

Digital footprint of India



360M+ Internet users

190M+ Broadband users

31K WI-FI Hotspots

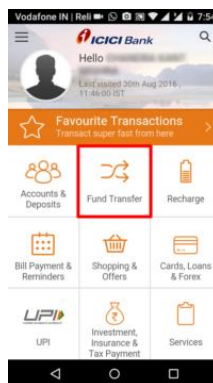


1B+ Mobile connections

383M Smartphone users



1B+ Aadhaar cards



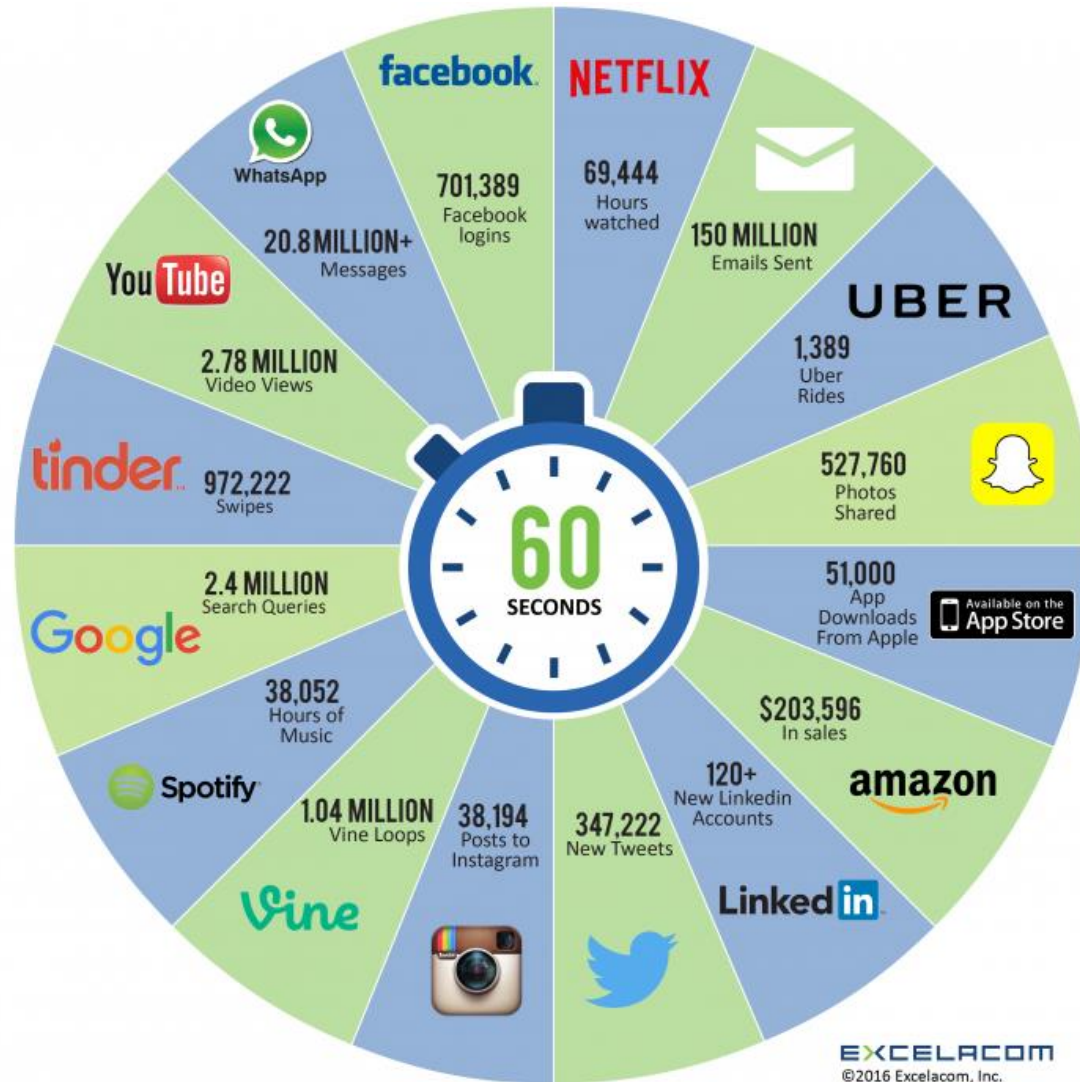
260M+ Jan Dhan accounts

8 Payment Banks

Unified Payment Interface

1.3B+ People, 6 lakh villages, 2.3 lakh gram panchayats

The amount of data generated every minute is exploding



Without broadband, everything will collapse...

