. Hence, DoT has awarded the work of installation of 2 Wi-Fi AP to CSC-SPV and Govt. of RJ under BharatNet Phase-I. so far 30000 GPs have been provided with Wi-Fi hotspots.

States, infrastructure provider, telecom service providers, internet service provider, local cable provider, multiple service operators, CSC centres and sister deptt. like primary health centre, police station, post office, patwari offices, primary schools, aanganwadis etc. are the primary users of BharatNet infrastructure. These potential customers are looking for reliable, secured, accessible, affordable and faster broadband connections for their different purposes like fiberization of towers, leasing of fibres provisioning for different digital e-governance services etc.

Thus, it is evident that the supply side of horizon must meet the horizon of demand side i.e. the SLA based (more than 98% uptime) reliable dark cables must be available under BharatNet Project to ensure the optimal utilization of created infrastructure.

As far as BharatNet Phase-II is concerned, utilization and O&M are the integral part of implementation strategy and States are implementing these GPs with a vision of

broad business models. Thus, utilization is not going to be an issue under BharatNet Phase-II.

The high-level Committee on PPP model has also highlighted that the handing over of created infrastructure under BharatNet project to a private service player on a long terms lease would definitely bring the fullest utilization of the infrastructure as it gives the flexibility to, the private player to upgrade, operate and maintain and to customize the infrastructure in such a fashion that brings potential utilization.

Source: BBNL and USOF

## 2.3. Salient features of Bharatnet :

1. World's largest rural broadband connectivity project through optical fibre
2. All 2,50,000 Village Panchayats in India to be connected on optical fibre
3. Minimum 100 Mbps bandwidth at each Village Panchayat
4. Non-discriminatory Access infrastructure for all Service Providers
5. Approx. 6,00,000 Kms of new incremental optical fiber cable to be laid(during initial approval, later on this cable laid higher)
6. High capacity Network Management System and Network Operation Centre

## 2.4. Modalities of Implementation:

**Phase I**

- Project Period: **2014 – December, 2017 (1 Lac Village Panchayats are Service Ready as on 31st Dec 2017)**
- To connect **1,00,000 GPs** spread over **2727 Blocks**, investment of **INR 11,148 crore**

**Phase II**

- Provide broadband connectivity to remaining Village Panchayats
- By Optimal Mix of OFC (UG & Aerial), Radio & Satellite by **March, 2019**
- Last mile architecture (Wi-Fi) to be set up at Village Panchayats

**Phase III**

- Project Period : **2018 - 2023**

- Futuristic Network; Ring Topology, Data Centre & service delivery infrastructure to meet the infrastructure need of 5G and Internet of Things era.

**Organization of National Importance:**

- Setting up e-highway for realisation of Digital India program to promote **e-Governance and other e-Services**
- Facilitate smooth flow of Information on e-highway & **Digital identity of each citizen**
- Facilitate opening up of **new markets** waiting to be tapped at bottom of the pyramid
- Multiplier effect for **GDP growth**
- Developing India into **Knowledge Economy**

1. BharatNet project has been rolled out in 2 phases,3rd phase is yet to start.

- **Phase-I:**

  The total revised target of BharatNet Phase-I is 1.25 Lakh GPs. which initially was 1 Lakh GPs. The target of connecting 1 Lakh GPs through OFC was completed in December, 2017. However, due to revised work front of Phase-I i.e. 1.25 Lakh GPs, currently 1.23 Lakh GPs have been connected under BharatNet Phase-I.

- **Phase-II:**

  The target of BharatNet Phase-II is to connect remaining 1.25 Lakh GPs (which has now been increased to 1.3 Lakh GPs due to increase in number of GPs by some of the State Govt. There are 4 models of implementation under Phase-II;

- **State-led Model:**

  around 65000 GPs are being implemented by State Govt. like MH, GJ, OD, JH, AP, TEL, TN and CG. So far only 10% of GPs have been connected through broadband OFC. The States which are progressing are Gujarat & Maharashtra  Tamil Nadu & Telangana have just been started and other rest 4 States are progressing less than the expected pace.

- **Private-led Model:**

  BBNL is implementing the project in BR & PB under this model. The total number of GPs are approx. 8000.

- **CPSU-led Model:**

  UP East, Madhya Pradesh, UP West, Rajasthan, West Bengal, Sikkim & Jammy & Kashmir were awarded to BSNL on nomination basis for implementation of BharatNet Phase-II. However, BSNL could obtain the approval of UP East & Madhya Pradesh so far. In rest of the States the tender discovered cost escalated beyond the market discovered cost of BharatNet Phase-II across the States. Thus, DoT does not accord approval to these States. The total number of GPs in UPE & MP is 25000 approx.

- **PPP model:**

  Currently under finalization of Tenders.

## 2.5. Current Status of Implementation:

**Latest Summary Status of BharatNet as on 03.02.2020**
**(As per Weekly report dated 3.2.2020)**
(Total including Phase-1, Phase-2 and Satellite)

- Total Work Front (GP's) : 2,62,173 GP's
- Ph-1: 1,26257 GP's
- Ph-2: 128798 GP's
- Satellite GP's: 7118 GP's
- PLB Duct (pipe) laid is 4,05,464 kms (1,50467 GPs )
- Optical fibre laid is 4,12467 kms (1,47,460 GPs )
- Optical fibre cable delivered on site – 3,31,259 kms
- End to End (E2E) connectivity ready (GPs)- 1,37,695 GPs
- Service Ready (GPs) – 1,34,736 GPs

- Service Opened GPs -1,31,662 GPs

## 2.6. Issues and challenges in implementation

- **Several Implementing Agencies – Varied Implementing Strategies**
- CPSUs, State PSUs
- Distribution Companies
- Private Sector: TSP, ISP, MSO, LCO etc.
- Various models of implementation by States being varied and varied requirements of States. Vs Varied Technologies.
- Issues of integration, aggregation, coordination and Management of **vast and distributed network** and virtual assets

## 2.7. Broadband for All

1. Public Private Partnership (PPP) model envisaged for BharatNet to give significant push to the utilization of the infrastructure and catapult the digital wave in rural areas
2. Broadband Readiness Index (BRI) developed for states / UTs to address Right of Way challenges and attract investments. The framework encapsulates areas like policy, enabling infrastructure, Service Infrastructure, Fiberization as the key elements comprising 9 parameters, which are envisaged to be measured on annual basis to enable policy environment in building next generation networks
3. Exponential increase in number of Wi-Fi Hotspots in the country – from 38,000 earlier to more than 5 Lacs now
4. Plan to connect key institutes of development viz. schools, healthcare centres, post offices and police stations across all 2.5 Lac gram panchayats in the country through high speed broadband network

5. Biggest ever Telecom Spend in the North-East Region – Ongoing projects with a total outlay of more than Rs. 10,800 crores, connecting border areas, highways, and unconnected villages

6. Submarine cable connectivity to Andaman and Nicobar Islands, in addition to strengthening connectivity within the islands and in Lakshadweep – at an outlay of Rs. 2,250 crores

7. National Broadband Mission

8. Broadband Authority

## 2.8. Push to Digital India

Average data tariff declined by 97% - from Rs. 269 per GB in 2014, to Rs. 8 per GB in March 2019

a. Increase in overall tele-density in the country – from 75% in June 2014 to 91% in Dec 2018, adding 250 million new subscribers

b. Mobile Internet subscriptions more almost tripled– from 233 Million in March 2014 to 615 Million in March 2019

c. Over 150% increase in internet coverage – from 251 million users in June 2014 to 636 million in March 2019

d. Average mobile data usage per subscriber grew ~ 150 times – from 62 MB per month to 9.1 GB per month

e. Cheapest data tariff globally – from Rs. 300 per GB in 2014 to Rs. 11 per GB in Dec 2018, tariff reduction of 96%

f. Highest mobile data consumption globally at Billion GB per month

g. Eight times growth in broadband access – from 61 million subscribers in March 2014, to 603 million subscribers in Dec 2018

Source: BBNL, USOF and NDCP [16],[4]

## 2.9. Connecting Unconnected :

As one of its policy initiatives, Department of Telecommunications DOT /Government has made a very aspirational objective and stiff target to connect the unconnected and provide Broadband Access to all by 2022 as per its National Broadband Mission/NDCP. It has planned special focus on connectivity to all the difficult areas, which include:

- Difficult Terrain (Hilly areas, Extreme climate prone areas etc)
- Boarder areas
- North East(NE) areas
- LWE areas
- Aspirational Districts
- Islands
- J&K
- Other Uncovered villages etc.

These areas are being connected by using various innovative technologies apart from optical Fibre. These new technologies are like:

- FSOC
- Satellite (High Throughput)
- Overhead OF cable
- TV white space

- LEO/MEO satellites
- Latest WiFi Technologies (IEEE Standard)
- Hybrid technologies like FSOC+WiFi/Microwave etc

DOT has set up a special projects division under USOF to do pilot tests and clearance of these technologies accordingly they can be put to use in the unconnected areas for providing Broadband

Some of the images are enclosed at annexure 3.

# 3. Chapter:

## 3.0.Choice of technology for NOFN/BharatNet and International Scenario of Implementation

In this chapter,Various Technological Choices of Broadband for NOFN/BharatNet have been discussed with comparision among these technologies. It has been mentioned that GPON technology as ultimate choice for BharatNet. Latest upcoming Broadband technology 5G also has been described citing its advantage and concerns. Finally an international scenario on Impact of Broadband on economic growth is discussed in a brief tabular form.

## 3.1. Overview of broadband access technologies

Source:[12]

This part has been quoted from reference [12]

### 3.1.1. TECHNOLOGY OPTIONS

As a part of technologies for broadband delivery, There are several broadband technologies that are being deployed and some latest innovative technologies are coming up. Broadband solutions can be broadly classified into two groups namely 'Fixed Line Technologies' and 'Wireless Technologies'.

**A.Fixed line technologies**

The **fixed line technologies** capable of providing Broadband services are listed below:

a. Digital Subscriber Line (xDSL)

b. Broadband Power Line (BPL)

c. Hybrid Fibre Coax – Cable TV and Cable Modems -

d. Fibre to the Home/Curb (FTTH/C), which includes BPON/EPON/GPON

- **DSL technology**

**DSL technology** ensures providing broadband speed on copper cable access and there is a trade-off between the speed and length of copper cable. The speeds available are far below the GP requirement and in any case require the fiber connection to the vicinity of the subscriber premises.

| Technology | Max. Upstream Capacity (Mbps) | Max. Downstream Capacity (Mbps) | Max. Distance (Km.) | Downstream Mbps Capacity @ max distance | Freq. Range (MHz) |
|---|---|---|---|---|---|
| ADSL | 0.640 | 12 (0.3 km) | 5.4 | 1.5 | Up to 1.1 |
| SDSL | 3 | 3 | 2.7 | 2 | Up to 1.1 |
| ADSL 2.2 | 1 | **26 (0.3 km)** | 3.6 | 4 | Up to 2.2 |
| VDSL | 16 | 52 (0.3 km) | 1.3 | 13 | Up to 12 |

**Table 5: DSL technologies**

### (a) Broadband on Power Line

**Broadband on Power Line Technology** is suitable for achieving data rates of up to 2 Mbps to 3 Mbps per customer but eventually high aggregated data rates of 50 Mbps or even up to 200 Mbps may be available in future. However, in the current status of development there are certain limitations:

- Frequencies used for BPL often interfere with medium wave radio broadcasting frequencies in 530 KHz – 1735 KHz band.
- Broad band on Power Line BPL requires high investment cost to upgrade the power transmission network and bypass transformers and to support high-speed and reliable broadband services.
- However The standardization in PLC technology has not fully stabilized, making it difficult for manufacturers to reach economies of scale necessary to lower costs and for utilities to justify long term investment.

### (b) Hybrid Fibre Coax technology

The **Hybrid Fibre Coax technology** is used for cable TV services has a capability of **maximum 30 Mbps downstream speed** as per DOCSIS specifications as per ITU-T are tabulated below:

| Specifications | Data Speed | Applications/ Services | Remarks |
|---|---|---|---|
| DOCSIS 1.0 | 30 Mbps downstream | High speed data | Standard specification |
| DOCSIS 1.1 | 30 Mbps downstream | Tiered services QOS | Double upstream capacity |
| DOCSIS 2.0 | 30 Mbps downstream, 30 Mbps upstream | Symmetric services such as business applications and peer to peer operation | S-CDMA and FA- TDMA are mandated as the modulation techniques up to 20 times the capacity of TI |

**Table 6: Hybrid OF COAX technologies**

- **Optical based Broadband technologies**

The **Optical based Broadband Technologies** are generally known as FTTx technologies can be deployed over Point to Point (P2P)/All Optical Ethernet Network (AOEN ) and Passive Optical Network (PON) architectures.

In case of **P2P technologies** the architecture followed is generally star topology and the overall management has to be carried on link by link basis. This is not economically scalable in the context of providing fiber connectivity to the large no. of villages.

### (c) Passive Optical Network (PON)

The main signal from local exchange is passively split such that it is shared between 16 and 32 subscribers. Privacy is ensured by time-shifting and personal encryption of each subscriber's traffic. Upstream traffic is enabled by TDMA synchronization. The PON solution benefits from having no outside-plant electronics. This reduces network complexity and life-cycle costs, while simultaneously improving reliability. PON systems are capable to cover typically 20 Km. between central office and subscribers. Two PON variants are standardized today:

i. ITU-T GPON (Gigabit PON) (Rec. G.984 series) providing up to 2.5 Gbps down steam and 1.2 Gbps upstream, accommodating split rates up to 1:64.

ii. IEEE EPON (Ethernet PON) (now part of IEEE 802.3 – 2008) providing symmetric 1 Gbps data rate, accommodating split ratios above 1:16. The system is also referred to as 1G-EPON.

- **Broadband PON**

**Broadband PON (BPON)** was initially developed and deployed and based on ATM transmission and supports 622 Mbps downstream and 155 Mbps upstream Subsequently GEPON became popular and has been deployed quite extensively. GEPON can offer data speeds of 1.2Gbps both upstream and downstream. The latest development is of Gigabit PON (GPON) which offers higher speeds namely

2.5 Gbps downstream & 1.25 Gbps upstream. The comparison is tabulated below:

| **Parameter** | **x PON** | | | |
|---|---|---|---|---|
| | **BPON** | **GEPON** | **GPON** | **NGPON** |
| DS bit rate | 622 Mbps | 1.2 Gbps | 2.5 Gbps | 10 Gbps |
| US bit rate | 155 Mbps | 1.2 Gbps | 1.2 Gbps | 2.5 Gbps |
| Spilling factor | 32 | Min.16 | Max. 64 | max. 512 |
| Payload | ATM Cells | Ethernet | ATM / Ethernet /TDM | ATM / Ethernet /TDM |
| 3rd wavelength for cable TV | Standardized | Non Standardized | Standardized | Standardized |

**Table 7: Comparision of performance on PON technologies**

- **Next Generation PON (NG-PON)**

NG-PON is a GPON enhancement. It spans 100 Km. between the OLT and up to 512 ONT's. With 10 Gbps downstream and 2.5 Gbps upstream it is able to cover many more subscribers, and deliver higher rates to each subscriber.

- **B. Wireless access technology**

The wireless access technologies are also briefly discussed below to study their applicability for the proposed project. There are **two categories** of wireless

technologies, namely ‘Line of Sight’ systems and ‘Non-line-of sight’ systems as listed below.

| Line of sight systems | Non Line of sight systems |
|---|---|
| Microwave links | Wi-Fi (Wireless Fidelity) |
| MMDS (Multi Channel Multipoint Distribution Service) | Wi-Max (Worldwide Interoperability for Microwave Access) |
| LMDS (Local Multipoint Distribution Service) | 3G (Third Generation Mobile Network) |
| FSO (Free Space Optics) | LTE (Long Term Evolution) |
| Satellite | 5G |

**Table 8:wireless technologies LOS&NLOS**

## (a) Line of sight systems

### *i) Microwave Links*

Microwave links have been extensively used on trunk routes and are useful in case of access network where short distance links for data rates up to STM-1 (155 Mbps) can be used on P2P basis. Microwave links are in-expensive when installed for single channel capacity. In the subject case since a large number of Gram Panchayats are to be connected the cost would be very high and bandwidth scalability as also spectrum availability will also remain the limiting factors.

### *ii) MMDS (Multi Channel Multipoint Distribution Service)*

MMDS uses point–to–multipoint architecture and the customer end is located within LOS (line of sight) of the base station. The limitation of MMDS is the restricted number of licensed channels available. Since many users share the same radio channel, practical data throughputs are in the range of 500 Kbps to 1 Mbps. Therefore MMDS is a broadband solution suited only to low data rate or localized services.

### *iii) LMDS (Local Multipoint Distribution Service)*

LMDS operates at higher end of UHF range and thus can offer higher bandwidth but the range of radio signals is limited due to higher space attenuation. LMDS is useful as a localized service. LMDS utilizes a sector antenna at the base station to transmit

point to multipoint over a wide coverage area.

LMDS can be used to deliver digital TV services and also provide two-way broadband services of voice, data, video and internet. Each LMDS channel is capable of 45 Mbps downstream, upper limit 155 Mbps. LMDS is distance limited and its wide-spread deployment is limited by the available radio spectrum. We have to cover as many as 250,000 Gram Panchayats, and the Base Station to GP hops would be 40 km. typically. The spectrum requirements for covering the whole country would be a major inhibiting factor. The LMDS transmission at higher frequencies is limited by rain, fog etc.

### *iv) FSO (Free Space Optics)*

The FSO system utilizes infra-red light sources or lasers to support free space data transmission rates of between 10 Mbps and 1.25 Gbps between a transmitter and receiver over distances of up to 4 Km. LOS is required for each link, since it operates in THz range of RF spectrum. FSO system has the advantage of low installation cost and avoidance of radio spectrum licensing requirements. But the FSO system is point to point only and not cost effective for wide area coverage to provide the necessary competitiveness in the broadband consumer market. The propagation is susceptible to outage in poor weather conditions. The system is primarily suited to private applications.

### *v) Satellite*

Satellite communication is very expensive because of the limited satellite bandwidth and associated equipment cost. Satellite transmission also involves transmission delay which does not support many broadband applications.

## (b) N-LOS access technologies

### *i) Wi-Fi (Wireless Fidelity)*

Wi-Fi is a localized adaptation of MMDS and does not require LOS. It is based on IEEE 802.11x standards. It transmits in the 2.4 GHz band which is lower end of UHF range and thus allows the transmitter to operate at lower power while achieving ranges of 30 m indoors and up to 450 m outdoors. The main application of WiFi is to provide wireless radio links to PCs, VoIP phones within customer premises / residences and in airports / restaurants / office buildings etc. It is a 54 Mbps per channel connectivity and thus practical limits to end-user data rates is approximately 1 Mbps.

### *ii) Wi-Max (Worldwide Interoperability for Microwave Access)*

Wi-MAX delivers Wi-Fi type of wireless connectivity over much greater distance range on a point–to–multipoint basis. Wi-MAX is based on IEEE 802.16 standard. There are two types of Wi-MAX systems:

- Line of Sight (LOS)

### *iii) Non Line of Sight (N-LOS)*

The LOS Wi-MAX systems are point–to–point operation only, whereas NLOS Wi-MAX systems are point–to–multipoint. The LOS systems have better reach capability but do not facilitate large consumer service coverage area. The N-LOS Wi-MAX offers choice of indoor self-install or outdoor customer premise equipment. The indoor self-install equipment is favoured for simplicity of installation, but reach is severely reduced as signal is attenuated by the building.

Wi-MAX aims to provide fixed, nomadic, portable and even mobile wireless broadband connectivity without the need for direct line-of-sight with a base station within a given sector cell. The typical cell radius is 3 Km. to 9 Km. Up to 75 Mbps

per channel capacity is possible for fixed and portable access applications. In case of mobile network deployments up to 15 Mbps capacity may be provided in a cell of radius up to 3 Km. Practical bandwidth per user is much less because it is a shared bandwidth technology and will depend on customer/channel contention ratio. The Wi-MAX performance for LOS/N-LOS/self-install- indoor/outdoor-CPE/standard/full-featured is tabulated below.

| **Wi-Max system type** | **Reach capability (Km.)** | **Max. downlink BW per sector (Mbps)** | **Max. Uplink BW per sector (Mbps)** | **Downlink BW per CPE at cell edge (Mbps)** | **Uplink BW per CPE at cell edge (Mbps)** |
|---|---|---|---|---|---|
| Standardized: | | | | | |
| LOS | 10-16 | 8 – 11.3 | 8 – 11.3 | 2.8-11.3 | 2.8-11.3 |
| NLOS | 1-2 km., 0.3-0.5 km. Self Install | 8 – 11.3 | 8 – 11.3 | 2.8-11.3 | 2.8-11.3 |
| Full featured: | | | | | |
| LOS | 30-50 | 8 – 11.3 | 8 – 11.3 | 2.8-11.3 | 2.8-11.3 |
| NLOS | 4-9 km., 1-2 km. self install | 8 – 11.3 | 8 – 11.3 | 2.8-11.3 | 0.7-1.75 |

**Table 9: LOS and NLOS comparision**

- ***LTE (Long Term Evolution), 3G PPP***

The 3G mobile systems are widely deployed in many parts of the world and are poised to be widely deployed in India also. But it is also seen that 3G systems will not meet the exploding demand for mobile broadband multimedia communication services. The Table below provides a summary of theoretical peak data rates for mobile networks as defined in 3GPP standards. Wi-MAX and LTE are both post-3G standards. LTE has the potential for higher data rates between the mobile device and the base station. However, the applications are limited by the device size; also as yet LTE is in advance evolution stage. Wireless access systems are most suited for dense subscriber areas to be economical.

**Theoretical peak data rates of selected standards**

| Level | Standard | Uplink (bps) | Downlink (bps) |
|---|---|---|---|
| 2G | GSM | 9.6 k | 14.4 k |
| 2.5G | Edge | 384 k | 513 k |
| 3G | UMTS | 384 k | 2.0 M |
| 3G+ | HSDPA / HSUPA | 5.8 M | 14.4 M |
| 3G+ | HSPA+ | 11 M | 42 M |
| “4G | LTE | 50 M | 100 M |
| 5G | 3GPP | 50 mbps to 2gbps (It is expected to go up to 100Gbps) | 50 mbps to 2gbps (It is expected to go up to 100Gbps)100 times faster than 4G |

**Table 10: Comparision of Peak Data rates of various generation cellular technologies**

## (c) 5G :

Source: This section has been Quoted from reference [14]

**5G** is the fifth generation wireless technology for digital cellular networks that began wide deployment in 2019. As with previous standards, the covered areas are divided into regions called "cells", serviced by individual antennas. Virtually every major telecommunication service provider in the developed world is deploying antennas or intends to deploy them soon. The frequency spectrum of 5G is divided into millimetre waves, mid-band and low-band. Low-band uses a similar frequency range as the predecessor, 4G.

5G networks are digital cellular networks, in which the service area covered by providers is divided into small geographical areas called *cells*. Analog signals representing sounds and images are digitized in the telephone, converted by an analog to digital converter and transmitted as a stream of bits. All the 5G wireless devices in a cell communicate by radio waves with a local antenna array and low power automated transceiver (transmitter and receiver) in the cell, over frequency channels assigned by the transceiver from a pool of frequencies that are reused in other cells. The local antennas are connected with the telephone network and the Internet by a

high bandwidth optical fiber or wireless backhaul connection. As in other cell networks, a mobile device crossing from one cell to another is automatically "handed off" seamlessly to the new cell.

5G millimetre wave is the fastest, with actual speeds often being 1–2 Gbit/s down. Frequencies are above 24 GHz reaching up to 72 GHz which is above the extremely high frequency band's lower boundary. The reach is short, so more cells are required. Millimeter waves have difficulty traversing many walls and windows, so indoor coverage is limited.

5G mid-band is the most widely deployed, in over 20 networks. Speeds in a 100 MHz wide band are usually 100–400 Mbit/s down. In the lab and occasionally in the field, speeds can go over a gigabit per second. Frequencies deployed are from 2.4 GHz to 4.2 GHz. Sprint and China Mobile are using 2.5 GHz, while others are mostly between 3.3 and 4.2 GHz, a range which offers increased reach. Many areas can be covered simply by upgrading existing towers, which lowers the cost.

The industry project 3GPP defines any system using "5G NR" (5G New Radio) software as, "5G", a definition that came into general use by late 2018. Previously, some reserved the term for systems that deliver frequencies of 20 GHz shared called for by ITU IMT-2020. 3GPP will submit their 5G NR to the ITU. In addition to traditional mobile operator services, 5G NR also addresses specific requirements for private mobile networks ranging from industrial IoT to critical communications.

## Performance

**a) Speed**

The speed of 5G will range from ~50Mbit/s to over 2 gigabit at the start, and is expected to grow to even 100Gbit/s, 100x faster than 4g. The fastest 5g, known as mmWave, delivers speeds of up to and over 2Gbit/s. As of July 3, 2019, mmWave

had a top speed of 1.8Gbit/s on AT&T's 5g network, much faster than 4g's top speed of 23.6Mbit/s on T-Mobile's network. The problem with this though is that it cannot go through walls trees, etc. because of the high frequency.

Sub-6 GHz 5g (Mid-band 5G), by far the most common, will usually deliver between 100 & 400 Mbit/s, but will have a much farther reach than mmWave, not being limited by walls, trees, and other obstacles which interfere with mmWave transmission.

Low-band spectrum offers the farthest area coverage but is slower than the others, though still faster than 4g.

5G NR speed in sub-6 GHz bands can be slightly higher than the 4G with a similar amount of spectrum and antennas, although some 3GPP 5G networks will be slower than some advanced 4G networks, such as T-Mobile's LTE/LAA network, which achieves 500+ Mbit/s in Manhattan and Chicago. The 5G specification allows LAA (License Assisted Access) as well, but LAA in 5G has not yet been demonstrated. Adding LAA to an existing 4G configuration can add hundreds of megabits per second to the speed, but this is an extension of 4G, not a new part of the 5G standard.

The similarity in terms of throughput between 4G and 5G in the existing bands is because 4G already approaches the Shannon limit on data communication rates. 5G speeds in the less common millimeter wave spectrum, with its much more abundant bandwidth and shorter range, and hence greater frequency reuseability, can be substantially higher.

**b) Latency**

In 5G, the "air latency" in equipment shipping in 2019 is 8–12 milliseconds. The latency to the server must be added to the "air latency". Verizon reports the latency on

its 5G early deployment is 30 ms. "Edge Servers close to the towers can reduce latency to 10–20 ms. 1–4 ms will be extremely rare for years outside the lab.

Network simulation can be used to predict the performance of 5G networks prior to deployment.

**c) Standards**

Initially, the term was associated with the International Telecommunication Union's IMT-2020 standard, which required a theoretical peak download speed of 20 gigabits per second and 10 gigabits per second upload speed, along with other requirements. Then, the industry standards group 3GPP chose the 5G NR (New Radio) standard together with LTE as their proposal for submission to the IMT-2020 standard.

The first phase of 3GPP 5G specifications in Release-15 is scheduled to complete in 2019. The second phase in Release-16 is due to be completed in 2020.

5G NR can include lower frequencies (FR1), below 6 GHz, and higher frequencies (FR2), above 24 GHz. However, the speed and latency in early FR1 deployments, using 5G NR software on 4G hardware (non-standalone), are only slightly better than new 4G systems, estimated at 15 to 50% better.

IEEE covers several areas of 5G with a core focus in wireline sections between the Remote Radio Head (RRH) and Base Band Unit (BBU). The 1914.1 standards focus on network architecture and dividing the connection between the RRU and BBU into two key sections. Radio Unit (RU) to the Distributor Unit (DU) being the NGFI-I (Next Generation Fronthaul Interface) and the DU to the Central Unit (CU) being the NGFI-II interface allowing a more diverse and cost-effective network. NGFI-I and NGFI-II have defined performance values which should be compiled to ensure different traffic types defined by the ITU are capable of being carried. 1914.3

standard is creating a new Ethernet frame format capable of carrying IQ data in a much more efficient way depending on the functional split utilized. This is based on the 3GPP definition of functional splits. Multiple network synchronization standards within the IEEE groups are being updated to ensure network timing accuracy at the RU is maintained to a level required for the traffic carried over it.

**d) 5G NR**

5G NR (New Radio) is a new air interface developed for the 5G network. It is supposed to be the global standard for the air interface of 3GPP 5G networks.

**e) Pre-standard implementations**

- 5GTF: The 5G network implemented by American carrier Verizon for Fixed Wireless Access in late 2010s uses a pre-standard specification known as 5GTF (Verizon 5G Technical Forum). The 5G service provided to customers in this standard is incompatible with 5G NR. There are plans to upgrade 5GTF to 5G NR "Once [it] meets our strict specifications for our customers," according to Verizon.

- 5G-SIG : Pre-standard specification of 5G developed by KT Corporation. Deployed at Pyeongchang 2018 Winter Olympics.

**f) Internet of Things**

In the Internet of Things (IoT), 3GPP is going to submit evolution of NB-IoT and eMTC (LTE-M) as 5G technologies for the LPWA (Low Power Wide Area) use case.

**g) Spectrum**

Large quantities of new radio spectrum (5G NR frequency bands) have been allocated to 5G in order to enable its increased throughput when compared with 4G. For example, in July 2016, the U.S. Federal Communications Commission (FCC) freed up vast amounts of bandwidth in underused high-band spectrum for 5G. The Spectrum Frontiers Proposal (SFP) doubled the amount of millimeter-wave unlicensed spectrum

to 14 GHz and created four times the amount of flexible, mobile-use spectrum the FCC had licensed to date. In March 2018, European Union lawmakers agreed to open up the 3.6 and 26 GHz bands by 2020.

As of March 2019, there are reportedly 52 countries, territories, special administrative regions, disputed territories and dependencies that are formally considering introducing certain spectrum bands for terrestrial 5G services, are holding consultations regarding suitable spectrum allocations for 5G, have reserved spectrum for 5G, have announced plans to auction frequencies or have already allocated spectrum for 5G use.

Research has been done into the most suitable candidates for spectrum ranges for 5G. Due to the demand for spectrum resources and wide frequency range of 5G technology, it is necessary to plan high, medium and low frequency bands in stages in frequency planning, gradually release frequency resources and guarantee the frequency requirements of 5G. The frequency spectrum became a focus due to predictions that the 3G/4G frequency spectrum would not suffice to accommodate the amount of traffic that 5G will need to handle.

**h) Unlicensed spectrum**

MNOs are increasingly using unlicensed spectrum in the 2.4 and 5 gigahertz (GHz) frequency bands. 5G networks will need to tap into the vast amount of spectrum available in these unlicensed bands to offload traffic in heavily congested areas and provide connectivity for billions of IoT devices. Advancements in Wi-Fi, LTE in Unlicensed spectrum (LTE-U), License Assisted Access (LAA), and MulteFire, among others, provide better quality and regulated access to unlicensed spectrum.

Source: This section has been quoted in toto from reference [14]

### 3.1.2. Choice of technology for NOFN/BharatNet

In view of the above discussion it is seen that the wire-line technologies utilising fibre medium are indicated for providing 100 Mbps or more speed capability up to the Gram Panchayats and the choice of passive optical networking solutions is favoured since it minimises the number of active nodes in the rural areas, thus reducing high capital and operating costs. Comparing the various PON technologies it is seen that the Gigabit PON is the latest development offering the maximum downstream speed and therefore in the present stage of development GPON appears to be most suited solution for connecting the Gram Panchayats in the country. Utilisation of fibre optic cable to the Gram Panchayats in fact offers a highly scalable future proof system since the spare fibres can be utilised in future for various high end applications that may arise once the commercial interest of the society starts shifting back to the rural areas.

**GPON meets the following key requirements:**

(i) **Bandwidth,** the capability to support mobile broadband services as wireless networks evolve to full BWA.

(ii) **Quality of Service (QOS), t**he capability to support services that are sensitive to delay and jitter.

(iii) **Converged Packet Transport,** the capability to transport and manage TDM- based and packet-based services on a single Ethernet (or packet) network.

(iv) **Demarcation,** the capability to monitor end points of the backhaul network in support of service level agreement (SLA) enforcement, policing and fault- isolation.

## 3.2. Similar Projects in the world and Economic Impact:

## Broadband a platform for Progress

| Similar projects in the world: Broadband's impact on economic growth: examples of research | | | |
|---|---|---|---|
| **Country** | **Plan** | **Agency** | **Likely Impact** |
| Germany | The Impact of Broadband on Jobs and the German Economy (2010) | Columbia Business School, Telecom Advisory Services LLC, | An investment of EUR 36 billion will return EUR 22.3 billion to the economy during network construction, as well as externalities of EUR |
| Thailand | Broadband Thailand 2015 (2010) | Center for Ethics of Polynomics AG 137.5 billion Science and only 3.4% of households and about 12% of | In 2010 the Thai broadband penetration rate was individuals, but it is forecast that broadband will contribute 0.9% to Thailand's GDP growth rate. |
| Japan | Investment in Broadband Infrastructure: Impacts on Economic Development and Network Neutrality | Kyushu University, Technology, Digital Divide Institute, Thailand Japan | If the Japanese economy grows and the potential of ubiquitous networks is fully utilized, the real GDP growth rate will be about 1.0 to 1.1 points higher than otherwise |
| China | Broadband in China: (2009) Accelerate Development to Serve the Public (2009) | Value Partners | The development of China's dial-up and broadband Internet together may contribute a combined 2.5% to GDP growth for each 10% rise |
| Global | What Role should Governments Play in Broadband Development? | The World Bank/InfoDev | Broadband is a key driver of economic growth, in penetration. providing a boost of 1.38 percentage points in GDP growth in developing countries, for every |
| Latin America, Caribbean | The Impact of Taxation on (2009) the Development of the Mobile Broadband Sector (2009) | Telecom Advisory Services LLC | In 24 Latin American and Caribbean countries 10-percentage-point rise in penetration. (controlling for educational level and development starting point), a 1% rise in broadband penetration yields a 0.017 point rise in GDP growth. Broadband growth between 2007 and 2008 (prorated average of 37%) contributed |
| 15 OECD nations, | Economic Impact of Broadband: An Empirical Study (2009) | LeCG Ltd., for Nokia Siemens Networks | One more broadband line per 100 people in between USD 6.7 billion and USD 14.3 billion, including direct and indirect effects, and preservation of an economic growth rate. |

| | | | |
|---|---|---|---|
| Republic of 14 European Korea | Broadband as a platform for economic, social and cultural development: | The World Bank/InfoDev USA | The contribution of telecom services and these “medium or high ICT” countries raises productivity by 0.1%. broadband to GDP more than doubled between |
| UK | The Economic Impact of a Lessons from Asia (2008) Competitive Market for Broadband (2003) | Centre for Economics and Business Research Ltd The Broadband Industry Group, CEBR GBP 21.9 billion | By 2015, the productivity benefits of broadband 1995 and 2005: the decade of broadband’s expansion in the Republic of Korea could result in the GDP of the UK rising by up to |

**Table 11: World Implementation of similar Projects**

Source:https://unesdoc.unesco.org/ark:/48223/pf0000219825(Table1.1)

# 4. Chapter:
# Operation and Maintenance (O&M), Utilization and Service Delivery Models:

## 4.1. Operation and Maintenance (O&M), Utilization and Service Delivery Models:

This chapter describes Operation and maintenance(O&M) of Bharatnet,Utilization models including CSC model ,Digital Villages etc. mentioning various technologies like WiFi hotspots ,P2P links,Fibre to Home (FTTH) etc as technologies for digital delivery to citizens. Current utilization status has also been indicated and discussed .Various challenges and issues of O&M as well as Utilization , Solutions for different issues are also suggested. Existing tariff structure provided by BBNL for Bharatnet usage is also mentioned in this chapter.Finally field visit of APPPA team to a Digital Village in Haryana has been discussed wherein the experience of the team on the utilization model of CSC and its impact of creating good Governance has been mentioned.

### 4.1.1. Operation & Maintenance:

Initially ,The responsibility of O&M of the so far created network of BharatNet Phase-I was with BSNL . However performance of O&M carried out by BSNLwas not satisfactory. Till 30/06/2019 only 22000 GPs out of 1.22 Lakh GPs were reflecting in the Network Monitoring System (NMS), BBNL. This means 20% of GPs under BharatNet Phase-I was operational and maintained and rest 80% GPs were either partially maintained or non-maintained or unattended by BSNL.

Looking this ,CSC has been awarded the work of O&M and utilization as a short term for one year initially for phase 1 GP's. It conducted the physical survey has found many infrastructural and quality issues in BharatNet Phase-I implementation and O&M issues.DOT is fortnightly reviewing the performance of O&M of BharatNet

Phase-I with all the stakeholders and putting its efforts to mitigate these issues as much as possible.It is worthwhile to mention here that, the long-term solution of O&M of BharatNet Phase-I is PPP model which is under process of Cabinet approval.

Source :BBNL web site/BBNL NOC

## 4.2. Utilization of BharatNet:

### 4.2.1.

Utilization of BharatNet is depended upon the ensured, reliable, affordable and faster broadband connections availability. Utilization also depends upon the quality of supply of services and proper maintenance of infrastructure with stringent SLA parameters. However, as mentioned above it is noted that O&M is a great challenge under BharatNet Phase-I. in fact there seems to be issues with the quality of work being done in Phase-I as is being reported by CSC-SPV. Thus, in this context it can be derived that utilization of BharatNet Phase-I shall be minimal. As noted above utilization has never being thought in NOFN which later on provision under BharatNet Project.

Union Cabinet in 2017 has approved the funds for two Wi-Fi hotspots or any other suitable broadband connection at each GPs. Hence, DoT has awarded the work of installation of 2 Wi-Fi AP to CSC-SPV and Govt. of RJ under BharatNet Phase-I. so far 30000 GPs have been provided with Wi-Fi hotspots.

States, infrastructure provider, telecom service providers, internet service provider, local cable provider, multiple service operators, CSC centres and sister deptt. like primary health centre, police station, post office, patwari offices, primary schools, aanganwadis etc. are the primary users of BharatNet infrastructure. These potential customers are looking for reliable, secured, accessible, affordable and faster broadband connections for their different purposes like fiberization of towers, leasing

of fibres provisioning for different digital e-governance services etc. Thus, it is evident that the supply side of horizon must meet the horizon of demand side i.e. the SLA based (more than 98% uptime) reliable dark cables must be available under BharatNet Project to ensure the optimal utilization of created infrastructure.

As far as BharatNet Phase-II is concerned, utilization and O&M are the integral part of implementation strategy and States are implementing these GPs with a vision of broad business models. Thus, utilization is not going to be an issue under BharatNet Phase-II.

The high-level Committee on PPP model has also highlighted that the handing over of created infrastructure under BharatNet project to a private service player on a long terms lease would definitely bring the fullest utilization of the infrastructure as it gives the flexibility to, the private player to upgrade, operate and maintain and to customize the infrastructure in such a fashion that brings potential utilization.

A typical network diagram showing utilization of BharatNet has been shown below:

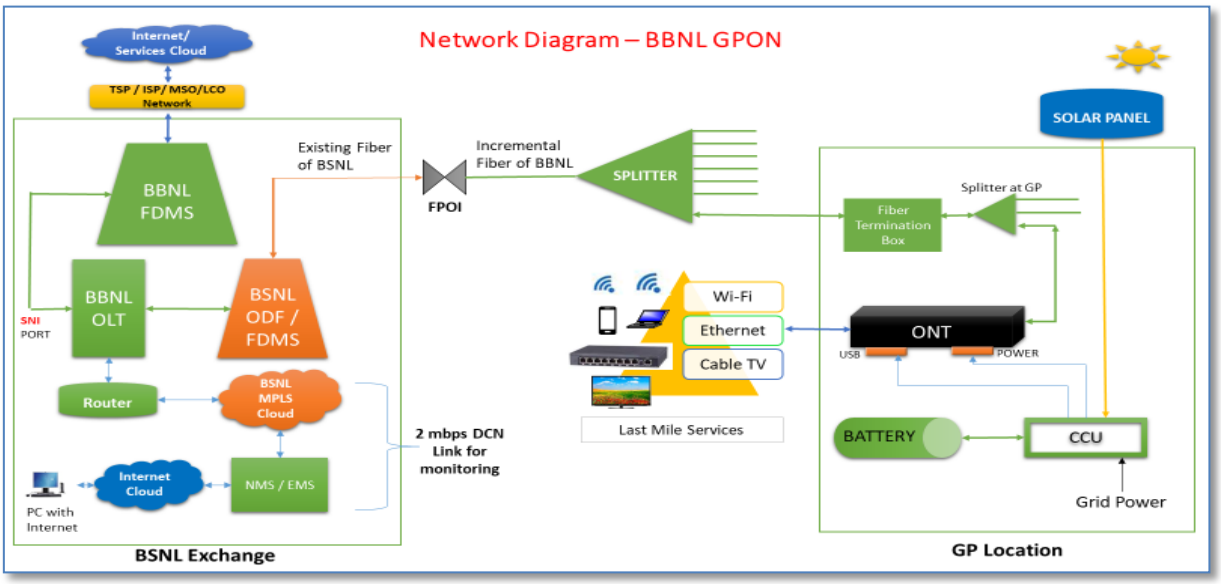



**Figure 4: Diagram showing Utilization**

**Source: BBNL web site/BBNL NOC/CSC**

**4.2.1.1.**

**Following are the challenges under BharatNet project affecting utilization.**

a) **Network Availability- O&M issues, Many GPs are still down**

b) **Demand of higher SLA by customers-** TSPs are asking for 98% uptime and with current state of O&M, only 75% SLA may be ensured.

c) **Network design issues: 24 Fibre cable with single fibre of BSNL (Ph-I)-** This needs to be addressed to create redundancy.

d) **Coverage only up to GPs –** need to reach villages where most of the end users are residing.

e) **Lack of custodianship at GPs –** There are theft/missing cases being reported from the field for solar panel and the GPON equipment.

f) **Lack of awareness in villages –** Customers are not aware what kind of services are being offered to them through this network.

g) **Technology for LMC – FTTH, Wi-Fi or any other-** Many more options for utilizations need to be explored to reach to customers.

h) **Tariff of backhaul for BharatNet users-**

i) **Local content –** content management is also required to make the utilization more attractive.

