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Policy and Regulation of Internet- Current State of Service Provision

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Training Methodology

- **Objective:**
- **“To learn all you wanted to know about Internet Service Provision”**
- **Philosphy:**
- **If I Listen- I Forget**
- **If I See- I Remember**
- **If I Interact- I Understand**
- **“ Learning through Knowledge-Exchange”**
- **Moral:**
- **For next few hours, you should Eat, Drink ,Think and Talk Internet- Sleep not an option- There is a reverse-Quiz and Prize to be won.**

Agenda

- Introduction- Broadband Definition
- Facilitating Regulation for Broadband
  - Roadblocks for Broadband
  - Govt's Role in promoting Broadband
  - Enabling Regulation for Broadband
- National Broadband Policy –Technology-Neutrality
- National Broadband Plans –Developed and Emerging Markets
- Recommendations for NBP India, Dec 2010
- Salient Features of NTP-2012
- Spectrum "Issues" Management- Layered Allocation Approach
- Creating NBP India – NOFN Implementation Strategy
- Road Ahead
- Reality Check-State of Internet Services and ISPs in India

Introduction

Broadband- Broad Definition

- **Generally, Broadband describes high speed, high capacity data communication making use of DSL, Cable Modem, Ethernet, Fixed Wireless Access, Optical Fiber, W-LAN, V-SAT etc.**

- **There is no specific international definition for the Broadband though there is a common understanding among developed and developing countries that it should be more than 2MBPS.**

- **As per Broadband Policy 2004, Broadband in India was defined as:**
  - **"Always-On' data connection that is able to support various interactive services including Internet access having the capacity of a minimum download speed of 256 Kbps to an individual subscriber form the Point of Presence of the service provider."**

(This definition has already started showing up its limitations and has been recommended for upward revision to 512 KBPS and further to 2MBPS in future, in line with best international practices)

Targets for Internet & Broadband Penetration in India
(Broadband Policy 2004 and NTP 2012)

Year Ending	Internet Subscribers (in million)	Broadband Subscribers (in million)
2005	6	3
2007	18	9
2010	40	20
2012	-	75
2014	-	160
2017	-	175
2020	-	600
Dec. 2012 (Actual)	25	15

Roadblocks for Broadband-India

1. Price

- **Price for broadband access @ INR 250 (USD 5) per month – still unaffordable to masses (> 3% of monthly per capita income)**

2. Access to the customer

- **Lack of access to the incumbent's copper loop for DSL by competitors.**
- **Low quality of cable TV infrastructure and lack of industry organization.**
- **High costs for VSAT based access.**
- **High spectrum costs making BWA unaffordable to masses.**
- **Cumbersome and expensive processes for Right Of Way (ROW).**

3. Cost of connectivity

- **Lack of effective competition in the "within city"/ last mile access networks**
- **High cost of Upstream Bandwidth**
- **Absence of National Broadband Network (NBN)**

4. Fiscal policies

- **High taxes and duties, and lack of fiscal incentives for faster Broadband growth**

5. Content and applications

- **Lack of locally relevant content and absence of "Killer Applications" to drive growth**

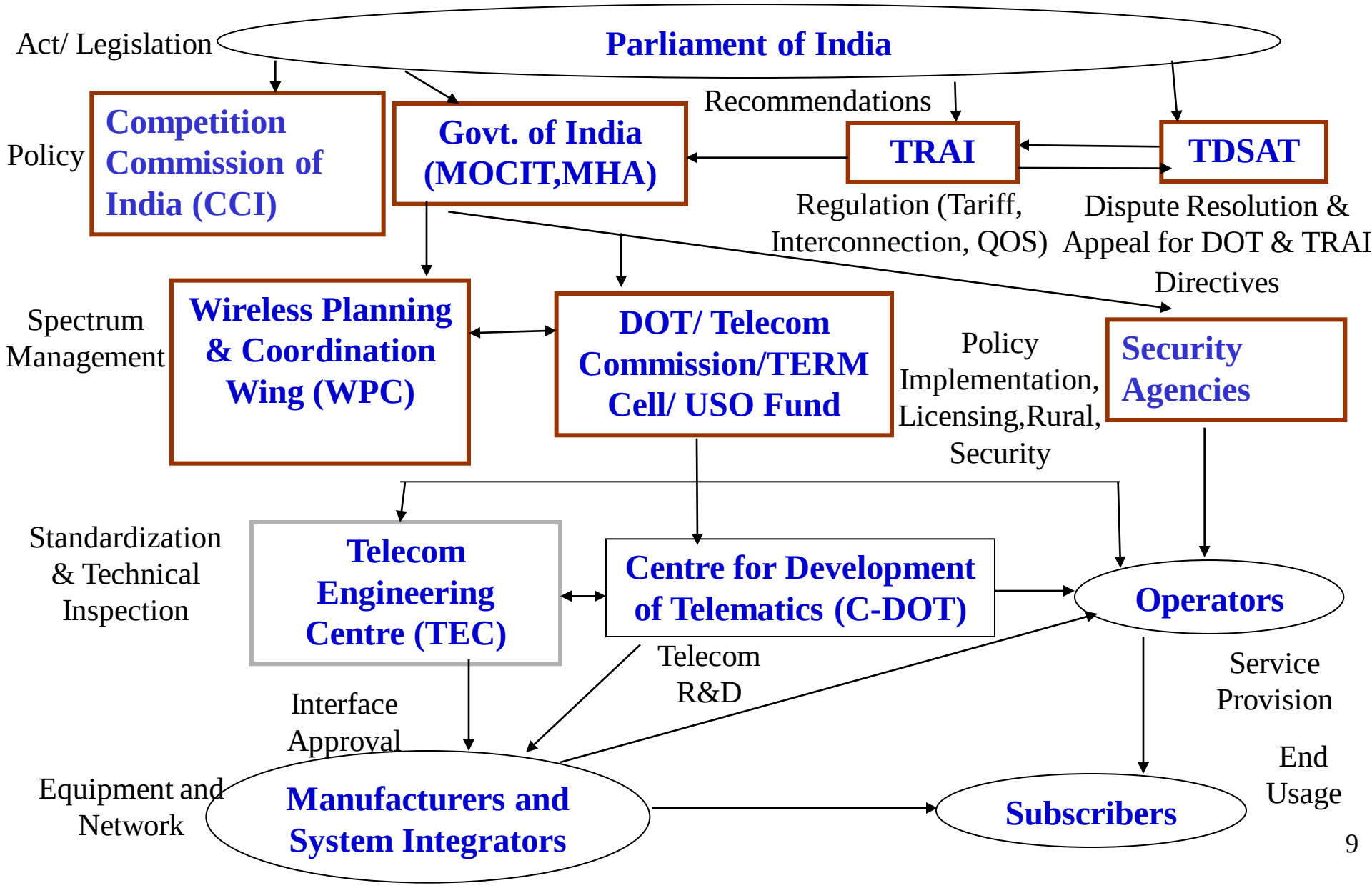
Govt's Role in Promoting Broadband

- **Creating the right policy environment by having a National Broadband Plan (NBP) and including Broadband in Universal Service/Access definition.**
- **Creating National Broadband Network infrastructure with Open Access.**
- **Establishing and empowering Internet Exchange in the country.**
- **Permitting Service Based Competition/Class licencing for Broadband.**
- **Encouraging International players to setup Gateways in the country.**
- **Supporting community/local investment in Broadband in uneconomic remote rural areas through PPP mode.**
- **Leveraging Govt's own demand and setting example by being on-line leader through delivery of e-governance services.**
- **Extending special tax concessions for equipments, access devices, content & services used for Broadband.**

Enabling Regulation for Broadband

- **Promoting service-based/Class licencing by removing entry barriers.**
- **Permitting infrastructure sharing among different service providers including LLU and FS for optimum utilization and cost reduction.**
- **Allowing captive infrastructure of utility companies (Rail-roads, Power grids, Highways, Pipelines) to be used for public Broadband service.**
- **Reducing the bottleneck in last-mile access by facilitating deployment of alternative technologies like Cable TV network, Fiber, Wireless, Broadband over Power lines,etc through easy ROW.**
- **Reducing the cost of bandwidth for domestic and international Internet connectivity.**
- **Allocation of suitable Radio Spectrum for Broadband services at reasonable price and making more spectrum unlicenced.**
- **Permitting broadcast infrastructure like DTH to be used for Broadband access.**
- **Allowing service-agnosticness over broadband without any restrictions for VOIP, IPTV etc.**

Institutional Framework for the Indian Telecommunication-Public and Private Actors

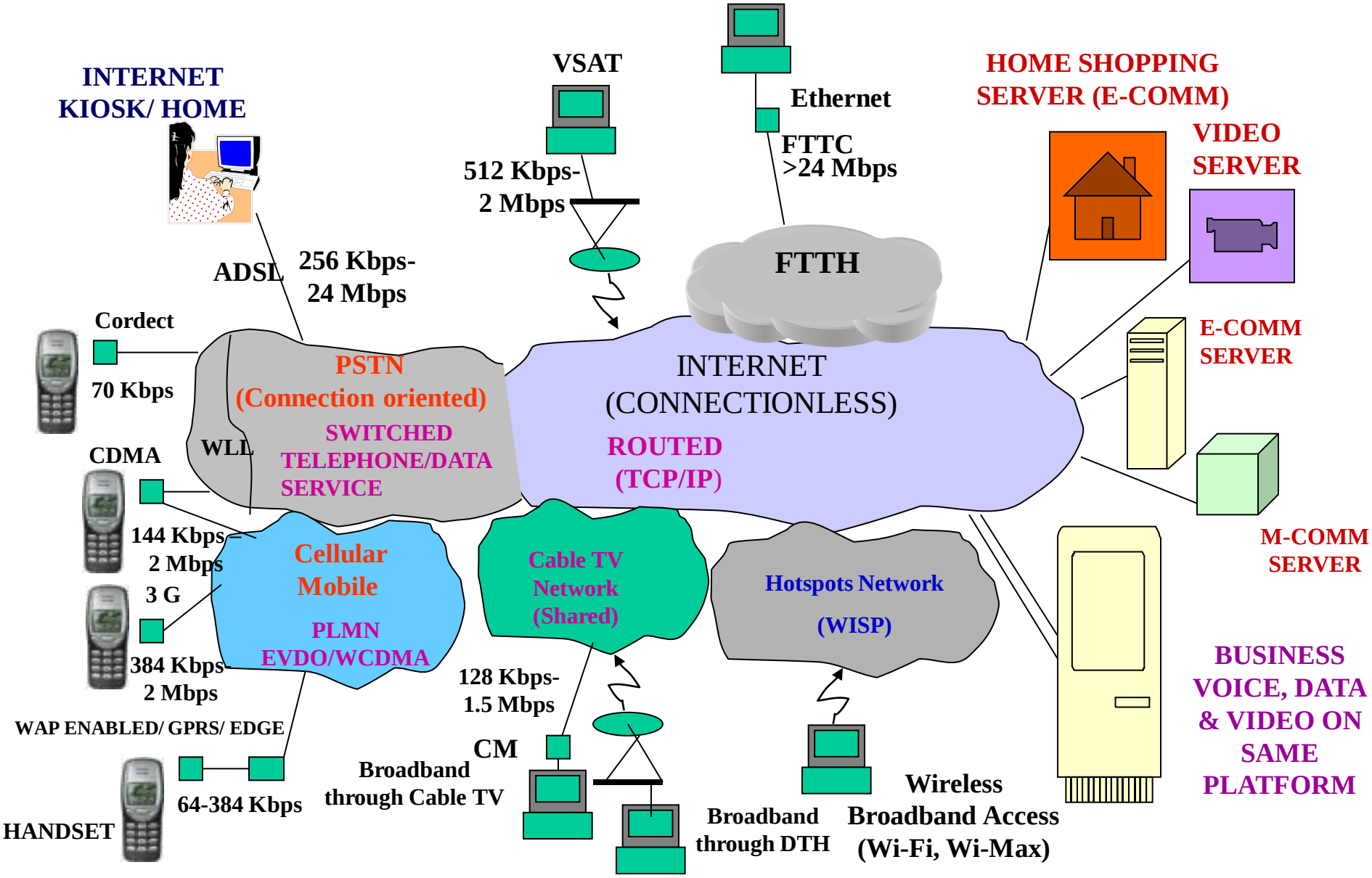


Broadband Policy, 2004- India

Service Providers can choose any technology(Tech- neutral)

- **Over existing infrastructure**
  - ✓DSL/ ADSL/VDSL over Copper loop
  - ✓Cable Modem over Cable TV network
  - ✓Power Line Broadband Access
- **Over new Cable Infrastructure**
  - ✓Fiber To The Curb (FTTC)
  - ✓Fiber To The Home (FTTH)
  - ✓Hybrid Fiber Coaxial (HFC)
  - ✓Metro Ethernet over Fiber (MEF)
- **Over Wireless Infrastructure**
  - ✓Fixed Wireless Broadband Access (FWBA) (WiMax 802.16d)
  - ✓Wireless LAN (Wi-Fi) (802.11a/ b/ g)
  - ✓Satellite (V-SAT, DTH)
  - ✓High speed WLL (GPRS, EDGE, CDMA, CorDect)
  - ✓3G Cellular Mobile System (WCDMA, EVDO, IMT2000)
  - ✓IMT-advanced Technologies (Wimax, LTE)