Hyper-connected world: Creating internet of people, things,... and everything



Source: Mario Morales, IDC

Are we ready with ... **Broadband?**

The prerequisite for convergence is broadband connectivity



Augmented Reality



Drones



3D Printing



Internet of Things



Robots



Virtual Reality



Blockchain

Are we ready with ... **Broadband?**

Lack of infrastructure in India demands virtual connectivity

Lack of banks

- 14000 per bank branch in India

Lack of hospitals and doctors

- Doctor-population ratio in the country stands at 1:1681 against the WHO norm of 1:1000
- 6.28 lakh hospital beds and 9.18 lakh allopathic doctors for over 1.25 billion people

Lack of schools, universities and vocational training centers

- Pupil-teacher ratio in primary and upper primary schools in India fell to 28:1 and 30:1 respectively in 2013-2014

Lack of roads and highways

- India has less than 3.8 kilometres of roads per 1000 people
- In terms of quality, all season, 4 or more lane highways, India has less than 0.07 kilometres of highways per 1000 people, as of 2010

Are we ready to provide... **Broadband?**

All the strategic initiatives of the government demand internet connectivity

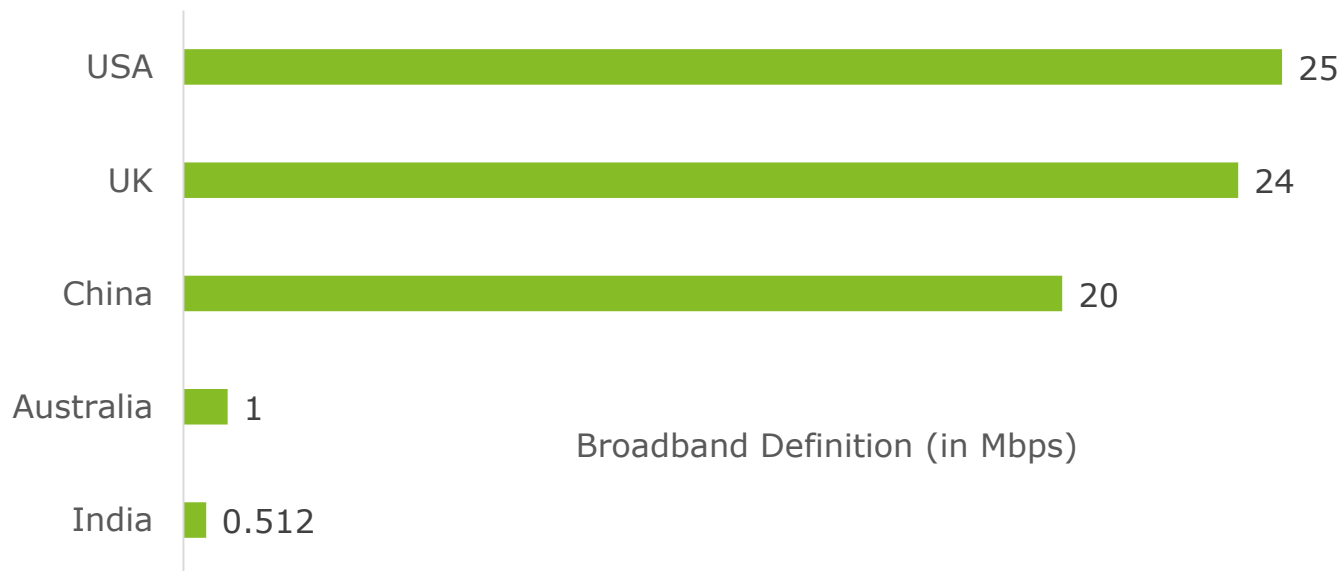


#startupindia



Are we ready to provide... **Broadband?**

Developed countries have defined broadband as a minimum of over 20 Mbps speed

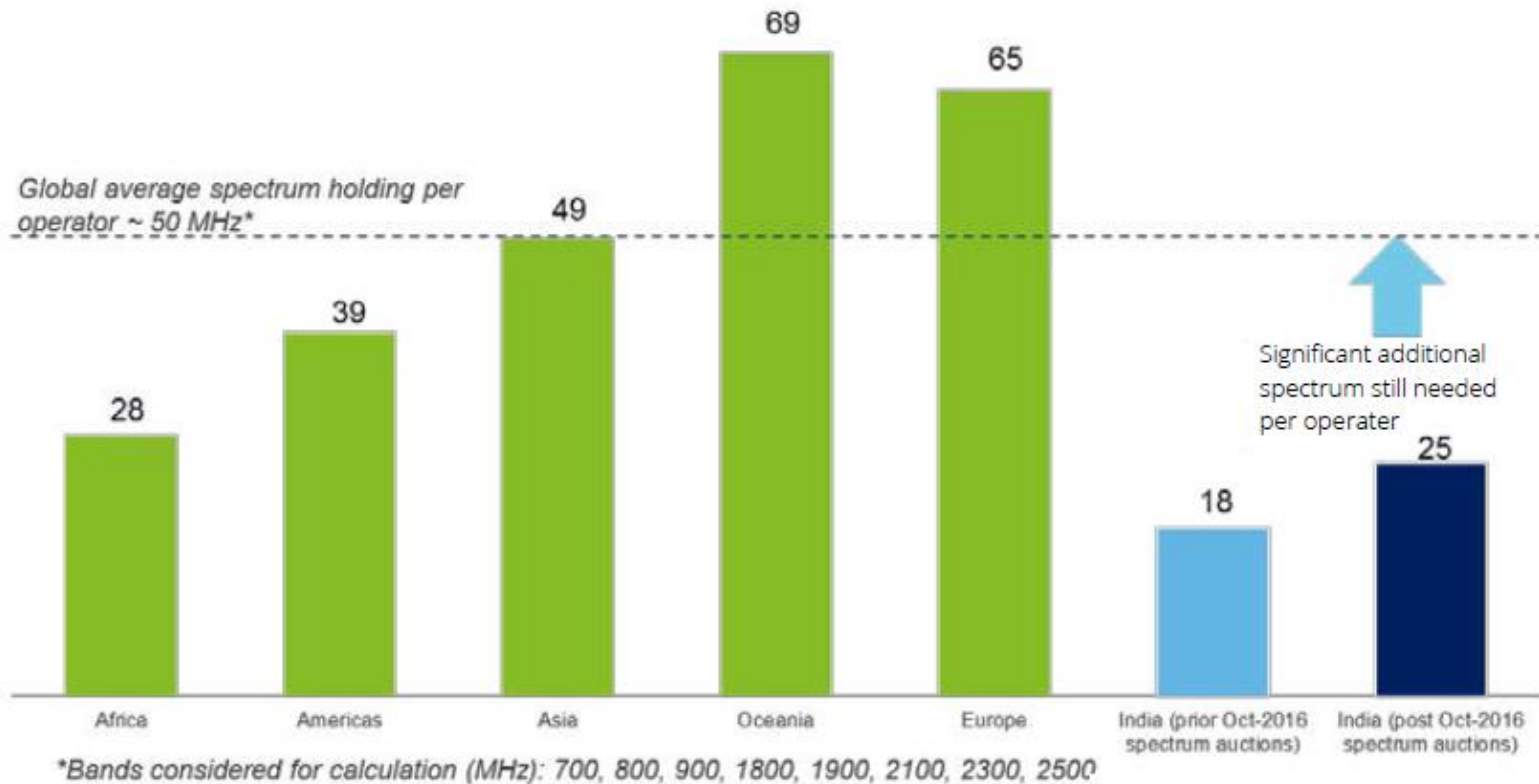


While India has set the Broadband definition as 512 Kbps...

Is that enough?

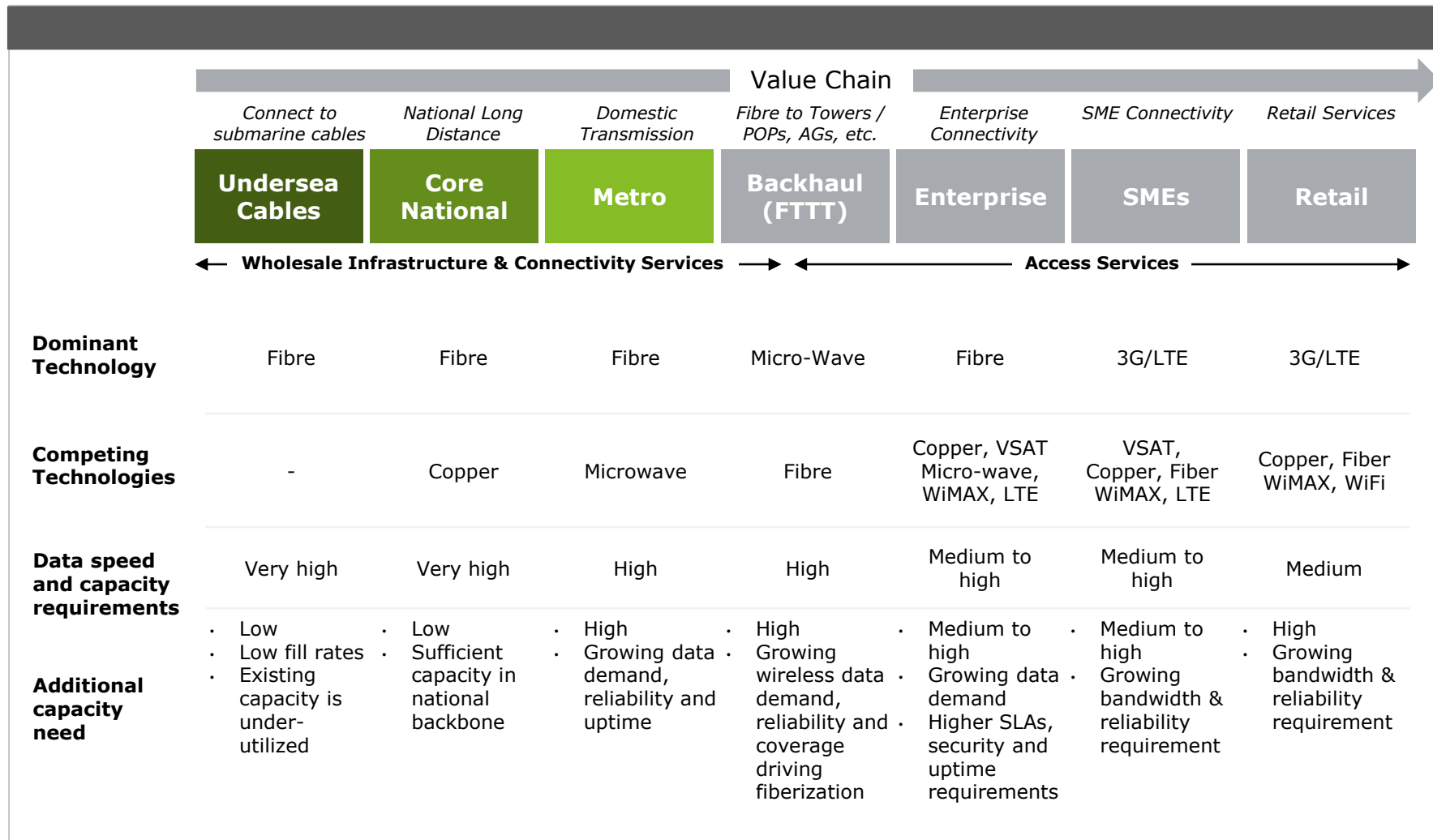
Although lot of spectrum was made available in last auction, significant spectrum still needed per operator