**Solutions**:

- **Rectifications of faults and proper O&M**
- **SLA based quality of service**
- **PPP model- to resolve several issues like**

- **custodianship,**
- **O&M,**
- **utilizations models,**
- **last mile reach to villages,**
- **market determined bandwidth tariff for BharatNet users on non-discriminatory access etc.**
- **Utilization status of Bharatnet:**

  **The latest status of utilization of BharatNet is at annexure- 2.**

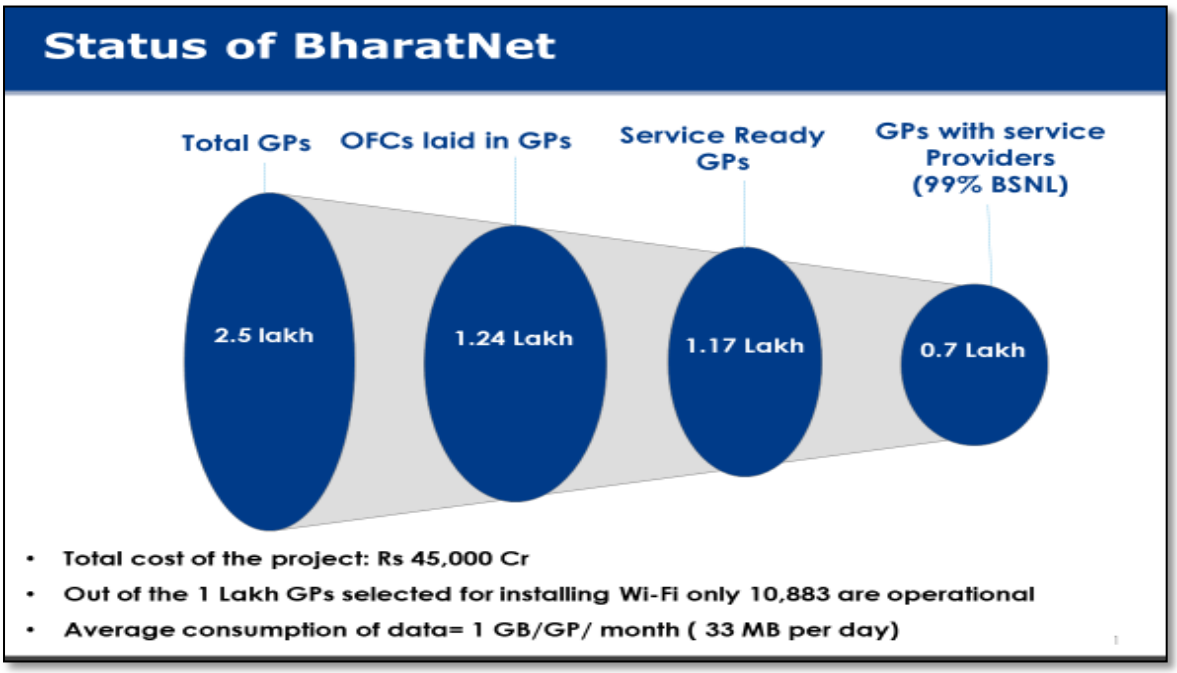



Figure 5: Status of BharatNet at a glance (NiTi Source)

## Background

| S.No | State | Total GPs | Service Ready GPs | % Coverage till date |
|---|---|---|---|---|
| 1 | Kerala | 941 | 1129 | 115.7% |
| 2 | Haryana | 6083 | 6123 | 100.7% |
| 3 | Rajasthan | 9891 | 8452 | 85.5% |
| 4 | Madhya Pradesh | 22839 | 12687 | 55.62% |
| 5 | Bihar | 8516 | 5865 | 68.9% |
| 6 | Uttarakhand | 7539 | 1508 | 20.0% |
| 7 | Odisha | 6598 | 3501 | 53.06% |

- States sampled on the basis of coverage ( High, medium and low)
- Only service ready GPs were selected for assessment

3

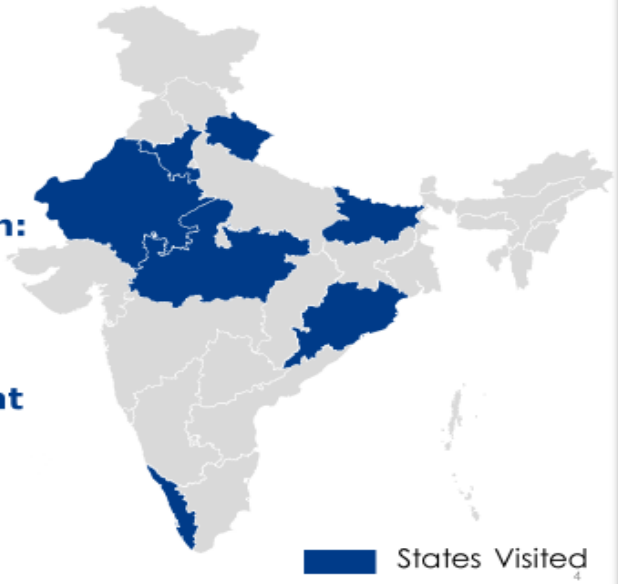
## Assessment Approach

7 states

60+ GPs

100+ interactions with:

- BBNL officials
- GP officials
- IT Dept at Panchayat Samiti
- Service Providers
- Beneficiaries




4

Figure 6: Assessment of BharatNet (NiTi Source)

### 4.2.1.2. Bharat Net utilization models

(a) **Bandwidth:** Utilization: Any service provider/ government agency who intends to provide its services at Gram Panchayat level may connect to BharatNet at block OLT location from where its traffic is carried to Gram Panchayat (GP) level on BharatNet.

At the GP, service provider has to extend its services to the end-customers using its own last mile. To trigger the ecosystem and promote BharatNet utilization, this bandwidth is being offered at highly attractive and affordable price.

(b) **Dark Fiber Utilization**: Service providers may also utilize the dark fiber on the new cable laid by BBNL between block and GPs, called incremental cable, for extending its services to GPs. The dark fiber is available from Fiber Point of Interconnect (with the existing fiber) to the GPs. However, there are about 15000 Gram Panchayats where BBNL fiber is available right up to the block from GPs. The dark fiber is also being offered at very affordable and attractive price of Rs 2,250 per fiber per KM per annum which is very much below the market price.

**(c) Current Utilization Status**

**Source: BBNL Web site/CSC**

Digital India to provide Digital Services in rural and remote areas is one of the priority of the Government. In order to provide affordable broadband services in rural India under the dynamic leadership of our Hon`ble Prime Minister of India Shri Narender Modi ji, a new tariff structure has been decided by Bharat Broadband Network Limited with the principle of more you use, less you pay, This tariff structure is expected to be reflected in the tariffs to be charged from the consumers by the service providers. The new tariff structure for provisioning of bandwidth between block to GP has been divided into two basic compartments i.e. symmetrical bandwidth where downlink and uplink have the same speed and asymmetrical bandwidth where uplink and downlink speed is in the ratio of 1:0.5.

For asymmetrical bandwidth between block to GPs the charges per annum varies from Rs.700/- per Mbps for up to 10Mbps and Rs. 200/- per Mbps for 1Gbps. However for symmetrical bandwidth between block to GP, charges have been prescribed as

Rs.1000/- per Mbps up to 10Mbps, and Rs.500/- per Mbps for 100 Mbps per annum. Tariff for any intermediate Bandwidth shall be calculated on prorata basis.

Further, discount of 5% to 25% have been offered for taking bandwidth in more than 1000 GPs to more than 25,000 GPs in a single application. Further, to lower the entry barriers, port charges at block and GP have been waived off. Tariffs for dark fibre are prescribed as Rs.2250/- per fibre per km per annum for service providers and Government agencies.

This will give an impetus to broadband facilities in rural India.

**(d) Tariff Plan for BharatNet:**

**Source: BBNL web site**

**i. TARIFF FOR BHARTANET BANDWIDTH FROM BLOCK TO GRAM PANCHAYATS:**

- **Asymmetric Bandwidth** (upload bandwidth is half of the download bandwidth):

| S No. | Bandwidth (Asymmetric) in Mbps | Tariff per annum (Rs) |
|---|---|---|
| 1 | Upto 10 Mbps | Rs 700 per Mbps |
| 2 | 10 | 7,000 |
| 3 | 100 | 38,000 |
| 4 | 200 | 56,000 |
| 5 | 300 | 74,000 |
| 6 | 400 | 92,000 |
| 7 | 500 | 1,10,000 |
| 8 | 1000 | 2,00,000 |

**Table 12: BharatNet tariff Asymmetric (B/W)**

ii. **Symmetric Bandwidth** (equal upload and download bandwidth):

| S No. | Bandwidth (Symmetric) in Mbps | Tariff per annum (Rs) |
|---|---|---|
| 1 | Upto 10 Mbps | Rs 1000 per Mbps |
| 2 | 10 | 10,000 |
| 3. | 100 | 50,000 |

**Table 13: BharatNet tariff Asymmetric (B/W)**

- Tariff for any intermediate bandwidth to be calculated on pro-rata basis.
- **Additional discount** for bulk bandwidth is as follows:

**A.** For bandwidth requested in 1000 to 5000 GPs as a single application : 5%

**B.** For bandwidth requested in 5000 to 10000 GPs as a single application : 10%

**C.** For bandwidth requested in 10000 to 25000 GPs as a single application : 20%

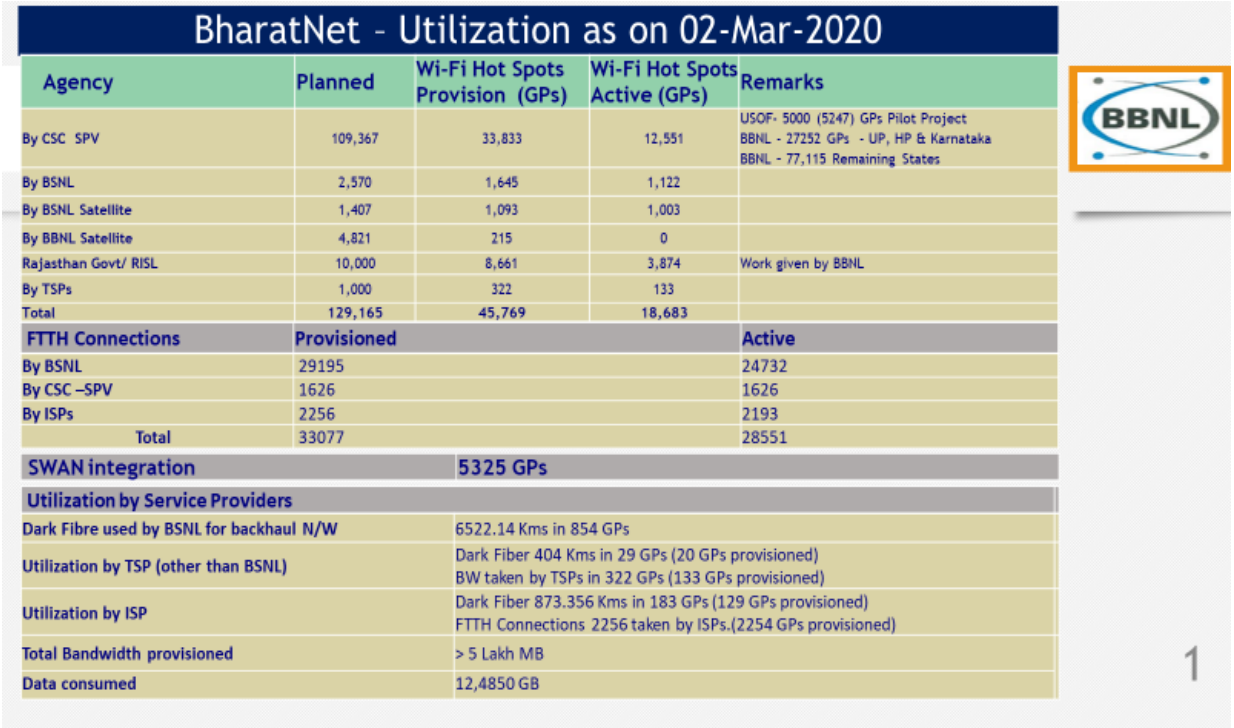
**D.** For bandwidth requested in more than 25000 GPs as a single application : 25%

- The port charges at Block and Gram Panchayats waived off.

iii. **TARIFF FOR BHARTANET DARK FIBRE ON BBNL'S OFC**

Tariff for dark fibre on BBNL'S OFC (Incremental cable) for service providers, government agencies etc at a uniform rate of **Rs 2250/- per fibre per Km per annum**.

The utilization status of Bharatnet is as per annnexure:2



BharatNet - Utilization as on 02-Mar-2020

| Agency | Planned | Wi-Fi Hot Spots Provision (GPs) | Wi-Fi Hot Spots Active (GPs) | Remarks |
|---|---|---|---|---|
| By CSC SPV | 109,367 | 33,833 | 12,551 | USOF- 5000 (5247) GPs Pilot Project<br>BBNL - 27252 GPs - UP, HP & Karnataka<br>BBNL - 77,115 Remaining States |
| By BSNL | 2,570 | 1,645 | 1,122 | |
| By BSNL Satellite | 1,407 | 1,093 | 1,003 | |
| By BBNL Satellite | 4,821 | 215 | 0 | |
| Rajasthan Govt/ RISL | 10,000 | 8,661 | 3,874 | Work given by BBNL |
| By TSPs | 1,000 | 322 | 133 | |
| Total | 129,165 | 45,769 | 18,683 | |

| FTTH Connections | Provisioned | Active |
|---|---|---|
| By BSNL | 29195 | 24732 |
| By CSC –SPV | 1626 | 1626 |
| By ISPs | 2256 | 2193 |
| Total | 33077 | 28551 |

| | |
|---|---|
| SWAN integration | 5325 GPs |
| Utilization by Service Providers | |
| Dark Fibre used by BSNL for backhaul N/W | 6522.14 Kms in 854 GPs |
| Utilization by TSP (other than BSNL) | Dark Fiber 404 Kms in 29 GPs (20 GPs provisioned)<br>BW taken by TSPs in 322 GPs (133 GPs provisioned) |
| Utilization by ISP | Dark Fiber 873.356 Kms in 183 GPs (129 GPs provisioned)<br>FTTH Connections 2256 taken by ISPs.(2254 GPs provisioned) |
| Total Bandwidth provisioned | > 5 Lakh MB |
| Data consumed | 12,4850 GB |

1

## Table 14: Utilization

**Source: BBNL/CSC**

## 4.3. Issues and Challenges of BharatNet:

**O&M Issues:**

Some of the reasons for such unsatisfactory performance of O&M are produced as below:

- **There was no penal provision** in the signed MoU between BSNL and BBNL for operation & maintenance of BharatNet Phase-I created infrastructure.
- **Neither there were any SLA parameters** mentioned in the MoU to enforce.
- O&M cost was being paid in advance to BSNL however, **the fund for O&M was not percolated down to local field unit of BSNL by its corporate office** and hence the local contractor was not maintaining the created infrastructure.

  **Solutions**: Thus, DoT took a stand and cancelled the O&M of created infrastructure (except OLTs) with BSNL and handed it over to CSC e-governance India Ltd. and SPV of MeitY having its presence and foot soldiers called VLEs across India. CSC-SPV is maintaining the infrastructure from 01/07/2019 and in these 3 months the total live GPs have increased from 22000 to 30000.

## 4.4. Utilization Issues &Challenge: In addition to issues discussed at 4.2.1.1

- ***Challenges***: There are various Issues and challenges ,which can be listed as below:
- **Poor Maintenance** of Fibre & Electronics
- **Multi Party Liasioning/payment** for Service Provider (SP)
- **Lack of viability** of service provision by SPs
- **No Network Utilization/demand creation** for end beneficiary
- **No** clear **Business/Utilization Model**
- State Governments **promoting own networks**

- **Poor Progress** of phase II project rollout
- **Inadequate manpower** of State BBNL teams
- So far BharatNet has reached only 1,35000 GPs,out of 2,50000 GPs.Another 1,15000 GPs to be covered in proper timeline.
- CPSU model has to be pushed wherever it has been mandated in Ph 2 implementation ,similarly PPP model in rest of Ph 2 to be pushed.
- CSC centres have to be placed at GPs at expedited rate.
- Digital Villages The target for 1 lakh digital Villages by March 2020 and 3 lakhs to follow.Hence the Digital Village have to expedited.
- We don't have Robust digital infrastructure and high speed network ready so far to cater hugh data explosion in our country.
- Roboust data policy has to be in place,
- We are not ready with our own technologies
- Security policy,Not enough data centres,
- Whether present cloud policy is sufficient ,
- IPV6 address pool is sufficient etc to cater addressing for billions of these IOT devices , Do we need separate IP registry in our country.can we as country able to handle the disruption of such ICT growth the country faces currently with the growing Emerging technologies and whether there any road map facilitating and handling of these ICT growth in future?
- Do we need separate regulator /licenser to regulate the disruptive growth of ICT services as well as monitor the threat of these services for the users.

- Multiparty liaising and payment scenario to service partners
- No commitment for reliable Services for Service Providers.
- **Lack** of viability for service provisioning creation of demand for digital services etc. poor maintenance of infrastructure created
- Lack of clarity on Business/Utilization models etc.
- **Finally**, this high-level Committee recommended for moving towards PPP of BharatNet Project including implementation, O&M and its utilization on 13/06/2019 has also approved the recommendation of the Committee and directed to take it up to the Union Cabinet. The Cabinet memo is under preparation by DoT.
- In-addition to above mentioned reasons for slow progress, there are other issues as well which has also delayed the targets of completion of BharatNet Phase-II. These are as follows:
- Under estimation of DPRs- The Scrutiny Committee of BBNL under estimated the DPRs of most of the States and when the tender discovered cost discloses to the authority, it was found that the most of these states are escalated in the range of 50-60% and that has laid to revisions of DPRs. The revision of DPRs has taken around 1 year for getting all kind of Scrutiny recommendations and approval by the Competent Authority.
- Repeated Cancellation of the tenders by some of the states.
- Enhancement of technology i.e. IP-MPLS over GPON and typology i.e. ring over linear. The Union Cabinet had envisaged that enhance architecture shall be taken up by DoT in Phase-III. But most of these states went for enhance architecture in Phase-II itself with their own additional fund. Because states claimed integration of features of Phase-III i.e. enhance architecture with Phase-II would reduce the cost of man

material and resources and would save time. This was neither financial nor technically was detailed in the Union Cabinet approval of 2017. Thus, DoT took few months to scrutinize the proposal of enhance architecture under Phase-II and the funding segregation of linear with GPON vs IP-MPLS between Centre and States respectively.

- Few states took more time in deciding its firmed implementation strategies and technologies.
- Slow implementation by the contractors etc.
- Solutions Thus, with all the above reasons, the implementation work of phase-II which was started from December, 2017 has taken more than a year to fix these issues and accord its approval to the state govts. to start the actual ground work by the contractors. The pace of the project has just been achieved and due to multiple rounds of review meetings and close monitoring/DoT progress are improving and it is expected that with the end of rainy season the more numbers of GPs are going to be connected in next 9 months. Further, after getting the approval of PPP model under BharatNet Project from Union Cabinet the performance of BharatNet Phase-II is expected to enhance.
- Service Delivery Models: Various Digital Service Delivery models are seen, however CSC model has been emerged as most popular model for service delivery. BBNL and CSC has made MOU in this regard recently.

## 4.5. CSC: Common Service Centre:

It is created to serve as Point of Delivery of Services and Happening point of Good Governance

Common Services Center (CSC)s are a strategic cornerstone of the Digital India programme. They are the access points for delivery of various electronic services to

villages in India, thereby contributing to a digitally and financially inclusive society. CSCs are more than service delivery points in rural India. They are positioned as change agents, promoting rural entrepreneurship and building rural capacities and livelihoods. They are enablers of community participation and collective action for engendering social change through a bottom-up approach with key focus on the rural citizen.

## 4.6. Overview

a. One of the integral part of "Digital Village" scheme is the availability of infrastructure to provide internet access to the villagers. All the identified villages need to be provided with a facility for enabling internet provisioning to households. The Department of Telecommunications (DoT) has undertaken implementation of BharatNet and activated in nearly 1.25 lakh Gram Panchayats for enabling delivery of internet services to the citizens. The Department of Telecommunications has undertaken initiatives under Phase-II for activating and installing BharatNet access points in remaining 1.25 lakh Panchayats.

b. Universal Service Obligation Fund (USOF) under DoT has made significant progress in extending BharatNet across the country with a view to provide high speed internet connectivity to rural citizens. By improving access to Internet connectivity, it ensures a vibrant and inclusive economy. CSC Wi-Fi Choupal programme powered by BharatNet is playing significant role in supporting the vision of DoT by providing affordable Internet access to the population at the last mile using the BharatNet. CSCs have been entrusted with the task of ensuring Internet connectivity in remote and inaccessible areas of rural India by DoT on pilot basis.

c. BharatNet Phase 1 under which more than one lakh Gram Panchayats are equipped with high speed broadband infrastructure, CSC VLEs have already done well in

establishing last mile access network through Wi-Fi technology in 31,006 Gram Panchayats in 14 states namely Bihar, Chandigarh, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh ,Maharashtra, Manipur, Odisha, Puducherry, Uttar Pradesh, Uttarakhand by utilizing BharatNet.

d. There is general saying "we give fish to the person he/she will eat and we give internet to the person they would find a livelihood ". The necessity of internet for empowering communities which is also an objective of Digital Village cannot therefore be undermined.

e. CSC pilot for Wi-Fi in villages

- CSCs across the country are last mile access points for enabling delivery of services to the citizens across the country. The CSC run and operated by the local entrepreneur become first user of internet in the villages as this will enable him to deliver services more efficiently and effectively. It is with the underlined provision that DoT has undertaken on pilot basis last mile provision of internet services and wifi in 35,000 locations through CSCs.
- To realize the vision of Digital India programme into digitally empowered society and knowledge economy CSC Wi-Fi Choupal was introduced to enable last mile delivery of internet connectivity through Wi-Fi/Optical Fiber Cable and bridge the urban rural divide.
- CSC Wi-Fi Choupal initiative encapsulates enabling of Wi-Fi Service in all 1.25 lakh Gram Panchayat by deploying affordable and effective infrastructure thereby delivering services at an affordable price and reliable access of internet through Village Level Entrepreneurs of CSC.

- CSC Wi-Fi Choupal provides requisite framework for facilitating internet service by integrating it with BharatNet end point at Gram Panchayats (GP) and providing last mile connectivity.
- Wi-Fi Choupal essentially facilitates a Service Delivery ecosystem which is used to deliver the following main services:-
- Hi Speed Internet Access across village
- Free Wi-Fi calling solution
- Video Calling between local Smartphones possible without using telecom billing
- Streaming of Audio/Video Content (entertainment, edutainment and infotainment) over Smartphones and Tablets
- Mobile Commerce
- G2C and B2C Services

i. <u>The architecture for CSC BharatNet wifi ecosystem is as follows:</u>

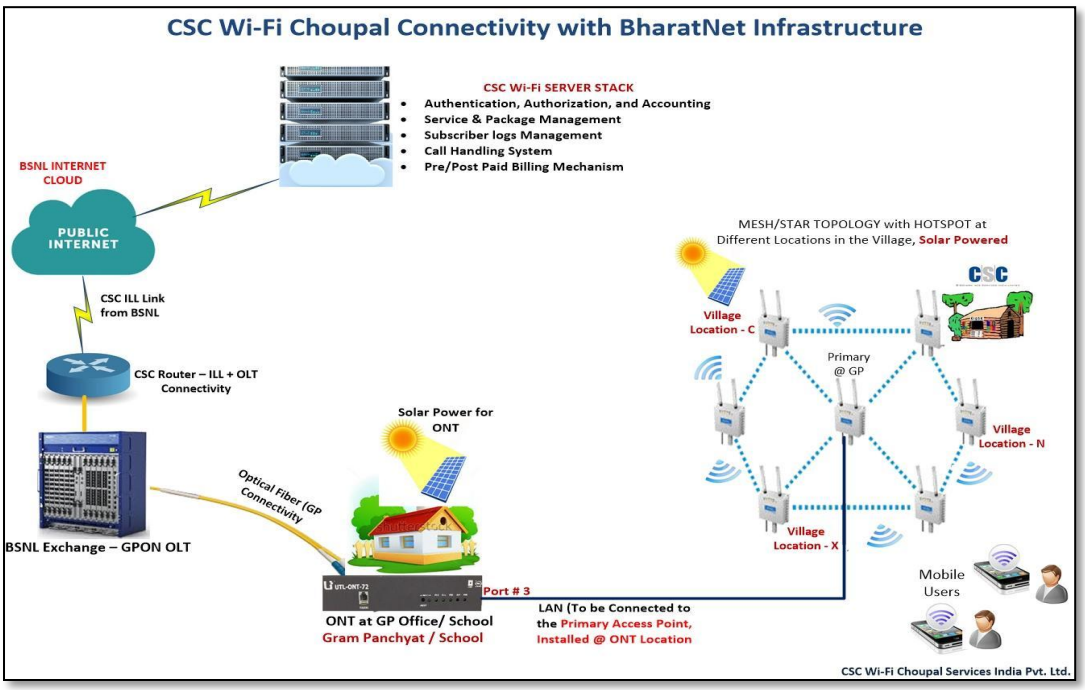
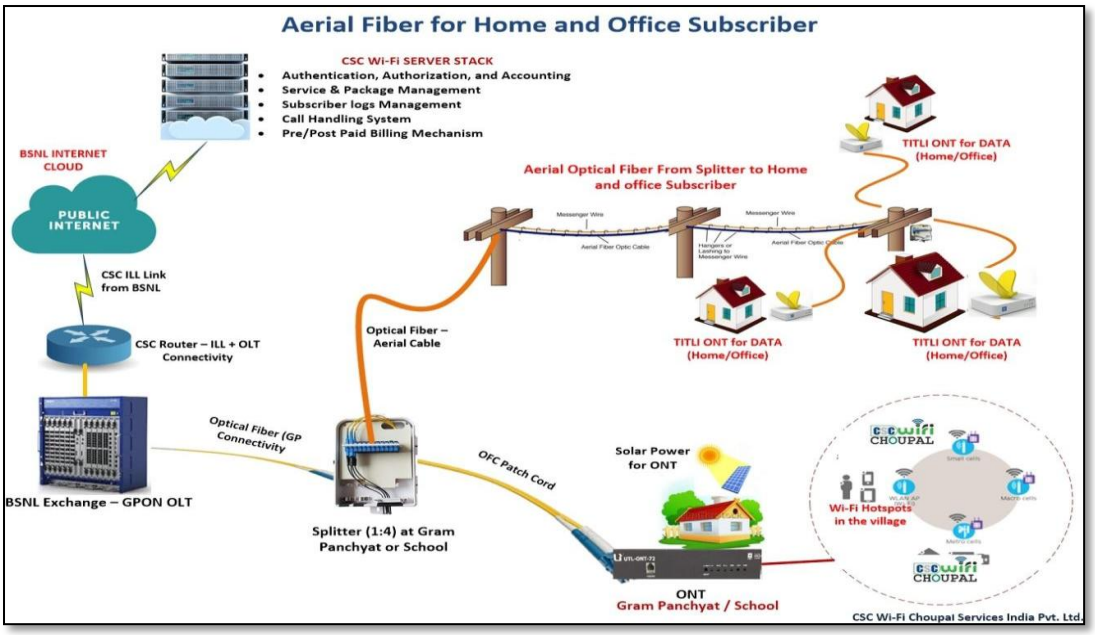



**Figure 7: CSC model of last mile delivery WiFi Chaupal**

CSC initiative for providing internet access points also supports FTTH (Fiber to Home). The model for providing FTTH of CSC SPV is as given below.




## Figure 8: CSC model connecting homes through Aerial fibre

CSC model for providing internet access to villagers through wifi Choupal has been found to be very effective and meet the expectation of the citizens. Through this model, it is proposed to cover all 1,00,000 digital villages which would transform Rural landscapes and achieve the objective of empowering communities through use of technology. The model envisages training of large number of persons for Grass root telecom services, deployment & maintenance of Wi-Fi radios , OFC laying & maintenance , Repair and maintenance of GPON & OLTs and related services at the local level. It is expected that 2-3 persons will be employed in each of the Gram Panchayat to manage, support and promote internet sale & hardware service to the subscribers.

Support for Service Provisioning in 1.25 Lakh GPs covered in BharatNet Phase 1

Based on the learning from the Wi-Fi last mile provision by CSC SPV pilots in order to make the CSC wifi model sustainable there is need for active support from USOF/BBNL and DoT. CSC SPV can undertake the provision for internet access

points to all the 1.25 Lakh GPs covered under phase-1 of BharatNet and would need support for the following:

1. **CSCs as Custodian**: CSC at the local level can be made custodian of GPON and other last mile equipmets . This would help in taking proper care of GPON equipments and make CSC operator accountable for its maintenance and Up keep. Availability of BharatNet GPON in Panchayat offices / Schools does not create the accountability & ownerships and therefore basic maintenance & up keep of equipmets becomes very difficult, thus disrupting the functioning /operation of Bharat net. This seriously impinges on its credibility and acceptability of internet service within community. Making CSC as custodian will address these issues and make the system more accountable and incentivize enough to maintain the last mile equipments to contain disruptions in functioning.

2. **Shifting equipments to CSCs** : - Presently BharatNet GPON in nearly one lakh twenty five thousand Gram Panchayats are located in schools /Panchayat office building and it has its own limitations in maintenance and upkeep even the entry in these locations is highly restricted and dependent on the staff. There is also lack of ownership and accountability at the Panchayat level. Shifting of GPON to the CSC will ensure uninterupted power supply and regular cleaning of Hardwares which will enhance significantly the upkeep and maintenance of GPON and strengthen the delivery of internet services to the citizens using Bharatnet.

3. **Maintenance by CSCs** : There is need to support CSCs in maintenance of the GPON Equipments. USOF, DOT /BBNL to consider assistance for enabling CSC /VLE operator to maintain and upkeep the GPON Equipments. An amount of Rs.

1150/- per location per month as approved by Empowered Committee chaired by Secretary(T), Dept. of Telecommunications, Govt. of India on 17th Oct 2017 of Rs 1150 per month/GP may be provided as incentive to the CSC operator for the same. This will ensure proper upkeep and maintenance.

4. **Signage for optical fiber network** : In rural India there are issues in regard to the frequent cut of the optical fiber due to mutiple regular projects of Depts. Like Irrigation, Roads , Railways Petroleaum and Gas etc. It is also true that the optical fiber network has no proper demarcation, symbol/signs for warning the rural citizens to be careful while digging such paths/places. There is need for optical fiber network to have proper demarcation and signage with cautions. DoT and USOF may provide installation and maintenance of all these signages along with optical fiber path.

5. **Repair of Optical Fiber**: In addition wherever there is fiber cut it needs to be immediately repaired / replaced. CSC SPV in the present system has been undertaking the work of repairing the fiber through its own resources in order to make them accessible to the citizens. It is also found that CSC VLEs – effectively maintain and repair the fiber if they have been provided necessary training for the same. It is necessary that the responsibility to maintain the fiber for the delivery of services within the Gram Panchayats and also repair it wherever it is required may be assigned to CSC SPV for the digital villages. DoT /USOF may provide Rs. 800/- per Km per month for this purpose. This would support in timely repair of fiber cut.

6. **Skilling of people for maintenance and upkeep of BharatNet and related infrastructure** : DoT /USOF and skilling Ministry may consider and provide

necessary support for skilling of minimum 2 (two) persons in every Panchayats for each Digital Village identified in maintaining and upkeeping of various infrastructure provided by BharatNet. Provisioning of these would result in employment generation for more than 2.5 lakh people in rural India for maintaining and supporting in the BharatNet infrastructure.

7. **Connecting the Government institutions in the Digital Village with BharatNet:** Government institutions in the digital village such as Police Stations ,schools, Anganwadi, Sub-Centres, Panchayats and Agriculture depot/ Ration shops may be provided internet access through BharatNet. USOF /DoT may provide support in enabling extension of BharatNet connectivity within the Digital Village at Panchayat level. The operating expenses, infrastructure cost for one year may also be provided for these institutions for internet facility as well as for delivery of services to the citizens. CSC SPV will support in these initiatives:

   CSC SPV as Proof of Concept has already connected more than 10 Police Stations across Uttar Pradesh, Uttarakhand and Himchal Pradesh. In fact one of the most critical Police establishment of UP police i.e. Police Signature Tower, Lucknow which is a office of Dial 100, CCTNS NoC and E-Thana is connected by CSC through BharatNet.

   In brief Digital Village scheme would include provisioning of internet/wifi and needs support from DoT for the following:

- Making CSC as custodian.
- Shifting of existing GPON equipments to CSCs.
- Maintenance and upkeep of last mile equipments through the CSC VLEs.
- Maintenance of optical fiber by the CSC VLE for the concerned area.

- Provisioning for providing connectivity to five Government institutions within the digital village using BharatNet.
- Support for skilling to create 2.5 lakh persons employable.

## 4.7. Digital Village:

With the vision and mission of the Digital India Programme launched by our Honourable Prime Minister Shri Narendra Modi, CSC e-Governance Services India Ltd. has joined the "Digital Village" Campaign.

Digi-Village aims to make the root of Indian Society - "The Villages" Digitally Connected and every rural citizen digital literate.

CSC SPV has initially selected six villages as a pilot under the Digital Village Campaign where the target is to provide all e-Governance Services to the rural citizens through the medium of CSC Center.

CSC Center will act as a one stop channel to digitally connect the entire population of the Village.

Source:Digital Village official website[17]

## 4.8. Vision & Mission

Creating a One Stop Service Solution for the village area citizens, providing them with qualityservices like telemedicine, Financial Services, Internet Connectivity and other G2C/B2C services which are easily accessibleat an affordable price round the year.

I. The aim of the Project is to support techno economic viability of digital technology, projects for productive applications in village area livelihoods; standardize the technology packages for future applications; create awareness and capacity building activities on Information Technology systems.

II. Creation of employment opportunities for the youth, by promoting the IT/ITES Industry.

III. Promotion of investment in IT/ITES Sector in order to expand the base of IT Industry and secure balanced regional growth.

## 4.9. Visit of Teams from IIPA:

**Various teams from IIPA visited the Digital Village** Gurwara , Teh. Palhwas ,Dist : Rewari Haryana.The observations of the teams at both Occasion are as under:

i. **Visit on Date 6.11.2019**: A team of about 50 senior officers mostly JS rank visited the BharatNet and digital village Gurwara , Teh. Palhwas ,Dist : Rewari Haryana on 6.11.2019. to see and experience the various digital services delivery models of CSC in rural areas under digital India mission of Govt of India as well as working of Bharatnet in providing high speed bandwidth.


**Figure 9: Visit of APPPA 45 participants to Digital Village Gurwar, Rewari, Haryana**

ii. **Visit on Date: 5.12.2019**

On 5.12.2019,A team of more than 40 officers belonging to Ministry of tribal affairs as part of participants in a workshop organised by IIPA visited visited the bharatnet and digital village Gurwara , Teh. Palhwas ,Dist : Rewari Haryana under the leadership of Professor Nupur Tewari to see and experience the various digital services delivery models of CSC in rural areas under digital India mission of Govt of India as well as working of Bharatnet in providing high speed bandwidth.


**Figure 10: Visit of Team from Tribal Affairs ministry under IIPA training to Digital Village Gurwara ,Rewari, Haryana**

iii. **Observations of both the Teams**: Both of the teams have similar observations on their visiot to Digital Village.The team appreciated the work of BBNL and CSC In making digital service delivery in a very effective and efficient manner.The women empowerment model is clearly exemplary and appreciated by the team. The effort of Bharatnet In Providing high speed bandwidth to the panchayats is also appreciated by the team. The initiative of IIPA in sending the senior policy making officers for such

visits which really makes difference in their overall approach in policy making .the team enjoyed the digital India initiative .The first-hand experience of Badalta Bharat , New India / Naya bharat initiatives were experienced and enjoyed by the team in this village.

# 5. Chapter:

## Some Key Policy Enablers for Broadband in the Country

This chapter describes different Policy enablers for Broadband Penetration in the country .The policies include Digital India,National Digital Communications Policy (NDCP)-2018,National Broadband Mission as well as Broadband Readiness Index (BRI) etc. have been elaborated in this chapter.

## 5.1. Digital India:

In the year 2015, A programme to transform India into a digitally empowered society and knowledge economy known as Digital India was launched .

Digital India is an umbrella programme that covers multiple Government Ministries and Departments. It weaves together a large number of ideas and thoughts into a single, comprehensive vision so that each of them can be implemented as part of a larger goal. Each individual element stands on its own, but is also part of the larger picture. Digital India is to be implemented by the entire Government with overall coordination being done by the Department of Electronics and Information Technology (DeitY). Digital India aims to provide the much needed thrust to the nine pillars of growth areas, namely Broadband Highways, Universal Access to Mobile Connectivity, Public Internet Access Programme, e-Governance: Reforming Government through Technology, e-Kranti - Electronic Delivery of Services, Information for All, Electronics Manufacturing, IT for Jobs and Early Harvest Programmes. Each of these areas is a complex programme in itself and cuts across multiple Ministries and Departments. Bharatnet has been envisaged as pillar number 1 among nine pillars of Digital India.

**Vision of Digital India:**

- Centered on 3 Key Areas•
- Digital Infrastructure as a Utility to Every Citizen•
- Governance & Services on Demand•
- Digital Empowerment of Citizens

### 5.1.1. Nine Pillars of Digital India:

1. Broadband Highways-BharatNet
2. Universal Access to Phones
3. Public Internet Access Programme
4. E-Governance –Reforming government through Technology
5. eKranti –Electronic delivery of services
6. Information for All
7. Electronics Manufacturing –Target NET ZERO Imports
8. IT for Jobs
9. Early Harvest Programmes

## 5.2. NDCP: National Digital Communications Policy-2018[4]

1. **NDCP 2018**:
2. National Digital Communication policy has given sufficient push to create world class ICT echo system for India.
3. Earlier all the telecom policies were called as National Telecom Policy NTP,but for the first time the telecom policy of our country was called as National Digital Communications Policy-2018.

4. National Digital Communication policy is basically gives the Digital Road map of India by 2022. It has given sufficient push to create world class ICTecho system for India including BharatNet.

### 5.2.1. Objectives:

The National Communications Policy aims to accomplish the following Strategic Objectives by 2022:

1. Provisioning of Broadband for All
2. Creating 4 Million additional jobs in the Digital Communications sector
3. Enhancing the contribution of the Digital Communications sector to 8% of India's GDP from ~ 6% in 2017
4. Propelling India to the Top 50 Nations in the ICT Development Index of ITU from 134 in 20175.Enhancing India's contribution to Global value chain.
5. Ensuring Digital Sovergnity

### 5.2.2. Missions:

In pursuit of accomplishing these objectives by year 2022, the National Digital Communications Policy, 2018 envisages three Missions:

1. Connect India:

   Creating Robust Digital Communications Infrastructure

   To promote Broadband for All as a tool forsocio-economic development, while ensuring service quality and environmental sustainability.

2. Propel India:

   Enabling Next GenerationTechnologies andServices through Investments, Innovation and IPR generationTo harness the power of emerging digital technologies, including 5G, AI, IoT, Cloudand Big Datato enable provision of future ready products and

services; and to catalyse the fourth industrial revolution (Industry 4.0)by promoting Investments, Innovation and IPR.

3. Secure India:

   Ensuring Sovereignty, Safety and Security of Digital Communications to the interests of citizens and safeguard the digital sovereignty of India with a focus on ensuring individual autonomy and choice, data ownership, privacy and security; while recognizing data as a crucial economic resource.

## 5.3. Broadband Readiness Index (BRI):

Launching the Broadband Readiness Index for Indian States and Union **Territories (2019-2022):**

The Department of Telecom (DoT) and the Indian Council for Research on International Economic Relations (ICRIER) signed a Memorandum of Understanding (MoU) to develop a Broadband Readiness Index (BRI) for Indian States and Union Territories (UT). The first estimate will be made in 2019 and subsequently every year until 2022.

The National Digital Communication Policy (NDCP) 2018 acknowledged the need for building a robust digital communications infrastructure leveraging existing assets of the broadcasting and power sectors including collaborative models involving state, local bodies and the private sector. Accordingly, the policy recommended that a BRI for States and UTs be developed to attract investments and address Right of Way(RoW) challenges across India.

This index will appraise the condition of the underlying digital infrastructure and related factors at the State/UT level. Such an exercise will provide useful insights into

strategic choices made by States for investment allocations in ICT programmes. In the spirit of competitive federalism, the index will encourage states to cross learn and jointly participate in achieving the overall objective of digital inclusion and development in India. The framework will not only evaluate a state's relative development but will also allow for better understanding of a state's strengths and weaknesses that can feed into evidence-based policy making. The methodology developed as a part of this research will be adapted and used on an annual basis for systematic evaluation of state-performance on metrics set out as the goals for 2022 under the new policy. As a result, ranking and understanding State/UT performance over time will be an important part of the exercise.

The BRI consists of two parts. Part I will focus on infrastructure development based on the measurement of nine parameters. These are provided in the Table below. Part II consists of demand side parameters which will be captured through primary surveys. It will include indicators such as percentage of households using computers/ laptops with internet connection, percentage of households with fixed broadband connection, internet users as a percentage of the population, smart phones density, percentage of households with at least one digitally literate member, etc. The primary survey will be conducted annually until 2022.

| **S. No** | **Proposed BRI Indicators** |
|---|---|
| 1 | Availability of State Policy on RoW and Towers (based on DoT RoW Rules 2016 |
| 2 | Percentage of ROW cases given permission within 60 days of the first application |
| 3 | Availability of a centralized IT Portal for ROW clearances across all Government land and building owning authorities. |
| 4 | Adoption of the National Building Code 2016 by the State |
| (i) | State policy to have enabling provisions for access togovernment lands and buildings for installation of telecom towers |
| (ii) | State policy to have enabling provision for 24* 7 telecom operations |
| (iii) | Standardized RFP template for smart city implementation – enabling rules |

| | |
|---|---|
| | promoting non exclusivity and infrastructure sharing in a non-discriminatory manner |
| (iv) | Common duct policy based on the Central Government's "Dig Once Policy" |
| 5 | Percentage of mobile towers connected with fibre |
| 6 | Number. of fibre kms per sq. KM/ per capita/ per 100 households |
| 7 | Percentage of public institutions / offices connected by FTTX (Hospitals including PHCs, Police stations, Schools and CSCs) |
| 8 | Percentage of towers receiving grid supply (Duration: Urban 20 hours; Rural 12 Hours) |
| (i) | Priority electricity connection available to telecom towers in the state |
| (ii) | Supply of electricity at affordable/ industrial rates to telecom towers |
| 9 | NagarNet –Number of Public Wi-Fi Hotspots in urban areas |
| | JanWiFi – Number of Public Wi-Fi Hotspots in rural areas |

**Table 15: BRI Indicators**

The development of BRI will be a collaborative exercise with stakeholders including State governments and industry associations like the Tower and Infrastructure Providers Association (TAIPA), the *Internet Service Providers Association of India (ISPAI) and* the Cellular Operators Association of India (COAI). This will be a first of its kind exercise that will comprehensively measure the development of telecom infrastructure at the sub national level.

**Source: PIB ,dated 16.07.2019**

## 5.4. National Broadband Mission( NBM)

National Broadband Mission NBM was launched on 17.12.2019 by Hon'ble Minister of Communication and IT Shri Ravi Shankar Prasad.

The vision of the NBM is to fast track growth of digital communications infrastructure, bridge the digital divide, facilitate digital empowerment and inclusion and provide affordable and universal access of broadband for all.