Broadband Access in India- Technology-Neutrality (Making use of existing and new infrastructure)



Satellite based DTH Services offer alternate for the Broadband via Receive Only Internet Service (ROIS)

- **Deployment of DTH for TV has begun, but internet access through this was not permitted**
- **While internet data is downloaded from the satellite, the uplink connection to the ISP is through another channel**
- **Since DTH (or receive-only VSAT) dish is only receiving, should not require SACFA clearance or NOCC fee for uplink monitoring**
- **New technology permits DTH to be used for bi-directional internet access, though costs are high because of required hardware**



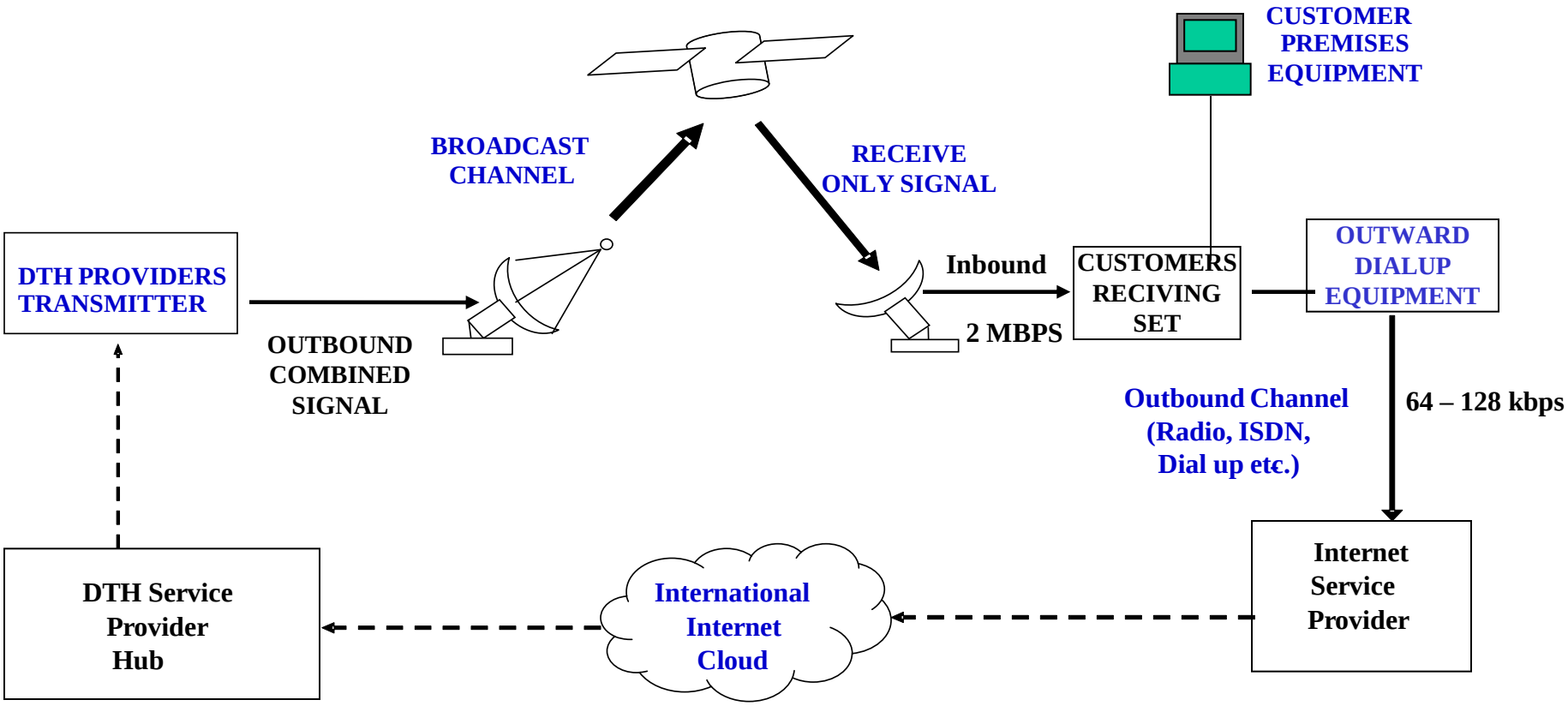
- **Broadband Policy 2004**

a. **DTH provider with ISP license allowed to offer internet services**

b. **ISP licenses permitted to allow customers for downloading data through DTH**

c. **DTH providers permitted to provide both way Internet service after obtaining VSAT and ISP license**

Broadband using DTH for Receive-only Internet



Speed of outbound channel is generally between 10 to 20% of inbound channel

VSAT has the potential for significant impact on Broadband Penetration in Remote Areas

- Advantages of VSAT for remote geographies, high reliability, multi-casting and disaster recovery applications are well-known
- VSAT operators face increased costs due to special regulations & restrictions because of its CUG category
- Policy makers have some concerns that can be addressed in changing current rules
- To bridge last mile, VSAT license could be permitted to be used as access media for Broadband

- **Broadband Policy 2004**

a. Open Sky policy for VSAT to be pursued by DOT

b. Minimum dish size of 1 m for KU-band permitted

c. Throughput restricted upto 2 Mbps

d. VSAT service providers permitted to provide Internet services by obtaining ISP license

Fixed Wireless Access- an important access technology

Unlicensed bands

– 802.11x (Wi-Fi) technologies are widely used international standards. Wi-Max has substantial future potential

  – 5.1 and 5.7 GHz bands (802.11a, Wi-fi) equally important as 2.4 GHz (802.11b/g, Wi-fi)

Alternative spectrum

– IMT 2000 bands have been keenly contested world over for 3G

  – Need to encourage alternative technologies in less congested bands

  – Need to exploit use of 450 MHz and 700 MHz (Digital Dividend bands)

- **Broadband Policy 2004**

a. 2.40 – 2.48 GHz spectrum De-licensed for outdoor usage with power restrictions (4W).

b. 5.15–5.35 & 5.7–5.8 GHz spectrum De-licensed for indoor usage for low power (200 mw) systems.

c. 5.25 – 5.35 GHz will be De-licensed for outdoor usage in consultation with DOS.

d. 1880 – 1900 MHz spectrum delinked from access providers allocation and available to ISPs.

e. Alternate spectrum for broadband services to be identified (2.3-2.4, 2.5.-2.7, 3.3-3.8 Ghz)

Facilitating Radio Spectrum for Broadband Access

- **ISM Spectrum (2.4 to 2.48 GHz, Wi-Fi) de-licensed for in-campus WLAN using any technology.**
- **De-licensing of this along with 5.7-5.8 GHz for outdoor usage has also been notified with 4W EIRP.**
- **De-licensing of 5.1 to 5.3 spectrum for indoor & in-campus usage has been notified.**
- **Earmarking of 20 MHz (1880 to 1900 MHz) for wireless TDD access systems by ISPs (delinking from mobile licencing).**
- **Time-bound frequency allocation, site clearance & frequency licenses through automation of Spectrum Management System and by setting predetermined standards for WPC.(E-application for SACFA clearance).**
- **E-Auction of 3G spectrum in 2.1 GHz and BWA spectrum in 2.3 to 2.4 Ghz band has been completed and spectrum allocated.**
- **In NFAP-2011, upper half of 700 MHz (Digital Dividend) band has been earmarked for BWA.**

Fiscal measures to reduce the cost of access devices, infrastructure and broadband service

Recommendations

a. Allow 100% depreciation of PC's and broadband CPE's in first year
b. Give tax benefit for donated PC's
c. Remove anti-dumping duty on import of recycled PC's
d. Reduce and rationalize import duties
e. Put local manufacturing on equal footing with imported finished goods
f. Exempt web hosting from income tax
g. Exempt ISP's from service tax
h. Personal broadband allowance



Broadband Policy 2004

a. High priority to indigenous manufacture of Broadband related equipments
b. Package to bring down the cost of broadband services at affordable level to be worked out in consultation with Ministry of Finance and other related departments.

Reduction in the cost of connectivity

- **Cost of connectivity (international & domestic) forms a significant part of Opex for Broadband services.**
- **Tariff for international bandwidth was forborne and left to the market forces. It was considered to be on the higher side in comparison to international benchmarks.**
- **Govt. reduced the license fees for ILDOs, NLDOs and Infrastructure Provider category II (IP-II) from 15% to 6% of AGR and bank guarantee for IP-IIs from Rs. 100 crore (USD 20M) to Rs. 5 crore (USD 1M).**
- **Revised tariff orders reducing the ceiling price for international bandwidth (IPLC) by 35% for E1 and by 70% for DS3 and STM1 capacity became effective from 29.11.2005.**
- **The revised tariff orders reducing the ceiling tariff for domestic leased circuits (DLC) by an extent of 30% for E1 market price and 70% for DS3/ STM1 market price, became effective from 1.5.2005.**
- **Recently regulator has mandated very high reduction in Access Charges at Cable Landing Stations (CLS) to make these cost- based and in line with International levels.**

National Internet Exchange of India (NIXI)

- **National Internet Exchange of India (NIXI) has been set up on recommendation of TRAI by DIT, Government of India to ensure that Internet traffic, originating and destined for India, should be routed within India.**

- **Six nodes of NIXI have been setup in metros and about 45 ISPs have already connected to these.**

- **All the ISPs are not still connected to NIXI and also all routes are not announced on NIXI leading to under utilization of the infrastructure.**

- **NIXI is taking appropriate steps for increasing the utilization of its facilities.**

Emerging Broadband Services

- **High speed Internet access (death of World-Wide-Wait) – Still the killer application for Broadband in India**
- **Video-On Demand, Interactive TV, IPTV, PPV, Time Shifted TV, Videoconferencing (Multimedia over Broadband)**
- **Triple Play (data, voice, video) – By UASP**
- **IP-VPN (low cost connectivity) – By UASP/NLDO**
- **VOIP (permitted only for UASPs)**
- **Interactive Gaming (future killer application)**
- **4 e's (e-Governance, e-Learning, e-Health, e-Commerce)**

Access-Radio Technology Comparison

Parameters	EV-DO	WiMAX	HSPA	LTE
Current Capex per Site	~INR 207K	~INR 1,113K	~INR 920K	~INR 1,150K
Monthly Opex per Site	~INR 50K	~INR 50K	~INR 50K	~INR 50K
Current CPE Cost	INR 2,300	INR 2,990	INR 2,000	INR 3,000
Realizable Throughput	9.9 Mbps per Site	30 Mbps per Site	10.8 Mbps per Site	40 Mbps per Site
Device Ecosystem	652 Devices	300 Devices	2,579 Devices	30 Devices
Service Bundling Possibility	Broadband Only	Broadband Only	Broadband & Voice	Triple Play
Time to Market	Current CDMA network can be easily upgraded	Pan-India deployment could be a challenge	Initial focus on top 100 cities	Currently limited due to device ecosystem

Favorability of Parameter: Very High Very High Medium Low Very Low

Source: Industry Inputs, Analysys Mason

Access-Possible Services by Radio Technologies

Parameters	EV-DO	WiMAX	HSPA	LTE
Native Voice	●	○	●	○
Internet Access	◑	◕	◕	●
Email	●	●	●	●
Instant Messaging	●	●	●	●
VoIP	●	●	●	●
Multimedia Based Tele Medicine	○	◕	◕	●
Video Streaming	◑	◕	◕	●
Video Conferencing	○	◑	◑	●
HD Video / IPTV	○	○	○	◕
Multimedia Based Learning	○	◑	◑	●