Global average spectrum holding per Operator



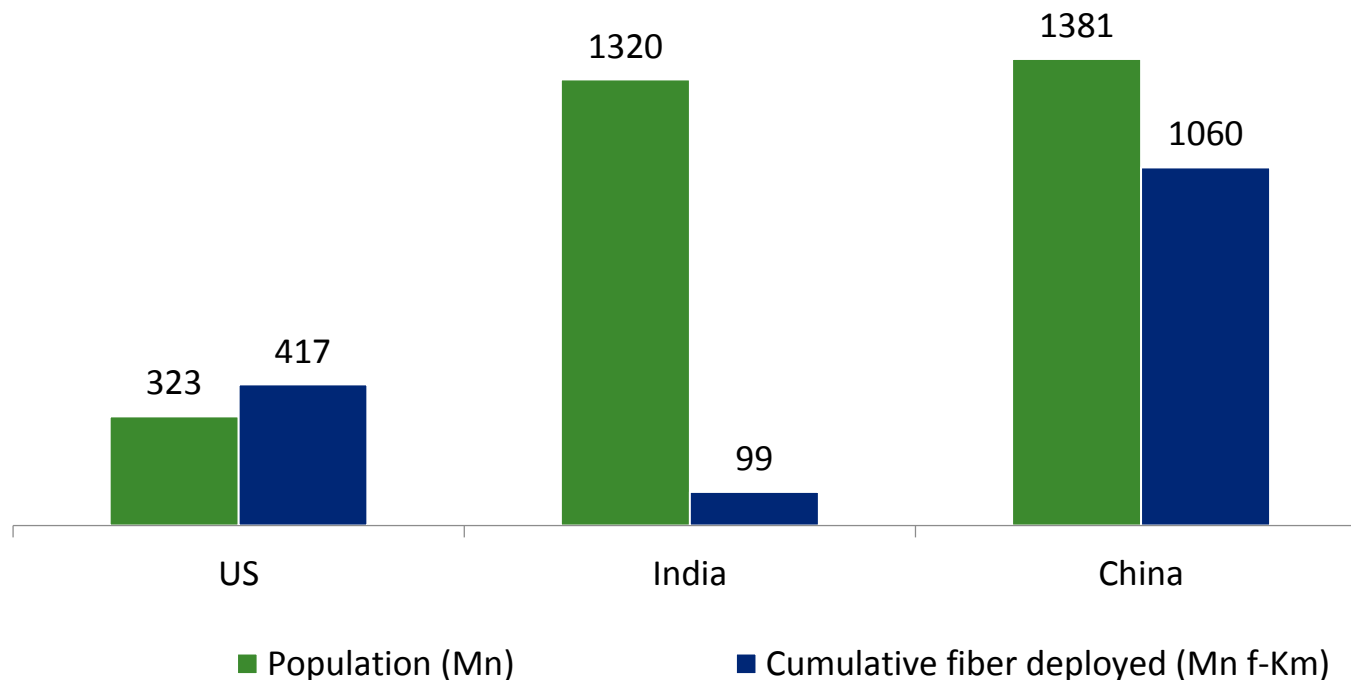
This is prerequisite to provide mobile broadband and achieving the objective of connecting 600 million by 2020.