Some of the objectives of the Mission which is structured with strong emphasis on the three principles of universality, affordability and quality are:

**a.** Broadband access to all villages by 2022

**b.** Facilitate universal and equitable access to broadband services for across the country and especially in rural and remote areas

**c.** Laying of incremental 30 lakhs route km of Optical Fiber Cable and increase in tower density from 0.42 to 1.0 tower per thousand of population by 2024

**d.** Significantly improve quality of services for mobile and internet

**e.** Develop collaborative and innovative implementation models for Right of Way (RoW) and to work with States/UTs for having consistent policies pertaining to expansion of digital infrastructure including for RoW approvals required for laying of OFC

**f.** Develop a Broadband Readiness Index (BRI) to measure the availability of digital communications infrastructure and conducive policy ecosystem within a State/UT.

**g.** Creation of a digital fiber map of the Digital Communications network and infrastructure, including Optical Fiber Cables and Towers, across the country

**h.** Investment from stakeholders of USD 100 billion (Rs 7 Lakh Crore) including Rs 70,000 crore from Universal Service Obligation Fund (USOF)

**i.** Address policy and regulatory changes required to accelerate the expansion and creation of digital infrastructure and services

**j.** Work with all stakeholders including the concerned Ministries / Departments/ Agencies, and Ministry of Finance, for enabling investments for the Mission

Source: PTI dated 17.12.2019 and other news media including DD news

## 5.4.1. NATIONAL BROADBAND MISSION

1Background: Digital Connectivity is a key factor for holistic growth across sectors. Enabling Broadband connectivity across the country is essential to bridge the Digital divide between rural-urban and rich-poor. This will also promote e-governance, transparency, financial inclusion and ease of doing business.It has led to socio-economic development of citizens across developing and developed economies.

For India, the connectivity is the key requirement across all infrastructure sectors such as water, electricity, communication, gas, highways, ports, airports etc.The Indian telecommunications sector has historically been a strong performer and more so in the recent past where it has witnessed a higher growth. As of September, 2019 the broadband penetration in India stood at 625.42 million, an increase of over 100% since the introduction of the first 4G networks in the country in 2015. During the same period, the data usage is now nearly 10 GB per subscriber per month. The quantum jump in broadband subscribers has catapulted India to be the largest consumer of mobile data in the world, overtaking USA and China in peak consumption. While the significant coverage of 4G is now a reality, there is still room to grow, and strengthen the underlying infrastructure. It is also important that such universal access to broadband is affordable and of high quality.

Accordingly, National Digital Communications Policy – 2018 (NDCP-18) recognizes digital communications infrastructure and services as key enablers and critical determinants of India's growth and well-being. One of the objectives of NDCP-18 is to provision 'Broadband for All' so that the resulting benefits of wide-spread, equitable and inclusive growth are enjoyed by all.

The policy aims to empower citizens by effectively bridging the digital divide.In order to operationalize 'Broadband for All' a “National Broadband Mission” or

"Rashtriya Broadband Abhiyan" needs to be set up to secure universal broadband access. The objective of this document is to outline the need, objectives, functions and the proposed structure of the National Broadband Mission.

*Source: Booklet released by DOT on National Broadband Mission from DOT web site.This section is quoted fully from the booklet.*

### 5.4.2. Importance of Broadband

The importance of broadband cannot be overstated, and the transformative potential of the technology has far reaching implications for the society, industry, Government and the economy. For the agrarian sector, broadband is well equipped to deliver increased outputs, lower costs, easier administration, remote monitoring of livestock and better security. Broadband also has a proven track record in enabling the emergence of Small and Medium Enterprises (SMEs), stimulating job creation, driving operational and business efficiencies that accrue from enterprises' use of cloud computing, and facilitating changes and improvements in work practices. From bringing healthcare and education services to the remote regions, to stimulating environmental responsibility by reducing the need to travel, and revamping transportation, energy, and even the very nature of work, broadband has assumed a position of great import for all nations. Over the last decade, there has been a global escalation in the penetration and usage of broadband and internet because of its vital role in the functioning of modern societies. It has also been repeatedly stressed by economists and academicians, in their effort to quantify the effects mentioned above, that socio-economic welfare has a direct link with broadband penetration. A recent report published by the Indian Council for Research on International Economic Relations (ICRIER) found that a 10% increase in Internet subscribers in India results in a 3.2 percent increase in the rate of growth of State per capita GDP and a 10

percent increase in India's mobile Internet traffic, delivers on an average a 1.6 percent increase in India's GDP. India has been classified as a mobile first economy since over 90 percent Indian subscribers are accessing the broadband on mobile. Widespread use of digital communications to supplement the physical infrastructure and availability of quality basic services for a large part of the population, makes broadband a biggest transformational opportunity, not only enabling leapfrogging from currently deficient citizen services delivery system to a universal services delivery system, but also opening up a plethora of economic opportunities for everyone. It is undeniable that a digital revolution does offer massive opportunity to change the status quo. The direction we take from hereon, will determine whether we exploit this opportunity or miss it. Every sector and all countrymen stand to benefit significantly from the adoption of broadband. Using this opportunity to our advantage would require conscious, well thought out interventions from policy makers. This will include interventions in the areas of digital communications, digital content, digital services, digital regulations, security etc.

### 5.4.3. Present State of Broadband in India

The current state of broadband in the nation is vibrant and signals potential for exponential growth in years to come. Compounded by the cascading positive impact of broadband on the economy and society, this growth will be a critical contributor to national progress, and thus the sector needs to be nurtured.Several challenges are faced in the rollout of networks in unserved and underserved areas which largely includes rural and remote areas.These arise due to low reach of infrastructure in rural areas, low population density and the consequent lack of a viable business case – all of which may be addressed with suitable policy prescriptions. Such mechanisms are fundamentally linked to the objectives of the mission and form a critical part of this

document. Since 2014 broadband connections (mobile and fixed line) have seen substantial growth, -from 61 million in 2014 to 625 million in September2019. Out of 625 million broadband connections there are almost 97% mobile broadband connections in India which are largely in urban areas. The current overall broadband connections cover around 45% of the population as compared to 70%-80% in a well-connected nation. In our country, the rural broadband connections are at around 27%, thereby clearly indicating the need to enhance broadband infrastructure to serve the rural citizens. Further, average data usage per month has registered an exponential growth rate of 129% over the last three years on the back of increased 4G data traffic. The growth in data usage has been further fuelled by increase in the sources of content, growing migration to smartphones, falling data prices and improved network coverage. In order to meet the increasing data demand and coverage the number of broadband connection have to be nearly doubled to facilitate digital inclusion of citizens for broadband services across the length and breadth of the country.

**5.4.4.**

Challenges however, much needs to be done to reach a stage where digital communications is able to fulfill its potential of becoming a universal platform for equitable and inclusive growth across the country. There is an urgent need to fast track the progress, necessitating fundamental changes in the way we operate, specifically with respect to creation of digital communications infrastructure, which faces several hurdles. Several challenges delay the roll out of broadband services to the unserved, underserved, rural and remoteregions of India.Investments in infrastructureneed to be enhanced and universal last mile broadband connectivityneeds to be promoted. Creation of the digital communications infrastructure requires coordination and alignment of work of multiple stakeholders

and agencies-the Central Ministries and Departments, State Governments, Local/Municipal authorities, industry and user communities to achieve the intended objectives. One of the major challenges is implementation of Indian Telegraph Right of Way Rules, 2016. The cost of fiber rollouts remains high in India due to complicated and uncertain Right-of-Way (RoW) policies across the country.We also need to promote the development and deployment of domestic manufacture of telecom goods for providing broadband infrastructure.

**5.4.5.**

Need for National Broadband Mission The National Broadband Mission is required to design and implement the strategy to be adopted by all stakeholders to achieve the goal of 'Broadband for All'. The National Broadband Mission (NBM), therefore, is expected to enable holistic measures which will provide equitable access to Digital Communications across all sections and strata of our society, and bridge the Digital Divide. As the Indian economy accelerates towards achieving its millennium goals, it will require all the critical resources at its disposal for efficient, productive & sustainable development. Amongst the most basic resources that the nation needs to make available to ensure that forward movement is uniform and homogeneous access to broadband services provided over state-of-the-art efficient networks, to connect a large proportion of un-served and serve large volume subscriber traffic.To fast track the progress for universalization of Digital Communications, coordination is required with a number of concerned stakeholders. The NDCP-2018 has envisaged the constitution of a National Broadband Mission (NBM), with the primary objective of facilitating the creation of digital communications infrastructure and provisioning of services thereon.

**5.4.6.**

Vision of the National Broadband Mission  To enable fast track growth of digital communications infrastructure, bridge the digital divide for digital empowerment and inclusion, provide affordable and universal access of broadband for all.

7Objectives of the National Broadband Mission It is absolutely essential, given the demographics and the socio-economic dimensions of a vast and diverse nation such as our country, that the three principles of universality, affordability and quality are intrinsic features of broadband services.

These three principles may be defined as:

Universality: Ubiquitous availability of broadband services to bridge digital divide

Affordability: Availability of affordable broadband services to every citizen of India to bridge the socio-economic divide

**5.4.7.**

Quality: Availability of high speed and highly reliable broadband access to all The Mission has been structured with strong emphasis on the above principles and promotes policies and activities to help the sector achieve its true potential.

To achieve the vision of National Broadband Mission in the next five years, the main objectives are:

a) To facilitate universal and equitable access to broadband services for growth and development throughout the country and especially in rural and remote areas
b) To address policy and regulatory changes required to accelerate the expansion and creation of digital infrastructure and services
c) Creation of a digital fiber map of the Digital Communications network and infrastructure, including Optical Fiber Cables and Towers, across the country

d) Work with all stakeholders including the concerned Ministries/ Departments/ Agencies, and Ministry of Finance, for enabling investments for the Mission

e) Work with the Department of Space, to make available adequate resources required for extending connectivity to far flung areas of country through satellite media

f) To encourage and promote adoption of innovative technologies for proliferation of broadband especially by the domestic industry

g) Seek cooperation from concerned stakeholders by developing innovative implementation models for Right of Way (RoW)

# 6. Chapter
# Case Study

## 6.1. Field visits to UP East and Haryana

This chapter is describes case study of various field visits made by undersigned. Chapter is dedicated towards field visits made to UP(East) and Haryana to Bharatnet and Digital Village to study implementation ,O&M as well as utilization aspects of BharatNet on ground. The experience of utilization linked with good governance during field visits also discussed. Current status of Implementation and utilization in field level have been indicated and analysed. Based on analysis,various issues/challanges are listed and solutions/way forwards have been suggested. These data are based on BBNL NOC and Other stake holders like CSC /Vendors etc.

### 1. Field Visit to UP East circle ,Lucknow

Undersigned visited Lucknow on 11.02.2020 to 13.02.2020 to have a ground facts on BharatNet implementation, O&M issues, Utilization status and issues and challenges as well as actions being taken by BBNL and other stake holders ie BSNL, ITI, Tejas and CSC .

CMD BBNL hold a review meeting at Lucknow on 12.02,2020 for BharatNet in UP East circle . Undersigned attanded the meeting and discussed various aspects with all stake holders.

The meeting was chaired by CMD BBNL and attended by BBNL officers, BSNL, GPON venderos like ITI, Tejas, UTL, L&T as well as CSC .

The detailed report presented and discussed in the meeting was as under:

UP (East) Circle BharatNet Phase-I & IIProgress Report
12-02-2020

BharatNet Ph-I O&M at a Glance: Source BBNL NOC

| Item Name | Number |
|---|---|
| District | 48 |
| Blocks (OLTs) | 275 (292) |
| GPs (Service Ready GPs) | 17967 (17819) |
| No. of GPs handed over for O&M to CSC | 17288 |
| Incremental OFC in KMs handover to CSC | 34545 |
| 13274 GPs and 27071 Kms Incr. OFC made over on | 09.08.2019 |
| 4014 GPs and 7474 Kms Incr. OFC made over on | 21.08.2019 |

**Table 16: Phase 1 Status of UP East**

**Monthly Average OLTs Down in UPE for Phase-I**

| Month | Average No's of OLT Down | Reason Of Down of OLT's |
|---|---|---|
| Feb-20 | 80 | Media fault/DC power issue/Electricity Cut |
| Jan-20 | 89 | Media fault/DC power issue/Electricity Cut |
| Dec-19 | 97 | Media fault/DC power issue/Electricity Cut |
| Nov-19 | 114 | Media fault/DC power issue/Electricity Cut |
| Oct-19 | 121 | Media fault/DC power issue/Electricity Cut |

**Table 17: NMS O&M status**

OLTs Availability as per NMS during 2019-2020 for BharatNet Phase-I

| OLT UP Time | 0-20% | 20% -40% | 40% -60% | 60%-80% | 80%-90% | 90%-95% | 95%-100% | Total |
|---|---|---|---|---|---|---|---|---|
| Nos. of OLTs during Q1 | 25 | 16 | 19 | 45 | 38 | 54 | 87 | 284 |
| Nos. of OLTs during Q2 | 33 | 28 | 26 | 50 | 45 | 53 | 49 | 284 |
| Nos. of OLTs during Q3 | 29 | 25 | 29 | 48 | 63 | 47 | 46 | 287 |
| **Nos. of OLTs during Q4_till 10th Feb' 20** | **20** | **12** | **30** | **48** | **55** | **54** | **73** | **292** |

**Table 18: OLT availability**

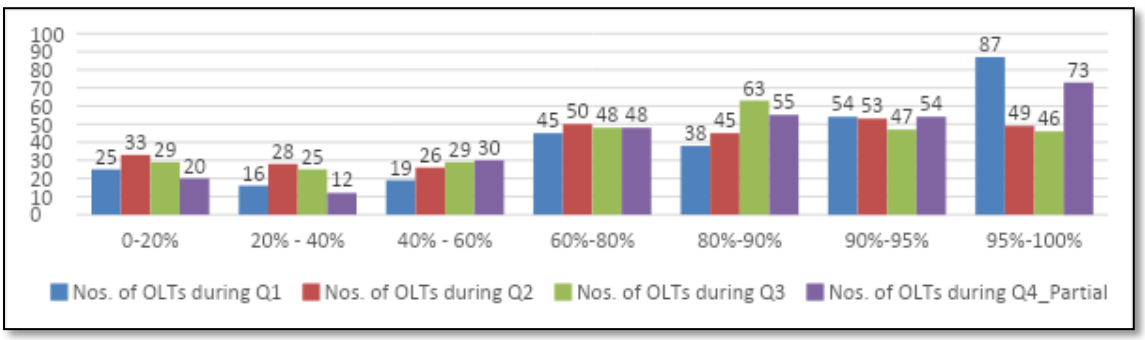



**Figure 11: OLT availability UPE**

OLTs Availability as per NMS During 2019-2020 for BharatNet Phase-II

| OLT UP Time | 0-20% | 20% - 40% | 40% - 60% | 60%-80% | 80%-90% | 90%-95% | 95%-100% | Total |
|---|---|---|---|---|---|---|---|---|
| Nos. of OLTs during Q1 | 16 | 21 | 23 | 27 | 11 | 12 | 14 | 124 |
| Nos. of OLTs during Q2 | 148 | 32 | 26 | 21 | 15 | 9 | 11 | 262 |
| Nos. of OLTs during Q3 | 242 | 24 | 17 | 21 | 15 | 13 | 12 | 344 |
| **Nos. of OLTs during Q4_till 10th Feb' 20** | **155** | **73** | **41** | **44** | **11** | **12** | **13** | **349** |

**Table 19: OLT availability Phase II**

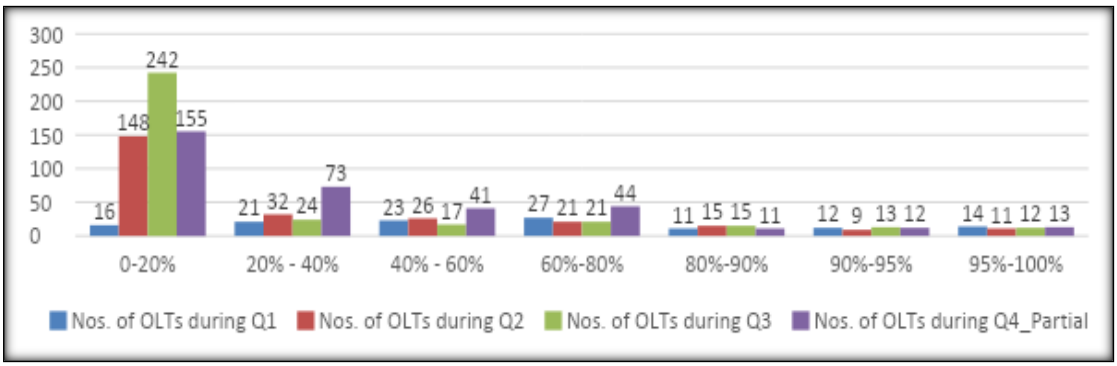



**Figure 12: OLT Availability as per NMS visibility**

Monthly Average NMS Visibility

| **Average No's of ONT Visible /Unknown in NMS** | | |
|---|---|---|
| **Month** | Unknown | Known |
| Feb-20 | 200 | 16,143 |
| Jan-20 | 243 | 15,986 |
| Dec-19 | 362 | 15,384 |

**Table 20:ONT visibility in NMS**

NMS Visibility as on 10.02.2020

| Total No. of GPs | No.of Gps Service Ready | No.of GPs visible in NOC with all details | No. of GPs unconfigured | No. GPs not visible in NOC | Total nos. of GPs not visible in the NOC including unconfigured |
|---|---|---|---|---|---|
| **17,967** | **17,819** | **16,252** | **418** | **1,149** | **1,567** |

## Table 21: ONT visibility in NMS

**Progress Month-wise for providing Power at GPs**

| **PMUs** | **Oct'19** | **Nov'19** | **Dec'19** | **Jan'20** | **Grand Total** |
|---|---|---|---|---|---|
| PMU-I | 131 | 76 | 175 | 290 | 672 |
| PMU-II | 519 | 260 | 372 | 258 | 1409 |
| PMU-III | 281 | 148 | 259 | 135 | 823 |
| PMU-KNP | 487 | 237 | 200 | 241 | 1165 |
| PMU-VNS | 190 | 80 | 176 | 275 | 721 |
| **Grand Total** | **1608** | **801** | **1182** | **1199** | **4790** |

## Table 22: PMU wise report

As per CSC Report dated 11.02.2020

**Current Progress Status of CSC**

| **PMUs** | **DISTRICT COUNT** | **BLOCK COUNT** | **GP COUNT** | **OPTICAL POWER AVAILABLE** | **GP LIVE IN BBNL NMS ?** | **Shifting** |
|---|---|---|---|---|---|---|
| PMU-I | 7 | 46 | 2864 | 994 | 672 | 481 |
| PMU-II | 8 | 58 | 3973 | 1897 | 1409 | 1062 |
| PMU-III | 11 | 43 | 2831 | 1174 | 823 | 484 |
| PMU-KNP | 13 | 67 | 3955 | 1292 | 1165 | 1165 |
| PMU-VNS | 9 | 61 | 4019 | 1161 | 721 | 721 |
| **UP East** | **48** | **275** | **17642** | **6518** | **4790** | **3913** |

As per CSC Report dated 11.02.2020

## Table:23 PMU wise report power availability

**GPs affected due to OLT & Fibre faults**

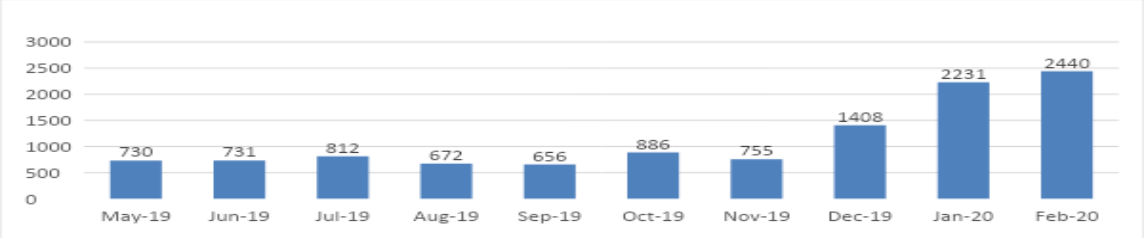
| PMUs | ONT (GP) Down due to OLT Off (Average) | GPs affected due to existing BSNL OFC faults | GPs affected due to large scale OFC Damages (500+ Meter) |
|---|---|---|---|
| PMU-I | 147 | 86 | 25 |
| PMU-II | 202 | 246 | 192 |
| PMU-III | 133 | 449 | 91 |
| PMU-KNP | 154 | 1213 | 472 |
| PMU-VNS | 136 | 113 | 529 |
| **UP East** | **772** | **2107** | **1309** |

As per CSC Report dated 11.02.2020

## Table:24 PMU wise report OFC fault and availability

Status of ONTs (GPs) as per NMS

| Month | Average No's of ONT UP | Month | Average No's of ONT UP |
|---|---|---|---|
| May-19 | 730 | Oct-19 | 886 |
| June-19 | 731 | Nov-19 | 755 |
| July-19 | 812 | Dec-19 | 1,408 |
| August-19 | 672 | Jan-20 | 2,231 |
| Sept-19 | 656 | Feb-20 | 2,440 |




## Table 25: ONT UP figure

**GPs affected due to Equipment faults /Theft/Missing –Vendor Wise**

| Vendor Name | GPs affected due to Equipment faults | | | | GPs affected due to theft / missing Equipment. | | | |
|---|---|---|---|---|---|---|---|---|
| | ONT | CCU | BATTERY | SOLAR | ONT | CCU | BATTERY | SOLAR |
| ITI | 71 | 129 | 185 | 59 | 95 | 76 | 107 | 242 |
| LnT | 96 | 773 | 1440 | 221 | 282 | 321 | 450 | 1156 |
| Tejas | 208 | 1153 | 2167 | 378 | 546 | 708 | 1568 | 3755 |
| UTL | 251 | 340 | 373 | 101 | 191 | 233 | 254 | 358 |
| **Grand Total** | **626** | **2395** | **4165** | **759** | **1114** | **1338** | **2379** | **5511** |
| **Total Excluding UTL** | **375** | **2055** | **3792** | **658** | **923** | **1105** | **2125** | **5153** |

As per CSC Report dated 11.02.2020

## Table 26: Vendor wise performance

**GPs affected due to Equipment faults /Theft/Missing –PMU wise**

| PMUs | GPs affected due to Equipment faults | | | | GPs affected due to theft / missing Equipment. | | | |
|---|---|---|---|---|---|---|---|---|
| | ONT | CCU | BATTERY | SOLAR | ONT | CCU | BATTERY | SOLAR |
| PMU-I | 88 | 245 | 693 | 96 | 189 | 208 | 491 | 1051 |
| PMU-II | 67 | 419 | 797 | 86 | 226 | 243 | 532 | 1438 |
| PMU-III | 18 | 272 | 484 | 324 | 168 | 195 | 287 | 555 |
| PMU-KNP | 13 | 535 | 731 | 58 | 115 | 228 | 348 | 982 |
| PMU-VNS | 189 | 584 | 1087 | 94 | 225 | 231 | 467 | 1127 |
| **Grand Total** | **375** | **2055** | **3792** | **658** | **923** | **1105** | **2125** | **5153** |

As per CSC Report dated 11.02.2020

## Table 27: PMU wise performance

GPON Fault Status – UP East

| GPON Equip. | Report By --> | CSC Report | CSC Report | CSC Report | CSC Report | CSC Report |
|---|---|---|---|---|---|---|
| | **Period -->** | **Feb-20** | **Jan-20** | **Aug-19** | **Jul-19** | **Jun-19** |
| | **Sample Size-->** | **17642** | **17,844** | **14570** | **13485** | **13320** |
| ONT | Faulty | 626 | 975 | 1466 | 1061 | 1208 |
| | Missing | 1114 | 1,233 | 1059 | 1068 | 1105 |
| | Not Installed | 262 | 307 | 655 | 318 | 344 |
| | **Total** | **2002** | **2515** | **3180** | **2447** | **2657** |
| CCU | Faulty | 2395 | 2,706 | 1496 | 1192 | 1960 |
| | Missing | 1338 | 1,492 | 820 | 846 | 1183 |
| | Not Installed | 262 | 299 | 655 | 318 | 463 |
| | **Total** | **3995** | **4497** | **2971** | **2356** | **3606** |
| Battery | Faulty | 4165 | 4,810 | 1536 | 1222 | 1786 |
| | Missing | 2379 | 2,576 | 1174 | 1220 | 1668 |
| | Not Installed | 262 | 299 | 569 | 318 | 463 |
| | **Total** | **6806** | **7685** | **3279** | **2760** | **3917** |
| Solar Panel | Faulty | 759 | 1,136 | 875 | 648 | 882 |
| | Missing | 5512 | 5,848 | 2321 | 2906 | 3881 |
| | Not Installed | 262 | 298 | 649 | 318 | 463 |
| | **Total** | **6533** | **7282** | **3845** | **3872** | **5226** |

## Table 28: Accessory status

**GP/ONT Which Can be made UP by the CSC**

| State/District | Ready to be UP (without GPON and OFC Fault) | Ready to be UP (without OFC Fault) | ONT ready to be UP after Shifting using 12 Volt Adopter & AC power supply at VLE Residence/office (ONT Working) | ONT UP As on 11.02.20 | No of ONT DOWN Since 7 Days |
|---|---|---|---|---|---|
| Uttar Pradesh East (As per CSC Report for 17844 GPs) As on 8-1-2020 | 4036 | 9038 | 7119 | 2509 | 755 |
| Uttar Pradesh East (As per CSC Report for 17643 GPs) As on 11-2-20 | 6762 | 14350 | 12145 | | |

**Table 29: Hand over status**

OF Cable Fault Status – UP East

| PMU | As per e-mail of CSC dated 11.02.2020 | | | | As per PMU after Field Visit/Meetings/Interaction with field | | | |
|---|---|---|---|---|---|---|---|---|
| | More than 500 meter faults in Incremental Cable | | Existing Fibre Faults | | More than 500 meter faults in Incremental Cable | | Existing Fibre Faults | |
| | Blocks (Nos.) | Affected nos. of GPs | Blocks (Nos.) | Affected nos. of GPs | Routes (Nos.) | Affected nos. of GPs | Routes (Nos.) | Affected nos. of GPs |
| PMU-I | 4 | 170 | 3 | 86 | 3 | 26 | 6 | 54 |
| PMU-II | 13 | 192 | 15 | 247 | 2 | 56 | 25 | 485 |
| PMU-III | 9 | 65 | 16 | 192 | 1 | 32 | 29 | 472 |
| PMU-KNP* | 40 | 575 | 49 | 1198 | 15 | 59 | 94 | 900 |
| PMU-VNS** | 14 | 596 | 4 | 113 | 30 | 137 | 16 | 135 |
| UP East | 80 | 1598 | 87 | 1836 | 51 | 310 | 170 | 2046 |
| * CSC has been Asked to submit the RF cases in the Specified Format provied to them. So far 5 Blocks, 59 GP's has been vsited. | | | | | | | | |
| **CSC has been Asked to submit the RF cases in the Specified Format provied to them. So far 4 Blocks 138 GP Data Given by the CSC and Visit is in progress. | | | | | | | | |

**Table 30: PMU wise hand over status**

**Fault Status of Incremental OF Cable More than 500 M & Existing OF Cable**

| UP East Report | As per CSC Report 24.12.2020 | As per CSC report 08.01.2020 | As per CSC report 04.02.2020 | As per CSC report 11.02.2020 |
|---|---|---|---|---|
| Nos of GP affected due to More Than 500 M | 963 | 2608 | 1886 | 1309 |
| Nos of GP affected due to Existing Cable Fault | 1366 | 2242 | 1836 | 2107 |
| UP East | 2329 | 4850 | 3722 | 3416 |

**Table 31:Incremental OF Cable laying more than 500 mtr**

### 6.1.1. Action Taken for Visit of Incremental Cable fault More than 500 M

As per the report on 24.12.2019 , CSC has been asked to submit the case of RF in the format supplied by the PMU's as these cases were not correlating with the available L-14 diagrams.

- OTDR Traces for faulty routes along with lat-long were not available.
- However, Joint Visits are being organised/done based on the inputs received during the Month of December 2019 and January 2020.
- During visit/meeting with CVLE, it has been observed that CVLE are not aware about the exact faulty length and exact location also.
- There were cases where cable has not been properly identified.
- No Estimate is being submitted

### 6.1.2. O & M- Uttar Pradesh (East)

#### 1) EFFORTS MADE TO IMPROVE THE UPTIME

- Daily monitoring of unreachable OLT at PMU level and communications to BSNL in-charge along with SSA head in order to keep up the OLT UP.
- More than 3 days Faults in OLT are being regularly intimated to CGM BSNL for rectification.

- Meeting at SSA level has also been conducted by the PMU in-charge along with CSC and BSNL for improvement of optical fibre faults.
- Based on Survey conducted by the CSC at field the fibre faults is being booked manually in NMS so that TT can be generated. Further the Bin Change has also done.
- Regularly letters/e-mails are being written to SSA heads/Circle Nodal/State head of BSNL for rectification of existing fibre faults to improve the up time of the network.
- Regularly letters/e-mails are being written to GPON vendors for rectification of GPON hardware faults.
- Visit of Blocks has also been conducted by the BBNL officials.
- The shifting of GPON Equipment as per MOU has been allowed to CSC.
- For fault rectification of OFC, the coordination of BSNL has been done for deploying supervisory level person in order to tell the routes of OFC.
- Regular meeting with vendor has also conducted in order to short the issues.
- Available L-14/PON Diagram/ABD Diagram of the Block has been provided to CSC
- CSC has been allowed to replacement of faulty ONT from all those GP's where optical power is not OK.
- Spare GPON equipment has also allotted to CSC for immediate fault rectification
- Letter to District authority has also ben written in order to allow the shifting the GPON equipment at VLE location as per MOU of DOT, USOF
- Tripartite agreement for ROW has also been provided to CSC for smooth O&M fiber in the routes.
- The faulty GPON is also being collected at District level and the fault of the equipment's are being attended by the Vendors at central location.
- The issue of change of PIC/PON is now being directly dealt from CSC NOC.

- CSC has been given the format for reporting the cases of replacement fiber more than 500 Meter cases.
- Based on the report of CSC , PMU officials are perusing with CVLE on daily bases to make the GP's UP in the NMS.

## 2) Challenge in O&M and FLM Work of Bharat Net Phase-I

- There is shortage of CSC regular staff at district /block level who can regularly follow-up with the CVLE.
- No report of physical verification of down of the GP's either in mobile App or as specified by the BBNL C.O has been provide to PMU's. However handing over was carried out by the CSC subject to physical verification.
- In many Blocks , CVLE has been appointed during the month of Oct-Nov 2019 only.
- CVLE are not having any ID cards issued from CSC and proper training for carrying out the O&M , FLM activities. Many CVLE during the visit of district/blocks/GP raised this concern also.
- Many of the CVLE raised the concern that the response from CSC NOC is delayed and cases of change of pic/pon and replacement ONT's are not being resolved timely.
- Shifting of GPON equipment at VLE location is not proper and even after shifting GP's are not getting UP. CSC is required to shift the equipment from that place only where GP site is problematic and to that site only where VLE is interested in providing the internet services.
- The issue related to fault in existing fiber and incremental fiber more than 500 M has not been reported correctly by the CSC. The routes provided by the CSC state team is not correlating with provided L-14 and also not matching after visit with CVLE.

- In many cases its has been observed that CVLE's are not following proper practices of O&M as mentioned in the MOU. CVLE neither have route diagram of repaired routes nor having any LAT and LONG of the repaired section/New Joint location.
- At many places 4F cable is being used for repairing of OF cable.
- It has been observed that CVLE are not following the preventive maintenance practises wherever the development of work of Road, Water Pipe line , Sewerage Pipe lines etc.

### 3) Issues with the Compliance of MoU signed on dated 15.07.2019:

- Several clauses of MoUs are not being followed by CSC in true letter and Spirit, few of them, as observed, are:
- CSC shall intimate the lat-long and address of the new custodian, in case of shifting of ONT to a new location. (Clause 6.5)
- CSC to provide signage on OFC routes. (Clause 2.9.2)
- CSC to capture the Lat-Longs of all OFC network elements on best effort basis.(Clause 2.9.4)
- Timely reporting of faults to the concerned team and BBNL. (Clause 6.7.1.6)
- Follow up and closure of the raised faults through NMS. (Clause 6.7.1.7)
- Regular liaising with various civic authorities …… to prevent damage to OFC laid in the BharatNet project. (Clause 6.7.2.1)
- Putting markers on fibre routes and updating GIS mapping records on best effort basis. (Cluase 6.7.3.7)
- Interaction with BBNL NOC and field unit for getting trouble tickets, closing TTs or escalating TTs as the case may be. (Cluase 6.7.3.7)
- As per Clause 5 of MoU, Monitoring mechanism have not been put in place

- As per Point 6.13 CSC shall ensure to provide access (physical and remote) of project management and monitoring tool to BBNL.
- As per point 6.17 CSC shall share the business plan for utilization of the network.

Source:BBNLCO/BBNL UPE source

### 4) Issues with GPON Vendors

- Rectification of faults of ONT's and CCU's are delayed.
- Battery are not being replaced
- Opening of repair centres as per tender terms and conditions.
- There are many ranged GP's which are getting automatically deleted from NMS on regular basis. In spite of report to vendor same are not being restored.
- The GP's which are un-configured in NMS are not getting configured in NMS .
- There is huge gap of visible GP's in NMS and Service ready GP's/ Lit GP's. The list of GP's has been made available and procedure has also been given to vendor for making visible of the GP's but not able to make all GP's visible in NMS.

### 5) Issues with BSNL

- Non availability of OLTs :

1. Main reason being non availability of power. Fuel for running of E/A is not available is SSA due to lack of funds.
2. Media issue : Media issues arising due to OF cut etc are not being attended promptly because of which OLT faults exceed seven days.

- Non rectification of existing fibre faults of GPs :

1. Fibre faults of existing fibres are not being attended at all.

- Non submission of asset register proforma:

1. Despite regular reminders and personal visit of PMU in all SSA, the documents related to finalization of Account of BharatNet Phase-I still awaited.

- Non submission of ABD/RID diagram & Revised L-14 & PON diagrams for many Blocks:

1. ABD diagrams of only 16 blocks have been received by BBNL. The received ABD diagrams do not have required lat/long and as per tender clauses.
2. BSNL has to correct them and submit the same. The ABD diagrams for 259 blocks may also be submitted at the earliest. Hence commissioning & TOC is Pending.
3. Revised L-14 & PON diagrams for many Blocks are still pending

   AT certificate for some of the GP 's and Lossy fibre is also pending.

## 6) Challenges of PMU's for Smooth monitoring of BharatNet

- In view of recent work allotment to PMU (i.e NMS related work, Service provisioning, visit for the cases of replacement fiber , visit of the GP for monitoring of O&M work of CSC.) sufficient number of regular staff is required to deployed at district level/ block level apart from NE & FT.
- Till the time no arrangement of regular staff in the PMU state head may be authorized to deploy the VRS Staff of BSNL in the PMU/District level further State Head /PMU may be authorised to engage OA/MTS in the PMU for NMS related, Service provisioning , Demand note and advice note work
- Proper arrangement of vehicle at PMU level/District level for the work of O&M.
- Arrangement of finance official at PMU level.
- O&M of fiber should be SLA based.
- The Charges of OLT Spaced and infra should be made based on SLA
- It has been observed that there are various routes of Existing and incremental cable has been majorly damaged due to NH Work, Road Widening, Nala Construction and any other infrastructure development work. Guideline for fresh cable laying is required on such routes.

- In Case of RF where incremental fiber comes under the road than how to dealt such cases.

**6.1.3.**

| UTTAR PRADESH EAST (10.02.2020) | | | |
|---|---|---|---|
| | TOTAL NO. GPs Advice Notes issued | As on 10.02.2020 | Reasons |
| CSC-SPV (WiFI AP) | 15299 | 4756 | Poor Network health (lots of Fiber fault with no optical power. GPON equipment's lying faulty/missing at many GPs). |
| FTTH Connection at GP by CSC | Commercial | 527 | |
| FTTH Connection at GP by BSNL | Commercial | 269 | |
| Dark Fibre | 56.87 | GPs | |

**Table 32: Utilization in UP E**

## 6.2. Field Visit of Digital Village to study ground reality on Digital Services Delivery model built up by CSC.

(a) **Various teams from IIPA visited the Digital Village** Gurwara , Teh. Palhwas ,Dist: Rewari Haryana to have ground realities on CSC based digital Services delivery model called as Digital Village model.Undersigned also visited with APPPA team on 6.11.2020 and coordinated the both visits. The observations of the teams at both Occasion are as under:

(b) **Visit on Date 6.11.2019**: A team of about 50 senior officers mostly JS rank visited the bharatnet and digital village Gurwara , Teh. Palhwas ,Dist : Rewari Haryana on 6.11.2019. to see and experience the various digital services delivery models of CSC in rural areas under digital India mission of Govt of India as well as working of Bharatnet in providing high speed bandwidth.

(c) **Visit on Date: 5.12.2019 :** On 5.12.2019,A team of more than 40 officers belonging to Ministry of tribal affairs as part of participants in a workshop organised by IIPA visited visited the BharatNet and digital village Gurwara , Teh. Palhwas ,Dist : Rewari Haryana under the leadership of Professor Nupur Tewari to see and experience the various digital services delivery models of CSC in rural areas under digital India

mission of Govt of India as well as working of Bharatnet in providing high speed bandwidth.

**Observations of both the Teams**: Both of the teams have similar observations on their visit to Digital Village.The team appreciated the work of BBNL and CSC in making digital service delivery in a very effective and efficient manner.The women empowerment model is clearly exemplary and appreciated by the team. The effort of Bharatnet In Providing high speed bandwidth to the panchayats is also appreciated by the team. The initiative of IIPA in sending the senior policy making officers for such visits which really makes difference in their overall approach in policy making .the team enjoyed the digital India initiative .The first hand experience of Badalta Bharat , New India / Naya bharat initiatives were experienced and enjoyed by the team in this village.

# 7. Chapter
# Socio-Economic Impact Of BharatNet

## 7.1 Socio-Economic Impact Of BharatNet

This chapter elaborates approach through which the Broadband penetration can be enhanced in the country by using FTTH technology. Impact of Broadband Penetration on Socio Economic growth is discussed in this chapter .In this regard, Two approaches have been discussed here 1. Traditional World bank formula of economic growth of 1.24% for every 10% increase in penetration as well as the second Formula of Joint group Broadband India Forum (BIF) and ICRIER saying with every 10% increase in Investments in Telecommunications Infrastructure, there will be at least a 3.3% increase of India's GDP.

## 7.2 Socio Economic Impact of BharatNet

Use of Broadband is seen as Socio Economic development driver for any country. In order country to grow from its developing status to developed nation, It is very important that it grows holistically with similar growth rate for both Urban as well as Rural sectors. It is very important to provide better life enhancing urban like amenities to rural areas and have an inclusive growth model by including rural area in Governance and decision making process, which is possible through ICT only.ICT has brought rural areas much closer to the markets and has improved business transactions. India's technological capabilities and rising exports in IT have been one of the major drivers of growth. GoldmanSach Economic research paper on "India's Rising Growth potential " (Global Economics paper no 152)dated January 22,2007 indicates that India's GDP will surpass that of the US before 2050,to make it second largest economy.

The demographic dividents arises from the fact that more than 50% of its population is below the age of 25 yrs and more than 65% are below the age of 35.This makes India one of the youngest countries in world.

In the above context it is absolutely essential that ICT be harnessed to the utmost potential ,The Inclusive potential of ICT at two levels :The benefits that can be to poorer communities and the capacity of individuals within these communities to participate in new economic opportunities.

Experts belief that Broadband has more Impact than any other ICT on GDP,As per world bank report ,10% increase in broadband penetration increases GDP of developing countries by 1.24%.To have a high sustained growth of broadband in the country, creation of a robust broadband infrastructure is of utmost importance.

Recent times industry has more optimistic view on economic growth vis a vis Broadband Penetration.

As per ICRIER-Broadband India Forum (BIF) report: Growth DiviDenDs of DiGital CommuniCations: The Case for India, in December 2018:[7]

With every 10% increase in Investments in Telecommunications Infrastructure, there will be at least a 3.3% increase of India's GDP, believe experts at the recent Broadband India Forum (BIF), adding other lucrative predictions that the proposed impact of US$100 billion investment envisioned by National Digital Communications Policy 2018 could cumulatively add US$ 1.21 trillion to India's GDP at the same time.

Economic survey 2019 as well as Budget 2019 envisage the total 5 Trillion Dollar Economy by 2025.

In this context, the contribution of Digital India is very important as it is envisaged that it will contribute more than 20% to GDP.

BharatNet being first Pillar of Digital India in providing a Very High speed Broadband Network built up with sustainable, robust Telecom and IT infrastructure plays very important role in Digital India to happen. This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy.

Experts belief that Broadband has more Impact than any other ICT on GDP,As per world bank report ,10% increase in broadband penetration increases GDP of developing countries by 1.24%.To have a high sustained growth of broadband in the country ,creation of a roboust broadband infrastructure is of utmost importance. Recent times industry has more optimistic view on economic growth vis a vis Broadband Penetration.

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Use of Broadband is seen as Socio Economic development driver for any country. In order country to grow from its developing status to developed nation ,It is very

important that it grow holistically with similar growth rate for both Urban as well as Rural sectors. It is very important to provide better life enhancing urban like amenities to rural areas and have an inclusive growth model by including rural area in Governance and decision making process, which is possible through ICT only. ICT has brought rural areas much closer to the markets and has improved business transactions. India's technological capabilities and rising exports in IT have been one of the major drivers of growth. GoldmanSach Economic research paper on "India's Rising Growth potential " (Global Economics paper no 152)dated January 22,2007 indicates that India's GDP will surpass that of the US before 2050,to make it second largest economy.

The demographic dividents arises from the fact that more than 50% of its population is below the age of 25 years and more than 65% are below the age of 35.This makes India one of the youngest countries in world.

In the above context it is absolutely essential that ICT be harnessed to the utmost potential, The Inclusive potential of ICT at two levels :The benefits that can be to poorer communities and the capacity of individuals within these communities to participate in new economic opportunities.

*Experts even belief that Broadband has more Impact than any other ICT on GDP,As per world bank report ,10% increase in broadband penetration increases GDP of developing countries by 1.38%.To have a high sustained growth of broadband in the country ,creation of a roboust broadband infrastructure is of utmost importance.*

## 7.3 Socio Economic Impact: Two different models

### 7.3.1 Rural Broadband Connectivity through FTTH Connections- Social and Economic Aspects (world Bank model)

**(a) Introduction:**

World Bank study on Digital Dividends to explore the relationship between broadband and economic growth concludes that a 10-percentage point increase in fixed broadband penetration would increase GDP growth by 1.21% in developed economies and **1.38%** in developing ones. This means that there is proportional relationship between broadband penetrations and Gross Domestic Product (GDP). Currently, India is one of the fast-developing countries, however still there are many parts of the country which are facing digital darkness in terms of lack of broadband or rather minimal 2G speed. Most of these digital dark sports are in rural and remote areas. Thus, Ministry of Communications, Government of India understood the importance of broadband connections and launched the scheme of providing Fiber to the Home to most of the governmental institutions in rural areas at free cost to spread the awareness among masses and bring the people in the ambit and habit of using FTTH connections. Commercial connections to rural households have been envisaged at the later stage and have been left to supply-demand dynamics of rural markets.