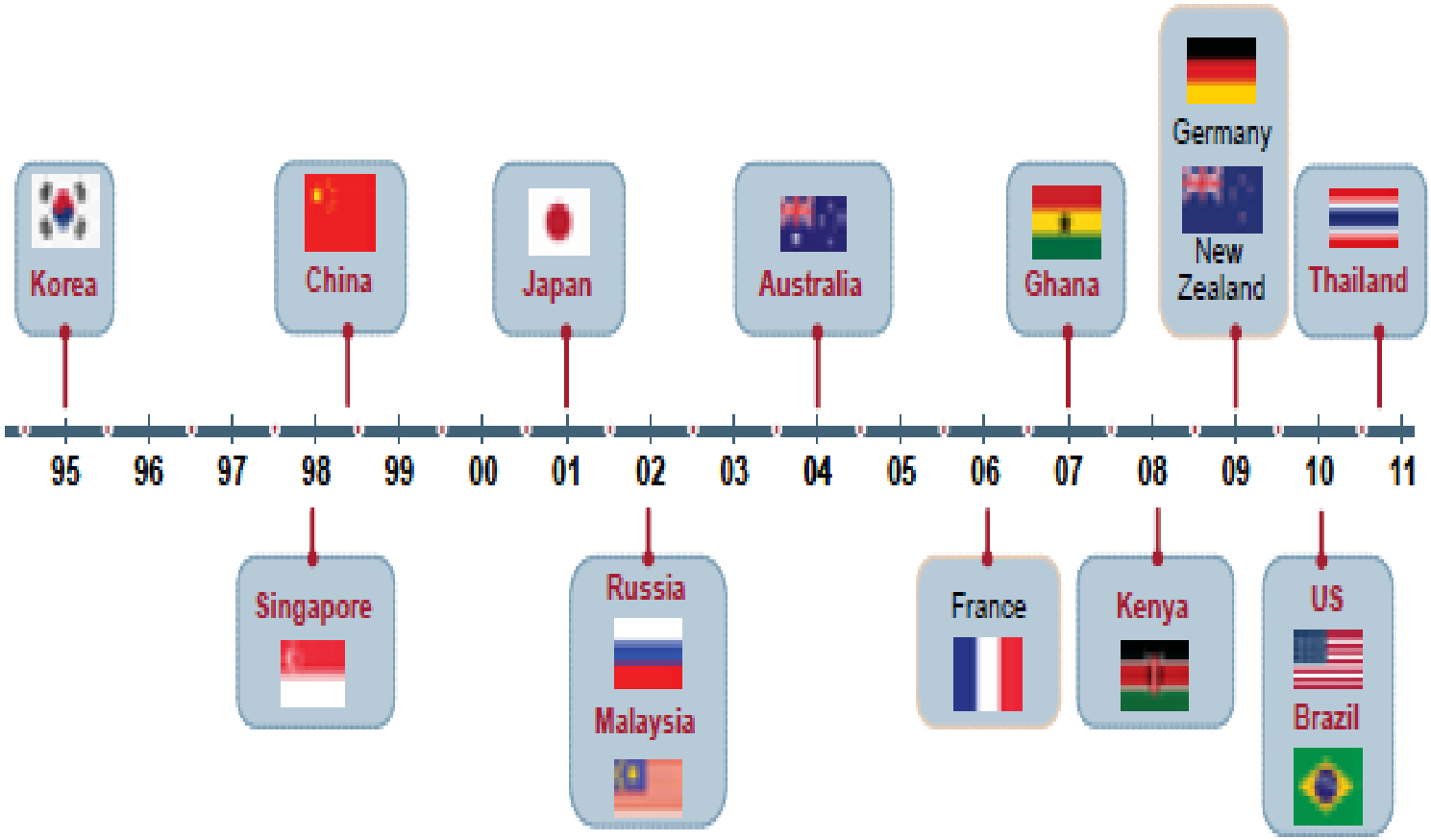
Favorability of Parameter: Very High ● Very High ◕ Medium ◑ Low ◔ Very Low ○

Source: Industry Inputs, Analysys Mason

Broadband Commission for Digital Development (BCDD)- UN Targets for Universal Broadband,2015

1. **Making broadband policy universal - By 2015, all countries should have a National Broadband Plan (NBP) or strategy and include Broadband in their Universal Access / Service definitions.**
2. **Making broadband affordable - By 2015, entry-level Broadband services should be made affordable in developing countries through adequate regulation and market forces (for example, amount to less than 3% of average monthly per capita income).**
3. **Connecting homes to broadband - By 2015, 40% of households in developing countries should have Internet access.**
4. **Getting people online - By 2015, Internet users penetration should reach 60% worldwide, 50% in developing countries and 15% in Least Developed Countries (LDCs).**
5. **The Broadband Challenge – Develop innovative policy frameworks, business models and financing arrangements needed to facilitate growth of broadband worldwide and to stimulate content production in local languages to benefit from and contribute to the digital revolution.**

Introduction of National Broadband Plan by Developed and Developing Countries



Source: Analysys Mason

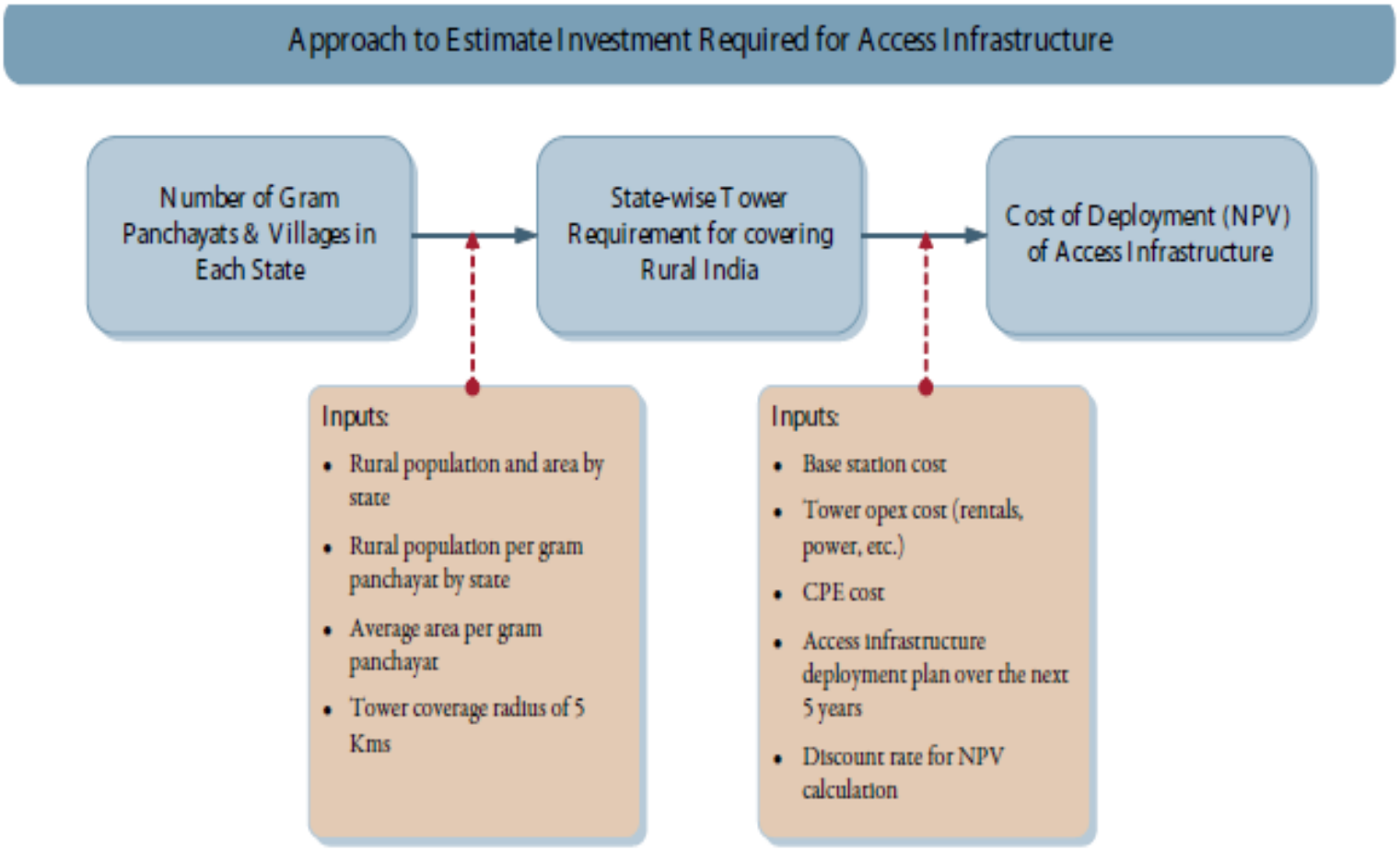
International Govt. Initiatives for NBP

Name of Country	Brief of National Broadband Plan (NBP)
Australia	• Government investment of USD 38 billion in National Broadband Network (NBN). • 90% of population shall be provided broadband access at 100 Mbps speed with fiber based network. • Telstra to be structurally separated under ASD 11B deal.
Singapore	• Next Generation Broadband Plan (NGBP) started in 2006 with Government subsidy. • Open Access Wholesale to 95% population by 2012 with initial speed 100 Mbps rising to 1 Gbps using FTTH network.
Malaysia	• High speed broadband network to connect 1.3 million homes in major cities on FTTH/FTTC network by 2012. • Government to invest USD 0.7 billion out of total cost 3.2 billion USD. • Government to invest additional USD 250 million in rural areas.

International Initiatives for NBP (Con.)

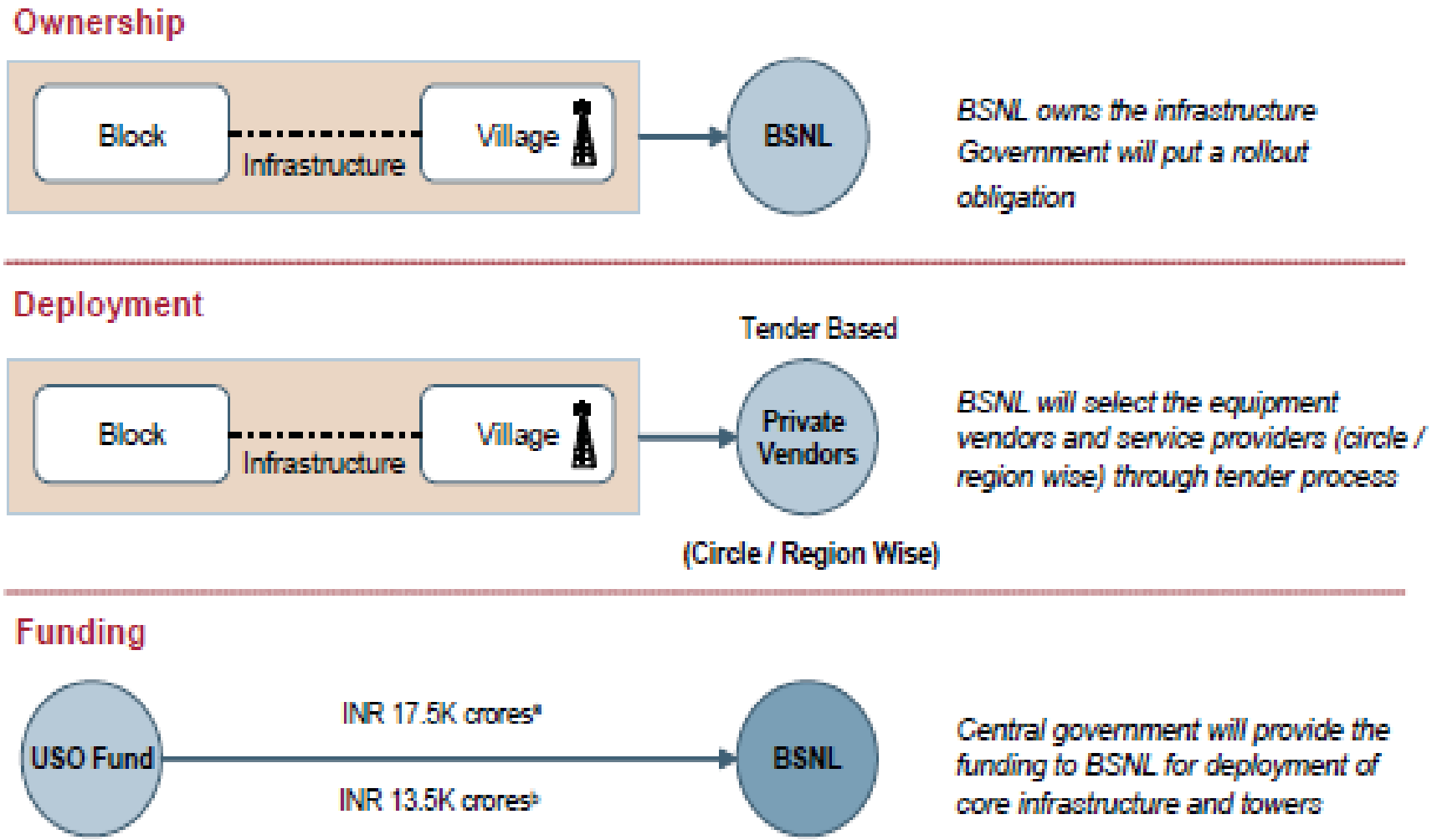
Name of Country	Brief of National Broadband Plan (NBP)
EU	EC proposes USD 12B for Broadband Investment to achieve Digital Agenda for Europe to get Broadband for All by 2020
Sweden	• Local municipals to invest more than 180 million USD to deploy 1.2 million km of fiber in and around Stockholm.
United Kingdom	• Government invested 1.6 billion USD for development of NGA (FTTP) in rural areas (1/3rd of UK). • Aim is to bring the superfast broadband (100Mbps) to 90% of population by 2014 and to "All" by 2015. • Private investment is expected to cover 70% (3.5B USD) of optical fiber cost by 2017. • Part funded by proposed broadband levy of USD 0.8 per month on all fixed line in the country .
United States	• There is a National Broadband Plan to provide the nationwide broadband including rural areas. • Government to provide USD 11.6 billion under various broadband programs. • Further USD 2.5 billion is made available for grants loan and loan guarantees.