For proliferation of Broadband, a range of technologies can be deployed across the value chain



India continues to remain highly under-fiberized

Comparative analysis (Population vs Cumulative fiber deployment)



While developed as well as developing countries are promoting deployment of optic fiber across broadband delivery value chain since it is **future proof...**

To match the global average of a hotspot for every 114 people, 11 million hotspots need to be deployed

	Public Wi-Fi Hotspots	Population	Citizens/Hotspot
World	64.2 Mn.	7.346 Bn. (7,346 Mn.)	114
India	31,000 (0.031 Mn.)	1.311 Bn. (1,311 Mn.)	37,000

Google free WiFi reaches 100th station, Ooty now connects to rail fibre line

Haryana connects 100 villages with Wi-Fi services

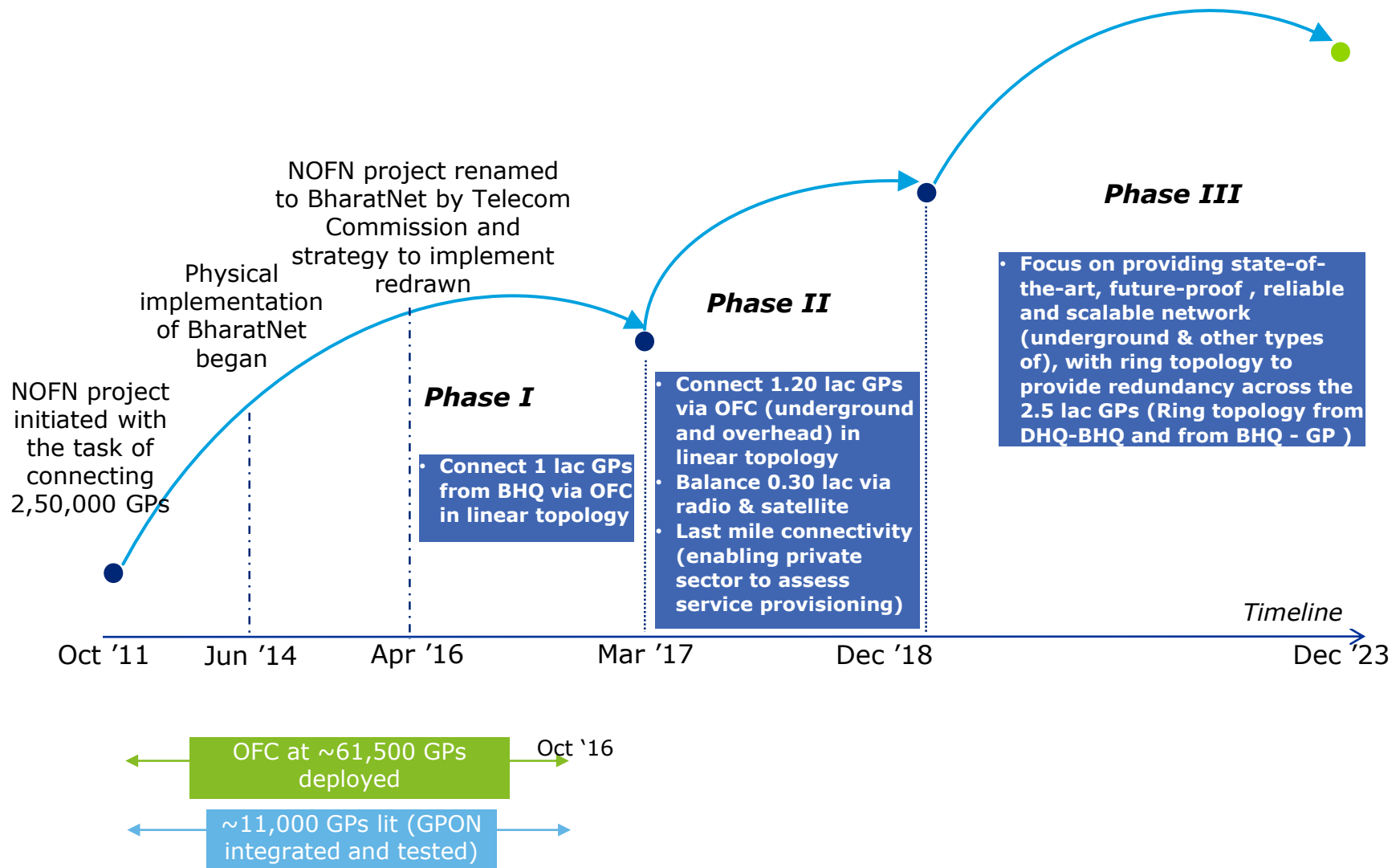
Mumbai-Pune Expressway to deploy largest public WiFi in India

Facebook targets Rural India with cheaper Internet and Wi-Fi plans

First time unused TV "white space" (TVWS) frequencies were combined with solar-powered base stations to deliver low-cost broadband to a rural area lacking even basic electricity.