**(b) How FTTH Connections in rural and remote areas was conceived:**

The Government of India established a Universal Service Obligation Fund (USOF) in 2002 with the contribution from all the telecom license operators. The licensees work on revenue sharing regime and contribute 8% of the total adjusted Gross revenue as license fee. Out of this 8% licensee fee, 5% is towards this Universal Access Levy. This fund is non-lapsable in nature and has accumulated a huge fund at the discretion of Government of India. The sole purpose of USOF is to provide the affordable, secured, reliable and universal telecom services to uncovered areas of the country. Ministry of Communications thought of using this fund to connect all rural and remote villages across of India through optical fibre cable and launched a project called “BharatNet”. This was middle mile connectivity project. So to take it to the last

mile that is up to rural household, the National Telecom Policy 2018 of Ministry of Communication, Government of India envisaged broadband connectivity. Recently, Government of India approved the project to provide minimum five connections at five different government institutions like primary schools, wellness centres, fair price shops, police stations, post offices, digital delivery centres etc. by using the fund from USOF. So the fund which was contributed indirectly by every consumer is being reinvested in rural areas to bridge the gap of digital divide. Currently, this fund has a corpus of 7 billion US Dollar. To take out the Optical Fibre to rural and remote areas, USOF is spending around 6 billion US Dollar.

**(c) Implementation approach:**

Initially, it was thought that Wi-Fi Hotspots are the best method to provide broadband connectivity to rural and remote areas because it was easy to install and open the access to common public. But while doing so, many issues were faced like there was no individual custodianship as it was a public good with shared responsibility and all consumers were only worried about its usage but not about its proper upkeep because it was free. Secondly, it was noticed that at least 50% population of women are out of its access as most of these hotspots were at public place like market, schools and women were not getting a chance to go outside to access the services due to social norms and customs. This was creating a gender gap in broadband usage. Then, Government thought of taking the broadband connections to each individual household where everyone can access whenever required. This was made possible by using the FTTH connections. To overcome the issues of local custodianship, the installation is being done at governmental institutions and the in-charge of the institute is being declared as custodian. These FTTH connections are not free of cost. This is being funded by Government of India for Capital Expenditure and Operational Expenditure is being borne by users department. The installation work has been given to a Special Purpose Vehicle (SPV) called Common Service Centres created by Government of India for the purpose of Digital India scheme. The viability gap funding in terms of its installation and operational cost, is being borne by Government of India to make it a viable business for private players and rest of the amount is being borne by them based on their commercial assessments. Through this scheme, it has been planned to install three million connections by Universal Service Obligation Fund and many more in coming years by private players on commercial connections.

Ministry of Communication is creating an ecosystem to develop in rural areas for these FTTH market.

**(d) Social and Economic Aspects of FTTH Connectivity:**

It is a well-known fact that women are one of the underserved sections of the society in many parts of the world. But, bringing them in the mainstream of the society where women can participate in the decision-making process, be it households or be it nation can bear rich dividends. The FTTH connection at home is giving wider opportunity to women to educate themselves by connecting to the world and internet. In many villages in India, it was found that by tapping one FTTH connections, women have opened Business Process Outsourcing (BPOs) for micro business, LED assembling units, sanitary pad vending machines, digital literacy centres, tele-law units, tele-medicine units etc. Many women customers are approaching these centres for different services. These are located in households itself and thus women are doing small scale business along with maintaining their houses and kids. The small-scale business by tapping FTTH connections has economically boosted the status of women in rural areas and consequently has made them independent to feel their social upliftment. The FTTH connections are being provided on non-discriminatory access to every governmental institutions and households. The rural and remote area of India is getting connected to the world through FTTH and social and economic activities are being prospered day by day.

**(e) Recommendations**

In view of the above, it has to be accepted that FTTH connectivity has huge potential to improve the quality of life of people living in rural and remote areas particularly women by tapping the social and economic aspect of it. Thus, all the developing countries may reexamine/revisit their broadband connectivity programmes and focus on giving more FTTH connections with the objective of social and economic improvement. Hence, it is recommended that this subject be studied and considered by ITU-D SG 1 under Question 5/1 dealing with ICT for rural and remote areas in order to uplift the social and economic status of people of ITU Member States.

### 7.3.2. BIF/ICRIERER Report:

Recent times industry has more optimistic view on economic growth vis a vis Broadband Penetration.

#### 7.3.2.1.

***The*** BIF along with Indian Council for Research on International Economic Relations (ICRIER) released a report highlighting the Impact of Telecommunications Infrastructure on Economic Growth in India. Titled Growth Dividends of Digital Communications: The Case for India the report highlights the impact that (i) mobile and internet penetration (ii) mobile and internet traffic and (iii) investments in telecommunications equipment have on states, on the country and the corresponding impact on GDP.

The policy addresses digital infrastructure as its very first objective. This has been accorded the highest priority as it is the lifeline on which all next generation services will run. This includes all necessary elements required to make this happen – optical fiber, mobile towers, WiFi hotspots, also SatCom and other unexplored spectrum. He added, "We will also utilize the opportunities presented by emerging and next generation technologies such as 5G, AI, IoT, Blockchain, Cloud Computing and others. Therefore the need for large investments in digital infrastructure is imperative as this needs to increase three fold in the next five years to achieve the goal of trebling our GDP to US$7.5 trillion."

Underlying this is ICRIER's recent analysis that confirms that every 10% increase in telecom investment will lead to 3.3% increase in GDP. And yet this seems an underestimate. As digital infrastructure becomes ubiquitous and pervasive and communications the norm not only between humans but also between machines, the magnitudes of the growth dividends will only multiply."

The study further reveals that a 10 percent increase in India's investment in telecommunications has the potential to deliver on average a 3.3 percent increase in India's GDP. The USD 100 billion investment envisioned in the National Digital Communications Policy, 2018 could cumulatively add USD 1.21 trillion to India's income.

Economic survey 2019 as well as Budget 2019 envisage the total 5 Trillion Dollar Economy by 2025.

In this context ,the contribution of Digital India is very important as it is envisaged that it will contribute more than 20% to GDP.

Bharatnet being first Pillar of Digital India in providing a Very High speed Broadband Network built up with sustainable, roboust Telecom and IT infrastructure plays very important role in Digital India to happen . This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy with its universal outreach in the country.

Use of Broadband is seen as Socio Economic development driver for any country. In order country to grow from its developing status to developed nation ,It is very important that it grow holistically with similar growth rate for both Urban as well as Rural sectors. It is very important to provide better life enhancing urban like amenities to rural areas and have an inclusive growth model by including rural area in Governance and decision making process,which is possible through ICT only.ICT has brought rural areas much closer to the markets and has improved business transactions. India's technological capabilities and rising exports in IT have been one of the major drivers of growth.Goldman Sach Economic research paper on "India's Rising Growth potential " (Global Economics paper no 152)dated January 22,2007

indicates that India's GDP will surpass that of the US before 2050,to make it second largest economy.

The demographic dividents arises from the fact that more than 50% of its population is below the age of 25 yrs and more than 65% are below the age of 35.This makes India one of the youngest countries in world.

In the above context it is absoultly essential that ICT be harnessed to the utmost potential ,The Inclusive potential of ICT at two levels :The benefits that can be to poorer communities and the capacity of individuals within these communities to participate in new economic opportunities.

Experts belief that Broadband has more Impact than any other ICT on GDP,As per world bank report ,10% increase in broadband penetration increases GDP of developing countries by 1.38%.To have a high sustained growth of broadband in the country ,creation of a roboust broadband infrastructure is of utmost importance.

Recent times industry has more optimistic view on economic growth vis a vis Broadband Penetration.

**10% Investment In Telecom To Add 3.3% Of India's GDP:**

As per ICRIER-Broadband India Forum (BIF) report : Growth DiviDent of DiGital :The Case for India,in December 2018:

With every 10% increase in Investments in Telecommunications Infrastructure, there will be at least a 3.3% increase of India's GDP, believe experts at the recent Broadband India Forum (BIF), adding other lucrative predictions that the proposed impact of US$100 billion investment envisioned by National Digital Communications Policy 2018 could cumulatively add US$ 1.21 trillion to India's GDP at the same time.

The BIF along with Indian Council for Research on International Economic Relations (ICRIER) released a report highlighting the Impact of Telecommunications Infrastructure on Economic Growth in India. Titled Growth Dividends of Digital Communications: The Case for India the report highlights the impact that (i) mobile and internet penetration (ii) mobile and internet traffic and (iii) investments in telecommunications equipment have on states, on the country and the corresponding impact on GDP.

The policy addresses digital infrastructure as its very first objective. This has been accorded the highest priority as it is the lifeline on which all next generation services will run. This includes all necessary elements required to make this happen – optical fiber, mobile towers, WiFi hotspots, also SatCom and other unexplored spectrum. He added, "We will also utilize the opportunities presented by emerging and next generation technologies such as 5G, AI, IoT, Blockchain, Cloud Computing and others. Therefore the need for large investments in digital infrastructure is imperative as this needs to increase three fold in the next five years to achieve the goal of trebling our GDP to US$7.5 trillion."

The report says "India is looking at 100% inclusivity of its citizens through digital empowerment with the Digital India program. This is a very timely report, far reaching in scale and scope, on the impact of telecommunications infrastructure on economic growth. This comes at an opportune time, when the National Digital Communications Policy 2018 (NDCP) underlines an ecosystem of convergence spanning IT, Telecom and broadcasting and in the backdrop of revolutionary new technologies such as 5G & IoT. While the first wave of largely mobile (voice) revolution heralded a new age of growth and dynamism to the economy, the second wave is now being led by the growth of internet subscribers and investments in

telecommunication infrastructure, leading to exponential benefits to the economic and GDP growth. It is critical therefore for states across India to leverage this to ensure greater direct and spill-over benefits."

The report of ICRIER said, "The narrative around digital impact is becoming stronger, pervasive and central to our multiple ambitions of growth, development and inclusion. It is hard to imagine India's future as an economic powerhouse without digital communications being integral to that vision. Already digital investment inspires massive growth dividends. It is expected that the 100 billion dollars envisaged to be invested over the course of NDCP 2018 will contribute over 1 trillion dollars in impact over the lifetime of those investments.

Underlying this is ICRIER's recent analysis that confirms that every 10% increase in telecom investment will lead to 3.3% increase in GDP. And yet this seems an underestimate. As digital infrastructure becomes ubiquitous and pervasive and communications the norm not only between humans but also between machines, the magnitudes of the growth dividends will only multiply."

AS per Broadband India Forum, "Telecom infrastructure has rightly acquired the tag of a General Purpose Technology (GPT) with the internet and mobile based communications generating multiplier and spill-over benefits for the national economy. We felt that it was time to re-look and re-quantify the benefits of telecom linked technologies and investments for both, states as well as the overall economy. We're seeing that the growth dividends from the internet are significantly higher than mobile (voice). While the impact of mobile penetration may have begun to moderate, the impact of internet continues to be on the rise. This is because of increasing use of the internet in improving existing business models and notably creating newer ones thus enabling markets to become more efficient."

## 1. Revised impact of Mobile Telecom & Internet Penetration on growth (states)

This study revisits an earlier ICRIER study done in 2009 that estimated the impact of mobile penetration exploiting the geographical diversity between 19 Indian states. Using data for 19 states over the period 1999-2000 to 2007-08, the earlier study found that a 10 percent increase in mobile penetration resulted in a 1.2 percent increase in the rate of State GDP growth. New estimates basis the new study highlights results that are both positive and significant and shows that a 10 percent increase in mobile penetration delivers, on average a 1.9 percent increase in output. Moreover, for states with above average tele density, the results show that 10 percent increase in mobile penetration swells the growth dividend to 2.6 percent. Similarly, ICRIER first presented the estimates for impact of Internet in India using socio-economic variables across 19 states for the period 2001 to 2010. The study found that a 10 percent increase in Internet subscribers delivers, on average 1.08% increase in GDP output.

### Revised impact of Internet Traffic on growth (GDP)

New estimates based on current internet usage instead of penetration shows that a 10 percent increase in India's internet traffic, delivers on average a 3.1 percent increase in GDP per capita, and a 10 percent increase in India's mobile traffic, delivers on average a 1.6 percent increase in India's GDP.

### Impact of investments in telecom Infrastructure on national growth (GDP)

The ICRIER-BIF study also captures the economic impact on the overall telecom sector (excluding broadcasting) in a technology neutral manner by using investment data for the sector. The National Digital Communications Policy, 2018 (NDCP) underlines the potential for US$100 billion telecom infrastructure convergence for IT, telecom and broadcasting. Using existing investment data, the study captured the

multiplier benefits the US$ 100 billion investment envisioned in the new NDCP. The impact of investments in telecommunications on GDP growth is computed for the period 2010-11 to 2017-18. Investments in telecom increased at a compounded annual growth rate (CAGR) of 16.3% during this time. The cumulative investment during this period was Rs. 7,47,652.8 crore amounting to 2.5% of the total gross fixed capital formation for India through those years.

The study further reveals that a 10 percent increase in India's investment in telecommunications has the potential to deliver on average a 3.3 percent increase in India's GDP. The USD 100 billion investment envisioned in the National Digital Communications Policy, 2018 could cumulatively add USD 1.21 trillion to India's income.

Economic survey 2019 as well as Budget 2019 envisage the total 5 Trillion Dollar Economy by 2025.

In this context ,the contribution of Digital India is very important as it is envisaged that it will contribute more than 20% to GDP.

Bharatnet being first Pillar of Digital India in providing a Very High speed Broadband Network built up with sustainable, roboust Telecom and IT infrastructure plays very important roll in Digital India to happen . This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy.

There are two broad views are emerging as far as economic Impact of Broadband is concerned:

i.*As per Earlier world bank analysis ,10% increase in broadband penetration increases GDP of developing countries by 1.24% and*

*ii.As per ICRIER-Broadband India Forum (BIF) report: With every 10% increase in Investments in Telecommunications Infrastructure, there will be at least a 3.3% increase of India's GDP*

# 8. Chapter
# Way forward/Recommendations and Conclusion

## 8.1. Way forward/Recommendations and Conclusion

This chapter summarizes main issues and challenges in BharatNet implementation, O&M and utilization. Although these issues were listed and discussed in detail at previous chapters 2 (para 2.6) ,4(4.2.1.1,4.3&4.4) and 6 (para 6.1.1 to 6.1.3), important issues need to be recapitulated to firm up recommendations and conclusions. Accordingly for each of these issues ,way forward has been suggested.Finally towards end of this chapter , Conclusion and Recommendation of the Dissertation have been made.

## 8.2. Main Issues and challenges in BharatNet:

**8.2.1** :Major Issues and challenges related to implementation are discussed in 2.6 and at various paras in earlier chapters.

**8.2.2**. Major reasons for unsatisfactory performance in O&M are as reteriated

There was no penal provision in the signed MoU between BSNL and BBNL for operation & maintenance of BharatNet Phase-I created infrastructure.

I. Neither there were any SLA parameters mentioned in the MoU to enforce.

II. O&M cost was being paid in advance to BSNL however, the fund for O&M was not percolated down to local field unit of BSNL by its corporate office and hence the local contractor was not maintaining the created infrastructure.

Solutions: Thus, DoT took a stand and cancelled the O&M of created infrastructure (except OLTs) with BSNL and handed it over to CSC e-governance India Ltd. and SPV of MeitY having its presence and foot soldiers called VLEs across India. CSC-SPV is maintaining the infrastructure from 01/07/2019 and in these 3 months the total live GPs have increased from 22000 to 30000.

### 8.2.3 Utilization Issues and Challenges:

Issues and challenges have been discussed in details at chapter4 para 4.2.1.1,4.3 and 4.4. Issues are segregated at different implementation levels/stake holders and are produced below:

(a) **Service Providers (SPs)**

- **Non-availabilit**y of SPs at the GPs
- **Extremely Low penetration** of private and local SPs other than BSNL
- **No SLA between** the SPs and BBNL regarding utilisation of BharatNet
- SPs find it **non- sustainable to invest in rural broadband network**
- **Lack of awareness** regarding the provisions and infrastructure of BharatNet

**(b) Gram Panchayat**

- GPs use internet services from State broadband scheme or private TSPs
- Frequent disruption in services due to maintenance issues
- Users have no information on tariff leading to non-payment of bills & hence disconnection
- GP officials have no awareness about service providers
- No horizontal connectivity provided from GPs
- Public institutions are mainly dependent on TSPs

(c) **Individual users**

- Individuals not aware about Wi-Fi chaupals provided under BharatNet
- Delays in e- governance services due to unreliable broadband connectivity
- NREGA operators and frontline workers unable to upload data due to limited access to internet

(d) State BBNL teams

### 8.2.4 Other important issues:-

- BBNL face delays in obtaining RoW from the Department of Forest, NHAI etc
- Entire focus towards installing the equipment's and, not towards utilization of infrastructure
- No monitoring on uptime of services
- Severe shortage of manpower to handle maintenance , SP engagement etc.
- Multi-party liasoning and payment scenario for service providers
- No commitment for reliable services for SPs
- Viability of service provision by SPs
- Creation of demand for digital services among individual beneficiaries
- States government majorly promoting their own broadband schemes rather than BharatNet
- Inadequate manpower of State BBNL team

### 8.2.5 Way Forward and Recommendations:

(a) Enrolement of SPs

(b) Do away with multi agency scenario –Make BBNL a single agency to offer/ maintain infrastructure for SPs or auction BharatNet infrastructure to the private telecom operators for utilisation and then maintenance

(c) USOF support to SPs for infrastructure or implement revenue sharing or risk sharing model for service providers

(d) Enforce license conditions on rural coverage to TSPs

(e) USOF support to end beneficiary to create demand

- Use & fell of services for 6-12 months, to make service provisioning viable for SPs

(f) Better reliable Bandwidth

- Explore alternate reliable and economic bandwidth through Satellite

(g) Equip BBNL with additonal man power

- Developing the broadband ecosystem at the rural level

a. Harness Private Sector Capabilities

b. Adequate incentives for Private Sector to enable wider participation

c. Flexibility to choose network topology/Architecture

d. Simple to implement, monitor and execute

e. Consolidated Role & Responsibilities

f. Adequate incentives for States

### 8.3. Recommended model:

- Work of creating, maintaining and utilizing network to single Private Entity.
- Private entity – Infrastructure Provider or Licensed service Provider
  - engagement through PPP model.
  - Selection through open & competitive tendering process.
- One Telecom Circle as one Package.
- Bidding criterion - Concessionaire fee/Viability Gap Funding (VGF)
- Operate on long term lease – 25 years.
- Milestone based Funding to be provided as Concessionaire fee/VGF

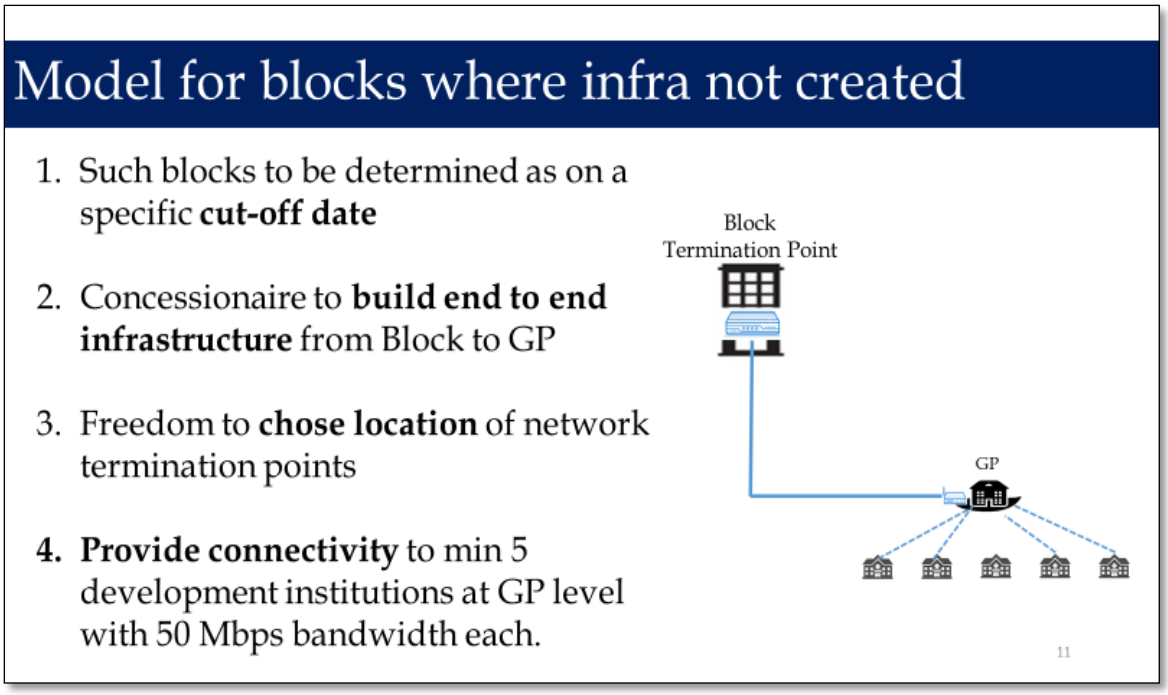
Models Where Infra created:

I. Concessionaire to maintain the entire infrastructure (OFC + Equipment)

II. Flexibility to relocate the equipment from Block BSNL Exchange to any location within Block; Similarly for equipment at GP

III. Lay new fibre, if required; RoW to be provided free of cost

IV. Provide connectivity at min 5 Govt institutions at GP level with 50 Mbps bandwidth each.




## 8.4. Way Forward for different models:

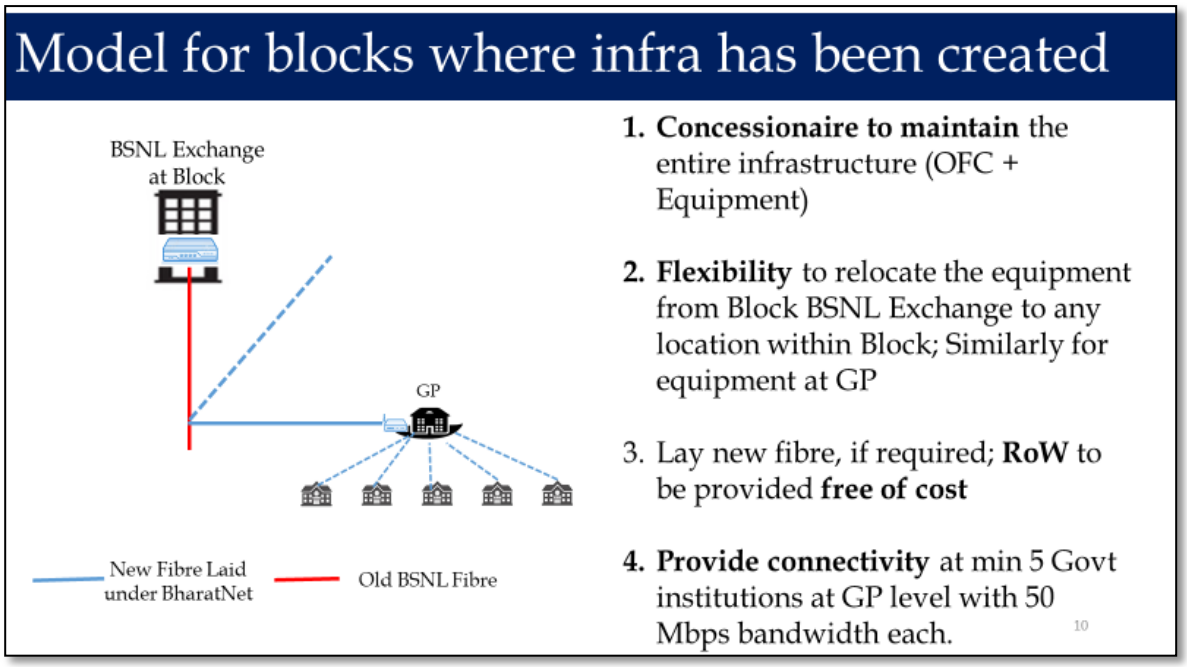



**Figure 13: Blocks with Infra created**

Source NiTi Ayog and USOF/DOT

## Figure 14: Blocks where Infra not created

### Role – Private Concessionaire

- **Build & Maintain** Infra; **Share** with other Service Providers
- **Flexibility** to relocate and upgrade the equipment at own cost
- **Coordinate** with BSNL – use of BSNL fibre, access to BSNL building
- **Equipment installation** – atleast match capability of existing equipment; flexibility for higher capacity/capability equipment.
- Network uptime **monitoring access** to BBNL Network Operation Centre (NOC)
- **Utilize/Market the infrastructure** on non-discriminatory basis & fair tariff.

12

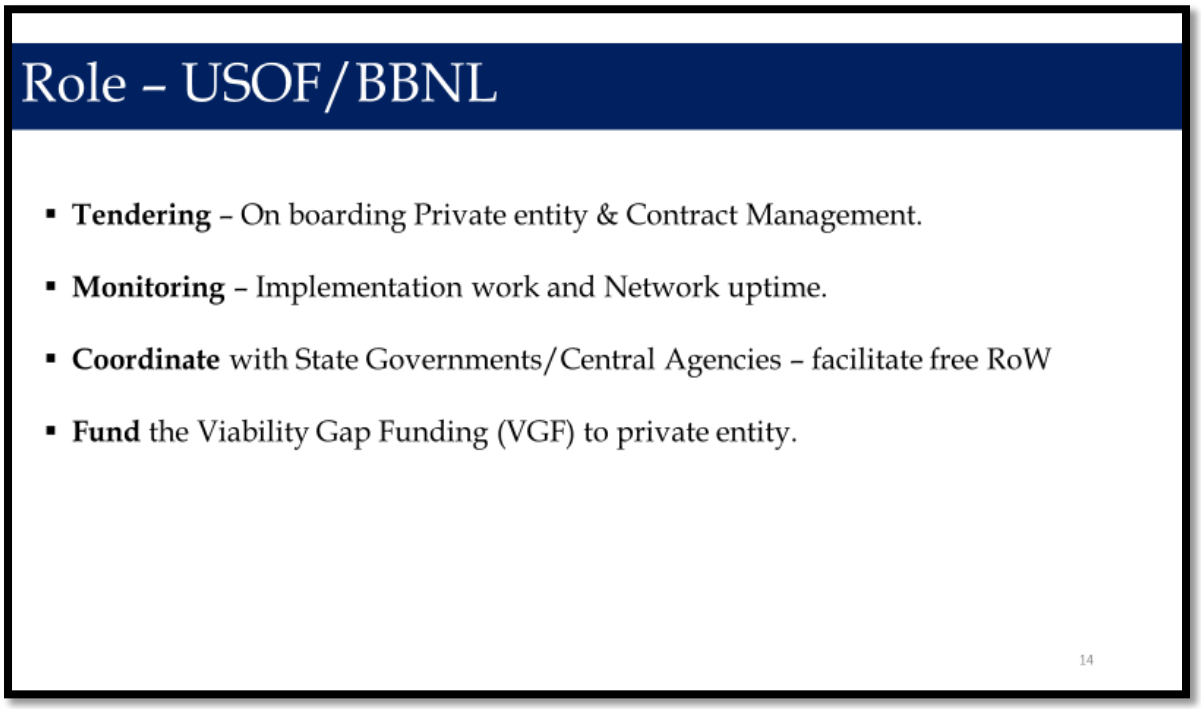
### Role – Private Concessionaire

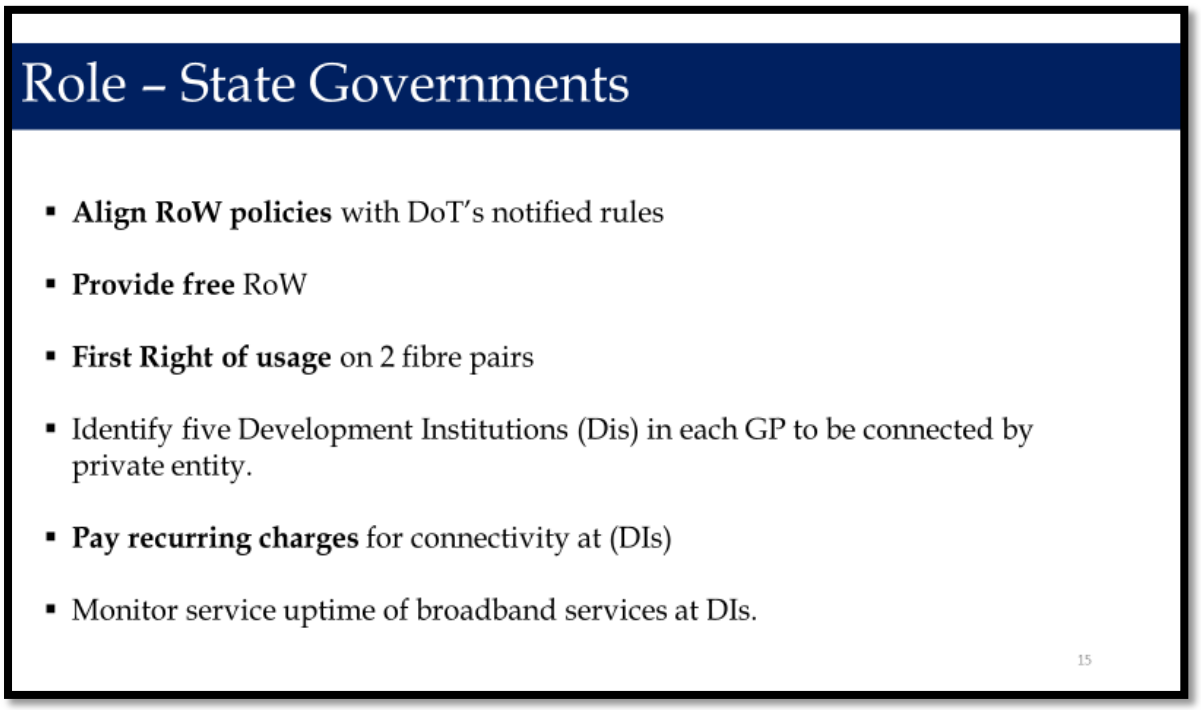
- **Connect minimum 5** rural Development Institutions (DIs).

  (**School**, **Hospital** (CHC/PHC/Health sub-centre/Health & Wellness Centre), **Post Office**, **Police Station**, **Common Service Centre**, **Gram Panchayat**, **Community Centre**, **Block Development Office**)

- Capacity to provide minimum 50 Mbps **on-demand internet bandwidth** to each DIs on chargeable basis.
- Digitized and geo-referenced As Build Drawings (ABDs) of Infrastructure – Create, keep & share with BBNL

13




## 8.5. Conclusion and Recommendation:

- Use of Broadband is seen as Socio Economic development driver for any country. In order country to grow from its developing status to developed nation, it is very important that it grow holistically with similar growth rate for both Urban as well as rural sectors.

- It is very important to provide better life enhancing urban like amenities to rural areas and have an inclusive growth model by including rural area in Governance and decision making process, which is possible through ICT only. ICT has brought rural areas much closer to the markets and has improved business transactions. India's technological capabilities and rising exports in IT have been one of the major drivers of growth .The demographic dividends makes India one of the youngest countries in world.it is therefore absolutely essential that ICT be harnessed to the utmost potential, The Inclusive potential of ICT at two levels :The benefits that can be to poorer communities and the capacity of individuals within these communities to participate in new economic opportunities.
- BharatNet being first Pillar of Digital India in providing a Very High speed Broadband Network built up with sustainable, roboust Telecom and IT infrastructure plays very important role in Digital India to happen . This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy. With lot of reviews and new implementation strategies introduced like CPSU model, CPSU+State led model ,PPP model ,the progress of rolling out of the project is still slow and skips the time lines .what are various challenges in implementation to be analysed. Similarly, the utilization of the Infrastructure are not happening as desired.
- Some issues related to implementation, O&M and utilization listed in this document in chapters 2 and 6 have been already analyzed at various levels of BBNL, USOF, DOT, NiTi Ayog etc .Way forward solution also were suggested and same are part of chapter 2,4 and 6 and actions are already being taken by the authorities.
- Field visits were made to UP East area as well as digital village of Rewari District, Haryana to study BharatNet implementation, O&M as well utilization. Field data

were collected from BBNL NOC, BBNL PMUs, CSC and Vendors. These data were analysed and the details are placed at Annexure 1and 2 as well as in Chapter 6. After analysis the solution and way forward have been suggested. This recommendations/ way forward can be implemented in BharatNet at various stages of implementation, O&M and utilization for better working of BharatNet and hence its impact on socio economic development can be ensured in more effective manner.

- BharatNet can effectively play the role of first Pillar of Digital India.It can be seen as India's Information Highway of I-Way.CSC models alongwith Digital Villages powered by BharatNet can be envisaged as effective Digital Service Delivery models. As observed by the teams of IIPA during the visits to the Digital Village , These models can very well be seen as very effective and efficient models In making digital service delivery . The effort of Bharatnet In Providing high speed bandwidth to the panchayats is also appreciated by the team.

- The benefits of the Inclusive potential of ICT that can be made available to poorer communities and the capacity of individuals within these communities to participate in new economic opportunities.
- As per Experts belief , Broadband has more Impact than any other ICT on GDP,As per world bank report ,10% increase in broadband penetration increases GDP of developing countries by 1.24%.To have a high sustained growth of broadband in the country, creation of a robust broadband infrastructure is of utmost importance.
- Recent times industry has more optimistic view on economic growth vis a vis Broadband Penetration.
- As per ICRIER-Broadband India Forum (BIF) report: With every 10% increase in Investments in Telecommunications Infrastructure, there will be at least a 3.3% increase of India's GDP, believe experts at the recent Broadband India Forum

(BIF), adding other lucrative predictions that the proposed impact of US$100 billion investment envisioned by National Digital Communications Policy 2018 could cumulatively add US$ 1.21 trillion to India's GDP at the same time.

- Economic survey 2019 as well as Budget 2019 envisage the total 5 Trillion Dollar Economy by 2025.
- In this context, the contribution of Digital India is very important as it is envisaged that it will contribute more than 20% to GDP.
- BharatNet being a Very High speed Broadband Network built up with sustainable, robust Telecom and IT infrastructure plays very important role in Digital India to happen. This means BharatNet plays major role in Socio Economic development of the country and contributes significantly to 5TD economy.

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# Annexure-1

# Implementation and O&M of BharatNet

**Status as on Dated: 03.02.2020:**

Status of BharatNet as on 03-02-2020 for further necessary action by all concerned.

**a. The Performance of 3 CPSUs for Ph 1 in respect of PLB & OFC laying for the week ending 03-02-2020 is given below**

Weekly target & achievement for PLB / OFC laying and E2E connectivity as on 31-01-2020

| CPSUs | Revised Work Front PH 1 | PLB laid (in Kms) | | OFC laid (in Kms) | | GPs for which PLB laid | | GPs for which OFC laid | | E2E connectivity achieved | | Service ready GPs | Service opened GPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | During the week | Cumulative | During the week | Cumulative | During the week | Cumulative | During the week | Cumulative | During the week | Cumulative | Cumulative | During the week | cumulative |
| | GPs | Kms | Kms | Kms | Kms | Nos | Nos | Nos | Nos | GPs | GPs | GPs | GPs | GPs |
| BSNL | 104326 | 13 | 235498 | 13 | 248046 | 4 | 102857 | 4 | 102723 | 1 | 102329 | 102210 | 28 | 100397 |
| RailTel | 11106 | 0 | 24664 | 16 | 24020 | 2 | 10030 | 4 | 9382 | 43 | 7836 | 7428 | 21 | 6677 |
| PGCIL | 10825 | 0 | 28451 | 5 | 30599 | 1 | 10600 | 0 | 10551 | 3 | 10114 | 10035 | 1 | 9589 |
| Total | 126257 | 13 | 288613 | 34 | 302665 | 7 | 123487 | 8 | 122656 | 47 | 120279 | 119673 | 50 | 116663 |

**Table 1**

**b. Status of Ph 1 GPON Eqpt supply, Installation testing etc. is as per table given below:**

Status of GPON supply and installation as on 31-01-2020

| S.No | Vendor | | PO | Ordered | | Delivered | | Installed | | Service ready GPs | GPON Equipment AT | | | | Service Opened GPs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | | Total | | Total | | | During the week | | Total | | |
| | | | | OLT | ONT | OLT | ONT | OLT | ONT | GPs | OLT | ONT | OLT | ONT | GPs |
| 1 | UTL (old) | BBNL | OLD | 1255 | 20473 | 1255 | 20473 | 1247 | 19644 | 19512 | 0 | 27 | 545 | 5950 | 19421 |
| 2 | Tejas Networks Ltd | BBNL | PO -1 | 376 | 9406 | 376 | 9454 | 376 | 9491 | 9373 | 0 | 0 | 375 | 8027 | 9123 |
| | | BSNL | PO-1 | 1105 | 27625 | 1318 | 38157 | 1310 | 36539 | 35791 | 0 | 22 | 1306 | 28196 | 34399 |
| | | | PO-2 | 195 | 9984 | | | | | | | | | | |
| Total(Tejas) | | | | 1676 | 47015 | 1694 | 47611 | 1686 | 46030 | 45164 | 0 | 22 | 1681 | 36223 | 43522 |
| 3 | ITI Ltd | BBNL | PO-1 | 1151 | 28770 | 1162 | 28770 | 1159 | 27889 | 26968 | 1 | 217 | 1139 | 20738 | 26064 |
| | | BSNL | PO-1 | 340 | 8500 | 393 | 11706 | 287 | 9260 | 9081 | 0 | 0 | 268 | 7704 | 8941 |
| | | | PO-2 | 60 | 3071 | | | | | | | | | | |
| Total (ITI) | | | | 1551 | 40341 | 1555 | 40476 | 1446 | 37149 | 36049 | 1 | 217 | 1407 | 28442 | 35005 |
| 4 | L& T Ltd | BBNL | PO-1 | 473 | 11824 | 473 | 11824 | 473 | 11714 | 11468 | 0 | 28 | 448 | 10263 | 11235 |
| 5 | UTL | BSNL | PO-1 | 255 | 6375 | 300 | 8329 | 270 | 7510 | 7480 | 0 | 74 | 265 | 5449 | 7480 |
| | | | PO-2 | 45 | 2304 | | | | | | | | | | |
| Total UTL(BSNL) | | | | 300 | 8679 | 300 | 8329 | 270 | 7510 | 7480 | 0 | 74 | 265 | 5449 | 7480 |
| Total | | | | 5255 | 128332 | 5277 | 128713 | 5122 | 122047 | 119673 | 1 | 368 | 4346 | 86327 | 116663 |

Note: 22 OLTs delivered for replacement of UTL Equipment have been installed in Ph 1 project. ( utilised BSNL Tejas replacement order: Guj:-6, MH-5,Raj-5, AP-1, Chg-1 & HR-4 from Ph 2 GPON Equipment of Punjab)

**Table 2**

**c. Overall Performance of Ph 1 for all the States /UTs in respect of duct & OFC laying, Equipment installation and acceptance testing etc. as on 03-02-2020 is given at the Annexure-I. The E2E is as reported by CPSUs.**

**d. The Status of Bharat Net Phase-II (weekly Progress & Total) for all the Models is as per the Table given below**

BharatNet Ph 2 Weekly Progress for PLB / OFC laying ,E2E ,SRGP & service Opened GPs as on 31-01-2020

| Model | Work Front Ph 2 | PLB laid (in Kms) | | OFC laid (in Kms) | | GPs for which PLB laid | | GPs for which OFC laid | | E2E connectivity achieved | | Service ready GPs | | Service opened GPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | During the week | Total | During the week | Total | During the week | Total | During the week | Total | During the week | Total | During the week | Total | During the week | Total |
| | GPs | Kms | Kms | Kms | Kms | Nos | Nos | Nos | Nos | GPs | GPs | GPs | GPs | GPs | GPs |
| State Led Model | 65590 | 1852.1 | 55172.6 | 2639.0 | 65717.1 | 457 | 9467 | 616 | 12642 | 376 | 8061 | 262 | 6012 | 262 | 6012 |
| PPP Proposed | 18604 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BSNL- NON EPC | 25157 | 568.0 | 40674.0 | 789.0 | 22630.0 | 104 | 10362 | 263 | 5344 | 115 | 2501 | 5 | 961 | 32 | 897 |
| BBNL Led | 7494 | 46.7 | 21004.2 | 71.3 | 21447.5 | 37 | 7151 | 55 | 7017 | 57 | 6854 | 112 | 6777 | 112 | 6777 |
| PPP Proposed | 8385 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 125230 | 2466.8 | 116850.8 | 3499.3 | 109794.6 | 598 | 26980 | 934 | 25003 | 548 | 17416 | 379 | 13750 | 406 | 13686 |

**Table3**

**e. The Status of Service Opened GPs on Satellite is as per the table given below.**

Status of Sattellite GPs as on 31-01-2020

| State | BBNL Tender | BSNL Tender | Total | Equipment Installed ( GPs/Sites) | | | | Service Ready ( GPs/Sites) | | | | Service Commenced ( GPs/Sites) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No of GPs/Sites | No of GPs/Sites | No of GPs/Sites | BSNL Tender | BBNL Tender | Total | Prog during the week for GPs/Sites | BSNL Tender | BBNL Tender | Total | Prog during the week for GPs/Sites | BSNL Tender | BBNL Tender | Total | Prog during the week for GPs/Sites |
| Total | 4821 | 1407 | 6228 | 1093 | 382 | 1475 | 72 | 1003 | 310 | 1313 | 58 | 1003 | 310 | 1313 | 58 |
| Note: Total Sat GPs arer 7118, Work Order for 890 GPs is yet to be alloted | | | | | | | | | | | | | | | |

**Table4**

**Overall Status of Ph 1, Ph 2 & Satellite GPs as on 03-02-2020 is as per the table given below.**

Overall Status of Ph 1 & Ph 2 as on 31-01-2020

| Phase/Sat | Total Work Front ( Inc BHQs) | PLB laid | | OFC laid | | E2E tested GPs | Service ready GPs | Service opened GPs |
|---|---|---|---|---|---|---|---|---|
| | | Total | Total | Total | Total | Total | Total | Total |
| GPs | GPs | Kms | GPs | Kms | GPs | GPs | GPs | GPs |
| Ph 1 | 126257 | 2,88,613 | 1,23,487 | 3,02,665 | 1,22,656 | 120279 | 1,19,673 | 1,16,663 |
| Ph 2 | 128798 | 1,16,851 | 26,980 | 1,09,795 | 25,003 | 17416 | 13750 | 13686 |
| Satelite | 7118 | | | | | | 1313 | 1313 |
| Total | 262173 | 4,05,464 | 1,50,467 | 4,12,460 | 1,47,659 | 137695 | 1,34,736 | 1,31,662 |