India-Approach to Estimate Investment for Broadband Access Infrastructure in Each State



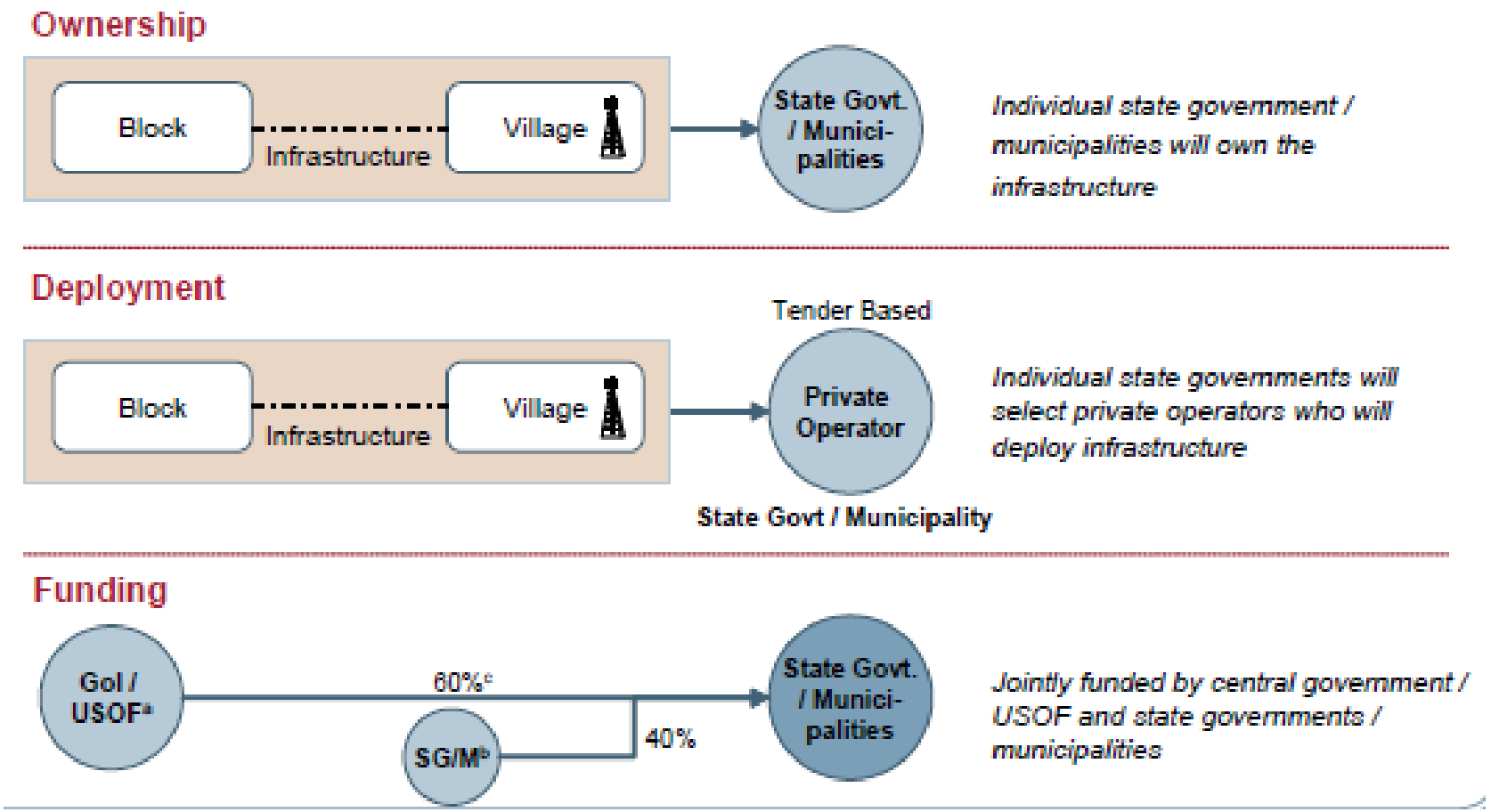
Source: Analysys Mason

NBN-Government Owned Model



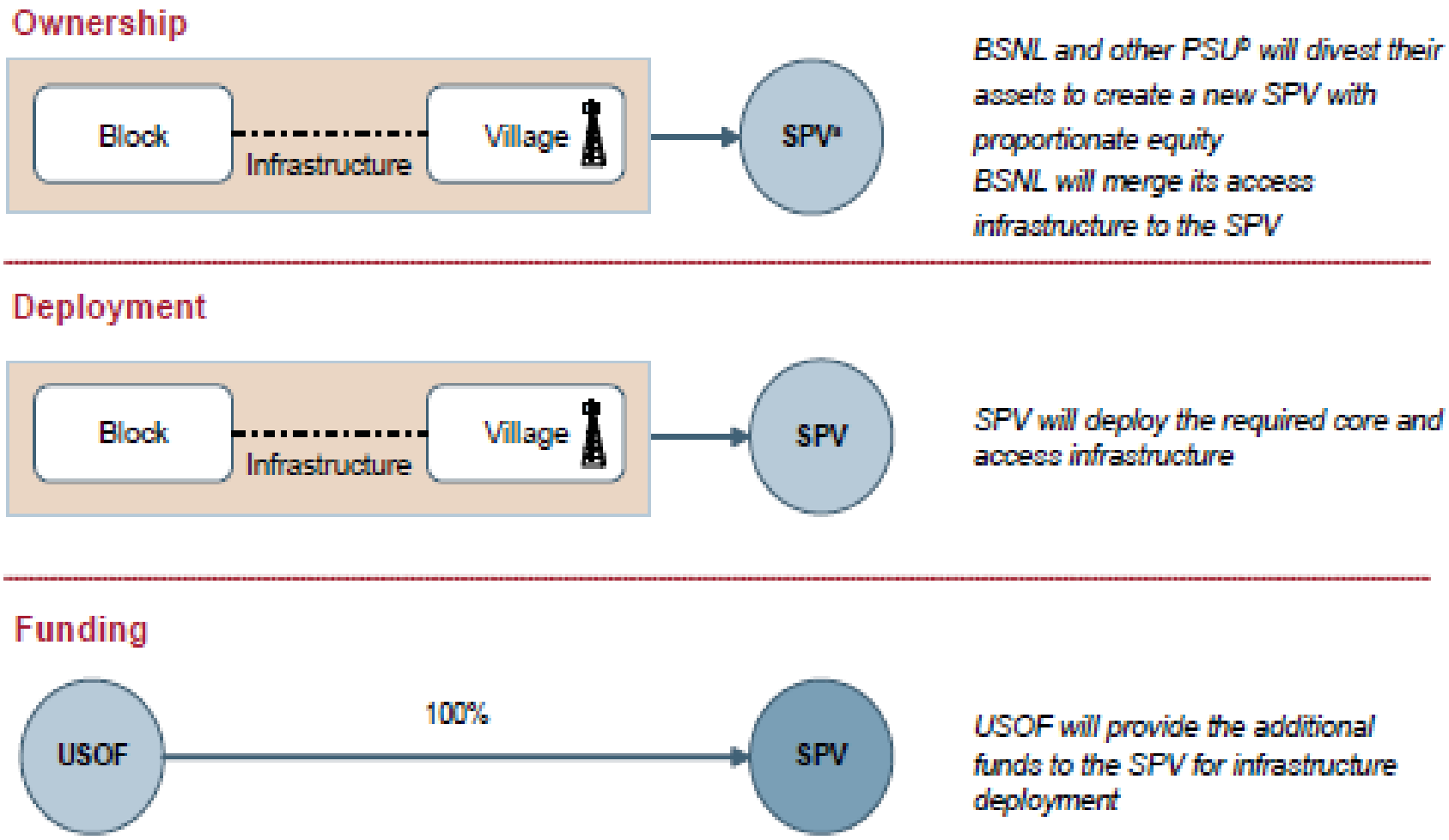
Source: Analysys Mason

NBN-State Government or Municipality Owned



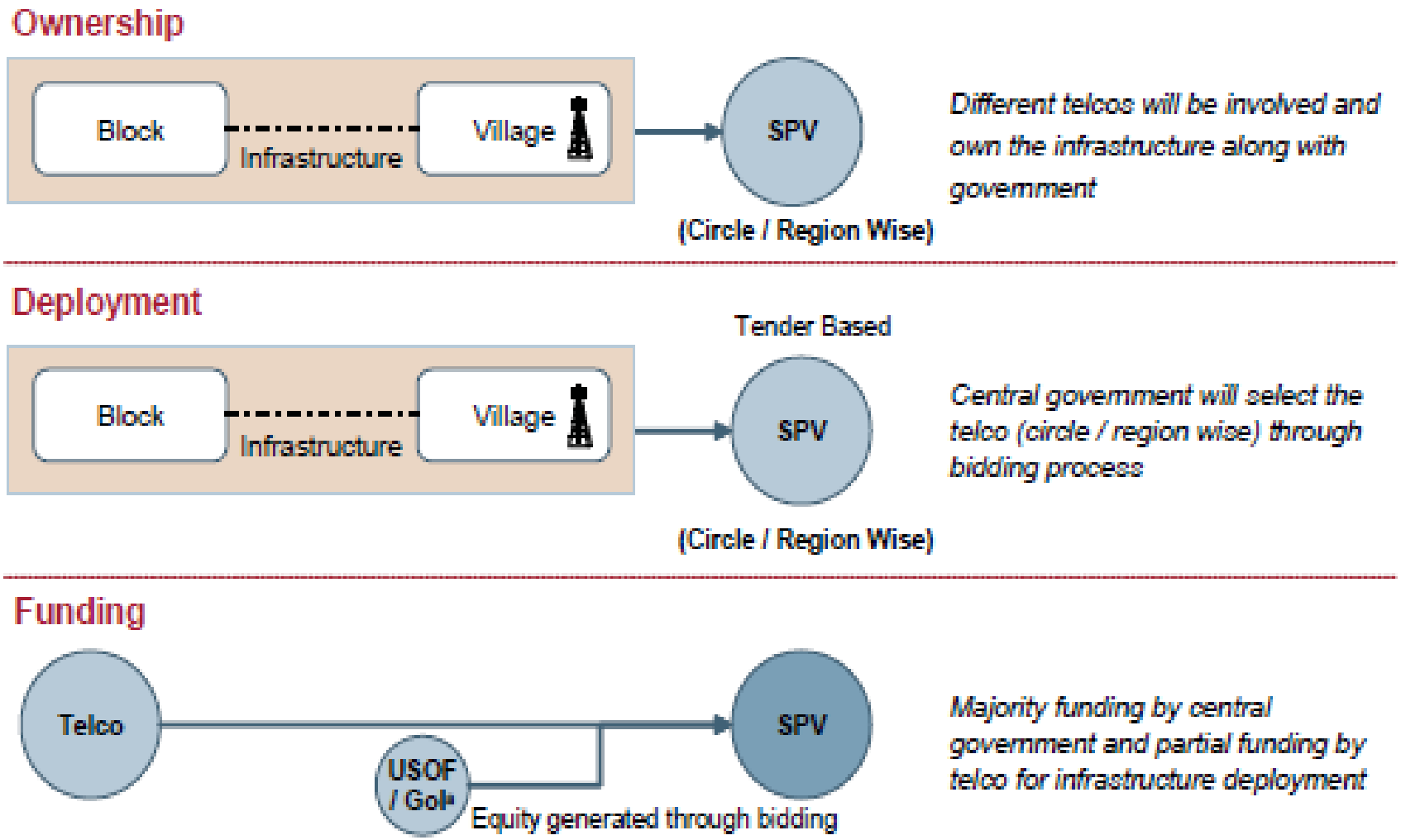
Source: Analysys Mason

NBN-Incumbent Owned, Government Supported SPV



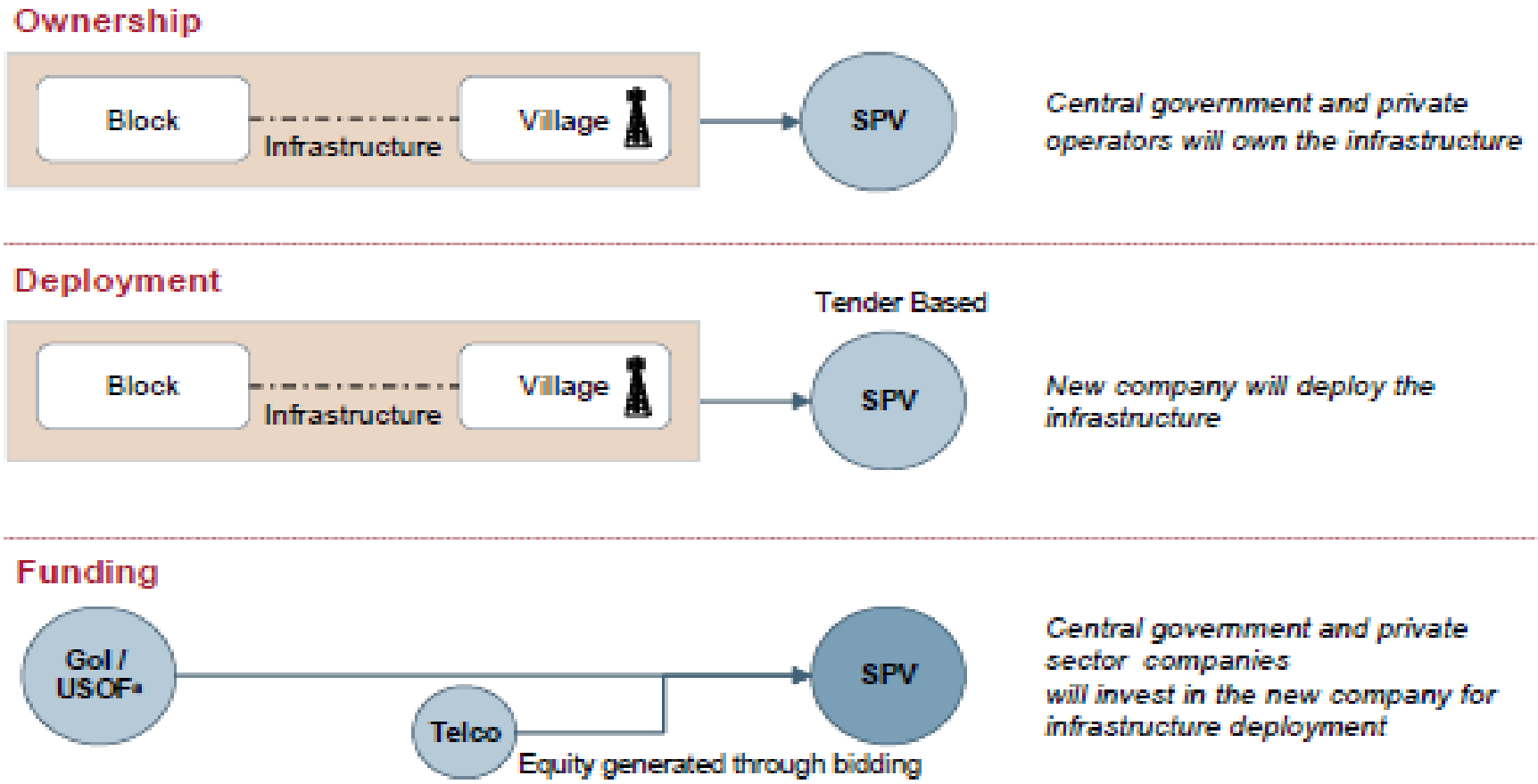
Source: Analysys Mason

NBN-Jointly Funded and Owned by SPV,Telco Led