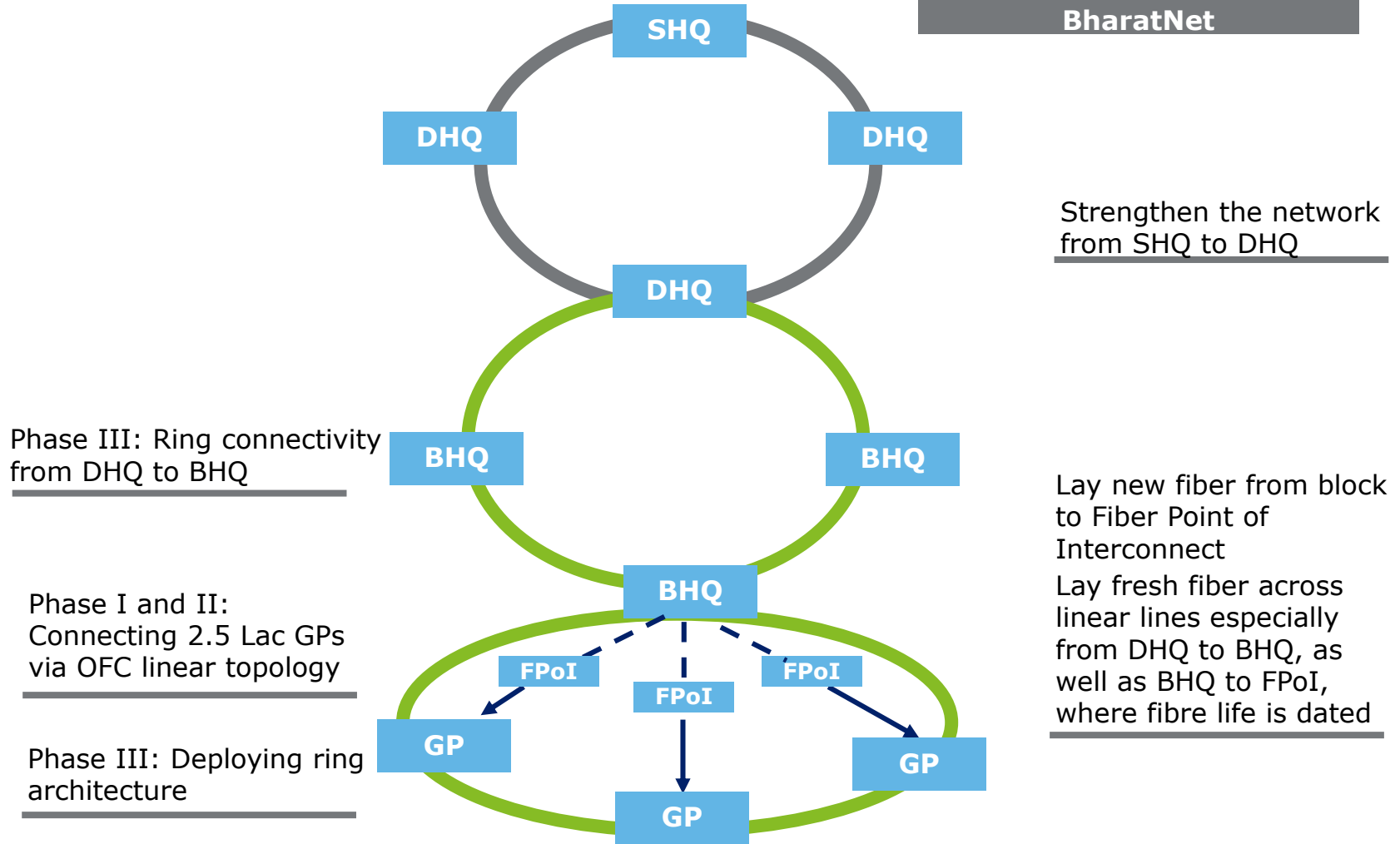
Marquee government projects such as BharatNet will accelerate the growth of broadband in India over the next 6 years



In addition to the existing scope, network strengthening and connecting DHQ to BHQ and BHQ to FPoI needs to be undertaken

Current scope of BharatNet

Additional considerations for BharatNet



→ Phase I & II

— Phase III

Transformation of the legacy wireless networks needs to be encouraged to ensure high-speed internet access

Dimension	Current state in India	Global leaders / Required future state
Core	<ul style="list-style-type: none"> Legacy 2G - 3G riding on 2G 	<ul style="list-style-type: none"> Full IMS, EPC, MDN, real time communication, big data support Virtual core components
Transmission medium	<ul style="list-style-type: none"> Microwave intensive (80%) Low bandwidth capacity 	<ul style="list-style-type: none"> Fiber intensive High capacity microwave (Giga bit)
Network topology	<ul style="list-style-type: none"> Greater fraction of spur sites (point to point) Limited rings (>6-7 sites in case of MW) 	<ul style="list-style-type: none"> Ring- smaller ring size in case of MW Hybrid & mesh in case of fiberized site
Network protocol	<ul style="list-style-type: none"> Circuit switched / Packet switched 	<ul style="list-style-type: none"> Full IP / E2E - MPLS
Traffic movement	<ul style="list-style-type: none"> Through macro sites 	<ul style="list-style-type: none"> Off-loading to micro sites for enhanced capacity Small cells, Wi-Fi etc.
Virtualization of network elements	<ul style="list-style-type: none"> Physical elements Often proprietary hardware 	<ul style="list-style-type: none"> Virtual elements Uses generic hardware
Technology dependence	<ul style="list-style-type: none"> Technology specific (2G, 3G) 	<ul style="list-style-type: none"> Technology agnostic (2G, 3G, 4G support)