**Table5**

Consolidated status of GPON I&C for both BBNL & BSNL vendors as on 31.01.2020

| S. No | State | Phase 1 | | | Phase 1 GPON Requirement including BHQs for 1.25 Lacs | | No. of GPs E2E tested where GPON equipment delivered | GPON equipment status | | | | | | | | | | | Service Opened GPs | Service Opened GPs in the previous week | Net Service Opened GPs during the week |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ordered | | Delivered | | Installed | | OLT Integrated with OCLAN | ONTs ranged | AT | | Service Ready GPs | | | |
| | | Blocks | GPs | GPs including BHQs | OLT | ONT | | OLT | ONT | OLT | ONT | OLT | ONT | | | OLT | ONT | | | | |
| BSNL TOTAL | | 2479 | 101860 | 104326 | 4104 | 104136 | 102329 | 4222 | 106712 | 4235 | 106869 | 4180 | 103078 | 4176 | 100409 | 3504 | 73426 | 102210 | 100397 | 100369 | 28 |
| 1 | Assam | 130 | 1533 | 1663 | 134 | 1663 | 1622 | 130 | 1652 | 134 | 1662 | 134 | 1640 | 134 | 1622 | 104 | 951 | 1622 | 1622 | 1622 | 0 |
| 2 | Bihar | 354 | 5667 | 6021 | 373 | 6108 | 5949 | 376 | 6054 | 375 | 6054 | 372 | 5987 | 372 | 5729 | 336 | 3909 | 5945 | 5729 | 5721 | 8 |
| 3 | Chhattisgarh | 64 | 4052 | 4116 | 129 | 4168 | 4111 | 130 | 4255 | 137 | 4255 | 137 | 4099 | 137 | 4092 | 103 | 2695 | 4098 | 4092 | 4089 | 3 |
| 4 | Haryana | 122 | 6082 | 6204 | 178 | 6140 | 6188 | 172 | 6101 | 189 | 6271 | 189 | 6188 | 189 | 6188 | 164 | 5230 | 6188 | 6188 | 6188 | 0 |
| 5 | J & K | 12 | 388 | 400 | 17 | 400 | 350 | 17 | 398 | 17 | 398 | 16 | 356 | 16 | 350 | 9 | 187 | 350 | 350 | 350 | 0 |
| 6 | Karnataka | 176 | 6085 | 6252 | 495 | 6268 | 6244 | 496 | 6318 | 496 | 6463 | 495 | 6289 | 495 | 6244 | 324 | 4043 | 6244 | 6232 | 6232 | 0 |
| 7 | Kerala | 152 | 977 | 1129 | 147 | 1129 | 1129 | 147 | 1179 | 147 | 1179 | 146 | 1129 | 146 | 1129 | 146 | 1093 | 1129 | 1129 | 1129 | 0 |
| 8 | Madhya Pradesh | 173 | 12528 | 12701 | 452 | 12828 | 12700 | 527 | 13287 | 526 | 13287 | 501 | 12736 | 501 | 12697 | 400 | 9954 | 12697 | 12697 | 12697 | 0 |
| 9 | Maharastra | 203 | 15169 | 15372 | 530 | 15505 | 15224 | 522 | 15564 | 530 | 15564 | 526 | 15243 | 526 | 14947 | 463 | 10901 | 15197 | 14947 | 14936 | 11 |
| 10 | Punjab | 93 | 7999 | 8088 | 181 | 8142 | 7987 | 207 | 8983 | 191 | 8358 | 183 | 8023 | 183 | 7892 | 170 | 6811 | 7987 | 7892 | 7890 | 2 |
| 11 | Rajasthan | 220 | 8717 | 8937 | 619 | 8414 | 8695 | 632 | 8484 | 631 | 8940 | 630 | 8740 | 630 | 8585 | 536 | 7169 | 8695 | 8585 | 8581 | 4 |
| 12 | UPE | 275 | 17629 | 17904 | 288 | 17920 | 17823 | 302 | 18342 | 294 | 18342 | 294 | 17816 | 293 | 17604 | 261 | 14594 | 17823 | 17604 | 17604 | 0 |
| 13 | UPW | 167 | 10300 | 10467 | 196 | 10496 | 10406 | 189 | 10769 | 198 | 10769 | 198 | 10402 | 198 | 9705 | 183 | 3149 | 10385 | 9705 | 9705 | 0 |
| 14 | Uttaranchal | 30 | 1836 | 1866 | 73 | 1893 | 1526 | 76 | 2040 | 76 | 2040 | 74 | 1739 | 74 | 1425 | 67 | 1316 | 1526 | 1425 | 1425 | 0 |
| 15 | West Bengal | 291 | 2774 | 3065 | 275 | 2912 | 2326 | 282 | 3116 | 277 | 3116 | 273 | 2646 | 272 | 2161 | 233 | 1407 | 2285 | 2161 | 2161 | 0 |
| 16 | Sikkim | 9 | 52 | 61 | 9 | 61 | 26 | 9 | 61 | 9 | 61 | 6 | 24 | 4 | 18 | 4 | 5 | 18 | 18 | 18 | 0 |
| 17 | A&N | 7 | 60 | 67 | 7 | 76 | 10 | 7 | 97 | 7 | 97 | 5 | 8 | 5 | 8 | 0 | 0 | 8 | 8 | 8 | 0 |
| 18 | Chandigarh | 1 | 12 | 13 | 1 | 13 | 13 | 1 | 12 | 1 | 13 | 1 | 13 | 1 | 13 | 1 | 12 | 13 | 13 | 13 | 0 |
| RAILTEL TOTAL | | 316 | 10790 | 11106 | 564 | 11099 | 7836 | 482 | 10562 | 490 | 10786 | 390 | 8334 | 352 | 6677 | 333 | 5456 | 7428 | 6677 | 6656 | 21 |
| 1 | Arunachal | 68 | 677 | 745 | 73 | 742 | 277 | 61 | 661 | 52 | 661 | 24 | 190 | 13 | 88 | 6 | 18 | 88 | 88 | 88 | 0 |
| 2 | Nagaland | 48 | 874 | 922 | 79 | 923 | 169 | 82 | 1115 | 76 | 1009 | 27 | 231 | 15 | 115 | 10 | 70 | 127 | 115 | 115 | 0 |
| 3 | Manipur | 14 | 650 | 664 | 29 | 663 | 370 | 5 | 97 | 17 | 437 | 15 | 374 | 15 | 326 | 12 | 246 | 326 | 326 | 326 | 0 |
| 4 | Mizoram | 13 | 262 | 275 | 34 | 275 | 45 | 22 | 489 | 22 | 489 | 6 | 101 | 6 | 40 | 6 | 23 | 41 | 40 | 40 | 0 |
| 5 | Tripura | 41 | 864 | 905 | 50 | 907 | 657 | 49 | 1048 | 49 | 1048 | 44 | 780 | 39 | 557 | 35 | 425 | 558 | 557 | 557 | 0 |
| 6 | Meghalaya | 23 | 948 | 971 | 46 | 971 | 122 | 15 | 395 | 15 | 385 | 15 | 122 | 5 | 98 | 5 | 95 | 122 | 98 | 98 | 0 |
| 7 | Gujarat | 103 | 6381 | 6484 | 245 | 6479 | 6056 | 240 | 6618 | 251 | 6618 | 251 | 6396 | 251 | 5314 | 251 | 4443 | 6026 | 5314 | 5293 | 21 |
| 8 | D&D | 2 | 16 | 18 | 2 | 17 | 18 | 2 | 17 | 2 | 17 | 2 | 18 | 2 | 18 | 2 | 18 | 18 | 18 | 18 | 0 |
| 9 | D&NH | 1 | 20 | 21 | 2 | 21 | 21 | 2 | 21 | 2 | 21 | 2 | 21 | 2 | 20 | 2 | 18 | 21 | 20 | 20 | 0 |
| 10 | Pondicherry | 3 | 98 | 101 | 4 | 101 | 101 | 4 | 101 | 4 | 101 | 4 | 101 | 4 | 101 | 4 | 100 | 101 | 101 | 101 | 0 |
| CIL TOTAL | | 512 | 10386 | 10825 | 553 | 10952 | 10114 | 551 | 11058 | 552 | 11058 | 552 | 10635 | 552 | 9589 | 509 | 7445 | 10035 | 9589 | 9588 | 1 |
| 1 | AP | 79 | 1670 | 1679 | 82 | 1752 | 1605 | 80 | 1776 | 81 | 1776 | 81 | 1634 | 81 | 1593 | 81 | 1521 | 1601 | 1593 | 1592 | 1 |
| 2 | Telangana | 104 | 1946 | 2047 | 103 | 2046 | 2047 | 103 | 2124 | 103 | 2124 | 103 | 2047 | 103 | 2047 | 100 | 2011 | 2047 | 2047 | 2047 | 0 |
| 3 | Odisha | 181 | 3811 | 3992 | 225 | 4041 | 3722 | 225 | 4041 | 225 | 4041 | 225 | 3937 | 225 | 3489 | 190 | 2397 | 3700 | 3489 | 3489 | 0 |
| 4 | Jharkhand | 142 | 2707 | 2849 | 134 | 2855 | 2490 | 134 | 2855 | 134 | 2855 | 134 | 2759 | 134 | 2232 | 129 | 1292 | 2437 | 2232 | 2232 | 0 |
| 5 | Himachal Prades | 6 | 252 | 258 | 9 | 258 | 250 | 9 | 262 | 9 | 262 | 9 | 258 | 9 | 228 | 9 | 224 | 250 | 228 | 228 | 0 |
| Grand Total | | 3307 | 123036 | 126257 | 5221 | 126187 | 120279 | 5255 | 128332 | 5277 | 128713 | 5122 | 122047 | 5080 | 116675 | 4346 | 86327 | 119673 | 116663 | 116613 | 50 |
| Progress during last week | | 3307 | 123036 | 126257 | 5221 | 126187 | 120232 | 5255 | 128332 | 5277 | 128713 | 5122 | 122005 | 5080 | 116625 | 4345 | 85959 | 119622 | 116613 | | |
| Difference | | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 50 | 1 | 368 | 51 | 50 | | 50 |

## Table6

| BharatNet Phase-2 Status ( State -Led Model ) | | | | | | | | As on 31-01-2020 |
|---|---|---|---|---|---|---|---|---|
| S.N | State | No. of GPs | TOTAL Funds Approved ( Total CAPEX** + OPEX for 3 years) in Crores of Rs. | Mobilisation fund (10%) Released ( Crore) | 20 % Fund ( less 10%) Released (Crore) | Release of fund of 3rd Milestone | AE & EC Charges paid (Crore) | RFP / Project Status |
| 1 | Andhra Pradesh | Total- 11254<br>Pkg A(TCIL) - 4810<br>Pkg B(L&T) - 3050<br>Pkg C(TeraSoft) - 3394 | 1162.17<br>( 998.74+163.43) | 84.798 | 129.476 | 0 | 12.85 | Passive Infrastructure: Work order awarded on 31-12-2018 to M/s TCIL, L&T and Terasoft. Survey completed for 11274 GPs in 613 Blocks Total 13695 Km OFC is laid in 2758 GPs.<br>Active Infrastructure: Work order issued on 14-01-2019 to L&T.<br>Project is likely to be completed on 30-09-2019 for passive infrastructure and on 31-10-2019 for active component. |
| 2 | Telangana | Total- 10787<br>Pkg A(L&T) - 3845<br>Pkg B(Sterlite) - 3901<br>Pkg C(TCIL) - 3041 | 2065.21 | 112.278 | 0 | 0 | 0 | • LOI has been given to L&T , Sterlite, TCIL for 3 packages seperately on 22-02-2019.<br>• revised DPR approved. |
| 3 | Maharashtra | Total- 12740<br>Pkg A(ITI) - 4091<br>Pkg B(Sterlite) - 4045<br>Pkg C(ITI) - 4604 | 3468.39<br>(2980.65+487.74) | 205.883 | 336.055 | 0 | 0 | • P.O have been issued on 03-11-2018 to M/s ITI and Sterlite.<br>• 4020, 3890, 4569 GP's survey completed and approved by TPA in Package A, B and C respectively.<br>• Total 23436 Km Duct has been laid in all three packages. Duct laying compited in 3749 No. of GPs.<br>• 115 No. of Blocks approved with Network design and BOQ by TPA. Total 21268 Km OFC (reported to be unapproved) in 3914 GPs has beeen laid till date.<br>* Project is likely to be completed on 30-11-2019. |
| 4 | Jharkhand | Total- 1684 | 637.44<br>(549.18+88.26) | 36.36 | 71.74 | 0 | 0 | * P.O has been issued to HFCL on 01-03-2019.<br>* Survey of 1670 GPs has been completeed till date.<br>* 2340.02 Km Duct laying completed.<br>* Duct laying is completed in 135 GP. 815 Km OFC has been laid in 68 GP. |
| 5 | Tamil Nadu | Total- 12524 | 1815.32 | 106.756 | 0 | 0 | 0 | • Revised DPR approved .<br>• RFP is floated on 01-12-2019. |
| 6 | Gujarat | Total -7692<br>Pkg A(ITI) - 3925<br>Pkg B(GTPL) - 3767 | 2525.92<br>(2176.18+349.74) | 155.799 | 232.8 | 757.782 | 36.68 | 1. GFGNL has issued Work Order to M/s ITI and M/s GTPL on 25-10-2018.<br>2. Agreement with GTPL & ITI has been signed on 15th Jan'2019.<br>3. Total 12233 Km and 11331 Km Duct has been laid by GTPL and ITI . GTPL and ITI has completed Duct laying in 2549 & 2236 GPs .<br>4. GTPL and ITI has completed 12131 Km & 9487 Km OFC laying in 2549 & 2236 GPs respectively.<br>5. Project is likely to be completed on 31-10-2019 |
| 7 | Chhattisgarh | Total -5964 | 2155.25<br>(1853.82+301.43) | 144.982 | 217.21 | 0 | 31.61 | • Delivery of Active eqpt. is in progress for 1992 GP routers & 85 Block routers.<br>• GIS Route survey of 26532 Km has been completed.<br>• Total 2691.1 Km OFC in 635 GPs has been laid .<br>• 25956 Km Route survey is approved till date.<br>• 5832.55 Km duct laying in 798 GPs is completed. |
| 8 | Odisha | Total- 2945 | 526.87<br>(453.92+72.95) | 30.754 | 53.816 | 0 | 0 | • Contract with Terasoft has been signed on 30-03-2019.<br>* Survey work has been completed in 2682 GPs in 265 Blocks.<br>* 5630 Km OFC has been laid. In 482 GP,OFC laying is completed. |
| | Total | 65590 | 12950.17 | 877.61 | 1041.097 | | 81.14 | |

** AE & EC charges @ 6/8% , Contingency charges @ 3% & QA charges @ 1% of Basic CAPEX are included in the Total CAPEX .

Table 7

| BharatNet Phase-II Status - CPSU Model | | | | | | | | As on 31-01-2020 |
|---|---|---|---|---|---|---|---|---|
| S.No. | Implementation Model | State | No. of GPs | TOTAL Funds Approved ( Total CAPEX + OPEX/O&M for 3/6 years) in Crores of Rs. | DPR Status | MoU Status | Mobilization Advance Status/ Gross Amount | RFP Status |
| 1 | | Assam | 1217 | 337.86 (293 + 44.86) | | M.O.U signed on 09-08-2018 | Total fund released to BSNL is Rs. 3165 Crores till date as below : • Initially, Mobilization Fund of INR 632 Cr was released on 8th Dec 2017. • Further, an amount of Rs. 1670 Cr. was released on 28-03-2018. • Additional amount of Rs. 863 Crores again released on 28-09-2018 | • Work Order issued for 24796 GPs in 374 Blocks under Non-EPC Model. • 22630 Km OFC has been laid under Non-EPC Model. • OFC Laying is completed for 5344 GPs. • 40674 Km duct has been laid. • Duct laying completed for 10362 GPs • E2E GP testing done for 2501 GPs. 897 GPs has been lit . **Note : GPs of HARYANA has been shifted to Phase-I** |
| 2 | | Madhya Pradesh | 10854 | 3264.18 (2838.85 + 425.33) | | | | |
| 3 | | J & K | 2396 | | | | | |
| 4 | | Rajasthan | 1671 | 614.47 (535 + 79.47) | | | | |
| 5 | | Uttar Pradesh ( E) | 23155 | 3963.07 (3459.54 + 503.53) | | | | |
| 6 | | Uttar Pradesh ( W) | 4307 | 601.38 (523.52 + 77.86) | | | | |
| 7 | | West Bengal | 593 | 210.32 (182.4 + 27.92) | | | | |
| 8 | | Sikkim | 124 | 77.07 (66.93 + 10.14 ) | | | | |
| | Sub Total | | 44317 | 9068.35 | | | | |
| 9 | CPSU Model-PGCIL | HP | 2785 | 640.27 | Work awarded by DoT to PGCIL on 12th Oct. 2017 TC has approved the DPR submitted . | M.O.U has not been signed. | NIL | • RFP of HP opened on 13-06-2018. • Financial bid opened on 17-07-2018 for both the packages. • HFCL & KEC are L1 Bidders in respective packages. • Case sent to USOF for additional funds as per price negotiated with the bidders. |
| 10 | | Uttarakhand | 5600 | 0 | Work awarded by DoT to PGCIL on 12th Oct. 2017 | M.O.U has not been signed. | NIL | • RFP has been opened on 10-07-2018. • Technical Evaluation completed and approved by management. • Financial Bid opened. ERA ( E-reverse auction) completed. • Revised DPR submitted by PGCIL to BBNL, which is under evaluation. |
| | Sub Total | | 8385 | 640.27 | | | | |
| 11 | BBNL | Punjab | 4802 ( VTL's P1 - 1602 GP & 14 Blocks, HFCL's P2- 1523 GPs & 17 Blocks and P3- 1677 GPs & 19 Blocks ) | 636.96 (553.90 + 83.06 # ) | | | | • No. of GPs where Survey approved by TPA -- 4775 GPs in 50 Blocks • No. of Blocks / GPs for which Survey / BOQ approved by BBNL -- 4775 GPs in 50 Blocks • Firm Work order issued to PIA for 4775 GPs in 50 Block till date. • Total Duct Laying in Km -- 11033.21 Km • No. of GPs where Duct Laying completed -- 4581 GPs • Total 11462.45 Km OFC laying completed in 4570 GPs. • Survey and BoM submission task data is uploaded for 46 approved Blocks in PM Tool. Work execution task updation is in process. |
| 12 | | Bihar | 2692 (VTL's B1 - 816 GPs & 57 Blocks and B2- 915 GPs & 58 Blocks , Polycab's B3 - 961 GPs & 65 Blocks) | 547.10 (475.68 + 71.42 # ) | | | | VTL 1. For Package B1 – Survey approved all 816 GPs of 57 Blocks. 3043 Km T&D completed for 677 GPs. 2994 Km OFC Blowing completed for 633 GPs. 2. For Package B2 - Survey approved for all 916 GPs of 58 Blocks. 3552 Km T&D completed for 884 GPs. 3433 Km OFC Blowing completed for 843 GPs. 3. For Package B3 - Survey approved for all 961GPs of 65 Blocks. 3376 Km T&D completed for 1009 GPs. 3558 OFC Blowing completed for 971 GPs. |
| | Sub Total | | 7494 | | | | | |
| 13 | BBNL | Satellite Media | 6228 | | Approved by Telecom Commission | | | • BBNL's PO has been issued to TCIL on 24-12-2018 for 4821 GPs. • BSNL has issued PO for 1407 GPs on satellite. Installation has been completed on 1308 GPs. Service has been commenced on 1169 GP Locations. |
| 14 | | Wi-Fi | | | | | | • Earlier Bid cancelled. New Tender has been opened on 25-10-2018. • 16 Bidders have participated for 42 packages. • Financial bid opened on 16-11-2018. • APOs for 10 packages has been issued to TCIL on 06-12-2018. |
| | Total | | 66424 | 10892.68 | | | | |
| | | # - O&M | | | | | | |

Table 8

## Status of Bharat Net for Non EPC BSNL

### Bharat Net Phase-II BSNL — Status as on 31/01/2020

| Circle | District | Blocks | No. of GPs | No of GPs (including Block HQ) | Tender Status | | | | | | | | | | Execution Status | | Execution Status | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non EPC | | NIT Floated | | Technical Bid Open | Financial bid Opened | Tender Approved | | Work Order Issued | | Duct Laid | No of GPs where Duct Laying | OFC laid | No of GPs where OFC Laying | No of GPs where E2E Fibre | No. of OLT installed | No. of ONT installed | ONT raged with OLT | Service Ready GPs | GPs LIT |
| | | | | | Blocks | GPs Including Block HQ | Blocks | GPs | | | Blocks | GPs | Blocks | GPs | Cumulative | Cumulative | Cumulative | Cumulative | Cumulative | Cumulative Progress | Cumulative Progress | | Cumulative | Cumulative |
| Unit | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Nos | Kms | Nos | Kms | Nos | Nos | Nos | Nos | | Nos | Nos |
| MP | 42 | 140 | 10,404 | 10,544 | 77 | 5,382 | 77 | 5,382 | 77 | 77 | 77 | 5,382 | 77 | 5,382 | 17,912 | 2,838 | 9,584 | 1,220 | 822 | 91 | 581 | 199 | 199 | 135 |
| UPE | 40 | 307 | 23,155 | 23,462 | 225 | 17,032 | 225 | 17,032 | 225 | 225 | 225 | 17,032 | 225 | 17,032 | 17,573 | 5,895 | 8,947 | 2,925 | 1,045 | 360 | 762 | 762 | 762 | 762 |
| UP(W) | 14 | 70 | 4,313 | 4,383 | 36 | 2,175 | 36 | 2,175 | 36 | 36 | 36 | 2,175 | 36 | 2,175 | 4,524 | 1,575 | 3,551 | 1,184 | 634 | 36 | 0 | 0 | 0 | 0 |
| WB | 8 | 66 | 734 | 800 | 16 | 157 | 16 | 141 | 16 | 16 | 16 | 141 | 15 | 87 | 257 | 0 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sikkim | 4 | 22 | 124 | 146 | 22 | 146 | 21 | 120 | 21 | 21 | 21 | 120 | 21 | 120 | 665 | 54 | 548 | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total Non-EPC Model** | | | **38,730** | **39,335** | **376** | **24,892** | **375** | **24,850** | **375** | **375** | **375** | **24,850** | **374** | **24,796** | **40,931** | **10,362** | **22,735** | **5,344** | **2,501** | **487** | **1,343** | **961** | **961** | **897** |

Table 9

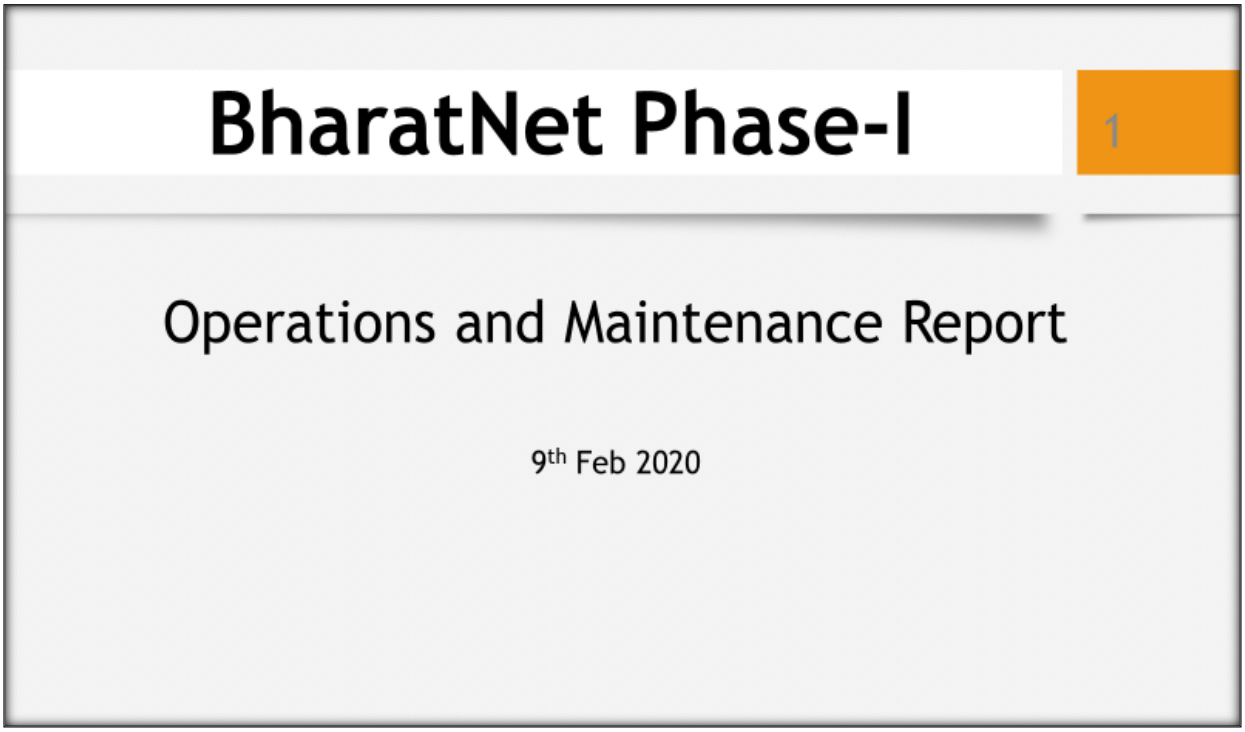
| Staus of Implementation of GPs to be connected on Satellite Media under BharatNet Project ( as on 02.02.2020) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl No | State | Number of GPs on Satellite Media | | | Survey Completed | | | Installation Completed | | | Service Ready | | |
| | | Total | Implemention by BSNL | Implementation by BBNL | BSNL | BBNL | Total | BSNL | BBNL | Total | BSNL | BBNL | Total |
| 1 | Arunanchal Pradesh | 1119 | 407 | 712 | 272 | 347 | 619 | 160 | 2 | 162 | 155 | 1 | 156 |
| 2 | Meghalaya | 843 | 77 | 766 | 72 | 725 | 797 | 70 | 2 | 72 | 70 | 2 | 72 |
| 3 | Tripura | 142 | 0 | 142 | 0 | 142 | 142 | 0 | 91 | 91 | 0 | 90 | 90 |
| 4 | Nagaland | 120 | 0 | 120 | 0 | 40 | 40 | 0 | 2 | 2 | 0 | 2 | 2 |
| 5 | Mizoram | 501 | 0 | 501 | 0 | 501 | 501 | 0 | 108 | 108 | 0 | 43 | 43 |
| 6 | Manipur | 2135 | 0 | 2135 | 0 | 2135 | 2135 | 0 | 140 | 140 | 0 | 140 | 140 |
| 7 | J&K ( UT) | 692 | 613 | 79 | 613 | 0 | 613 | 570 | 0 | 570 | 492 | 0 | 492 |
| 8 | LEH (UT) | 193 | 172 | 21 | 170 | 0 | 170 | 170 | 0 | 170 | 169 | 0 | 169 |
| 9 | HP | 154 | 0 | 154 | 0 | 153 | 153 | 0 | 35 | 35 | 0 | 31 | 31 |
| 10 | Uttrakhand | 175 | 0 | 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | Oddisha | 19 | 19 | 0 | 19 | 0 | 19 | 18 | 0 | 18 | 15 | 0 | 15 |
| 12 | Rajsthan | 30 | 30 | 0 | 30 | 0 | 30 | 30 | 0 | 30 | 30 | 0 | 30 |
| 13 | Chattisgarh | 23 | 23 | 0 | 16 | 0 | 16 | 13 | 0 | 13 | 13 | 0 | 13 |
| 14 | UP | 33 | 33 | 0 | 33 | 0 | 33 | 33 | 0 | 33 | 33 | 0 | 33 |
| 15 | MP | 33 | 33 | 0 | 32 | 0 | 32 | 29 | 0 | 29 | 26 | 0 | 26 |
| 16 | A&N | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | Lakshdweep | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | Jharkhand | 2 | 0 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 1 | 1 |
| Total | | 6228 | 1407 | 4821 | 1257 | 4045 | 5302 | 1093 | 382 | 1475 | 1003 | 310 | 1313 |
| As per last week | | 6228 | 1407 | 4821 | 1257 | 4045 | 5302 | 1093 | 310 | 1403 | 1003 | 252 | 1255 |
| Prog. During the week | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 72 | 0 | 58 | 58 |
| Satellite Gateways | | | | | | | | | | | | | |
| 1 | Ranchi | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 2 | Ahmedabad | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| | | | | | | | | | | | | | |

Table 10

## Bharatnet Implementation status as on 29.08.2019

| Consolidated status of GPON I&C for both BBNL & BSNL vendors as on 29.08.2019 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | State | Phase 1 | | | Phase 1 GPON Requirement including BHQs for 1.25 Lacs | | No. of GPs E2E tested where GPON equipment delivered | GPON equipment status | | | | | | | | | | Service Opened GPs | Service Opened GPs in the previous week | Net Service Opened GPs during the week |
| | | | | | | | | Ordered | | Delivered | | Installed | | OLT Integrated with OCLAN | ONTs ranged | AT | | Service Ready GPs | | | |
| | | Blocks | GPs | GPs including BHQs | OLT | ONT | | OLT | ONT | OLT | ONT | OLT | ONT | | | OLT | ONT | | | | |
| BSNL TOTAL | | 2479 | 101858 | 104333 | 4104 | 104136 | 102101 | 4222 | 106712 | 4234 | 106525 | 4171 | 102845 | 4165 | 99727 | 3441 | 66635 | 101893 | 99687 | 99677 | 10 |
| 1 | Assam | 130 | 1533 | 1663 | 134 | 1663 | 1622 | 130 | 1652 | 134 | 1662 | 134 | 1640 | 134 | 1622 | 104 | 856 | 1622 | 1622 | 1622 | 0 |
| 2 | Bihar | 354 | 5667 | 6021 | 373 | 6108 | 5941 | 376 | 6054 | 375 | 6054 | 372 | 5954 | 372 | 5643 | 336 | 3749 | 5914 | 5643 | 5643 | 0 |
| 3 | Chhattisgarh | 64 | 4052 | 4116 | 129 | 4168 | 4104 | 130 | 4255 | 137 | 4255 | 137 | 4093 | 137 | 4053 | 97 | 2567 | 4080 | 4053 | 4053 | 0 |
| 4 | Haryana | 122 | 6082 | 6204 | 178 | 6140 | 6188 | 172 | 6101 | 189 | 6271 | 189 | 6188 | 189 | 6188 | 158 | 4782 | 6188 | 6188 | 6188 | 0 |
| 5 | J & K | 12 | 388 | 400 | 17 | 400 | 340 | 17 | 398 | 17 | 398 | 16 | 332 | 15 | 322 | 9 | 185 | 322 | 322 | 322 | 0 |
| 6 | Karnataka | 176 | 6092 | 6268 | 495 | 6268 | 6227 | 496 | 6318 | 496 | 6355 | 495 | 6261 | 495 | 6166 | 323 | 3961 | 6166 | 6126 | 6126 | 0 |
| 7 | Kerala | 152 | 977 | 1129 | 147 | 1129 | 1129 | 147 | 1179 | 147 | 1179 | 146 | 1129 | 146 | 1129 | 104 | 339 | 1129 | 1129 | 1129 | 0 |
| 8 | Madhya Pradesh | 173 | 12528 | 12701 | 452 | 12828 | 12700 | 527 | 13287 | 526 | 13287 | 501 | 12736 | 501 | 12697 | 400 | 9769 | 12697 | 12697 | 12697 | 0 |
| 9 | Maharastra | 203 | 15169 | 15372 | 530 | 15505 | 15190 | 522 | 15564 | 529 | 15564 | 526 | 15193 | 526 | 14819 | 463 | 8262 | 15173 | 14819 | 14819 | 0 |
| 10 | Punjab | 93 | 7993 | 8082 | 181 | 8142 | 7979 | 207 | 8983 | 191 | 8358 | 183 | 8009 | 183 | 7802 | 170 | 5725 | 7979 | 7802 | 7793 | 9 |
| 11 | Rajasthan | 220 | 8714 | 8934 | 619 | 8414 | 8668 | 632 | 8484 | 631 | 8704 | 630 | 8702 | 630 | 8529 | 536 | 6905 | 8659 | 8529 | 8528 | 1 |
| 12 | UPE | 275 | 17629 | 17904 | 288 | 17920 | 17822 | 302 | 18342 | 294 | 18342 | 294 | 17816 | 293 | 17539 | 261 | 14352 | 17822 | 17539 | 17539 | 0 |
| 13 | UPW | 167 | 10300 | 10467 | 196 | 10496 | 10406 | 189 | 10769 | 198 | 10769 | 198 | 10396 | 198 | 9693 | 183 | 3001 | 10385 | 9693 | 9693 | 0 |
| 14 | Uttaranchal | 30 | 1836 | 1866 | 73 | 1893 | 1525 | 76 | 2040 | 76 | 2040 | 70 | 1742 | 69 | 1424 | 60 | 950 | 1525 | 1424 | 1424 | 0 |
| 15 | West Bengal | 291 | 2774 | 3065 | 275 | 2912 | 2213 | 282 | 3116 | 277 | 3116 | 273 | 2619 | 272 | 2072 | 233 | 1215 | 2202 | 2072 | 2072 | 0 |
| 16 | Sikkim | 9 | 52 | 61 | 9 | 61 | 26 | 9 | 61 | 9 | 61 | 6 | 22 | 4 | 16 | 3 | 5 | 17 | 16 | 16 | 0 |
| 17 | A&N | 7 | 60 | 67 | 7 | 76 | 8 | 7 | 97 | 7 | 97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | Chandigarh | 1 | 12 | 13 | 1 | 13 | 13 | 1 | 12 | 1 | 13 | 1 | 13 | 1 | 13 | 1 | 12 | 13 | 13 | 13 | 0 |
| RAILTEL TOTAL | | 316 | 10790 | 11106 | 564 | 11099 | 7566 | 487 | 10562 | 489 | 10786 | 388 | 8250 | 351 | 6059 | 321 | 4605 | 7116 | 6058 | 6049 | 9 |
| 1 | Arunachal | 68 | 677 | 745 | 73 | 742 | 277 | 61 | 661 | 52 | 661 | 23 | 190 | 13 | 88 | 6 | 18 | 88 | 88 | 88 | 0 |
| 2 | Nagaland | 48 | 874 | 922 | 79 | 923 | 169 | 82 | 1115 | 76 | 1009 | 27 | 231 | 15 | 115 | 10 | 70 | 127 | 115 | 115 | 0 |
| 3 | Manipur | 14 | 650 | 664 | 29 | 663 | 370 | 5 | 97 | 17 | 437 | 15 | 351 | 15 | 326 | 12 | 246 | 326 | 326 | 326 | 0 |
| 4 | Mizoram | 13 | 262 | 275 | 34 | 275 | 45 | 22 | 489 | 22 | 489 | 6 | 101 | 6 | 40 | 6 | 23 | 41 | 40 | 40 | 0 |
| 5 | Tripura | 41 | 864 | 905 | 50 | 907 | 657 | 49 | 1048 | 49 | 1048 | 44 | 776 | 39 | 550 | 33 | 332 | 550 | 550 | 550 | 0 |
| 6 | Meghalaya | 23 | 948 | 971 | 46 | 971 | 122 | 15 | 395 | 15 | 385 | 15 | 122 | 5 | 98 | 5 | 95 | 122 | 98 | 98 | 0 |
| 7 | Gujarat | 103 | 6381 | 6484 | 245 | 6479 | 5786 | 245 | 6618 | 250 | 6618 | 250 | 6339 | 250 | 4704 | 241 | 3686 | 5722 | 4703 | 4694 | 9 |
| 8 | D&D | 2 | 16 | 18 | 2 | 17 | 18 | 2 | 17 | 2 | 17 | 2 | 18 | 2 | 17 | 2 | 17 | 18 | 17 | 17 | 0 |
| 9 | D&NH | 1 | 20 | 21 | 2 | 21 | 21 | 2 | 21 | 2 | 21 | 2 | 21 | 2 | 20 | 2 | 18 | 21 | 20 | 20 | 0 |
| 10 | Pondicherry | 3 | 98 | 101 | 4 | 101 | 101 | 4 | 101 | 4 | 101 | 4 | 101 | 4 | 101 | 4 | 100 | 101 | 101 | 101 | 0 |
| IL TOTAL | | 513 | 10386 | 10825 | 553 | 10952 | 9974 | 551 | 11058 | 551 | 11058 | 552 | 10607 | 552 | 9447 | 505 | 5713 | 9867 | 9447 | 9444 | 3 |
| 1 | AP | 80 | 1670 | 1679 | 82 | 1752 | 1515 | 80 | 1776 | 80 | 1776 | 81 | 1611 | 81 | 1500 | 81 | 1392 | 1510 | 1500 | 1501 | -1 |
| 2 | Telangana | 104 | 1946 | 2047 | 103 | 2046 | 2047 | 103 | 2124 | 103 | 2124 | 103 | 2047 | 103 | 2047 | 96 | 1905 | 2047 | 2047 | 2047 | 0 |
| 3 | Odisha | 181 | 3811 | 3992 | 225 | 4041 | 3710 | 225 | 4041 | 225 | 4041 | 225 | 3937 | 225 | 3475 | 190 | 1356 | 3656 | 3475 | 3473 | 2 |
| 4 | Jharkhand | 142 | 2707 | 2849 | 134 | 2855 | 2461 | 134 | 2855 | 134 | 2855 | 134 | 2755 | 134 | 2206 | 129 | 859 | 2413 | 2206 | 2204 | 2 |
| 5 | Himachal Prades | 6 | 252 | 258 | 9 | 258 | 241 | 9 | 262 | 9 | 262 | 9 | 257 | 9 | 219 | 9 | 201 | 241 | 219 | 219 | 0 |
| Grand Total | | 3308 | 123034 | 126264 | 5221 | 126187 | 119641 | 5260 | 128332 | 5274 | 128369 | 5111 | 121702 | 5068 | 115233 | 4267 | 76953 | 118876 | 115192 | 115170 | 22 |
| Progress during last week | | 3308 | 123034 | 126264 | 5221 | 126187 | 119626 | 5260 | 128332 | 5274 | 128369 | 5111 | 121702 | 5065 | 115211 | 4255 | 76953 | 118845 | 115170 | | |
| Difference | | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 22 | 12 | 0 | 31 | 22 | | 22 |

## Table 11


BharatNet Phase-I
1
Operations and Maintenance Report
9th Feb 2020

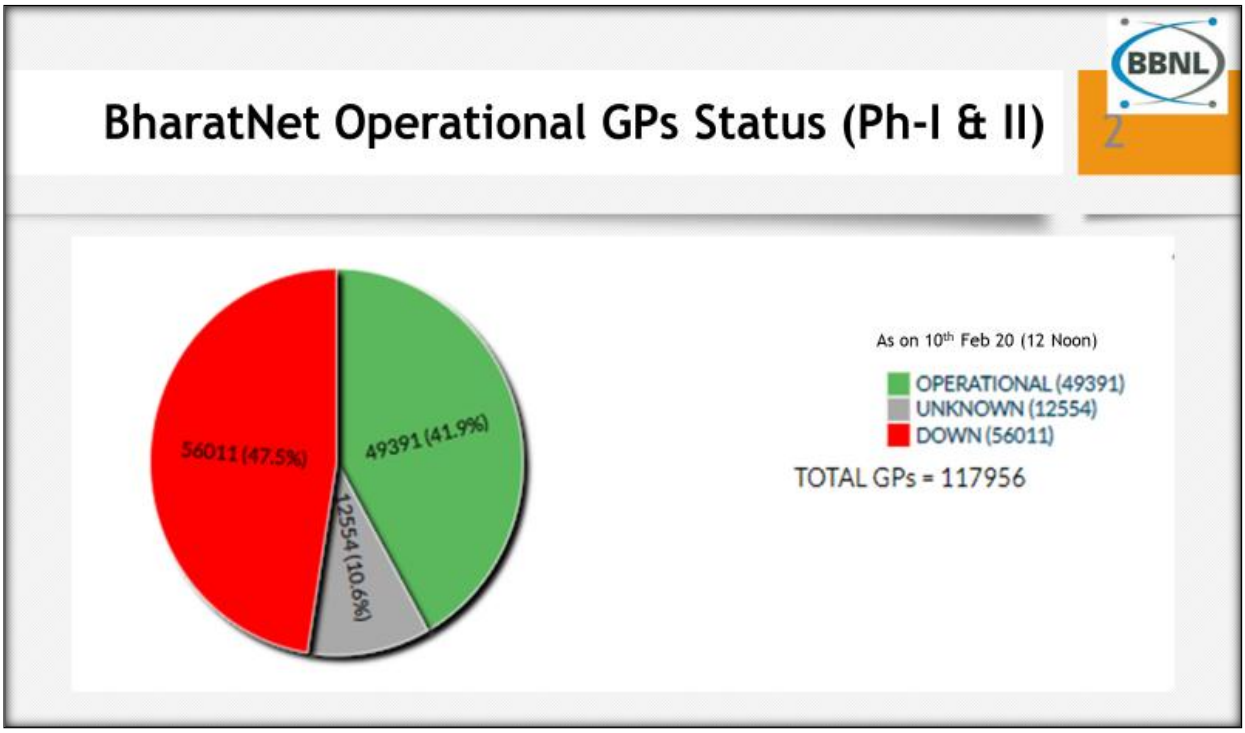

BharatNet Operational GPs Status (Ph-I & II)
BBNL
2
56011 (47.5%)
49391 (41.9%)
12554 (10.6%)
As on 10th Feb 20 (12 Noon)
OPERATIONAL (49391)
UNKNOWN (12554)
DOWN (56011)
TOTAL GPs = 117956