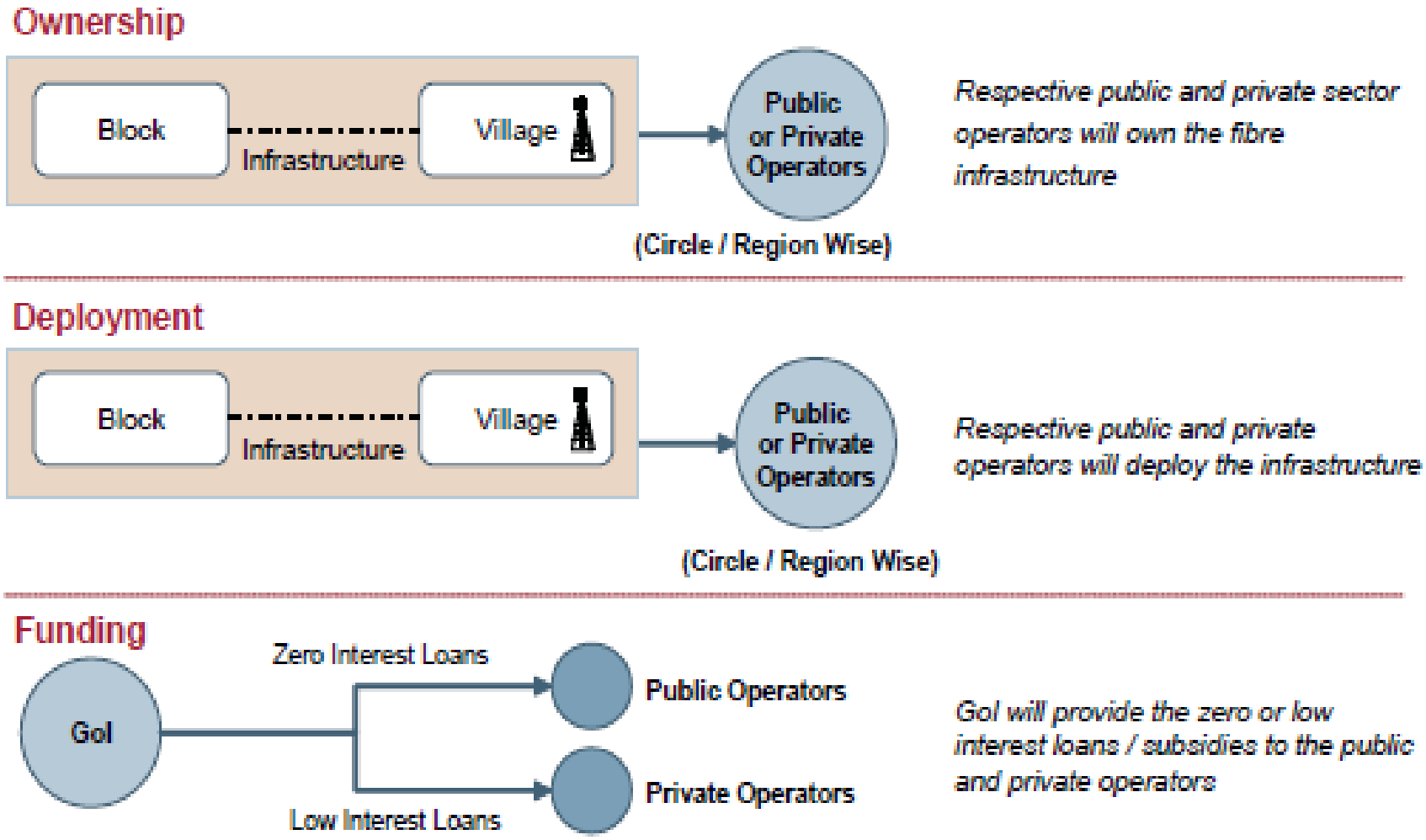
Source: Analysys Mason

NBN-Jointly Funded and Owned by SPV,Government Led



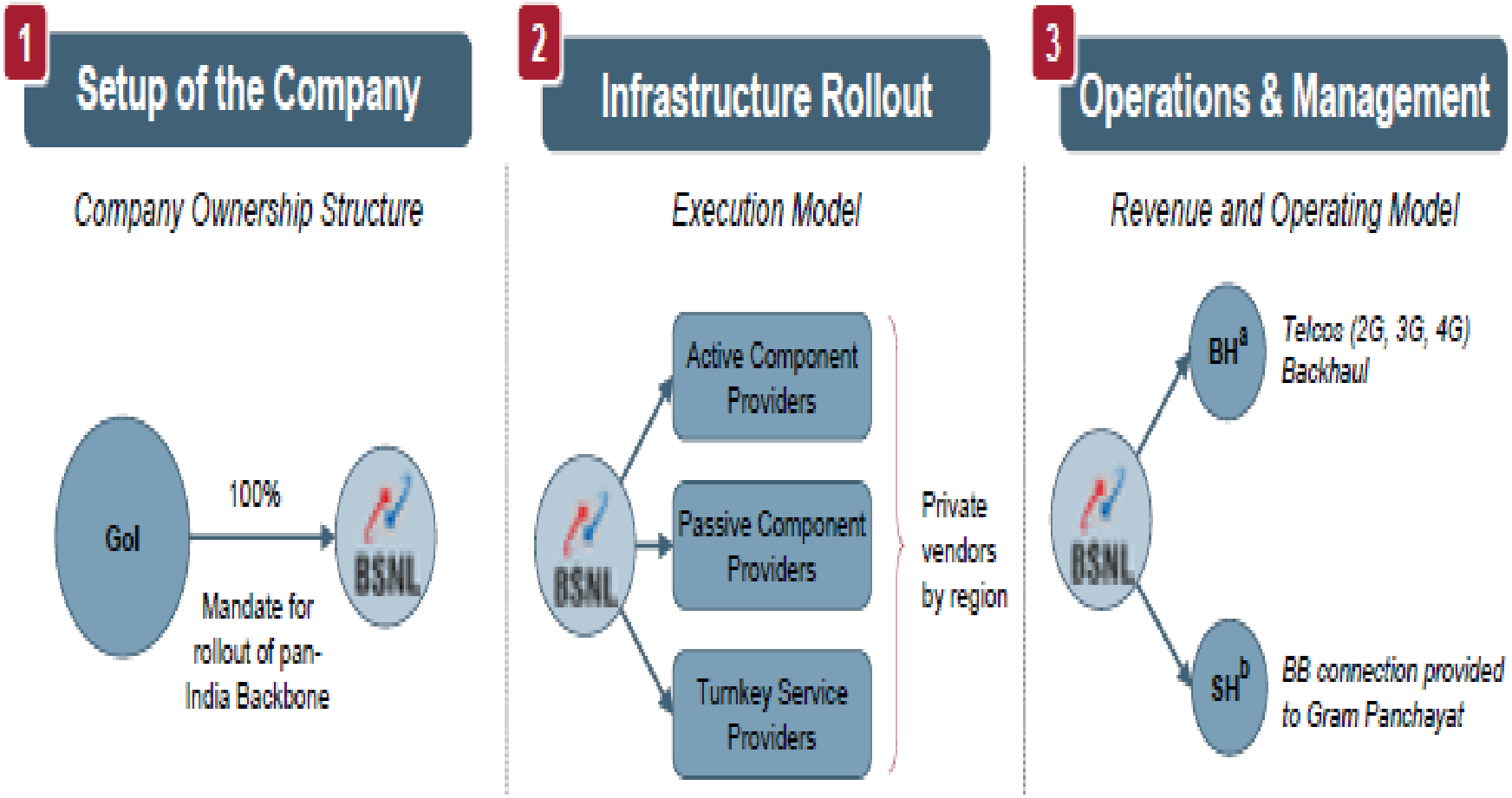
Source: Analysys Mason

NBN-Government Loan / Subsidies, Private Owned



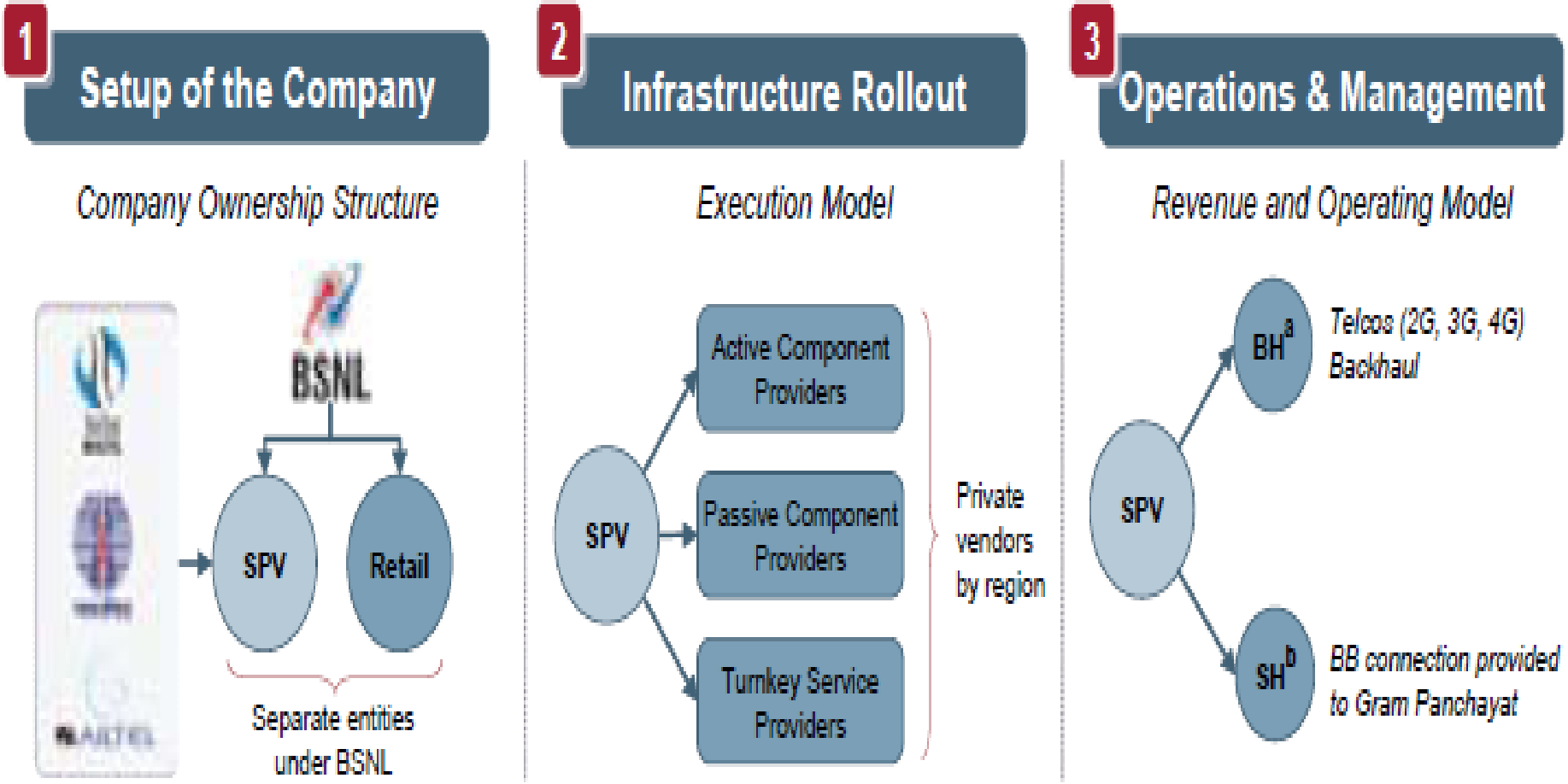
Source: Analysys Mason

NBN-Operational Plan for Government Owned Model



Source: Analysys Mason

NBN-Operational Plan for Incumbent Owned, Government Supported SPV Model



Source: Analysys Mason

NOFN India-Existing Fiber Infrastructure and Coverage by Various Service Providers