To ensure broadband uptake, specific initiatives need to be undertaken to promote and educate the masses

Strategic Partnerships

Form partnerships with private sector players (CSR initiative) and NGOs to provide computers and internet facility at public schools across India



Learning & Development

Impart training to government employees so that they are fully informed of the e-government services and at the same time they can play a societal role by educating other members of the society



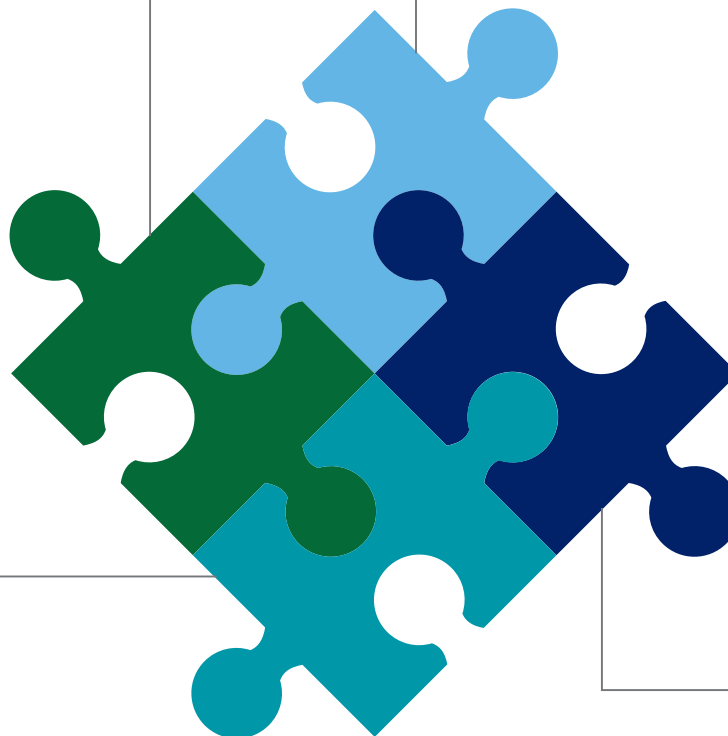
Targeted Education

Educate users of the advantages of performing financial transactions online and setup workshops/melas and events to address issues of the prospective users (About 50% of the population perceive online transactions as risky)