Fig 1

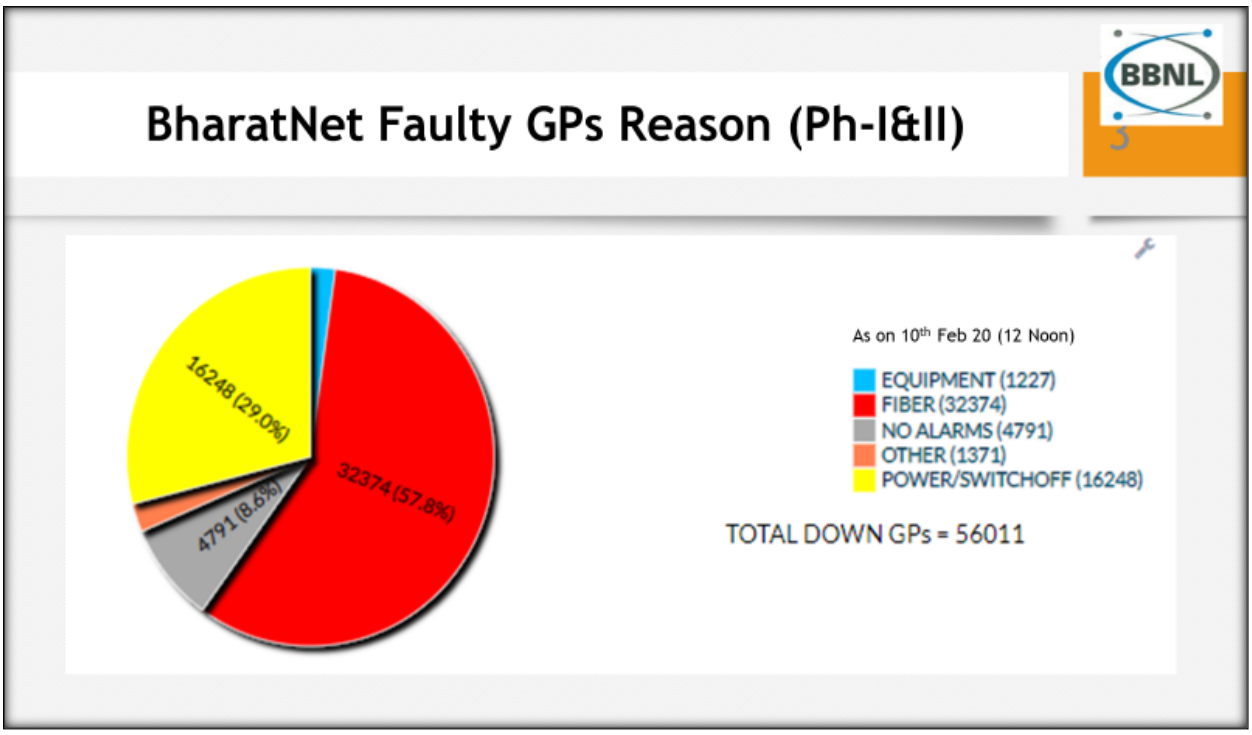
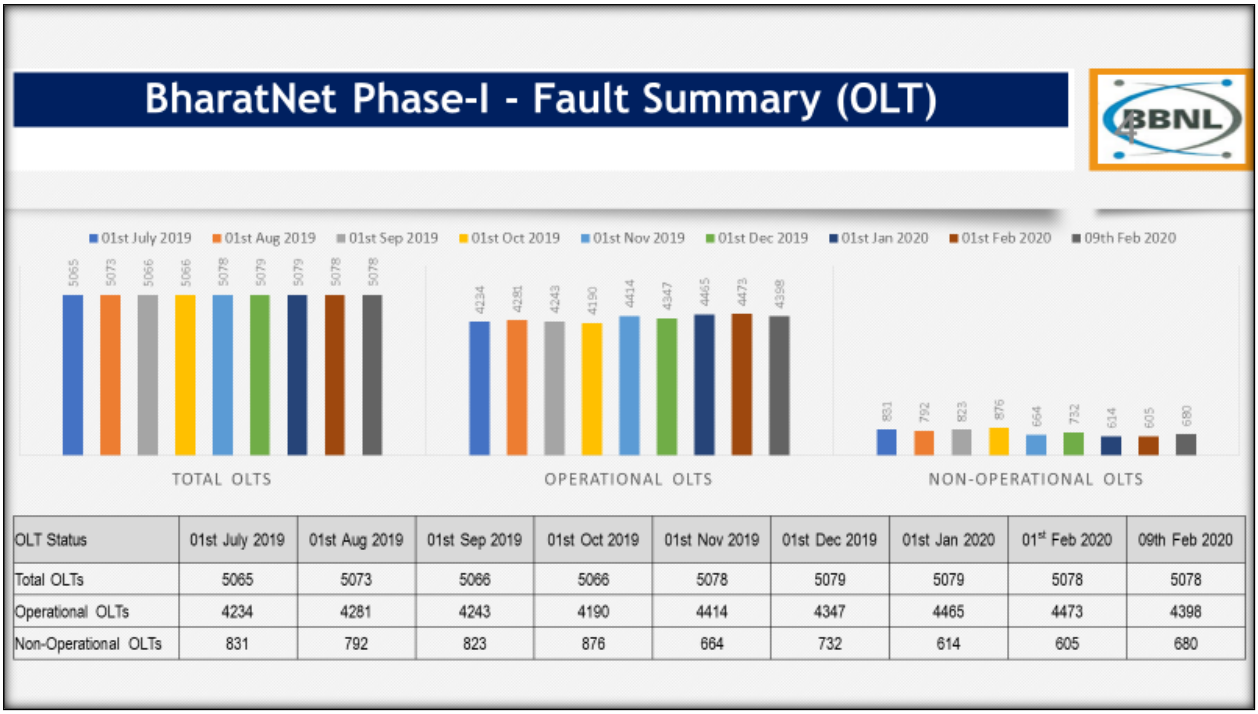
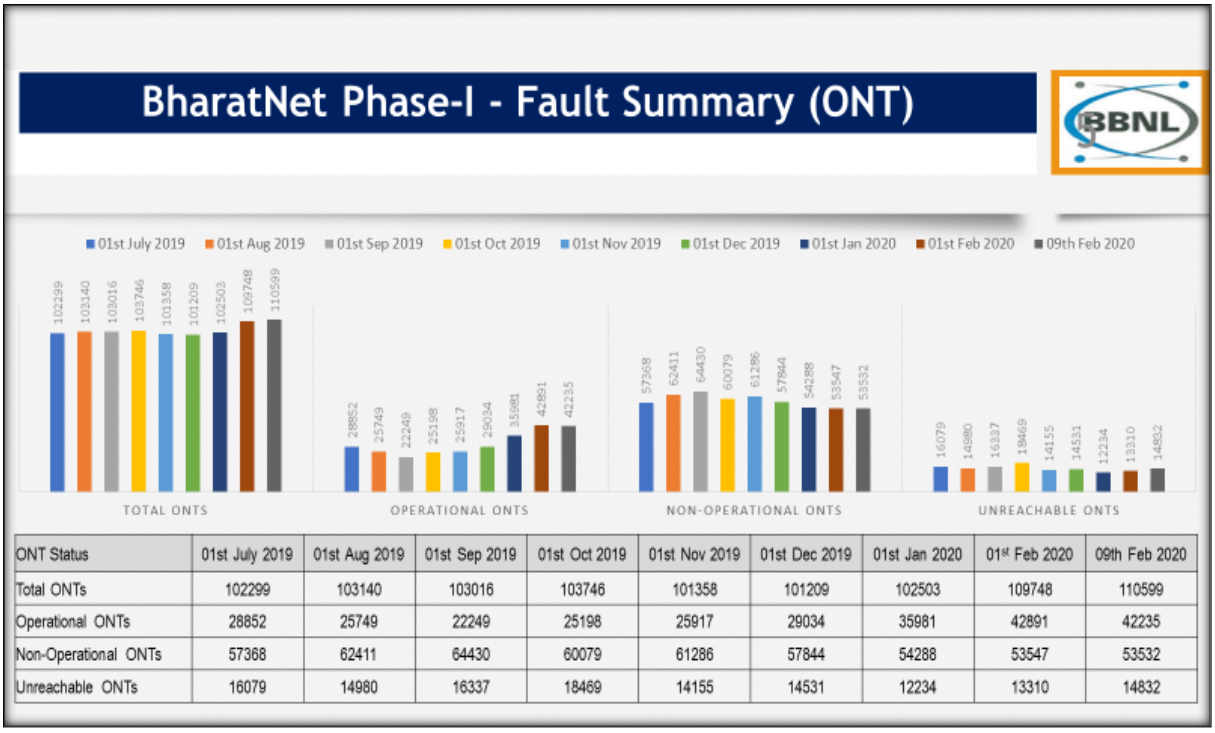



Fig 2




| OLT Status | 01st July 2019 | 01st Aug 2019 | 01st Sep 2019 | 01st Oct 2019 | 01st Nov 2019 | 01st Dec 2019 | 01st Jan 2020 | 01st Feb 2020 | 09th Feb 2020 |
|---|---|---|---|---|---|---|---|---|---|
| Total OLTs | 5065 | 5073 | 5066 | 5066 | 5078 | 5079 | 5079 | 5078 | 5078 |
| Operational OLTs | 4234 | 4281 | 4243 | 4190 | 4414 | 4347 | 4465 | 4473 | 4398 |
| Non-Operational OLTs | 831 | 792 | 823 | 876 | 664 | 732 | 614 | 605 | 680 |

Table 12




| ONT Status | 01st July 2019 | 01st Aug 2019 | 01st Sep 2019 | 01st Oct 2019 | 01st Nov 2019 | 01st Dec 2019 | 01st Jan 2020 | 01st Feb 2020 | 09th Feb 2020 |
|---|---|---|---|---|---|---|---|---|---|
| Total ONTs | 102299 | 103140 | 103016 | 103746 | 101358 | 101209 | 102503 | 109748 | 110599 |
| Operational ONTs | 28852 | 25749 | 22249 | 25198 | 25917 | 29034 | 35981 | 42891 | 42235 |
| Non-Operational ONTs | 57368 | 62411 | 64430 | 60079 | 61286 | 57844 | 54288 | 53547 | 53532 |
| Unreachable ONTs | 16079 | 14980 | 16337 | 18469 | 14155 | 14531 | 12234 | 13310 | 14832 |

Table 13

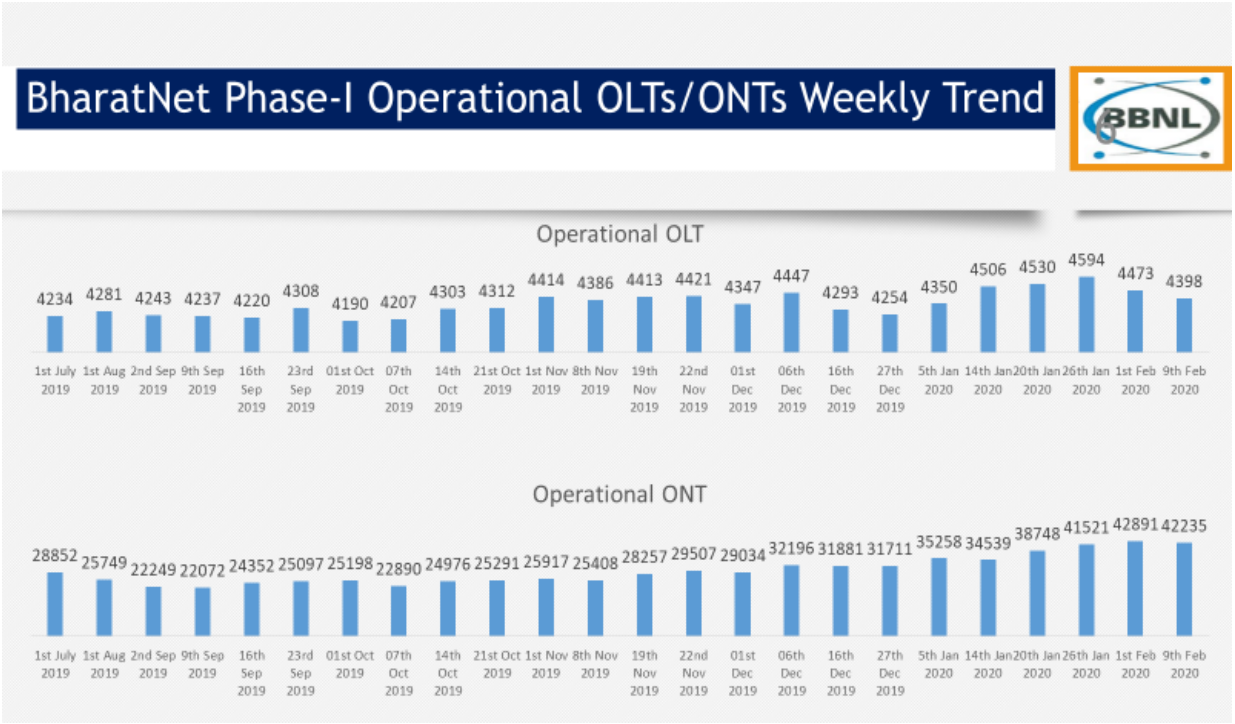



Fig 3

| Sr. No | Phase-1 | Overall GPON Status | | | | | | | | Reason for Down ONTs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Phase-I GPs (Incl. BHQs) | Total OLTs | Operational OLTs | Non Operational OLTs | Total ONTs | Operational | Unknown | Down | Fiber | Power SwitchOff | No Alarms | Ont Gpon | Ont Infra | Others |
| **BSNL** | | **104333** | **4172** | **3642** | **530** | **94972** | **36853** | **12714** | **45405** | **25591** | **13665** | **4038** | **482** | **439** | **1190** |
| 1 | ASSAM | 1663 | 134 | 103 | 31 | 1069 | 126 | 257 | 686 | 400 | 165 | 74 | 0 | 2 | 45 |
| 2 | BIHAR | 6021 | 372 | 314 | 58 | 5312 | 1505 | 803 | 3004 | 1809 | 737 | 343 | 1 | 30 | 84 |
| 3 | CHHATTISGARH | 4116 | 137 | 130 | 7 | 4035 | 2207 | 202 | 1626 | 1044 | 415 | 78 | 18 | 33 | 40 |
| 4 | HARYANA | 6204 | 189 | 178 | 11 | 6155 | 2510 | 318 | 3327 | 1973 | 924 | 78 | 277 | 31 | 44 |
| 5 | JAMMU AND KASHMIR | 400 | 16 | 10 | 6 | 366 | 222 | 99 | 45 | 13 | 27 | 1 | 4 | 0 | 0 |
| 6 | KARNATAKA | 6268 | 493 | 455 | 38 | 5561 | 3093 | 270 | 2198 | 731 | 1311 | 105 | 0 | 0 | 51 |
| 7 | KERALA | 1129 | 146 | 145 | 1 | 1129 | 677 | 7 | 445 | 35 | 382 | 25 | 0 | 0 | 3 |
| 8 | MADHYA PRADESH | 12701 | 501 | 405 | 96 | 12519 | 3123 | 2339 | 7057 | 3987 | 1947 | 596 | 18 | 237 | 272 |
| 9 | MAHARASHTRA | 15372 | 525 | 447 | 78 | 14725 | 4968 | 1895 | 7862 | 5334 | 2003 | 294 | 39 | 2 | 190 |
| 10 | PUNJAB | 8082 | 183 | 182 | 1 | 7678 | 6084 | 19 | 1575 | 795 | 535 | 110 | 63 | 9 | 63 |
| 11 | RAJASTHAN | 8934 | 631 | 583 | 48 | 8586 | 5980 | 502 | 2104 | 1316 | 531 | 197 | 29 | 0 | 31 |
| 12 | UTTAR PRADESH EAST | 17904 | 292 | 221 | 71 | 16569 | 2397 | 3873 | 10299 | 5739 | 2974 | 1346 | 9 | 33 | 198 |
| 13 | UTTAR PRADESH WEST | 10467 | 199 | 151 | 48 | 7884 | 2087 | 1870 | 3927 | 1734 | 1404 | 589 | 8 | 55 | 137 |
| 14 | UTTARAKHAND | 1866 | 70 | 61 | 9 | 1326 | 704 | 72 | 550 | 245 | 195 | 78 | 0 | 7 | 25 |
| 15 | WEST BENGAL | 3065 | 273 | 253 | 20 | 2027 | 1155 | 179 | 693 | 433 | 115 | 122 | 16 | 0 | 7 |
| 16 | SIKKIM | 61 | 5 | 2 | 3 | 10 | 1 | 2 | 7 | 3 | 0 | 4 | 0 | 0 | 0 |
| 17 | ANDAMAN AND NICOBAR ISLANDS | 67 | 5 | 1 | 4 | 8 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | CHANDIGARH | 13 | 1 | 1 | 0 | 13 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | LAKSHDWEEP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **RailTel** | | **11106** | **353** | **297** | **56** | **6018** | **2568** | **624** | **2826** | **1436** | **930** | **340** | **16** | **2** | **102** |
| 1 | ARUNACHAL PRADESH | 745 | 13 | 4 | 9 | 48 | 1 | 31 | 16 | 14 | 1 | 1 | 0 | 0 | 0 |
| 2 | NAGALAND | 922 | 15 | 5 | 10 | 93 | 0 | 79 | 14 | 4 | 10 | 0 | 0 | 0 | 0 |
| 3 | MANIPUR | 664 | 15 | 14 | 1 | 254 | 42 | 53 | 159 | 103 | 41 | 0 | 0 | 0 | 15 |
| 4 | MIZORAM | 275 | 6 | 1 | 5 | 39 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | TRIPURA | 905 | 40 | 30 | 10 | 543 | 190 | 113 | 240 | 94 | 111 | 25 | 0 | 0 | 10 |
| 6 | MEGHALAYA | 971 | 5 | 4 | 1 | 94 | 10 | 37 | 47 | 33 | 9 | 5 | 0 | 0 | 0 |
| 7 | GUJARAT | 6484 | 251 | 231 | 20 | 4812 | 2205 | 272 | 2335 | 1181 | 755 | 304 | 16 | 2 | 77 |
| 8 | DAMAN AND DIU | 18 | 2 | 2 | 0 | 16 | 13 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 |
| 9 | DADRA AND NAGAR HAVELI | 21 | 2 | 2 | 0 | 18 | 11 | 0 | 7 | 5 | 1 | 1 | 0 | 0 | 0 |
| 10 | PUDUCHERRY | 101 | 4 | 4 | 0 | 101 | 96 | 0 | 5 | 2 | 2 | 1 | 0 | 0 | 0 |
| **PGCIL** | | **10825** | **553** | **459** | **94** | **9609** | **2814** | **1494** | **5301** | **3388** | **1572** | **160** | **46** | **14** | **121** |
| 1 | ANDHRA PRADESH | 1679 | 82 | 76 | 6 | 1607 | 846 | 129 | 632 | 457 | 136 | 19 | 5 | 8 | 7 |
| 2 | TELANGANA | 2047 | 103 | 98 | 5 | 2045 | 238 | 99 | 1708 | 1167 | 458 | 53 | 12 | 1 | 17 |
| 3 | ODISHA | 3992 | 225 | 184 | 41 | 3361 | 1174 | 528 | 1659 | 956 | 587 | 37 | 29 | 5 | 45 |
| 4 | JHARKHAND | 2849 | 134 | 92 | 42 | 2368 | 402 | 738 | 1228 | 766 | 363 | 48 | 0 | 0 | 51 |
| 5 | HIMACHAL PRADESH | 258 | 9 | 9 | 0 | 228 | 154 | 0 | 74 | 42 | 28 | 3 | 0 | 0 | 1 |
| **Grand Total** | | **126264** | **5078** | **4398** | **680** | **110599** | **42235** | **14832** | **53532** | **30415** | **16167** | **4538** | **544** | **455** | **1413** |

Table 13

| Sr. No | Phase-1 | Overall GPON Status | | | | | Percentage | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Phase-I GPs (Incl. BHQs) | Total ONTs | Operational | Unknown | Down | Operational ONTs % | Unknown ONTs % | Down ONTs % |
| **BSNL** | | **104333** | **94972** | **36853** | **12714** | **45405** | **39%** | **13%** | **48%** |
| 1 | ASSAM | 1663 | 1069 | 126 | 257 | 686 | 12% | 24% | 64% |
| 2 | BIHAR | 6021 | 5312 | 1505 | 803 | 3004 | 28% | 15% | 57% |
| 3 | CHHATTISGARH | 4116 | 4035 | 2207 | 202 | 1626 | 55% | 5% | 40% |
| 4 | HARYANA | 6204 | 6155 | 2510 | 318 | 3327 | 41% | 5% | 54% |
| 5 | JAMMU AND KASHMIR | 400 | 366 | 222 | 99 | 45 | 61% | 27% | 12% |
| 6 | KARNATAKA | 6268 | 5561 | 3093 | 270 | 2198 | 56% | 5% | 40% |
| 7 | KERALA | 1129 | 1129 | 677 | 7 | 445 | 60% | 1% | 39% |
| 8 | MADHYA PRADESH | 12701 | 12519 | 3123 | 2339 | 7057 | 25% | 19% | 56% |
| 9 | MAHARASHTRA | 15372 | 14725 | 4968 | 1895 | 7862 | 34% | 13% | 53% |
| 10 | PUNJAB | 8082 | 7678 | 6084 | 19 | 1575 | 79% | 0% | 21% |
| 11 | RAJASTHAN | 8934 | 8586 | 5980 | 502 | 2104 | 70% | 6% | 25% |
| 12 | UTTAR PRADESH EAST | 17904 | 16569 | 2397 | 3873 | 10299 | 14% | 23% | 62% |
| 13 | UTTAR PRADESH WEST | 10467 | 7884 | 2087 | 1870 | 3927 | 26% | 24% | 50% |
| 14 | UTTARAKHAND | 1866 | 1326 | 704 | 72 | 550 | 53% | 5% | 41% |
| 15 | WEST BENGAL | 3065 | 2027 | 1155 | 179 | 693 | 57% | 9% | 34% |
| 16 | SIKKIM | 61 | 10 | 1 | 2 | 7 | 10% | 20% | 70% |
| 17 | ANDAMAN AND NICOBAR ISLANDS | 67 | 8 | 1 | 7 | 0 | 13% | 88% | 0% |
| 18 | CHANDIGARH | 13 | 13 | 13 | 0 | 0 | 100% | 0% | 0% |
| 19 | LAKSHDWEEP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **RailTel** | | **11106** | **6018** | **2568** | **624** | **2826** | **43%** | **10%** | **47%** |
| 1 | ARUNACHAL PRADESH | 745 | 48 | 1 | 31 | 16 | 2% | 65% | 33% |
| 2 | NAGALAND | 922 | 93 | 0 | 79 | 14 | 0% | 85% | 15% |
| 3 | MANIPUR | 664 | 254 | 42 | 53 | 159 | 17% | 21% | 63% |
| 4 | MIZORAM | 275 | 39 | 0 | 39 | 0 | 0% | 100% | 0% |
| 5 | TRIPURA | 905 | 543 | 190 | 113 | 240 | 35% | 21% | 44% |
| 6 | MEGHALAYA | 971 | 94 | 10 | 37 | 47 | 11% | 39% | 50% |
| 7 | GUJARAT | 6484 | 4812 | 2205 | 272 | 2335 | 46% | 6% | 49% |
| 8 | DAMAN AND DIU | 18 | 16 | 13 | 0 | 3 | 81% | 0% | 19% |
| 9 | DADRA AND NAGAR HAVELI | 21 | 18 | 11 | 0 | 7 | 61% | 0% | 39% |
| 10 | PUDUCHERRY | 101 | 101 | 96 | 0 | 5 | 95% | 0% | 5% |
| **PGCIL** | | **10825** | **9609** | **2814** | **1494** | **5301** | **29%** | **16%** | **55%** |
| 1 | ANDHRA PRADESH | 1679 | 1607 | 846 | 129 | 632 | 53% | 8% | 39% |
| 2 | TELANGANA | 2047 | 2045 | 238 | 99 | 1708 | 12% | 5% | 84% |
| 3 | ODISHA | 3992 | 3361 | 1174 | 528 | 1659 | 35% | 16% | 49% |
| 4 | JHARKHAND | 2849 | 2368 | 402 | 738 | 1228 | 17% | 31% | 52% |
| 5 | HIMACHAL PRADESH | 258 | 228 | 154 | 0 | 74 | 68% | 0% | 32% |
| **Grand Total** | | **126264** | **110599** | **42235** | **14832** | **53532** | **38%** | **13%** | **48%** |

Table 14

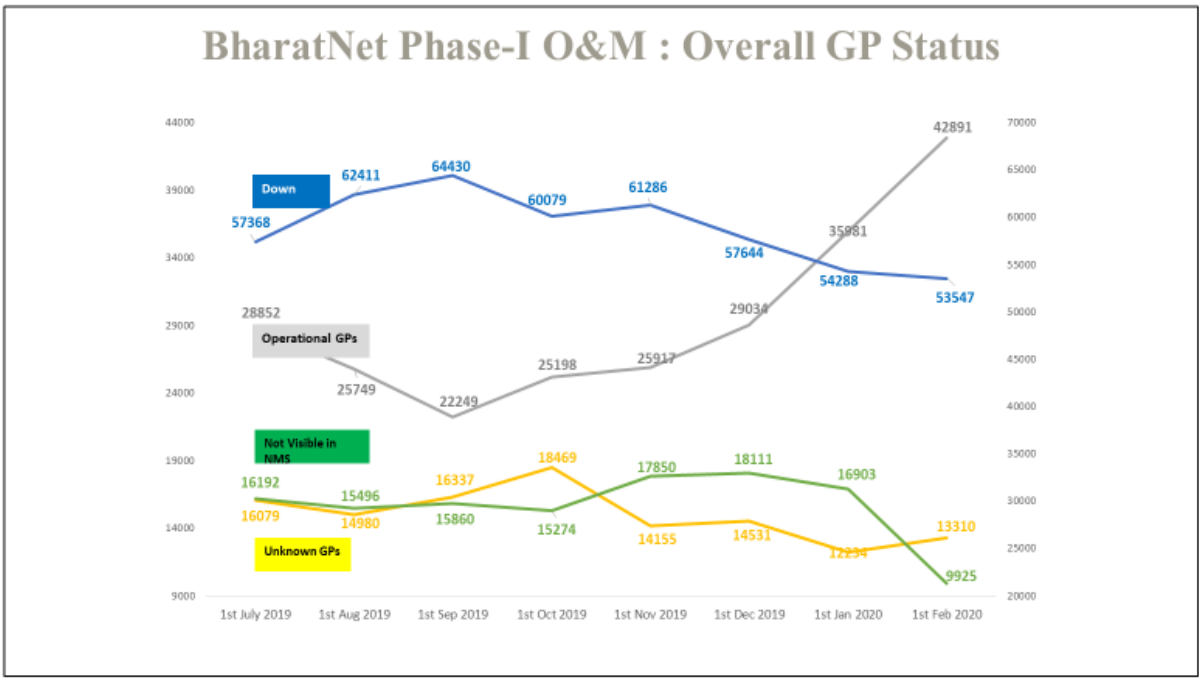

BharatNet Phase-I O&M : Overall GP Status
Down
Operational GPs
Not Visible in NMS
Unknown GPs
1st July 2019
1st Aug 2019
1st Sep 2019
1st Oct 2019
1st Nov 2019
1st Dec 2019
1st Jan 2020
1st Feb 2020

Fig 4

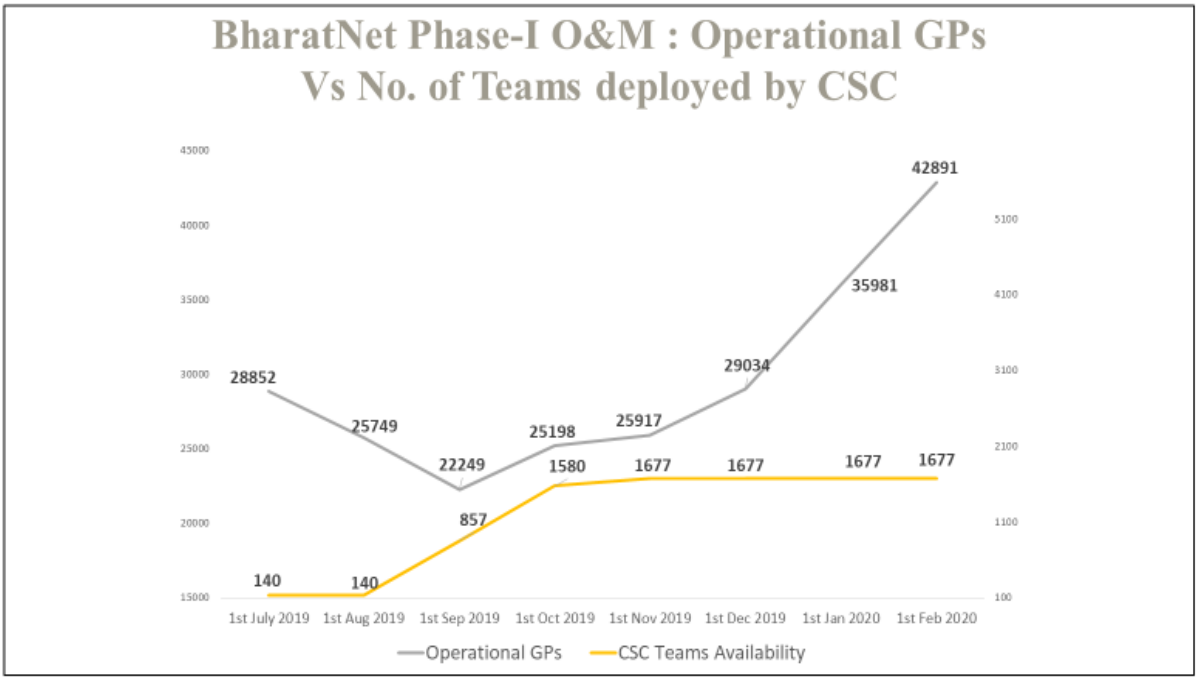

BharatNet Phase-I O&M : Operational GPs
Vs No. of Teams deployed by CSC
1st July 2019
1st Aug 2019
1st Sep 2019
1st Oct 2019
1st Nov 2019
1st Dec 2019
1st Jan 2020
1st Feb 2020
Operational GPs
CSC Teams Availability

Fig 5

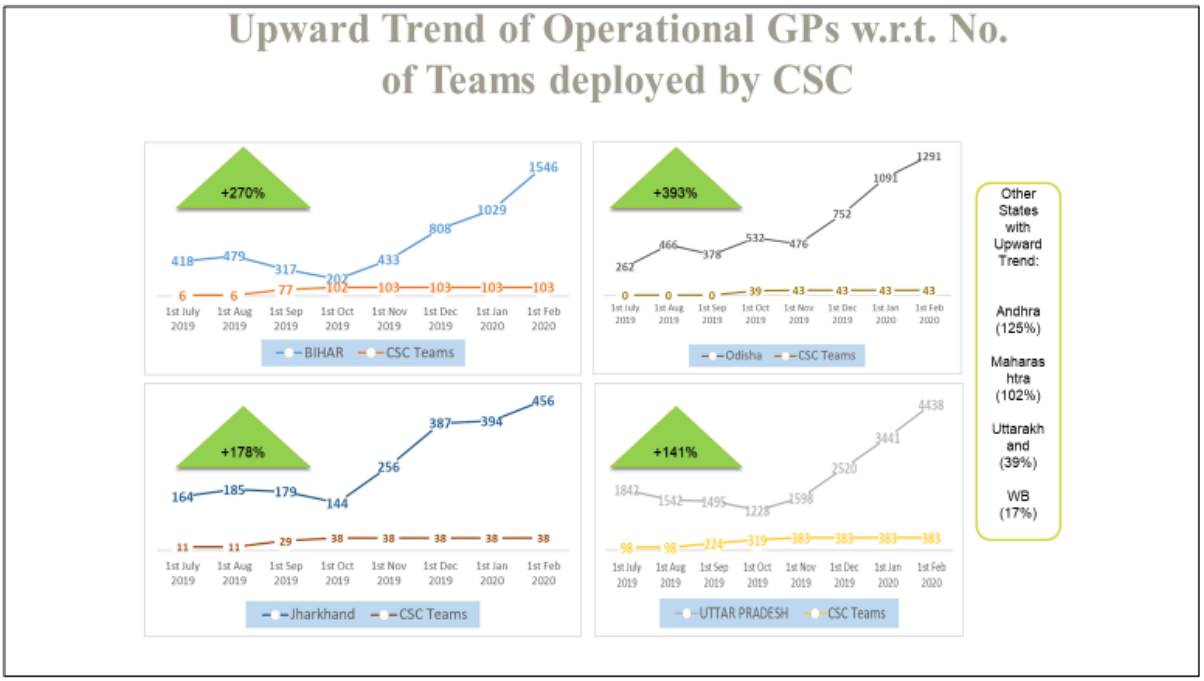

Upward Trend of Operational GPs w.r.t. No. of Teams deployed by CSC
+270%
BIHAR
CSC Teams
+393%
Odisha
CSC Teams
+178%
Jharkhand
CSC Teams
+141%
UTTAR PRADESH
CSC Teams
Other States with Upward Trend:
Andhra (125%)
Maharashtra (102%)
Uttarakhand (39%)
WB (17%)

Fig 5

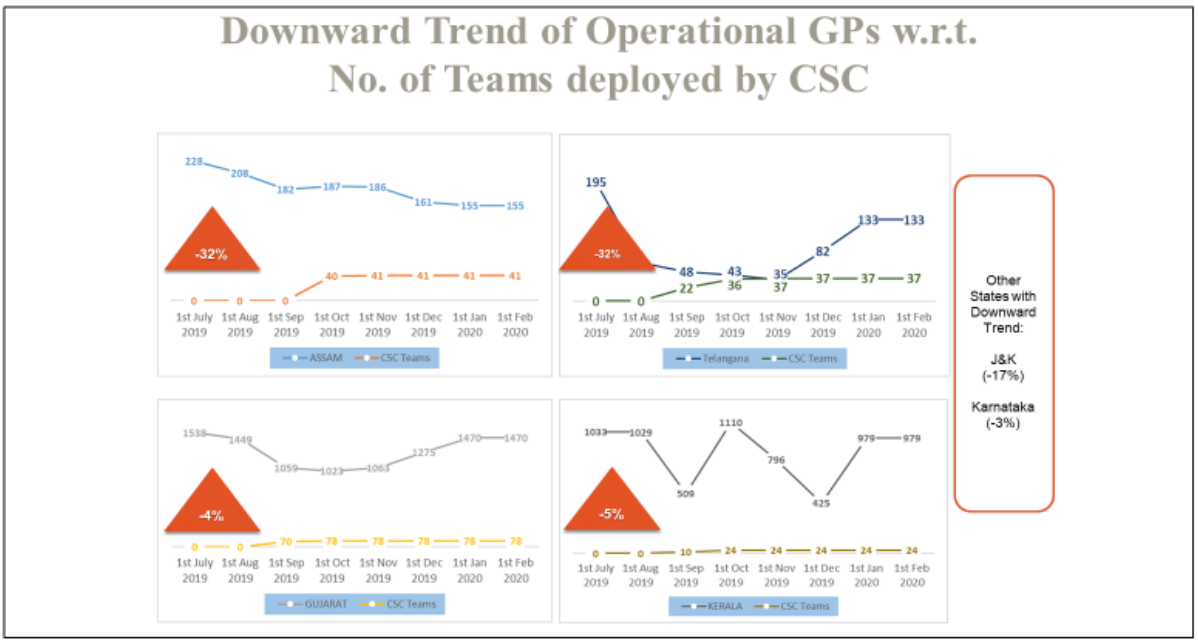
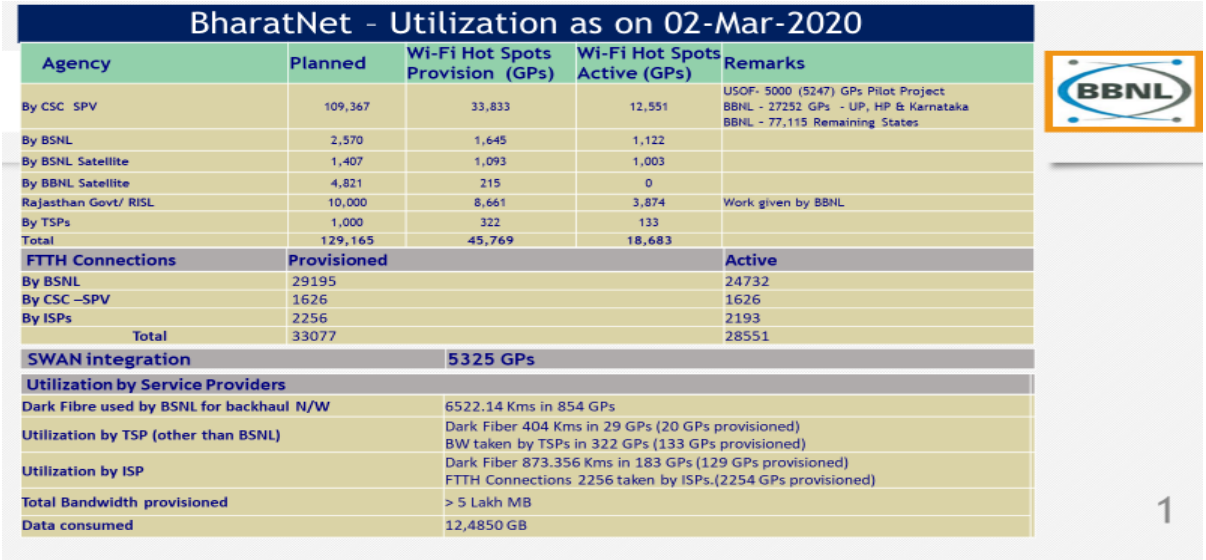

Downward Trend of Operational GPs w.r.t. No. of Teams deployed by CSC
-32%
ASSAM
CSC Teams
-32%
Telangana
CSC Teams
-4%
GUJARAT
CSC Teams
-5%
KERALA
CSC Teams
Other States with Downward Trend:
J&K (-17%)
Karnataka (-3%)

**Fig 6**

# Annexure-2

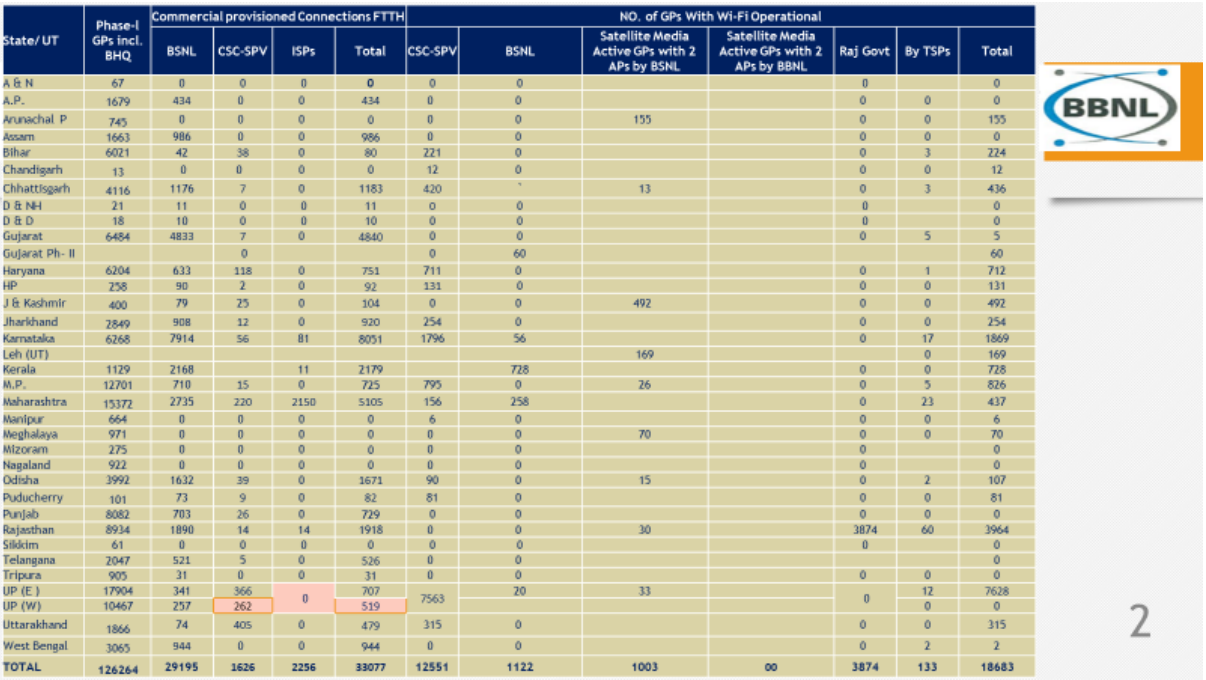
# Utilization Status of BharatNet



| BharatNet - Utilization as on 02-Mar-2020 | | | | |
|---|---|---|---|---|
| **Agency** | **Planned** | **Wi-Fi Hot Spots Provision (GPs)** | **Wi-Fi Hot Spots Active (GPs)** | **Remarks** |
| By CSC SPV | 109,367 | 33,833 | 12,551 | USOF- 5000 (5247) GPs Pilot Project<br>BBNL - 27252 GPs - UP, HP & Karnataka<br>BBNL - 77,115 Remaining States |
| By BSNL | 2,570 | 1,645 | 1,122 | |
| By BSNL Satellite | 1,407 | 1,093 | 1,003 | |
| By BBNL Satellite | 4,821 | 215 | 0 | |
| Rajasthan Govt/ RISL | 10,000 | 8,661 | 3,874 | Work given by BBNL |
| By TSPs | 1,000 | 322 | 133 | |
| Total | 129,165 | 45,769 | 18,683 | |
| **FTTH Connections** | **Provisioned** | | **Active** | |
| By BSNL | 29195 | | 24732 | |
| By CSC –SPV | 1626 | | 1626 | |
| By ISPs | 2256 | | 2193 | |
| Total | 33077 | | 28551 | |
| **SWAN integration** | **5325 GPs** | | | |
| **Utilization by Service Providers** | | | | |
| Dark Fibre used by BSNL for backhaul N/W | 6522.14 Kms in 854 GPs | | | |
| Utilization by TSP (other than BSNL) | Dark Fiber 404 Kms in 29 GPs (20 GPs provisioned)<br>BW taken by TSPs in 322 GPs (133 GPs provisioned) | | | |
| Utilization by ISP | Dark Fiber 873.356 Kms in 183 GPs (129 GPs provisioned)<br>FTTH Connections 2256 taken by ISPs.(2254 GPs provisioned) | | | |
| Total Bandwidth provisioned | > 5 Lakh MB | | | |
| Data consumed | 12,4850 GB | | | |