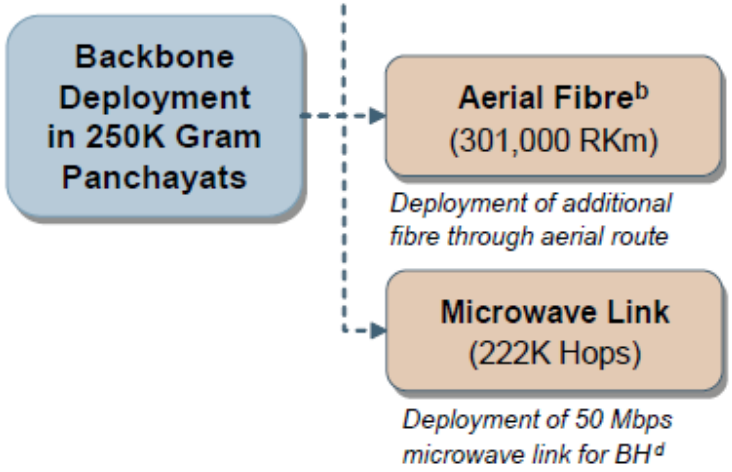
Service Provider	Total Fibre Laid	Total Cities Covered	Metros / Tier I Cities[a]	Other Cities	Gram Panchayats	Mid Sized Villages	Small Villages
BSNL	614,755 RKm[b]	All cities & 28 K gram panchayats	●	●	◔	○	○
Reliance	190,000 RKm[b]	44	●	◔	○	○	○
Airtel	126,357 RKm[b]	130	●	◔	○	○	○
Tata	40,000 RKm[b]	60	●	◔	○	○	○
RailTel	37,720 RKm	600	●	◑	◔	○	○
PowerGrid	21,652 RKm	110	●	◔	○	○	○
GAILTEL	13,000 RKm	200	◑	◔	○	○	○

Level of Backbone Infrastructure Coverage : Very High ● Very High ◕ Medium ◑ Low ◔ No Coverage ○

Source: Industry Inputs, Analysys Mason

NOFN India-Investment Required to Rollout Backhaul Network to Connect 250,000 Gram Panchayats

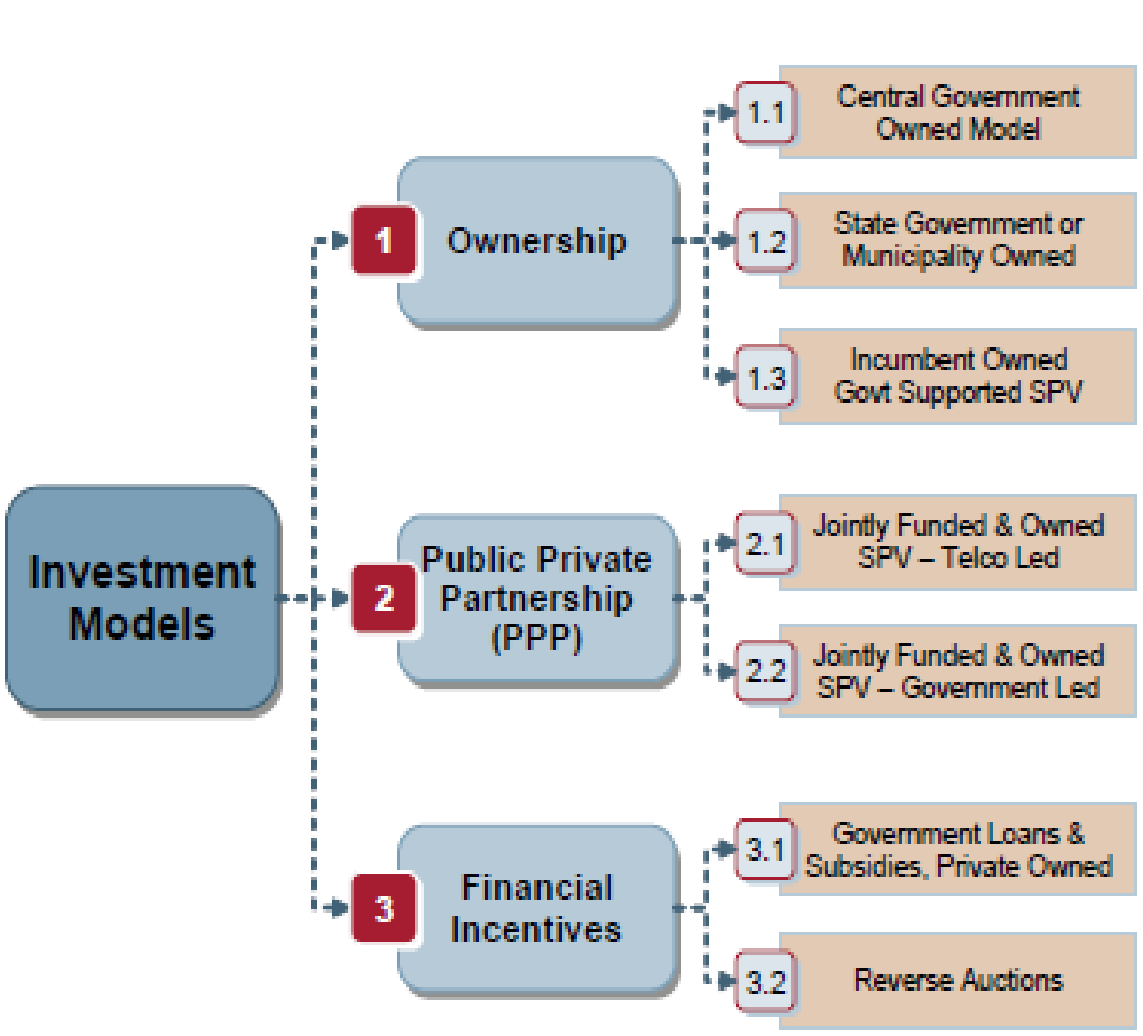
Backhaul Deployment Options and Required Investments for Covering 250K GPs



Cost Elements	Investment Required (INR / RKm)	Total Investment (INR Crores)
• Ducting and Trenching	150,000	INR 17,500 crores
• Cable Cost and Active Equipment	130,000	
• Right of Way[a]	300,000	
• Cable Cost and Active Equipment	130,000	INR 8,500 crores
• Right of Way	150,000	
• Equipment and Installation	243,800	INR 25,392 crores[c]
• Tower Rental per Month	15,000	

Source: Industry Inputs, Analysys Mason

NOFN India-Potential Investment Models for Additional Fiber Deployment



	Ownership	Deployment	Funding
1.1 Central Government Owned Model	Central Govt (Core); BSNL (Access)	BSNL (Core and access)	Central Government
1.2 State Government or Municipality Owned	State Govt or Municipality (Core)	Telcos (Core and access)	Central / State Govt / USOF / Municipality
1.3 Incumbent Owned Govt Supported SPV	Central Govt & BSNL (Core)	SPV (Core)	Central Government / USOF & BSNL
2.1 Jointly Funded & Owned SPV – Telco Led	Telcos and Central Govt (Core and access)	SPV (Core and access)	Central Govt & Public / Private Operators
2.2 Jointly Funded & Owned SPV – Government Led	Central Govt & Telcos (Core and access)	SPV (Core and access)	Central Govt & Public / Private Telcos
3.1 Government Loans & Subsidies, Private Owned	Public / Private Telcos (Core and access)	Public / Private Telcos (Core and access)	Central Govt & Public / Private Telcos
3.2 Reverse Auctions	Public / Private Telcos (Core and access)	Public / Private Telcos (Core and access)	Central Government

Source: Analysys Mason

Regulator's Recommendations for NBP - Dec 2010

- **Broadband Definition- 512 kbps to further enhance to 2MBPS**
- **Targets- 75M (17M DSL, 30M cable , 28M wireless) by 2012 and 160M (20M DSL, 80M Cable , 60M wireless) broadband connections by 2014.**
- **Connecting all Gram Panchayat (250,000 villages) by 2012.**
- **Connecting all the villages (6,00,000) by 2013.**
- **Setting up of Govt. funded National Optic Fiber Agency (NOFA)**
- **Setting up of State Optical Fiber Agency (SOFA) jointly with state governments and NOFA.**
- **Estimated investment of USD 12.5B financed by USO fund and Govt.**
- **Bringing out of Right Of Way (ROW) policy in consultation with states.**
- **Enabling Cable TV infrastructure to be fully digitized.**
- **Consideration for 100% depreciation for the tax purpose for CPEs and reduction in duties and levies on equipments used for broadband services.**

National Telecom Policy (NTP) 2012- Salient Features

- **NTP – 2012 released on 12-06-2012 by the Govt. is a revision of NTP – 1999 to take cognizance of emerging scenario in telecom Technologies, Networks & Services leading towards Convergence and Unification.**
- **Salient focus of policy is delinking of Spectrum from Licensing, facilitation of Unified Licensing Regime, special emphasis for Broadband, encouraging next generation technologies and domestic R & D and Manufecturing & treating telecom as Infrastructure.**
- **This policy is mainly a long – term, forward looking, all – encompassing vision statement of the Govt. to provide requisite policy impetus to take Telecom sector in India to next level and to rural areas to bridge the Digital-Divide, without detailing the implementation strategy & timelines.**
- **Though it is a great initiative, lot of efforts will be required by the executive arms of the Govt. & the Regulator to Operationalise and Implement it through various legislation amendments, guidelines and regulations.**

Creating NBP India- NOFN

Govt. of India
(Ministry of Communications & IT, Universal Service Obligation Fund)

Advisory Body consisting of Secretaries of the Govt., Chiefs of PSUs, Chairs of Industry bodies led by Infrastructure Advisor to PM

High Level Committee led by Infrastructure Advisor to PM including chiefs of 3 Telecom PSUs including incumbent (BSNL), C-DOT & Secretary

SPV (USO funded, incumbent owned, participated by other telecom PSUs and utility companies)

PPP (Equity participation from private players and industry at a later stage)

- **Objective to connect 2.5 Lacs Grampanchayts (Large Villages) spread over 5000 blocks by Optical Fiber backbone by 2014.**
- **Making use of the existing transmission infrastructure of incumbent BSNL and utility telcos.**
- **Investment of around 4.0 B USD to be funded from USO fund.**

Establishment and Maintenance of NOFN-I: NOFN Implementation Strategy

- **In its plan for the NOFN, for extension of the existing optical fiber network to all Panchayats, DoT proposed an Executing Agency (EA) to undertake the work of establishment, management and operation of the NOFN through a transparent bidding process.**
- **Phased institutional mechanism for implementation of NOFN**
  - **Stage I: A High Level Committee (HLC) to steer and coordinate all activities related to the NOFN Project.**
  - **An Advisory Body to advise on implementation issues and upstream and downstream integration as well as issues relating to non-discriminatory access.**
  - **A Project Implementation Team (PIT) shall look in to preparatory activities such as GIS Mapping, finalisation of network design, formulation of bid package as well as on issues related to establishment of SPV.**
  - **Stage II: After approval by the Union Cabinet (End Oct. 2011), action to be taken to establish and operationalised a Special Purpose Vehicle (BBNL).**
  - **The management of NOFN would be transferred to the Special Purpose Vehicle (SPV), which will take over the functions and responsibilities of the EA.**
  - **Stage III: Private sector companies will also be inducted into the SPV by equity expansion under PPP mode.**