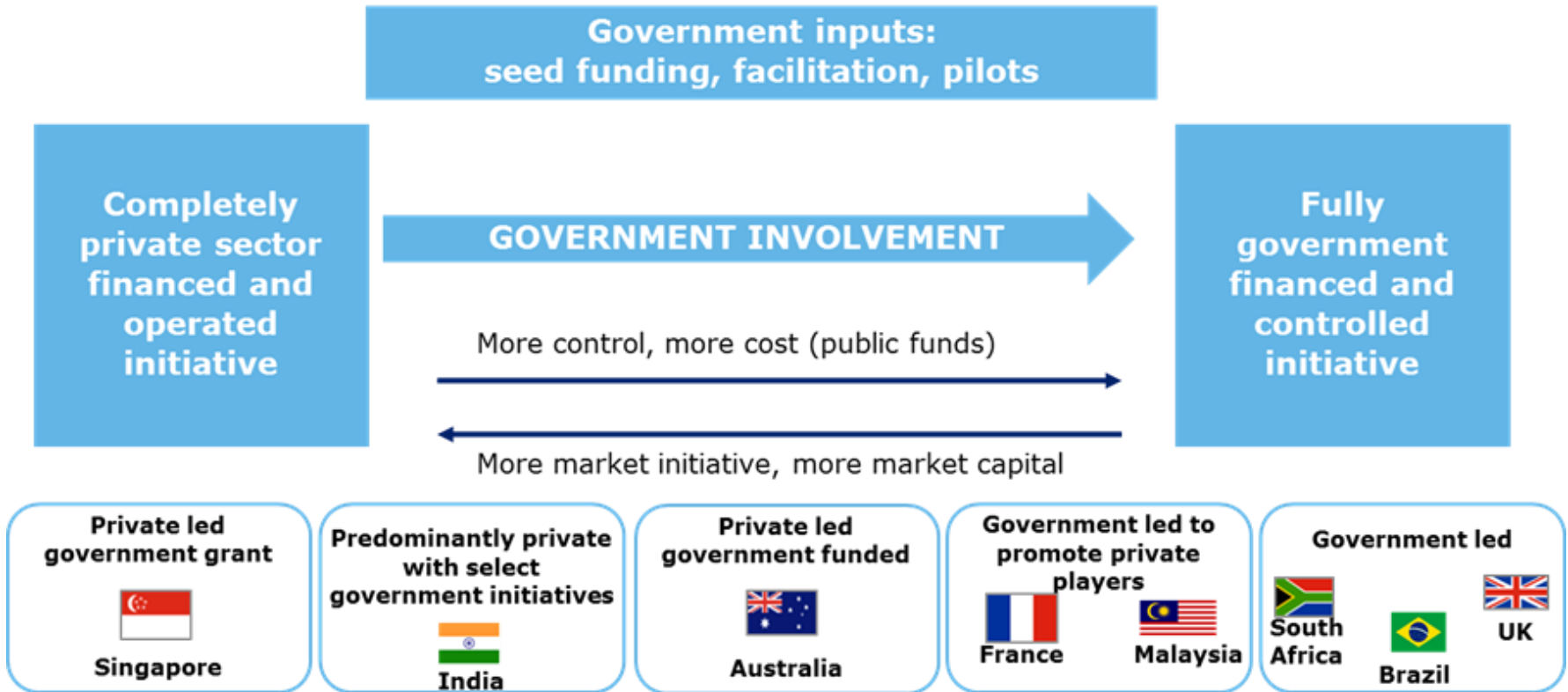
Relevance

Introduce relevance by demonstrating major benefits of using broadband, showcasing the positive impact that broadband services can have on the day-to-day lives of the rural populace across genders, age groups and income groups.



Learnings from Global Best Practices

Government Involvement by Country



Source: Ericsson Report, 2014: Benchmarking 15 national broadband plans

It is important to incorporate learnings from other countries across the globe

Country	Learnings from broadband infrastructure plans
<p>Singapore GDP/Capita: USD 52,889</p>	<ul style="list-style-type: none"> The Ministry of Information, Communications of Singapore outsourced the task of network deployment to a consortium named OpenNet (private players such as Singtel, Axia NetMedia Corporation, SP Telecommunications PTE were the primary owners) to design, build, operate the infrastructure such that it would meet the need of NextGen NBN of delivering 1 Gbps speed and beyond. The Government would support the cause by providing a grant of up to SGD 750 million Infrastructure ownership and service provisioning were segregated to drive broadband growth
<p>UK GDP/Capita: USD 43,734</p>	<ul style="list-style-type: none"> The UK Government initiated the OpenReach Network in the UK that aggregated the network of the service providers and is now responsible for services of fixed line connections, DSL and fiber optic broadband. It works on behalf of 537 communication providers to maintain local access network that covers 30 million customers Infrastructure ownership and service provisioning have been bifurcated to ensure effective broadband proliferation
<p>USA GDP/Capita: USD 55,837</p>	<ul style="list-style-type: none"> The US established a Connect America Fund-II (CAF-II) to incentivize both roll-outs and uptake. Despite being a predominantly fiberized country, significant efforts are being taken to further develop their broadband infrastructure and investments worth USD 70-75 billion per year are being made
<p>China GDP/Capita: USD 7,925</p>	<ul style="list-style-type: none"> China is spending USD 320 Bn. over a 5 year period (2015-2020), on infrastructure to bring broadband coverage and penetration to OECD levels. This Government funded infrastructure has set a target of delivering broadband services at download speeds of 50 Mbps for urban areas and 12 Mbps for rural areas This initiative is being spearheaded by the Government to ensure that 98% of the administrative villages are covered under broadband by 2020
<p>Kenya GDP/Capita: USD 1,377</p>	<ul style="list-style-type: none"> The GDP/capita of Kenya (with a population of ~46 Mn.) has remained lower (USD 1,376) than that of India (USD 1,581). However, their internet penetration has grown significantly higher from 39% in 2013, to 45.62% in 2015 -75% higher internet penetration than India. This growth in penetration has been enabled by Government policies such as reduction of spectrum and usage charges levied on service providers. The regulator is now proposing free-of-charge access to 4G spectrum to enable rapid deployment of broadband in select areas of the country
<p>Malaysia GDP/Capita: USD 9,766</p>	<ul style="list-style-type: none"> Malaysia has an internet penetration of over 70% (as of 2015). This has been possible owing to various initiatives carried out by the Government to ensure the deployment of broadband infrastructure PPP agreements with select private players have helped drive adoption of broadband services. An example of such a project includes a 10 year long deployment of High Speed Broadband Network (HSBB), which is a technology-hybrid deployment of FTTx, VDSL2, HSPA (mobile) and WiMAX

But Digital India is not realized till every user in every village is reached! (Only ~4% of the rural populace are broadband users)





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