1

**Table 15**



| State/ UT | Phase-I GPs incl. BHQ | Commercial provisioned Connections FTTH | | | | NO. of GPs With Wi-Fi Operational | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BSNL | CSC-SPV | ISPs | Total | CSC-SPV | BSNL | Satellite Media Active GPs with 2 APs by BSNL | Satellite Media Active GPs with 2 APs by BBNL | Raj Govt | By TSPs | Total |
| A & N | 67 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | | 0 |
| A.P. | 1679 | 434 | 0 | 0 | 434 | 0 | 0 | | | 0 | 0 | 0 |
| Arunachal P | 745 | 0 | 0 | 0 | 0 | 0 | 0 | 155 | | 0 | 0 | 155 |
| Assam | 1663 | 986 | 0 | 0 | 986 | 0 | 0 | | | 0 | 0 | 0 |
| Bihar | 6021 | 42 | 38 | 0 | 80 | 221 | 0 | | | 0 | 3 | 224 |
| Chandigarh | 13 | 0 | 0 | 0 | 0 | 12 | 0 | | | 0 | 0 | 12 |
| Chhattisgarh | 4116 | 1176 | 7 | 0 | 1183 | 420 | | 13 | | 0 | 3 | 436 |
| D & NH | 21 | 11 | 0 | 0 | 11 | 0 | 0 | | | 0 | | 0 |
| D & D | 18 | 10 | 0 | 0 | 10 | 0 | 0 | | | 0 | | 0 |
| Gujarat | 6484 | 4833 | 7 | 0 | 4840 | 0 | 0 | | | 0 | 5 | 5 |
| Gujarat Ph- II | | | 0 | | | 0 | 60 | | | | | 60 |
| Haryana | 6204 | 633 | 118 | 0 | 751 | 711 | 0 | | | 0 | 1 | 712 |
| HP | 258 | 90 | 2 | 0 | 92 | 131 | 0 | | | 0 | 0 | 131 |
| J & Kashmir | 400 | 79 | 25 | 0 | 104 | 0 | 0 | 492 | | 0 | 0 | 492 |
| Jharkhand | 2849 | 908 | 12 | 0 | 920 | 254 | 0 | | | 0 | 0 | 254 |
| Karnataka | 6268 | 7914 | 56 | 81 | 8051 | 1796 | 56 | | | 0 | 17 | 1869 |
| Leh (UT) | | | | | | | | 169 | | | 0 | 169 |
| Kerala | 1129 | 2168 | | 11 | 2179 | | 728 | | | 0 | 0 | 728 |
| M.P. | 12701 | 710 | 15 | 0 | 725 | 795 | 0 | 26 | | 0 | 5 | 826 |
| Maharashtra | 15372 | 2735 | 220 | 2150 | 5105 | 156 | 258 | | | 0 | 23 | 437 |
| Manipur | 664 | 0 | 0 | 0 | 0 | 6 | 0 | | | 0 | 0 | 6 |
| Meghalaya | 971 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | | 0 | 0 | 70 |
| Mizoram | 275 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | | 0 |
| Nagaland | 922 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | | 0 |
| Odisha | 3992 | 1632 | 39 | 0 | 1671 | 90 | 0 | 15 | | 0 | 2 | 107 |
| Puducherry | 101 | 73 | 9 | 0 | 82 | 81 | 0 | | | 0 | 0 | 81 |
| Punjab | 8082 | 703 | 26 | 0 | 729 | 0 | 0 | | | 0 | 0 | 0 |
| Rajasthan | 8934 | 1890 | 14 | 14 | 1918 | 0 | 0 | 30 | | 3874 | 60 | 3964 |
| Sikkim | 61 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | | 0 |
| Telangana | 2047 | 521 | 5 | 0 | 526 | 0 | 0 | | | | | 0 |
| Tripura | 905 | 31 | 0 | 0 | 31 | 0 | 0 | | | 0 | 0 | 0 |
| UP (E ) | 17904 | 341 | 366 | 0 | 707 | 7563 | 20 | 33 | | 0 | 12 | 7628 |
| UP (W) | 10467 | 257 | 262 | | 519 | | | | | | 0 | 0 |
| Uttarakhand | 1866 | 74 | 405 | 0 | 479 | 315 | 0 | | | 0 | 0 | 315 |
| West Bengal | 3065 | 944 | 0 | 0 | 944 | 0 | 0 | | | 0 | 2 | 2 |
| TOTAL | 126264 | 29195 | 1626 | 2256 | 33077 | 12551 | 1122 | 1003 | 00 | 3874 | 133 | 18683 |

2

**Table 16**

## BharatNet - Utilization

| SWAN INTEGRATION | | | |
|---|---|---|---|
| States/ UT's | Total GPs Requested | Provisioned | Horizontal Offices |
| Kerala | 72 | 72 | 186 |
| Karnataka | 258 | 258 | 59 |
| Puducherry | 3 | 3 | 31 |
| Uttarakhand | 307 | 229 | 307 |
| Chandigarh | 12 | 11 | 39 |
| Rajasthan | 4603 | 4603 | |
| West Bengal | 03 | 3 | |
| Gujarat Ph-II | 67 | 20 | |
| **Total** | **5325** | **5199** | **622** |

4

**Table 17**

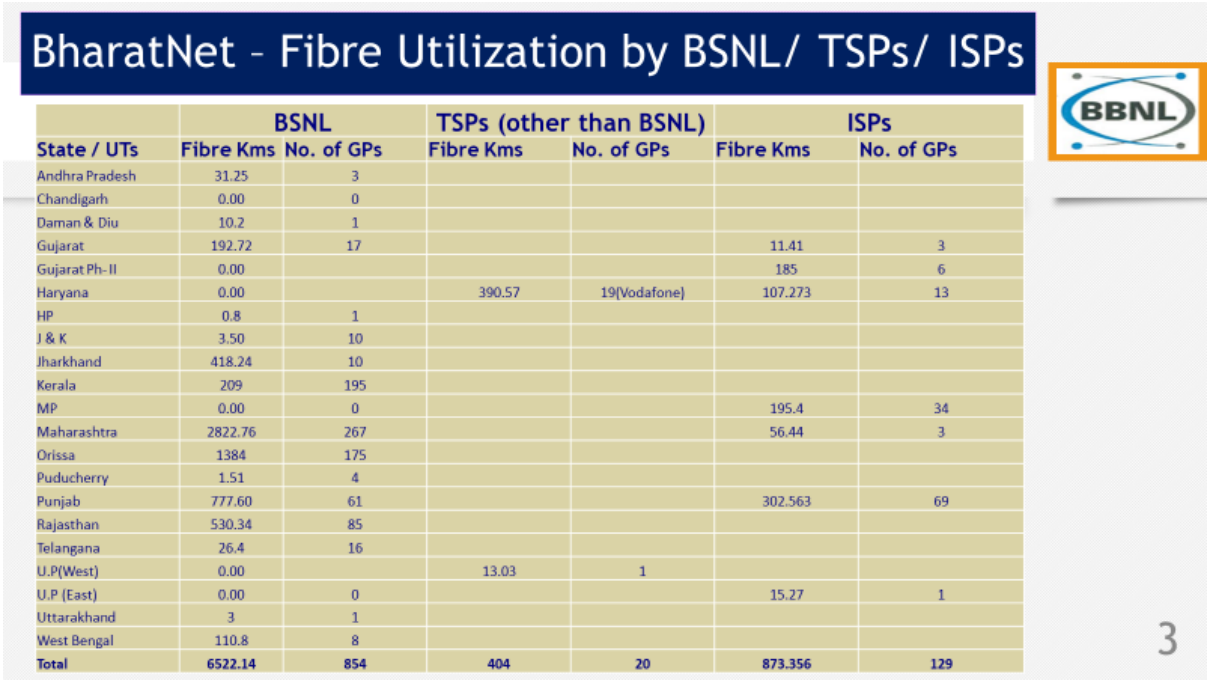
## BharatNet - Utilization

BHARAT BROADBAND NETWORK LIMITED

| ▪ Wi-Fi operational in GPs | 02.09.2019 | 01.10.2019 | 02.03.2020 |
|---|---|---|---|
| ➢ By CSC SPV | 10091 | 10091 | 12551 |
| ➢ By BSNL | 1151 | 878 | 1122 |
| ➢ By RISL | 3874 | 3874 | 3874 |
| ▪ Total FTTH Commercial Connections | | | |
| ➢ By BSNL | 19449 | 20352 | 29195 |
| ➢ By CSC –SPV | 8367 | 8367 | 1626 |
| ➢ By ISP | 1467 | 1467 | 2256 |
| SWAN connections | 5179 | 5179 | 5325 |
| Utilisation by TSPs and ISPs (Provisioning of GPs) | 1898 | 1942 | 2725 |

5

**Table 18**



## BharatNet - Fibre Utilization by BSNL/ TSPs/ ISPs

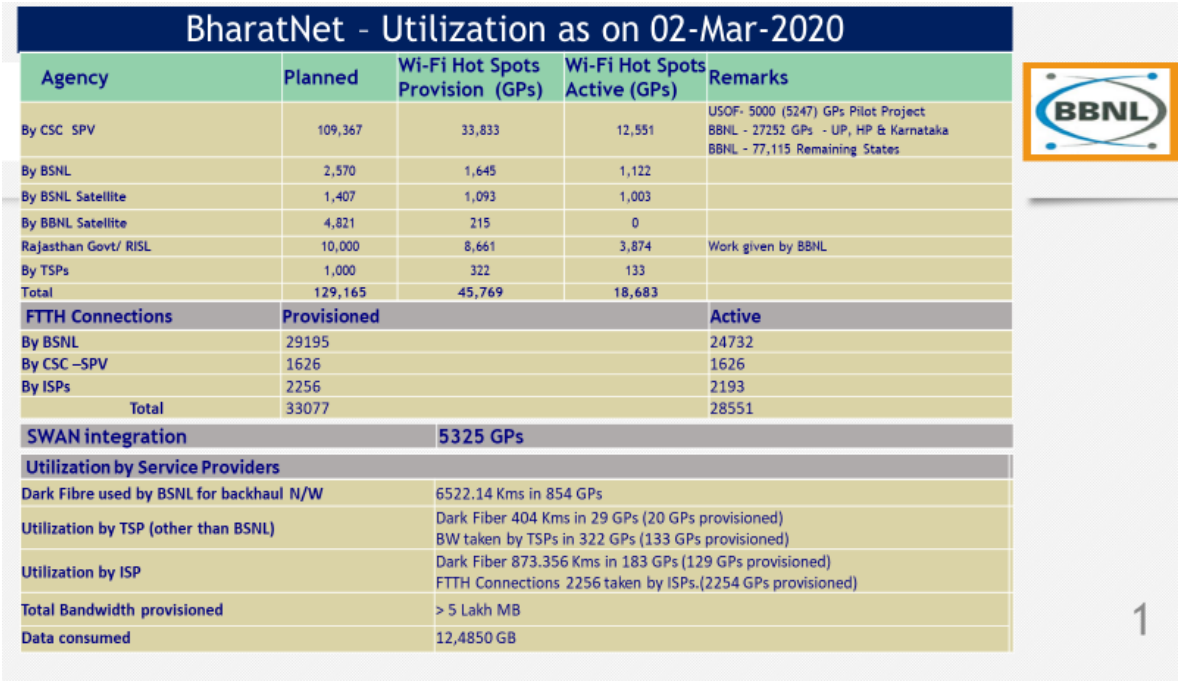
| | BSNL | | TSPs (other than BSNL) | | ISPs | |
|---|---|---|---|---|---|---|
| State / UTs | Fibre Kms | No. of GPs | Fibre Kms | No. of GPs | Fibre Kms | No. of GPs |
| Andhra Pradesh | 31.25 | 3 | | | | |
| Chandigarh | 0.00 | 0 | | | | |
| Daman & Diu | 10.2 | 1 | | | | |
| Gujarat | 192.72 | 17 | | | 11.41 | 3 |
| Gujarat Ph- II | 0.00 | | | | 185 | 6 |
| Haryana | 0.00 | | 390.57 | 19(Vodafone) | 107.273 | 13 |
| HP | 0.8 | 1 | | | | |
| J & K | 3.50 | 10 | | | | |
| Jharkhand | 418.24 | 10 | | | | |
| Kerala | 209 | 195 | | | | |
| MP | 0.00 | 0 | | | 195.4 | 34 |
| Maharashtra | 2822.76 | 267 | | | 56.44 | 3 |
| Orissa | 1384 | 175 | | | | |
| Puducherry | 1.51 | 4 | | | | |
| Punjab | 777.60 | 61 | | | 302.563 | 69 |
| Rajasthan | 530.34 | 85 | | | | |
| Telangana | 26.4 | 16 | | | | |
| U.P(West) | 0.00 | | 13.03 | 1 | | |
| U.P (East) | 0.00 | 0 | | | 15.27 | 1 |
| Uttarakhand | 3 | 1 | | | | |
| West Bengal | 110.8 | 8 | | | | |
| **Total** | **6522.14** | **854** | **404** | **20** | **873.356** | **129** |

3

**Table 19**

| UTILIZATION OF LAST MILE INFRA UNDER BHARATNET AS ON 30.08.2019 | | | | | | | | | | Commercial Connections of BSNL | | Wi-Fi Hotspot by BSNL(Active) | Swan Integration | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | State | Service Ready GPs Phase-I & II ( on | No. of GPs where service deployed | | | No. of active subscribers | | | Data consumption(GB ) | | | | Total GPs Requested | Provisioned | Horizontal Offices |
| | | | Wi Fi | FTTH | Dark Fibre (Fibre Kms) | Wi Fi | FTTH | Total Bandwidth Provided | | Provisioned | Working | | | | |
| 1 | Assam | 1622 | 0 | 975 | 0 | 0 | 975 | 9550 | 0 | 975 | 975 | | | | |
| 2 | Bihar | 6723 | 289 | 1143 | 0 | 19206 | 1143 | 9524 | 2940.24 | 846 | 663 | | | | |
| 3 | Chhattisgarh | 4080 | 1260 | 1098 | 0 | 33866 | 1098 | 15640 | 0.3516 | 1033 | 459 | 304 | | | |
| 4 | Haryana | 6188 | 1061 | 689 | 390.57 | 64576 | 689 | 8512 | 420.76 | 633 | 575 | | | | |
| 5 | Jammu & Kashmir | 322 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 10 | 10 | | | | |
| 6 | Karnataka | 6166 | 2523 | 5315 | 0 | 89492 | 5315 | 53439 | 2856.2 | 5134 | 5134 | 56 | 258 | 258 | 59 |
| 7 | Kerala | 1129 | 701 | 1726 | 160.23 | 51852 | 1726 | 10348 | 28487.42 | 1726 | 1669 | 697 | 72 | 72 | 186 |
| 8 | Madhya Pradesh | 12699 | 1316 | 640 | 314.76 | 101945 | 640 | 20520 | 3564.53 | 574 | 569 | | | | |
| 9 | Maharashtra | 15199 | 725 | 4191 | 105.22 | 41349 | 4191 | 42992 | 270.73 | 2735 | 2735 | 0 | | | |
| 10 | Punjab | 9627 | 0 | 205 | 236 | 0 | 205 | 950 | 0 | 201 | 201 | | | | |
| 11 | Rajasthan | 8659 | 8661 | 1870 | 158.4 | 0 | 1870 | 105362 | 0 | 1870 | 1457 | | 4603 | 4603 | |
| 12 | Uttar Pradesh-E | 18227 | 26831 | 6741 | 34.95 | 675816 | 6741 | 52064 | 15219.13 | 246 | 246 | 20 | | | |
| 13 | Uttar Pradesh-W | 10385 | | | 1.1 | | | 31224 | | 257 | 227 | | | | |
| 14 | Uttarakhand | 1525 | 353 | 1067 | 16.9 | 65994 | 1067 | 13570 | 8662.46 | 66 | 25 | | 307 | 229 | 307 |
| 15 | West Bengal | 2202 | 0 | 512 | 80.5 | 0 | 512 | 2730 | 0 | 512 | 512 | | 3 | 3 | |
| 16 | Sikkim | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 17 | A & N | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 18 | Chandigarh | 13 | 12 | 0 | 5.8 | 43 | 0 | 0 | 0 | 0 | 0 | | 12 | 11 | 39 |
| 19 | Lakshadweep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 20 | Arunachal Pradesh | 88 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 21 | Nagaland | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 22 | Manipur | 326 | 161 | 0 | 0 | 20 | 0 | 60 | 0 | 0 | 0 | | | | |
| 23 | Mizoram | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 24 | Tripura | 550 | 80 | 15 | 0 | 0 | 15 | 0 | 0 | 15 | 15 | | | | |
| 25 | Meghalaya | 122 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 26 | Gujarat | 7198 | 0 | 1039 | 204.13 | 0 | 1039 | 7816 | 0 | 1039 | 1039 | | | | |
| 27 | Daman & Diu | 18 | 0 | 0 | 10.2 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 28 | Dadra Nagar Haveli | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 29 | Puducherry | 101 | 81 | 61 | 1.51 | 7004 | 61 | 962 | 127.2 | 39 | 26 | | 3 | 3 | 31 |
| 30 | Andhra Pradesh | 1510 | 0 | 79 | 0 | 0 | 79 | 0 | 0 | 79 | 47 | | | | |
| 31 | Telangana | 2047 | 0 | 442 | 24.4 | 0 | 442 | 1220 | 0 | 442 | 355 | | | | |
| 32 | Orissa | 3656 | 90 | 422 | 291.3 | 8116 | 422 | 3872 | 125.18 | 408 | 408 | | | | |
| 33 | Jharkhand | 2413 | 312 | 1022 | 323.83 | 32464 | 1022 | 4108 | 144.63 | 588 | 563 | | | | |
| 34 | Himachal Pradesh | 241 | 330 | 21 | 0.8 | 298 | 21 | 930 | 0.87 | 21 | 21 | 74 | | | |
| | **Total** | **123242** | **44786** | **29283** | **2360.6** | **1192041** | **29283** | **395393** | **62819.7016** | **19449** | **17931** | **1151** | **5258** | **5179** | **622** |

**Table 20**



## BharatNet - Utilization as on 02-Mar-2020

| Agency | Planned | Wi-Fi Hot Spots Provision (GPs) | Wi-Fi Hot Spots Active (GPs) | Remarks |
|---|---|---|---|---|
| By CSC SPV | 109,367 | 33,833 | 12,551 | USOF- 5000 (5247) GPs Pilot Project<br>BBNL - 27252 GPs - UP, HP & Karnataka<br>BBNL - 77,115 Remaining States |
| By BSNL | 2,570 | 1,645 | 1,122 | |
| By BSNL Satellite | 1,407 | 1,093 | 1,003 | |
| By BBNL Satellite | 4,821 | 215 | 0 | |
| Rajasthan Govt/ RISL | 10,000 | 8,661 | 3,874 | Work given by BBNL |
| By TSPs | 1,000 | 322 | 133 | |
| Total | 129,165 | 45,769 | 18,683 | |

| FTTH Connections | Provisioned | Active |
|---|---|---|
| By BSNL | 29195 | 24732 |
| By CSC –SPV | 1626 | 1626 |
| By ISPs | 2256 | 2193 |
| Total | 33077 | 28551 |

| | |
|---|---|
| **SWAN integration** | **5325 GPs** |
| **Utilization by Service Providers** | |
| Dark Fibre used by BSNL for backhaul N/W | 6522.14 Kms in 854 GPs |
| Utilization by TSP (other than BSNL) | Dark Fiber 404 Kms in 29 GPs (20 GPs provisioned)<br>BW taken by TSPs in 322 GPs (133 GPs provisioned) |
| Utilization by ISP | Dark Fiber 873.356 Kms in 183 GPs (129 GPs provisioned)<br>FTTH Connections 2256 taken by ISPs.(2254 GPs provisioned) |
| Total Bandwidth provisioned | > 5 Lakh MB |
| Data consumed | 12,4850 GB |

1

**Table 21**

# Annexure: 3

## Glimpses (related Images)of

## Telecom Journey

## (on Broadband/BharatNet and Economic Growth)

### 3(i)

### BharatNet

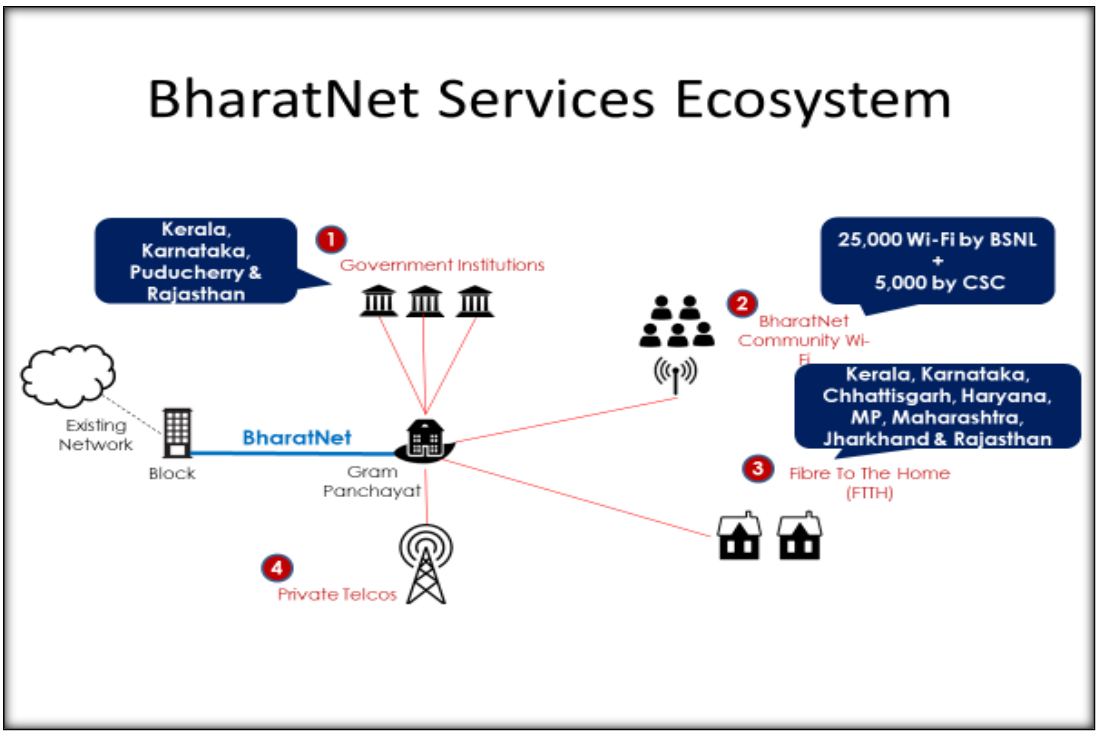



Fig 1

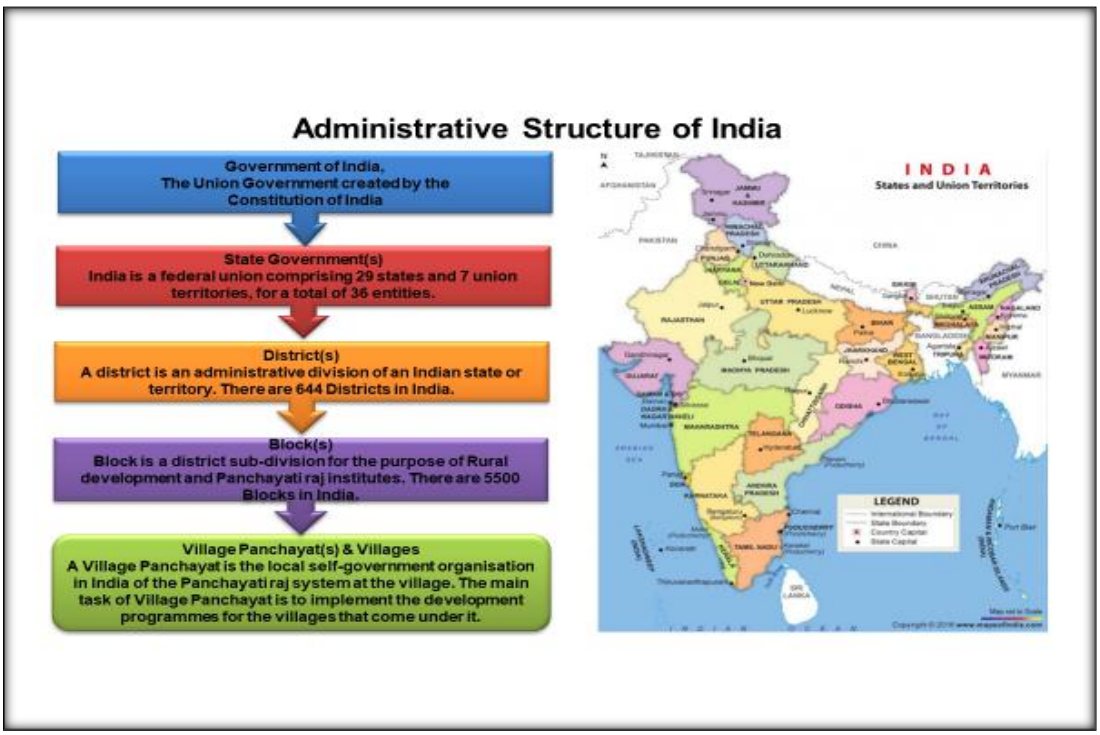

Administrative Structure of India
Government of India,
The Union Government created by the Constitution of India
State Government(s)
India is a federal union comprising 29 states and 7 union territories, for a total of 36 entities.
District(s)
A district is an administrative division of an Indian state or territory. There are 644 Districts in India.
Block(s)
Block is a district sub-division for the purpose of Rural development and Panchayati raj institutes. There are 5500 Blocks in India.
Village Panchayat(s) & Villages
A Village Panchayat is the local self-government organisation in India of the Panchayati raj system at the village. The main task of Village Panchayat is to implement the development programmes for the villages that come under it.
INDIA
States and Union Territories
LEGEND

Fig 2

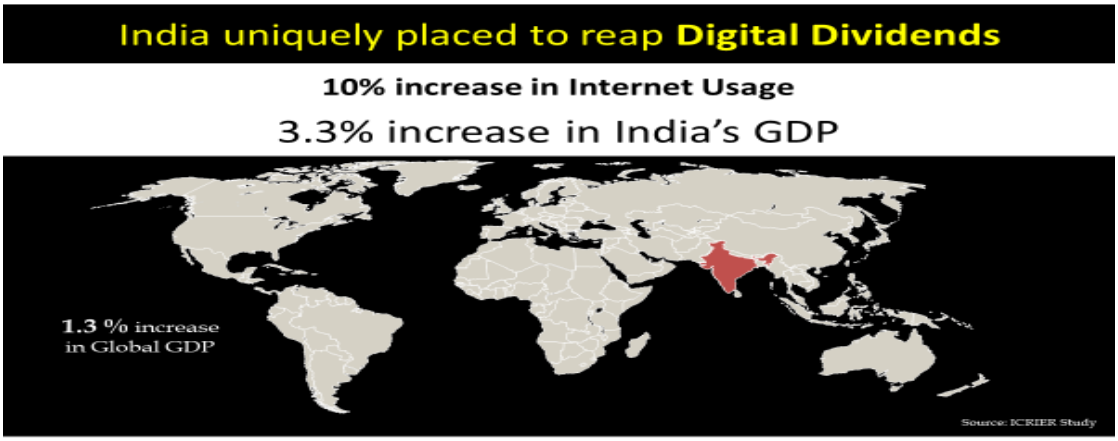

India uniquely placed to reap Digital Dividends
10% increase in Internet Usage
3.3% increase in India's GDP
1.3 % increase
in Global GDP
Source: ICRIER Study

Fig 3

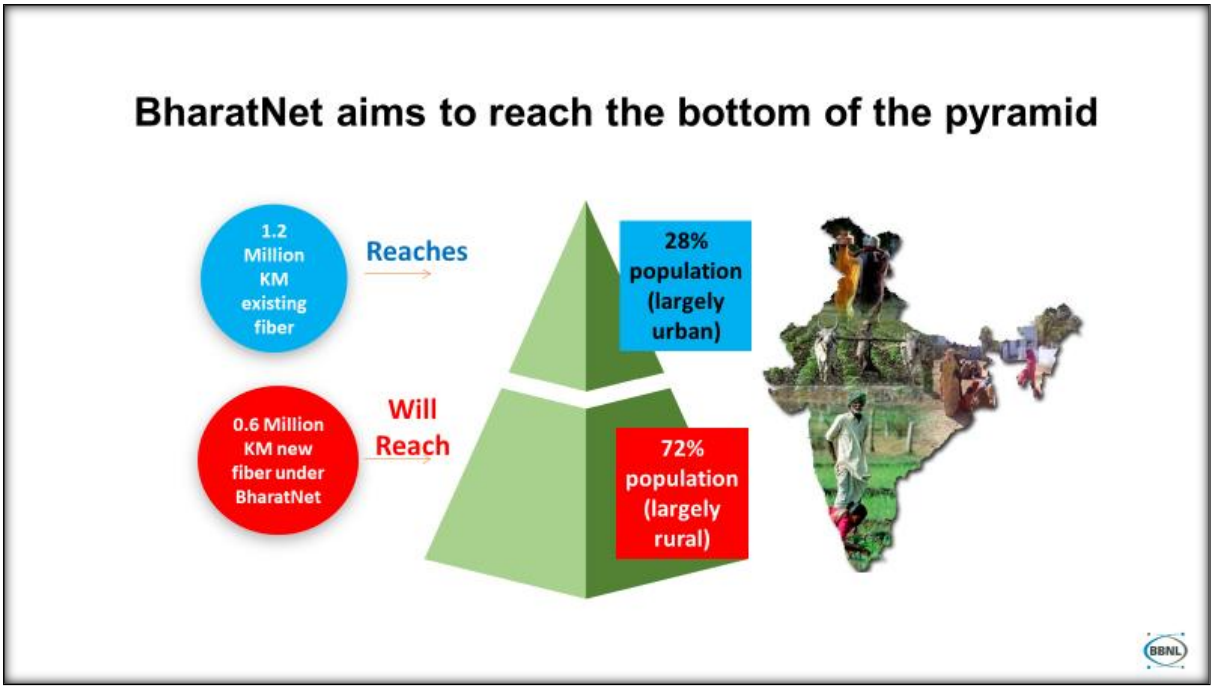

BharatNet aims to reach the bottom of the pyramid
1.2 Million KM existing fiber
Reaches
0.6 Million KM new fiber under BharatNet
Will Reach
28% population (largely urban)
72% population (largely rural)
BBNL

Fig 4

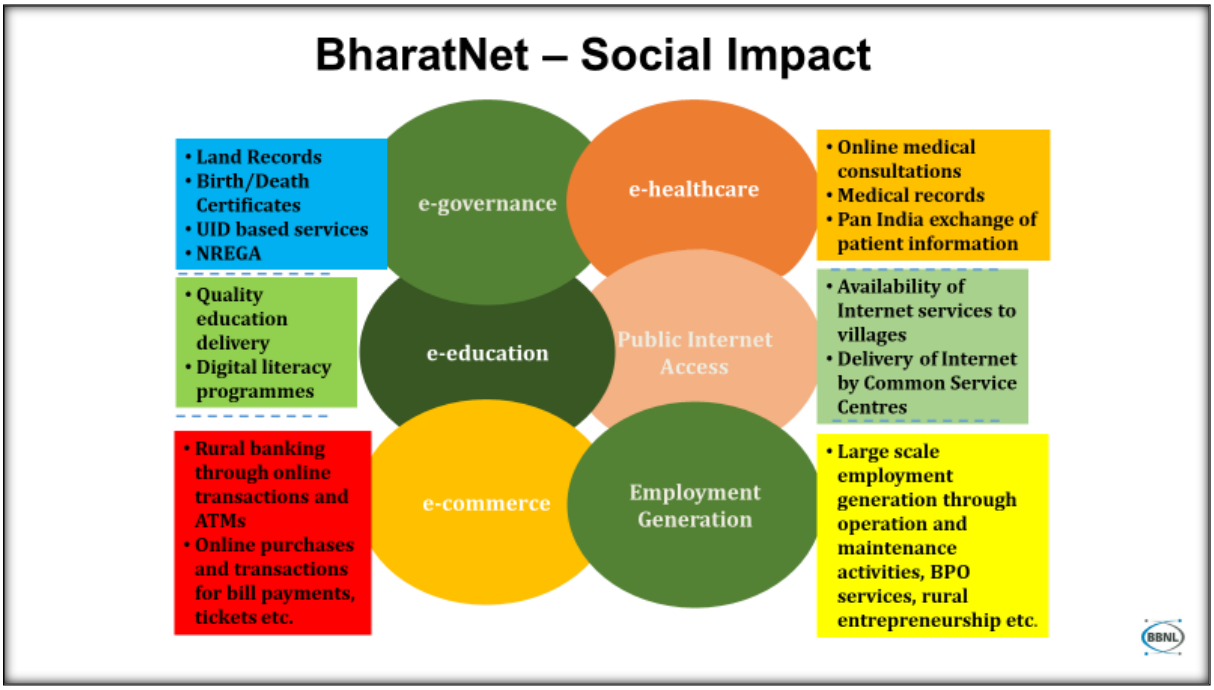

BharatNet – Social Impact
• Land Records
• Birth/Death Certificates
• UID based services
• NREGA
e-governance
e-healthcare
• Online medical consultations
• Medical records
• Pan India exchange of patient information
• Quality education delivery
• Digital literacy programmes
e-education
Public Internet Access
• Availability of Internet services to villages
• Delivery of Internet by Common Service Centres
• Rural banking through online transactions and ATMs
• Online purchases and transactions for bill payments, tickets etc.
e-commerce
Employment Generation
• Large scale employment generation through operation and maintenance activities, BPO services, rural entrepreneurship etc.
BBNL

Fig 5

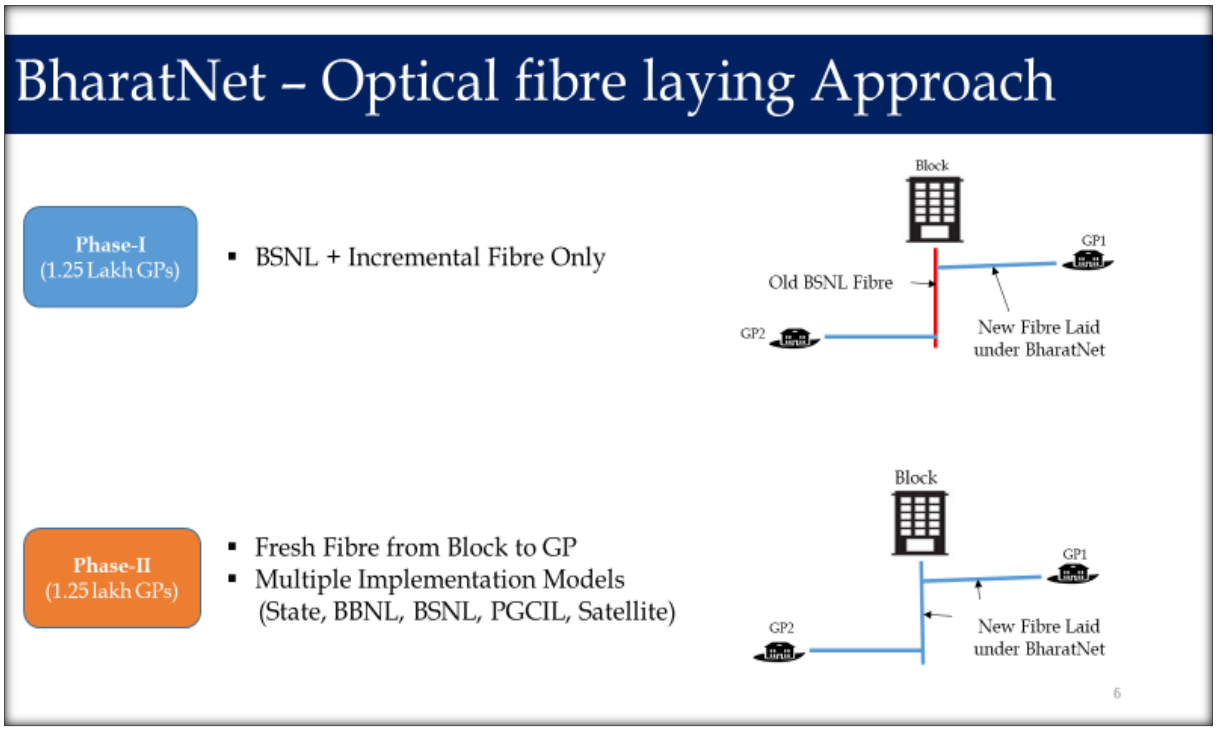

BharatNet – Optical fibre laying Approach
Phase-I
(1.25 Lakh GPs)
BSNL + Incremental Fibre Only
Block
GP1
Old BSNL Fibre
GP2
New Fibre Laid
under BharatNet
Phase-II
(1.25 lakh GPs)
Fresh Fibre from Block to GP
Multiple Implementation Models
(State, BBNL, BSNL, PGCIL, Satellite)
Block
GP1
GP2
New Fibre Laid
under BharatNet
6

Fig 6

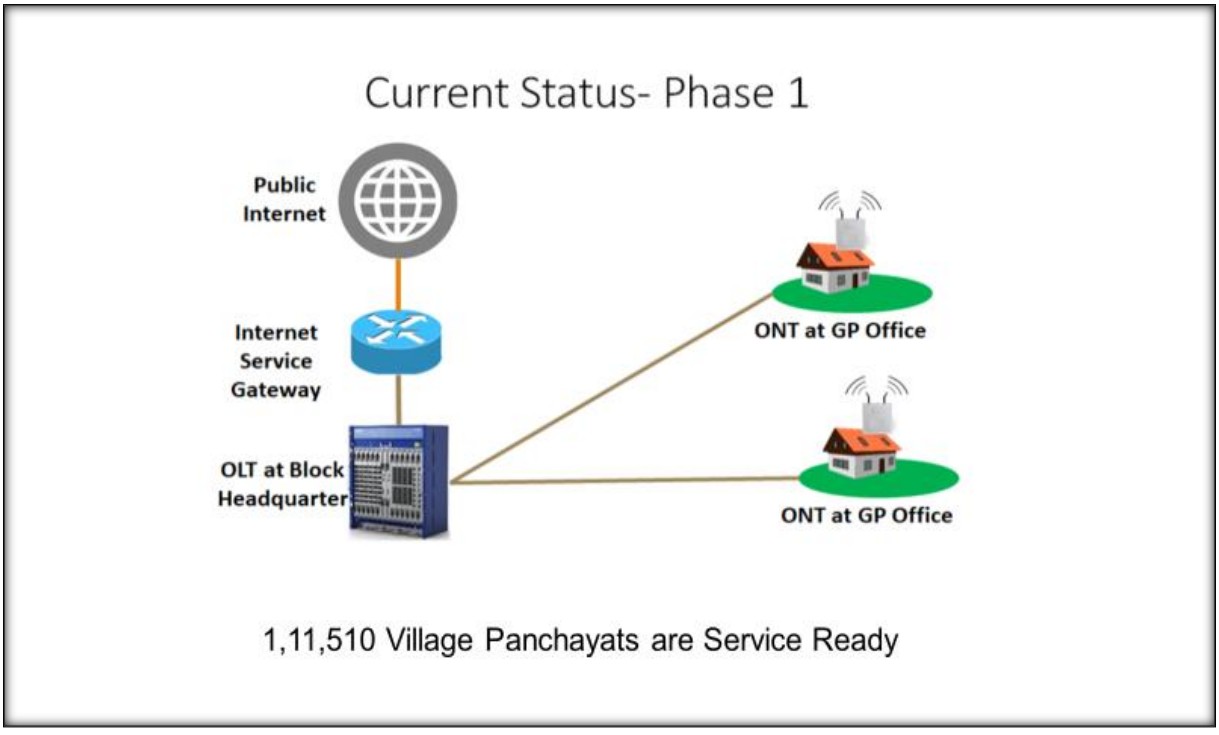

Current Status- Phase 1
Public
Internet
Internet
Service
Gateway
OLT at Block
Headquarter
ONT at GP Office
ONT at GP Office
1,11,510 Village Panchayats are Service Ready

Fig 7

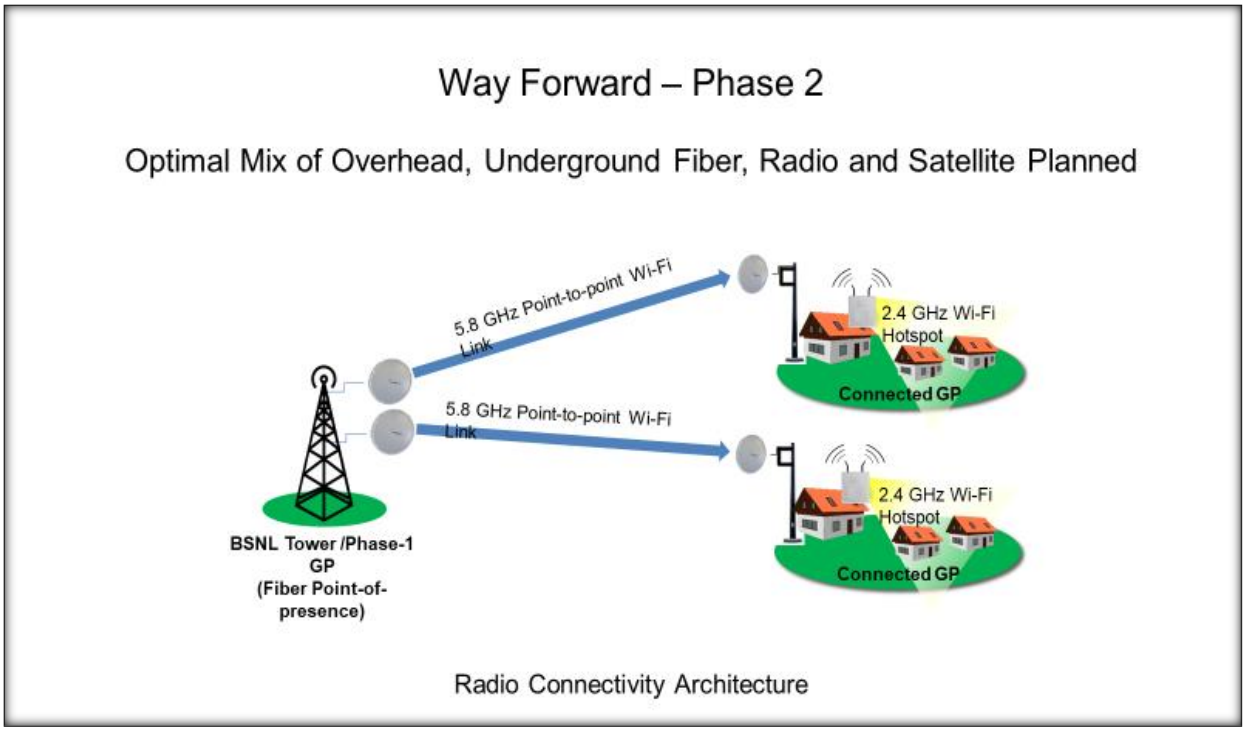
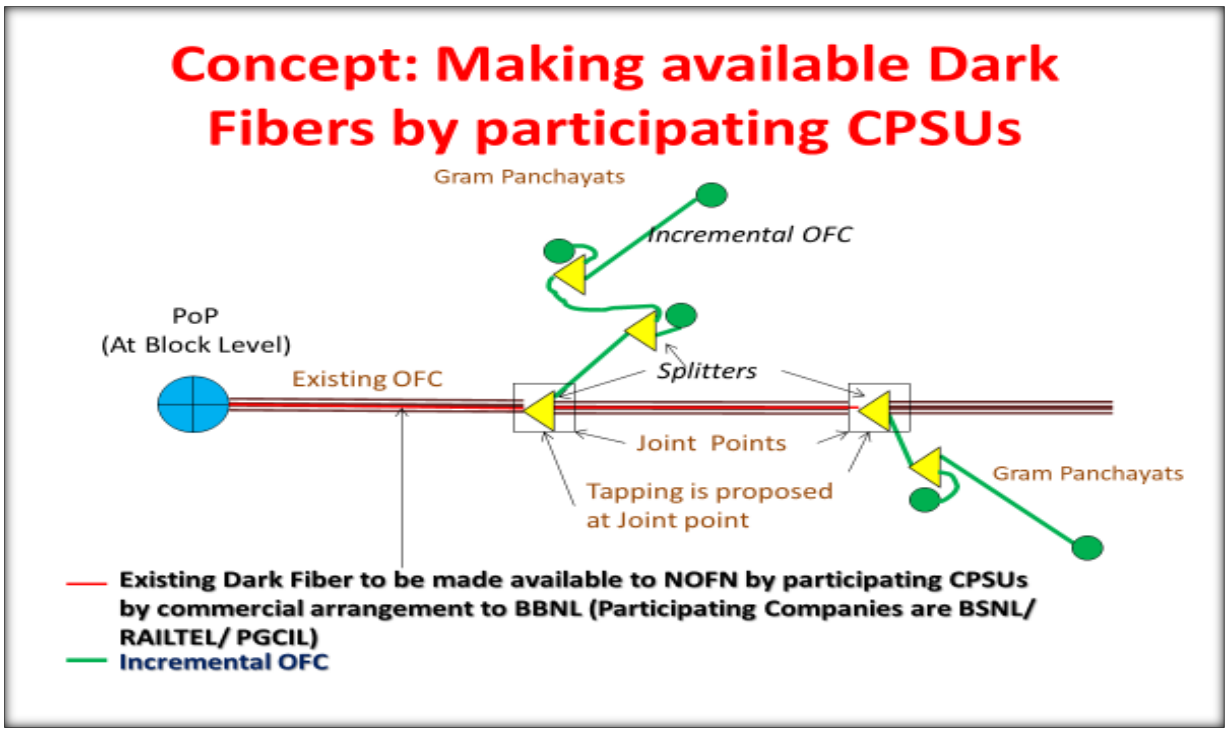