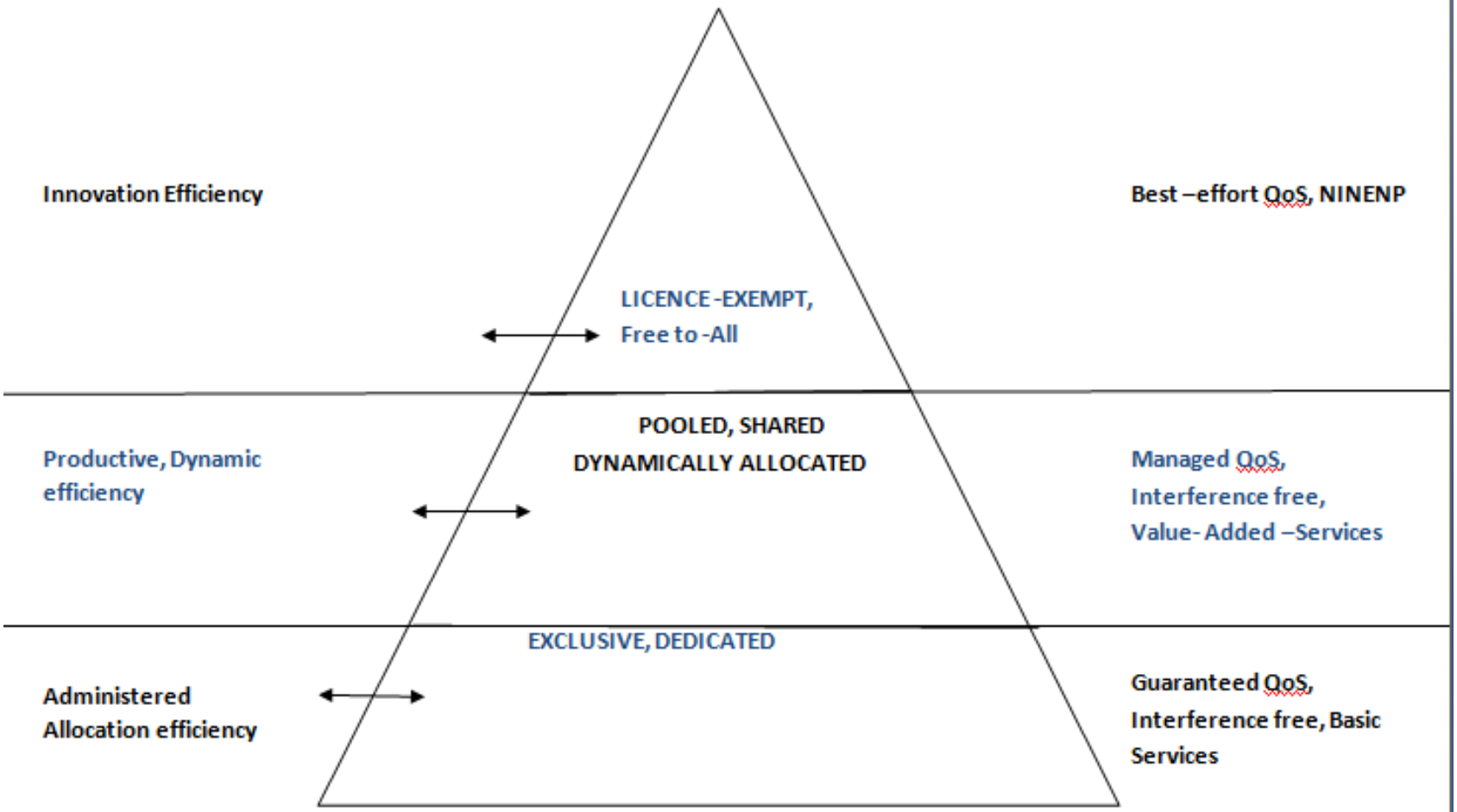
Funding Source of NOFN-USO Fund

- **Establishment and maintenance of the NOFN will be financed solely through the USO (Universal Service Obligation) Fund based upon bids received by the Executing Agency (BBNL). (USD 4.0B for first phase)**
- **Necessary funds will be allocated by the Ministry of Finance (MoF) to USOF within the amounts accrued/accruing to the USOF. No additional liability on the state exchequer outside of USOF is envisaged.**
- **Given the size and scope of USOF Projects, budgetary allocation by MoF towards USOF expenditure to be restored under Non Plan budget to avoid procedural delays and ensure timely allocation of funds.**
- **As on date the funds available are with USOF are approximately INR 18,000 crores (USD 3.5B) and on an average the annual accruals to the fund would be approximately USD 1.2B. it is expected that the approximate funds available including cumulative accrual of funds over the next three years (upto2014) would be about USD 7.0 B.**
- **At Intermediate stage Private sector will also be encouraged to make matching investments under PPP mode.**

Spectrum "Issues" Management

- First Principle -" If a Telecom service can be provided through alternate media, no scarce resources should be allocated for this"
- Public Goods Doctrine, Commons, Spectrum as Free Space vs. Ocean, Land
- Distribution of Natural Resources – Auctions, Beauty Contest, FCFS,AIP
- "Winner's Curse" in Spectrum Auction
- "Sweet- spot" in Radio Spectrum- 900 Mhz, Digital Dividend
- Technology Neutrality – Liberalization of Spectrum (Technology is not Spectrum -Neutral)
- Information carrying Capacity- Shannons Limit ,C=B*log2(1+SNR)
- Trade-off between Spectrum quantity and no. of Towers- Freqancy reuse
- Refarming of Spectrum– Capex and Environmental Issues
- Licence Exempt Spectrum- "NINENP", White Spaces, Cognitive Radio
- Fixed Mobile Convergence (FMC), UMA, Femto Cells
- Balancing Act-Maximization of Societal Welfare Versus State Revenue
- Autonomy for Spectrum Manager, Spectrum Act
- Spectrum Sharing,Dynamic Spectrum Exchange- Pooled Spectrum Clearinghouse, Pay-as-you-Use, Layered Spectrum Allocation- Nirvana

Layered Approach for Spectrum Allocation



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Road Ahead

1. **BCDD, a UN Initiative has laid down ambitious targets for all the nations to have National Broadband Plan(NBP) and strategy by 2015.**
2. **For ubiquitous broadband the Backbone infrastructure is required to be created by Govt. through State/USOF/Public funding with Access infrastructure to be funded through PPP(Public-Private-Partnership)**
3. **In India, national regulator (TRAI) has provided landmark recommendations to the Govt. for NBP entailing an investment of USD 12B for next 5 years**
4. **Govt. of India has announced NTP-2012 providing requisite emphasis on "Broadband for All" and also the NBP. Creation of NOFN with USO Funding (4.0B USD) and utilizing the existing Infrastructure of Govt. owned Telcos has been approved by Cabinet.**
5. **Time and hence the Execution is Essence for such project of national importance which is being executed through Special Purpose Vehicle (BBNL).**
6. **Pilots in 3 states has been completed through BSNL, Railtel, Powertel**

State of Internet Services and ISPs in India

- India's Ranking on Key Broadband Indicators
- Regulator's Report – Growth of Internet in India
- Internet Subscribers Base & Market share of top 10 ISPs
- Technology trends for Internet/Broadband Access
- Internet/broadband Subscribers for top 10 states
- Tariff Plans for USO funded Broadband
- Contribution of Telcos in Development of Internet Services
- Incumbent's Role in Growth of Broadband
- Plugging rural missing link- BBNL

India's Ranking on Key Broadband Indicators (ITU 2012)

Indicator	India's Rank	Percentage (2011)
Fixed Broadband Penetration	112	1.0
Active Mobile Broadband Penetration	106	2.0
Households with Broadband/Internet	80	6.0
Individuals Using Internet	136	10.0

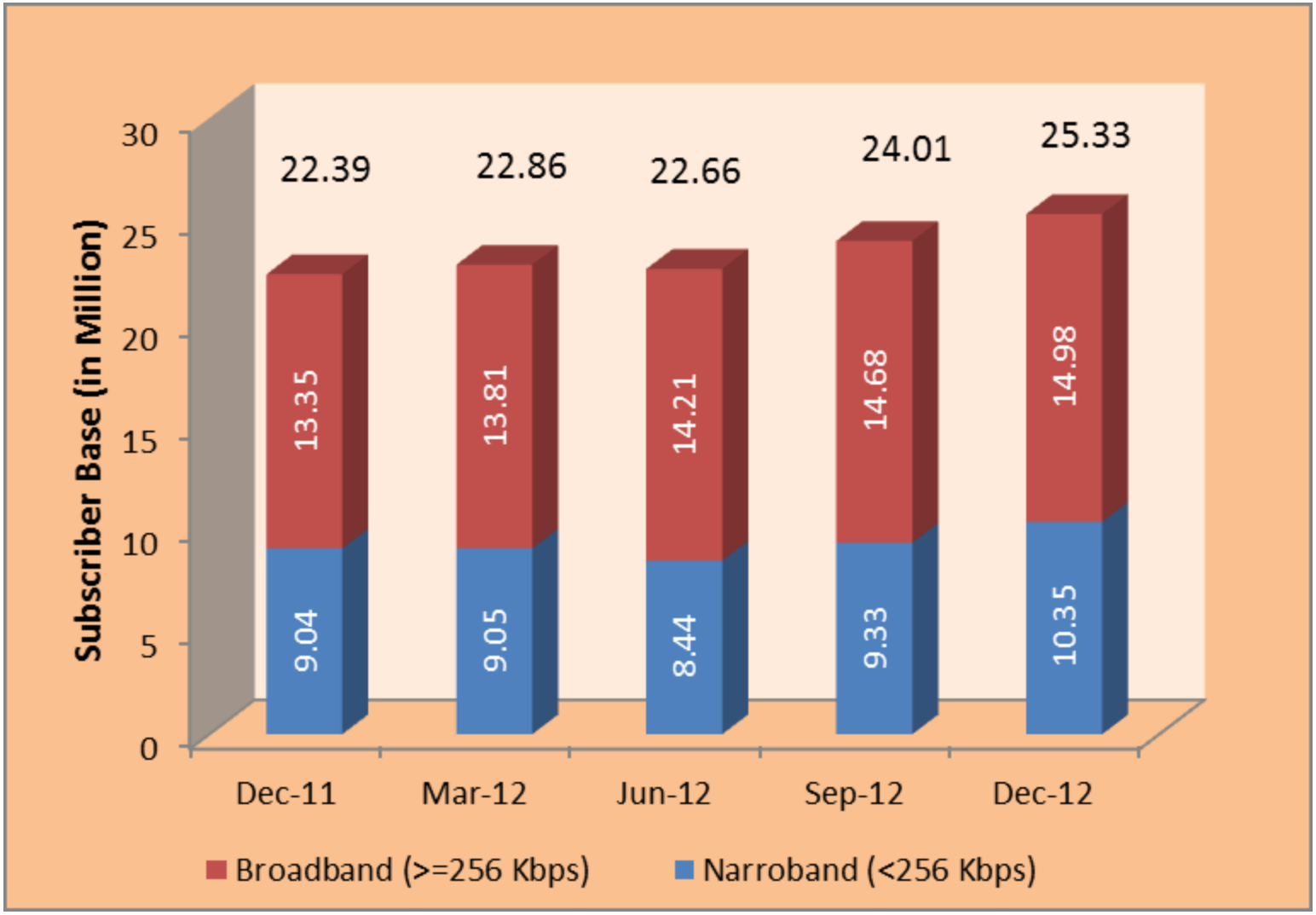
Regulator's Report – Growth of Internet in India (December 2012)

- **Internet subscribers increased from 24 million at the end of Sep-12 to 25 million at the end of Dec-12, registering a quarterly growth rate of 5.5%. Top 10 ISPs together hold 95% of the total Internet subscribers base.**

- **Number of Broadband subscribers increased from 14.7 million at the end of Sep-12 to 15 million at the end of Dec-12, registering a quarterly growth of 2% and Y-O-Y growth of 12%.**

- **Share of Broadband subscription in total Internet subscription decreased from 61% at the end of Sep-12 to 59% at the end of Dec-12. 85% of the Broadband subscribers are using Digital Subscriber Line (DSL) technology.**