Fig 8




Laying Diagram of OF Cable of Bharatnet connecting to Gram Panchayats

Fig 9

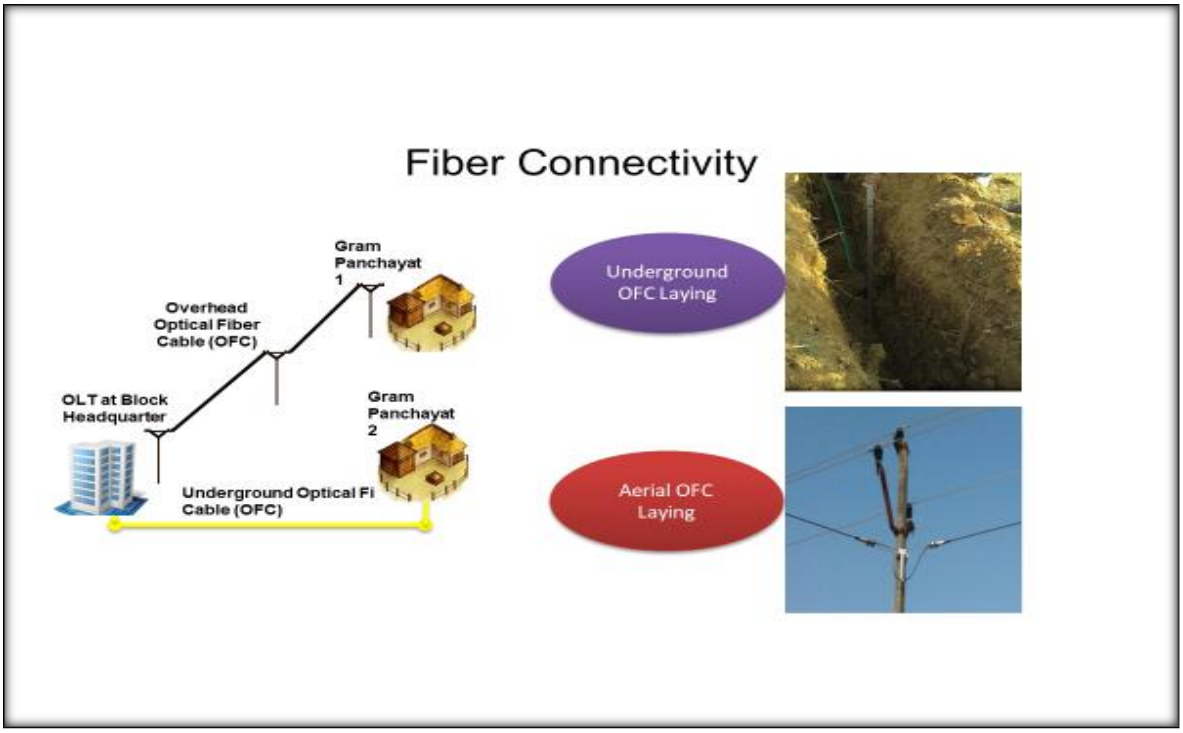

Fiber Connectivity
Gram Panchayat 1
Overhead Optical Fiber Cable (OFC)
OLT at Block Headquarter
Gram Panchayat 2
Underground Optical Fi Cable (OFC)
Underground OFC Laying
Aerial OFC Laying

Fig 10


BharatNet:
Involves
Massive work

Fig 11

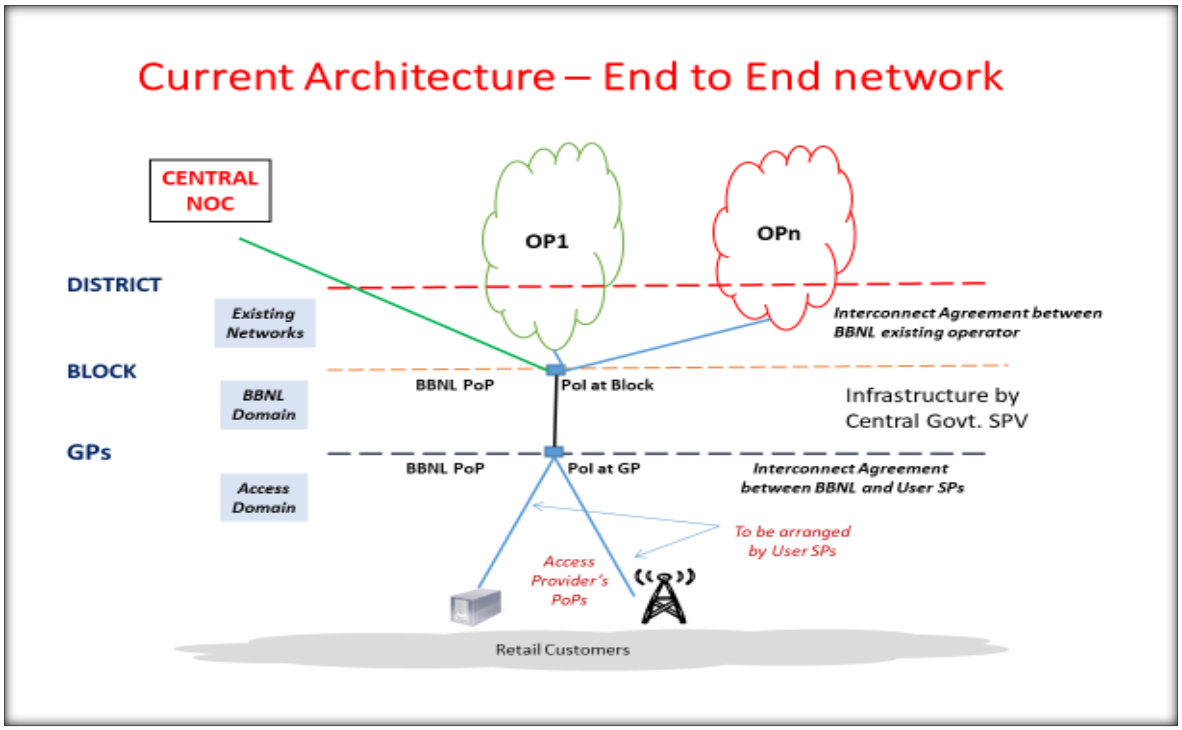



Fig 12

Undersigned participated and deliverd lecture on Broadband for All :BharatNet in Sweden .The Photograph is pasted below:

Undersigned Presenting on Topic “Broadband For All” at International conference in Sweden

Fig 13

## Village Institutions – Potential Beneficiaries

| Institutions | Location | Total Number |
|---|---|---|
| Primary Schools | GP/Village | 7,90,600 |
| Secondary Schools | GP | 1,31,300 |
| Sr Secondary Schools | BHQ/GP | 1,02,600 |
| Primary Health Centres | GP | 24,049 |
| Community Health Centres | BHQ | 4833 |
| Post Offices | GP | 1,39,144 |
| Anganwadis | GP/Village | 14,00,000 |
| Police Stations | BHQ/GP | 18,000 |


**Fig 14**

## Utilisation of BharatNet

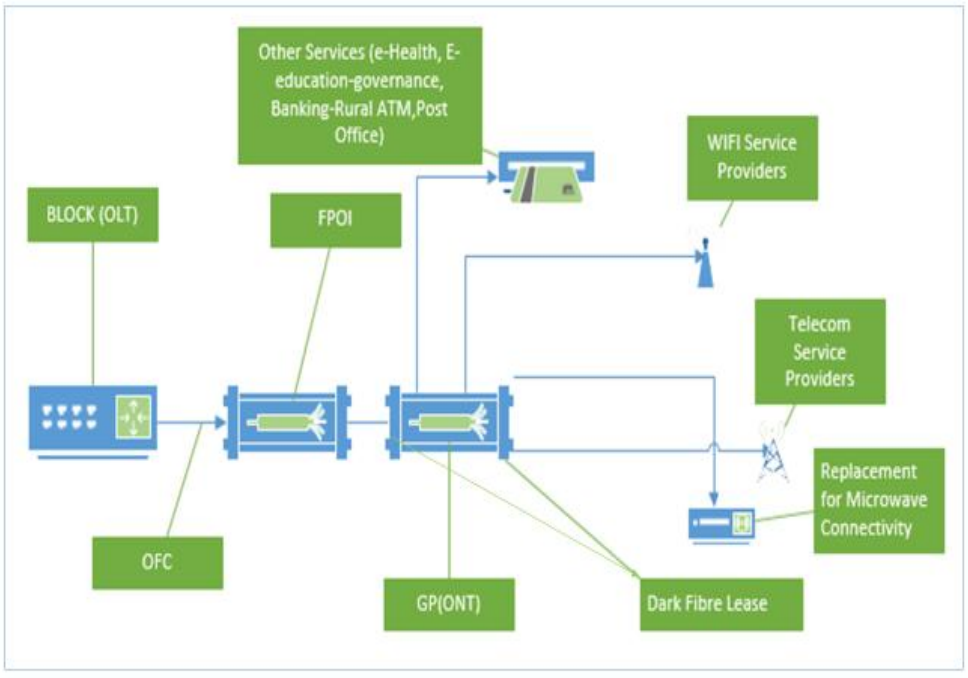



**Fig 15**

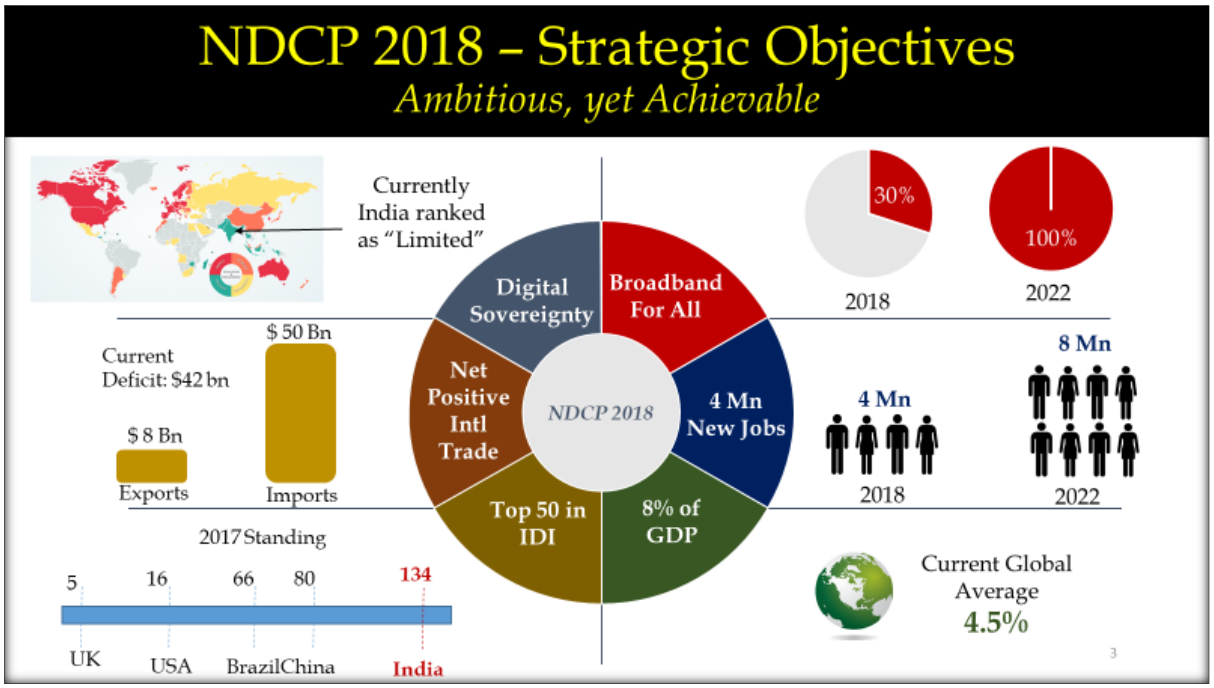

NDCP 2018 – Strategic Objectives
Ambitious, yet Achievable
Currently India ranked as "Limited"
Digital Sovereignty
Broadband For All
Net Positive Intl Trade
NDCP 2018
4 Mn New Jobs
Top 50 in IDI
8% of GDP
30%
2018
100%
2022
Current Deficit: $42 bn
$ 50 Bn
$ 8 Bn
Exports
Imports
4 Mn
2018
8 Mn
2022
2017 Standing
5
16
66
80
134
UK
USA
BrazilChina
India
Current Global Average
4.5%

**Fig 16**

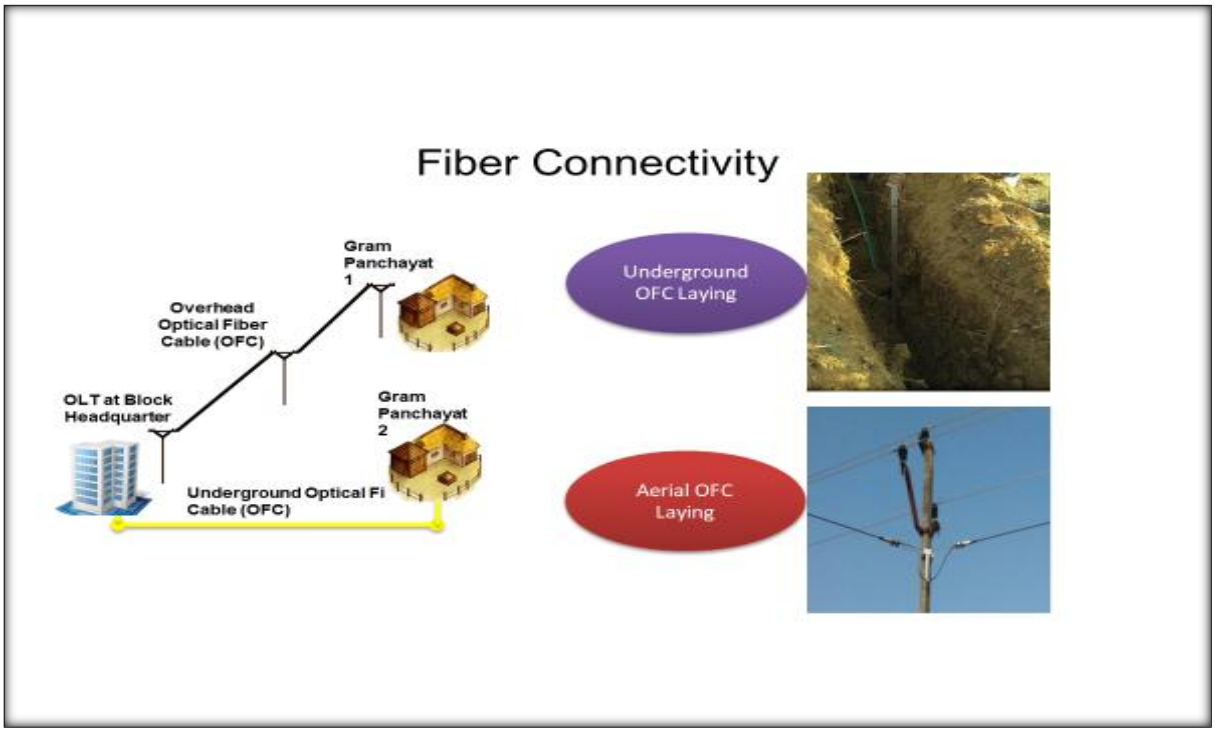

Fiber Connectivity
Gram Panchayat 1
Overhead Optical Fiber Cable (OFC)
OLT at Block Headquarter
Gram Panchayat 2
Underground Optical Fi Cable (OFC)
Underground OFC Laying
Aerial OFC Laying

Fig 17


Fig 18 :Bharatnet Cable Laying work

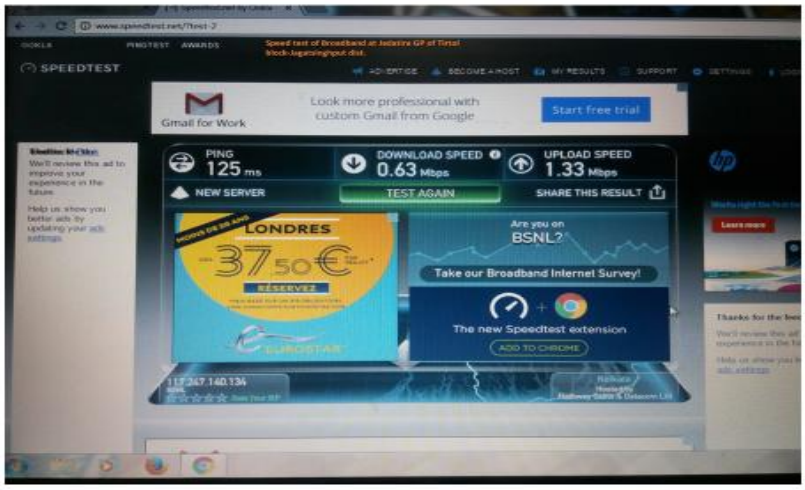
Fig 19

ONT equipments in GPs are solar Powered


Fig 20

OLT equipment in Block Headquarters

Fig 21




Speed test of Broadband speed proved at GPs through Bharatnet

Fig 21

Equipment installed in Gram Panchayat Buildings

Fig 22

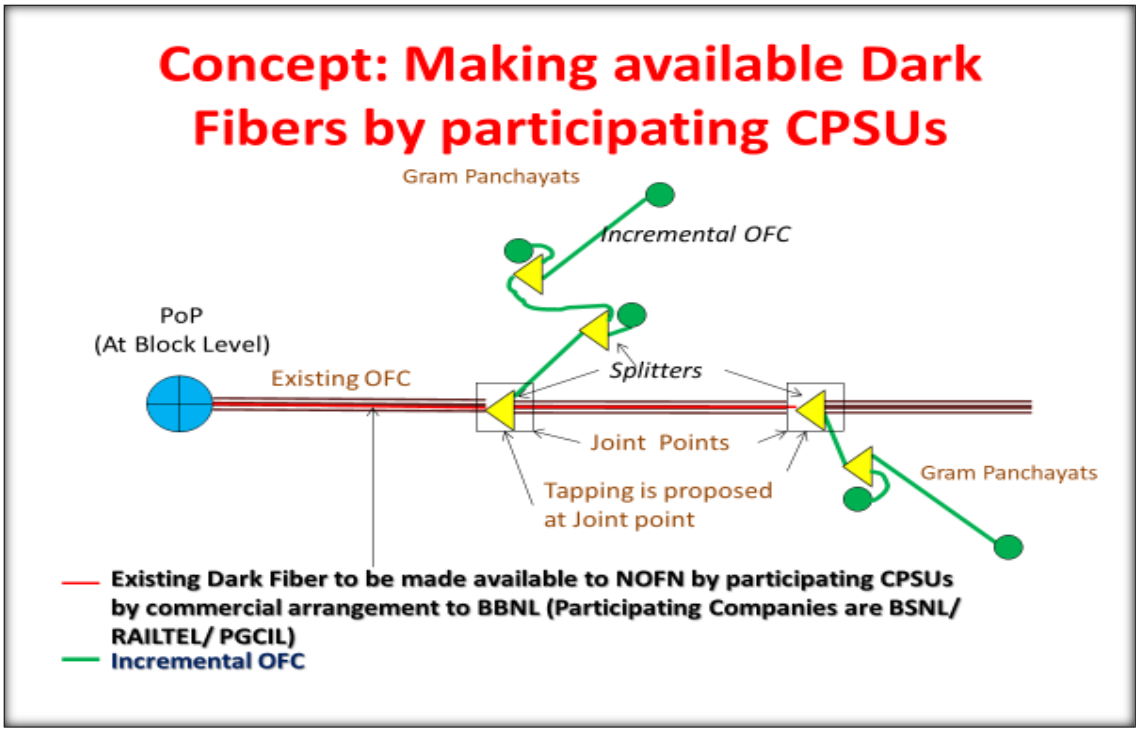



Fig 23

Laying Diagram of OF Cable of Bharatnet connecting to Gram Panchayats

Presenting on Topic “Broadband For All” at International conference in Sweden

Fig 24


Undersigned receiving award from Hon'ble Minister of state for Communications (I/C)

For significant contribution in timely completion BharatNet ph 1(Connecting 1 Lakh GPs)

Fig 25

## 3(ii)

## Connecting unconncted

## Broadband for All

Connectivity at Hilly /Difficult terrains,Equipments are phystically taken to sites for installation with great difficulties

Fig 26

Providing Connectivity through VSAT/Satellite in J&K Snow hit areas in Boarder in most difficult terrains/climate

Fig 27

Fig 28

Providing  Connectivity through VSAT/Satellite  in J&K Snow hit areas in Boarder

Fig 29

Providing connectivity in Hilly terrains

Broadband Connectivity through Satellite to Wakhen Village,Meghalaya,NE an Uncovered Village to bring the village to main stream. happy villagers,with Head man after this connectivity

Fig 30

दूरसंचार सचिव ने भारत नेट प्रगति कार्यों का जायजा लिया

दूरसंचार सचिव ने जैसलमेर के हमीरा गांव में भारत नेट की सर्विस का जायजा लिया।

जोधपुर| दूरसंचार विभाग की ओर से भारत नेट प्रोजेक्ट योजना के तहत गांवों में डिजिटलाइजेशन का कार्य करवाया जा रहा हैं। इसके लिए ग्राम पंचायतों पर 100 एमबीपीएस की ब्रॉडबैंड कनेक्टिविटी व हाईस्पीड इंटरनेट के कार्यों का दूरसंचार सचिव अरुणा सुंदरराजन ने जैसलमेर का दौरा कर जायजा लिया। सचिव सुंदरराजन ने बीबीएनएल और बीएसएनएल के अधिकारियों के साथ समीक्षा बैठक लेने के बाद जैसलमेर के हमीरा गांव में कार्यों का अवलोकन किया। उन्होंने सरपंच से भारत नेट ब्रॉडबैंड पर चर्चा कर बताया, कि 100 एमबीपीएस कनेक्टिविटी से ई-मित्र, स्कूल, रेलवे स्टेशन, राशन व्यवस्था तथा अन्य इंस्टीट्यूट को हाईस्पीड ब्रॉडबैंड से जोड़ा जा सकता हैं। वहीं हाईस्पीड इंटरनेट प्रोजेक्ट से महिलाओं व बच्चों को टेलीमेडिसन व ई-एजुकेशन की सुविधा दी जा सकती हैं। उन्होंने बीएसएनएल व बीबीएनएल अधिकारियों को ओएफएसी केबल बिछा इन संस्थानों को कनेक्टिविटी देने के निर्देश दिए।

Then Secretary Telecom ,visits Hamira Village Gram Panchayat , boarder district of Jaisalmer in Rajasthan and review the work of Bharatnet/broadband facility

Fig 31

Review of Secretary Telecom of the Broadband Services in Boarder area of Jaiselmer District,Rajasthan

Boarder area Connectivity for Defence Forces : Then Secretary Telecom along with Then SOC , Indian Army,Jointly reviewing the connectivity in Uttarakhand boardering china/Nepal.

Fig 32

Boarder area Connectivity for Defence Forces : Then Secretary Telecom along with Then SOC , Indian Army,Jointly reviewing the connectivity in Uttarakhand boardering china/Nepal.

Fig 33

Comprehensive Telecom Development Plan CTDP in North East area

Hon’ble Minister for Communication with then Secretary Telecom At a conference in Guwahati, Assam with All CM’s of NE states.

Fig 34

## 3(iii)

## Make In India, Innovative technologies ,Innovations/Startups ,Involvement of Our Own Academia IITS/IIMs etc in R&D

Fig 35

5G Startup team with Director ,IIT Chennai at IIT lab,Chennai

Then Secretary Telecom addressing ITI employees at ITI,Palghat ,Kerala for while reviewing manufacturing of Make In India products

Fig 36

Fig 37

Then Secretary Telecom along with Heads of Academia in North India ie IIT BHU,IIT KanPur,IIT Patna,IIIT Allahabad,NIT Allahabad along with ITI management discussing to setup Telecom Startups Hubson 5G and other products in ITI factries at Raebareli,Naini and Mankapur with Innovations by our own Academia

**Innovative Technologies for providing connectivity to Difficult/Uncovered areas**

Site-1 Installed on the roof top of school ,near Raj Mahendri, LWE area,AP

Fig 38

Site-2: other side equipment is at Hill Top

Providing Communication Link between Site 1 and Site 2 through FSOC technology

Fig 39


One of the School in same FSOC site in AP village use very good quality Tele Eduacation to teach its students

Fig40

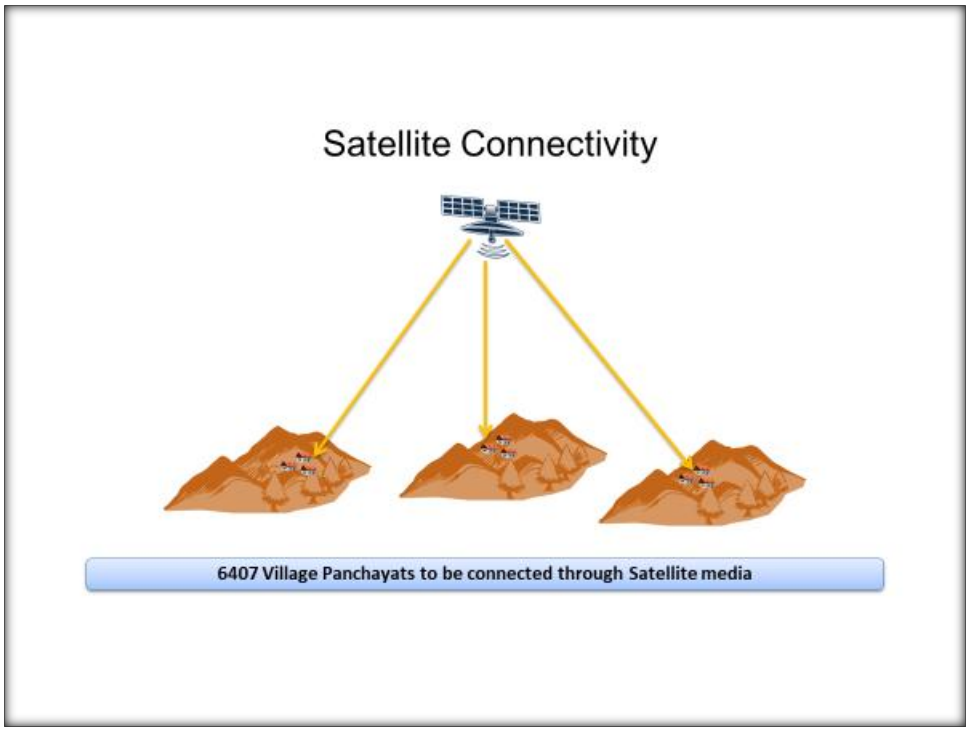

Satellite Connectivity
6407 Village Panchayats to be connected through Satellite media

Fig41

## Annexure 3(iv)

## Key Policy Enablers for Broadband penetration in India

## and Socio economic Impact

Source [16]

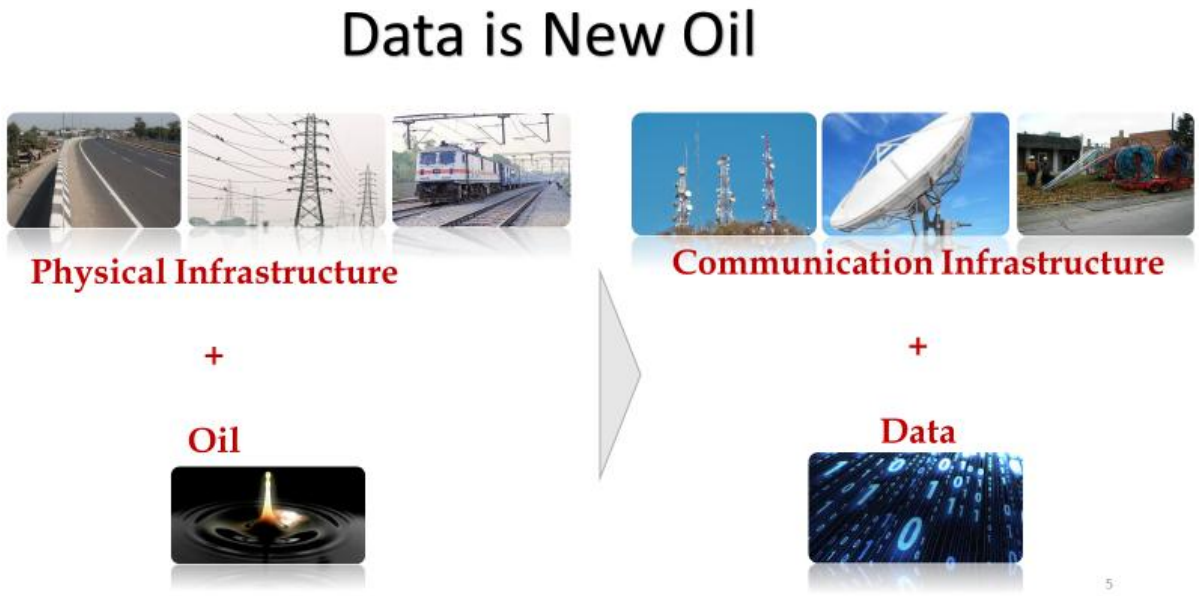



**Fig 42**

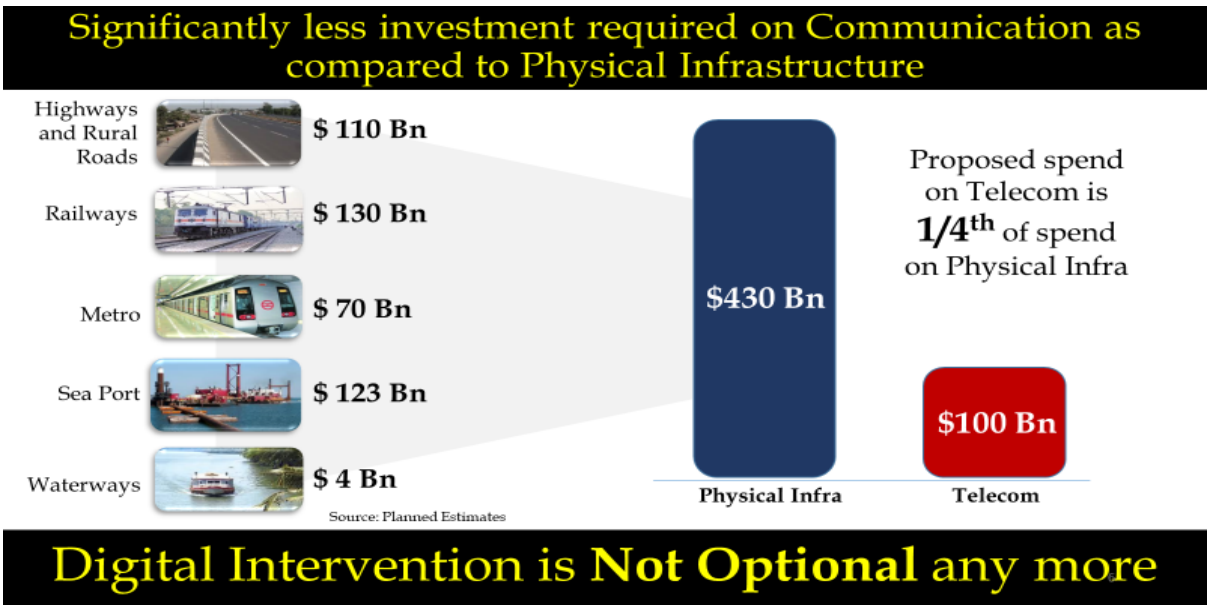


**Fig 43**

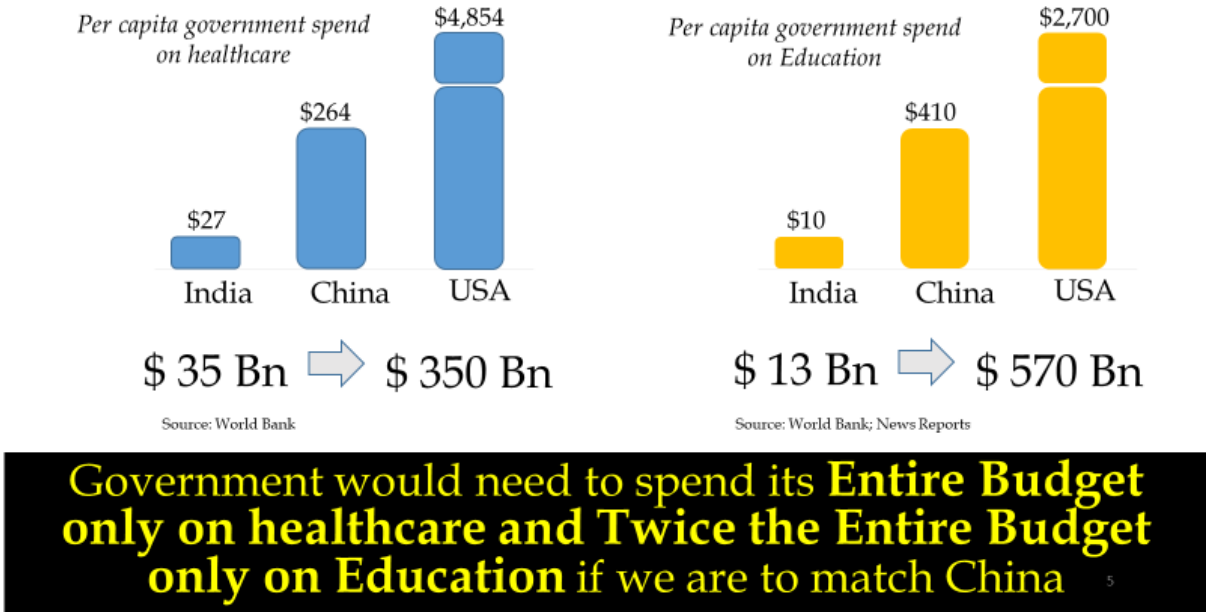



**Fig 44**

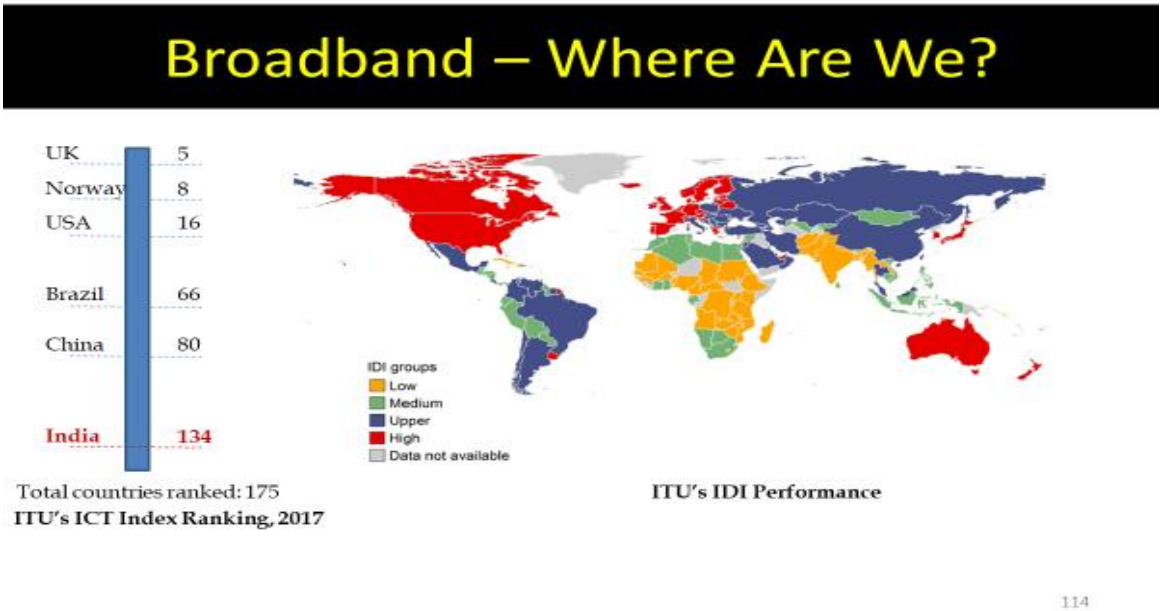



Fig 45


NDCP 2018 - Key Considerations
1
Investment
2
Innovation
3
Emerging Technologies
4
Digital Sovereignty
5
Ease of Doing Business
6
IPR Generation
124

Fig 56


Strategic Objectives
Currently India ranked as "Limited"
Current Deficit: $42 bn
$ 50 Bn
$ 8 Bn
Exports
Imports
2017 Standing
5
16
66
80
134
UK
USA
Brazil
China
India
Digital Sovereignty
Broadband For All
Net Positive Intl Trade
NDCP 2018
4 Mn New Jobs
Top 50 in IDI
8% of GDP
30%
100%
2017
2022
4 Mn
8 Mn
2017
2022
Current Global Average
4.5%
125


Fig 57

Socio Economic Impact: NDCP2018

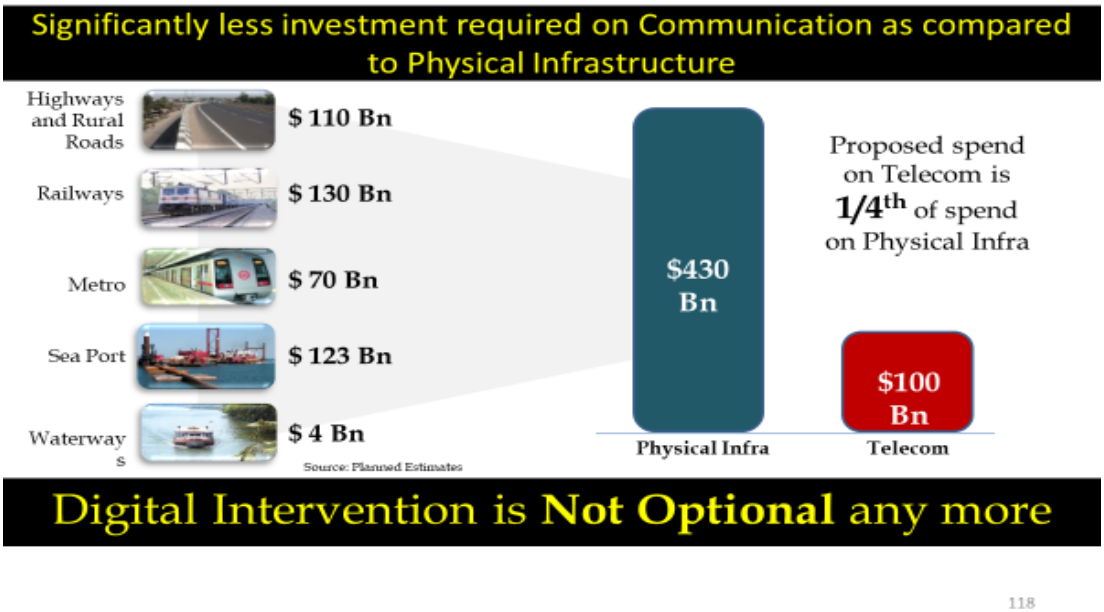



**Fig 58**

**Table 1.2 Broadband's impact on jobs: examples of research**

| Country Focus | Report | Institution | Key findings |
|---|---|---|---|
| Germany | The Impact of Broadband on Jobs and the German Economy (2010) | Columbia Business School, Telecom Advisory Services LLC, and Polynomics AG | Broadband network construction will create 304,000 jobs between 2010 and 2014, and 237,000 between 2015 and 2020. Also, it is estimated an additional 427,000 jobs will be created: 103,000 in 2010–2014 and 324,000 in 2015–2020. The accumulated total jobs over a ten-year period (2010–2020) will reach 968,000. |
| Sudan | Economic impact of mobile communications in Sudan (2010) | Zain, Ericsson | In addition to providing over 40,000 jobs to the Sudanese economy, the mobile telecommunications sector is related to demand-side GDP growth rates of 0.12% for each 1% rise in market penetration. |
| Brazil | Economic Development and Inclusion through Local Broadband Access Networks (2009) | The Multilateral Investment Fund, Inter-American Development Bank | Broadband has added about 1-1.4% to the employment growth rate |
| UK | The UK's Digital Road to Recovery (2009) | LSE enterprise ltd, and The Information Technology and Innovation Foundation | An additional GBP 5 billion investment in broadband networks would create or retain an estimated 280,500 UK jobs for a year. |
| USA | Economic Impacts of Broadband, Information and Communications for Development: Extending Reach and Increasing Impact (2009) | The World Bank | Broadband added 10-14% to the growth rate in the number of jobs between 1998 and 2002. |
| USA | The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of US Data; Robert Crandall, William Lehr,Robert Litan (2007) | "Issues in Economic Policy" July 2007 (The Brookings Institution) | For every one percentage point increase in fixed broadband penetration in a US state, employment is projected to increase by 0.2 to 0.3% per year. |

**Source:https://unesdoc.unesco.org**

Broadband a platform for progress

Fig 59