Growth of Internet/Broadband Subscription



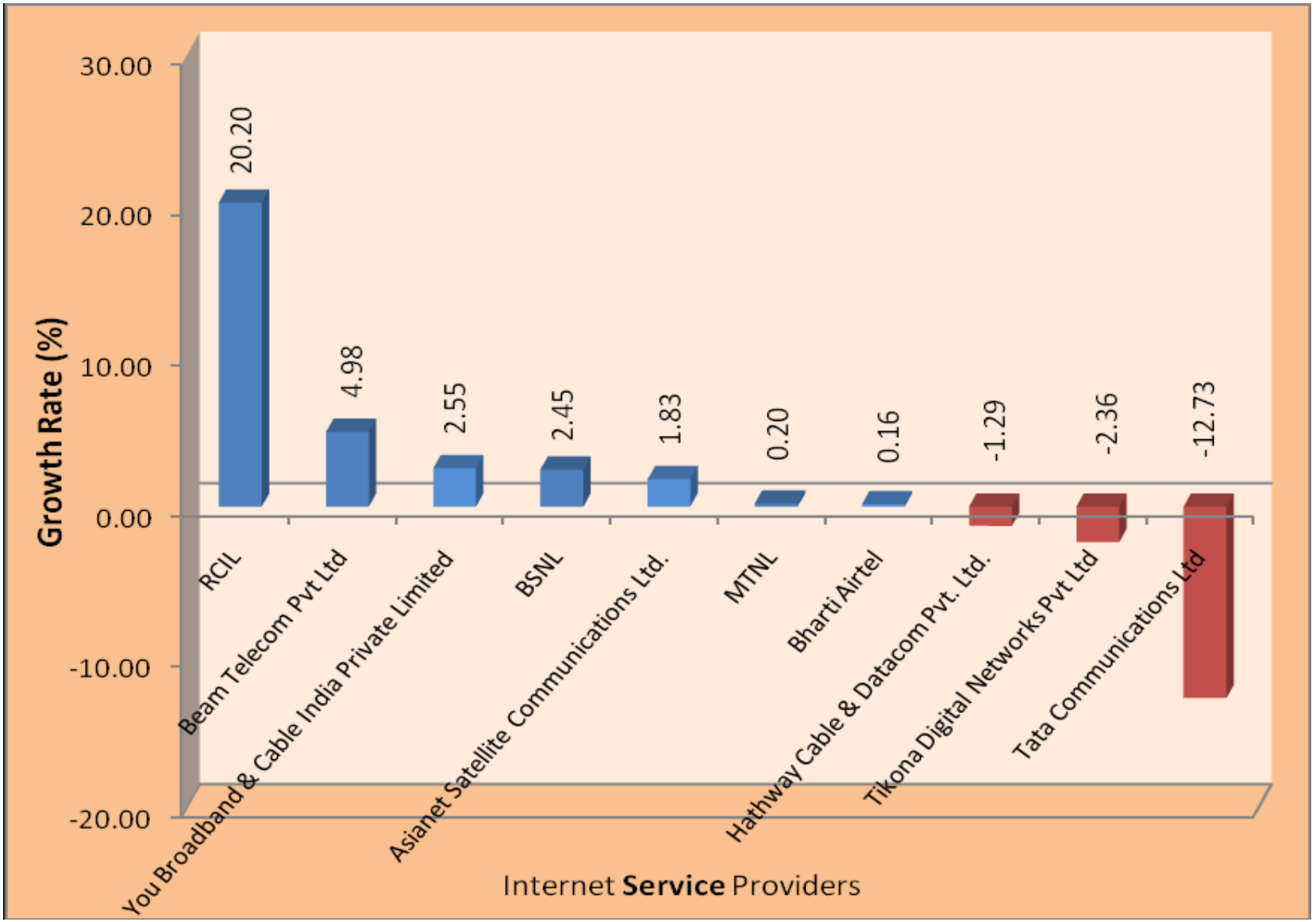
Growth of Internet & Broadband (Contd.)

	QE Dec 2011	QE Mar 2012	QE Jun 2012	QE Sep 2012	QE Dec 2012	%age change over Dec-2011	%age change over Mar-2012	%age change over Jun-2012	%age change over Sep-2012
						(12 months)	(9 months)	(6 months)	(3 months)
1) Subscriber's Base (in million)									
i) Internet (excluding Internet Access by wireless phone subscribers)	22.39	22.86	22.66	24.01	25.33	13.12%	10.80%	11.79%	5.49%
Internet (<256 Kbps)	9.04	9.05	8.44	9.33	10.35	14.45%	14.33%	22.54%	10.95%
Broadband Connections (>=256 Kbps speed)	13.35	13.81	14.21	14.68	14.98	12.22%	8.48%	5.40%	2.02%
ii) Wireless Data Subscribers	431.37	448.89	460.84	446.99	430.60	-0.18%	-4.07%	-6.56%	-3.67%

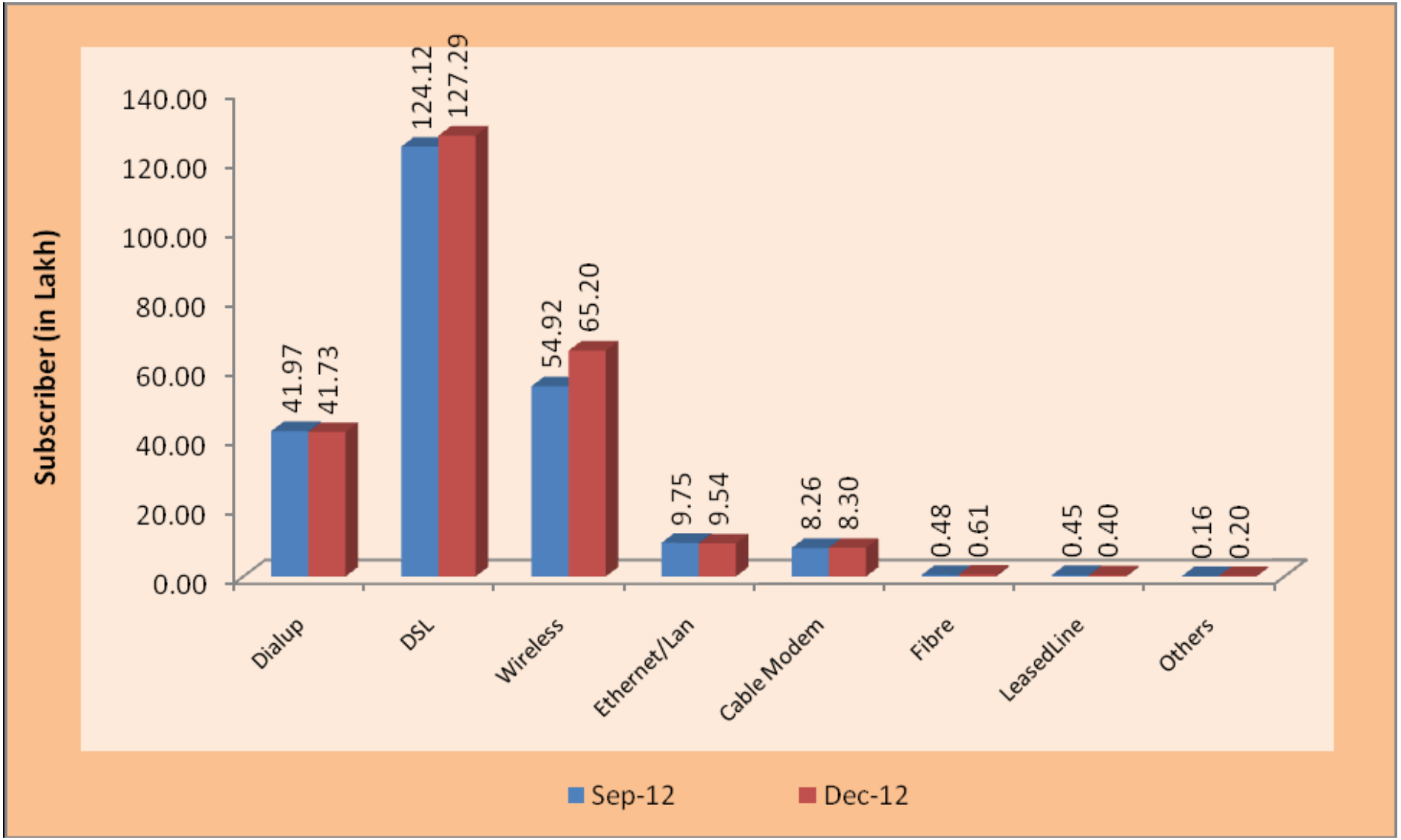
Internet Subscribers Base & Market share of top 10 ISPs

S.No	ISP	Category	Service Area	Subs	Share (%)
1	Bharat Sanchar Nigam Ltd.	A	All India	13092783	51.69
2	Reliance Communications Infrastructure Limited	A	All India	6239272	24.63
3	Mahanagar Telephone Nigam Ltd.	B	Delhi & Mumbai	1944089	7.68
4	Bharti Airtel Ltd.	A	All India	1392864	5.50
5	Hathway Cable & Datacom Pvt. Ltd.	A	All India	368134	1.45
6	You Broadband & Cable India Private Limited	A	All India	341875	1.35
7	Tikona Digital Networks Pvt Ltd	A	All India	283090	1.12
8	Beam Telecom Pvt. Ltd.	B	Andhra Pradesh	253829	1.00
9	Tata Communications Limited	A	All India	137248	0.54
10	Asianet Satellite Communications Ltd.	B	Kerala	115054	0.45
	Total of Top 10 ISPs			**24168238**	95.42
	Others			**1159561**	4.58
	Grand Total			**25327799**	

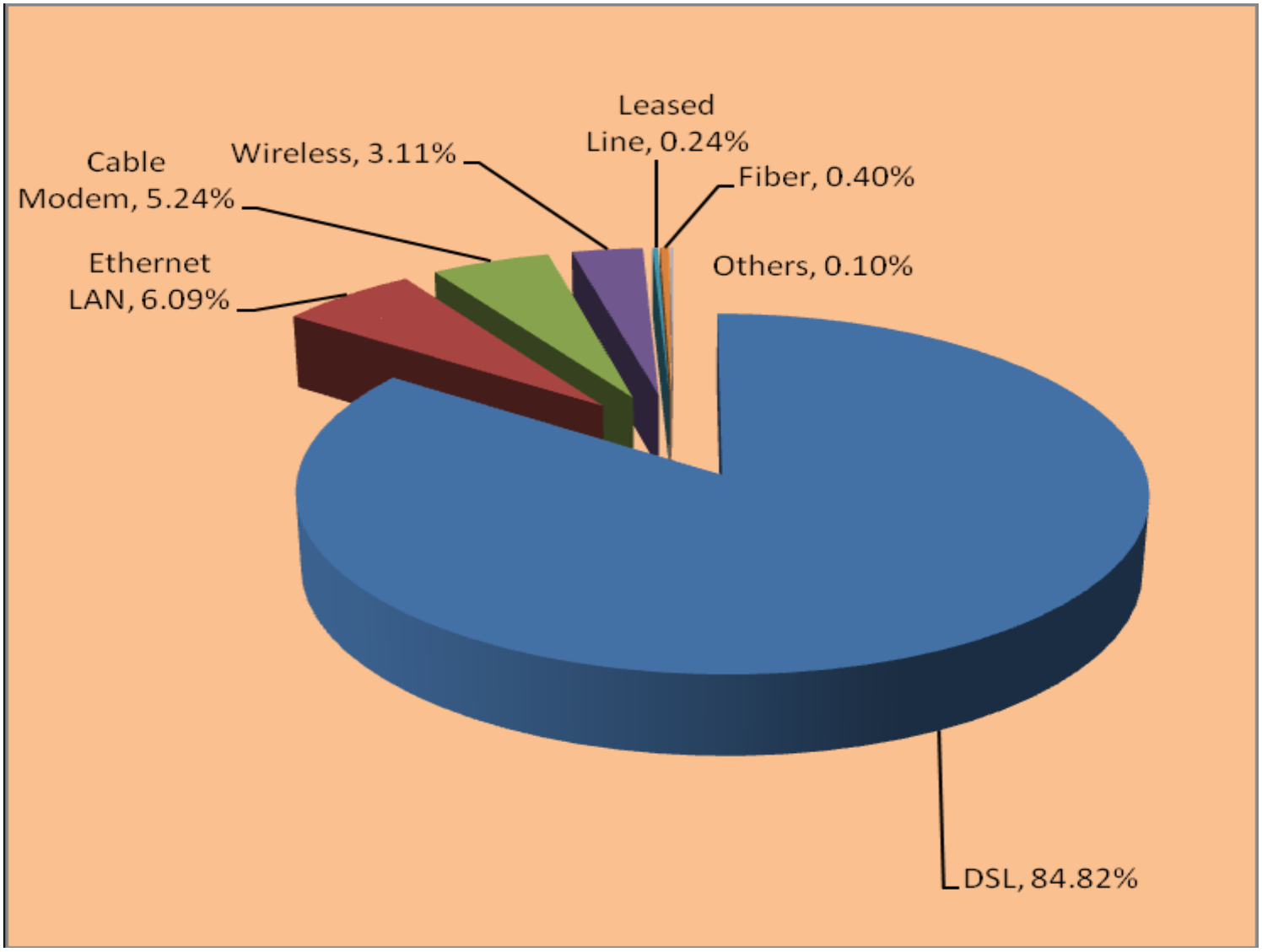
Growth achieved by top ten ISPs during QE Dec.12



Technology trends for Internet/Broadband Access



Broadband Access – Technology Trend



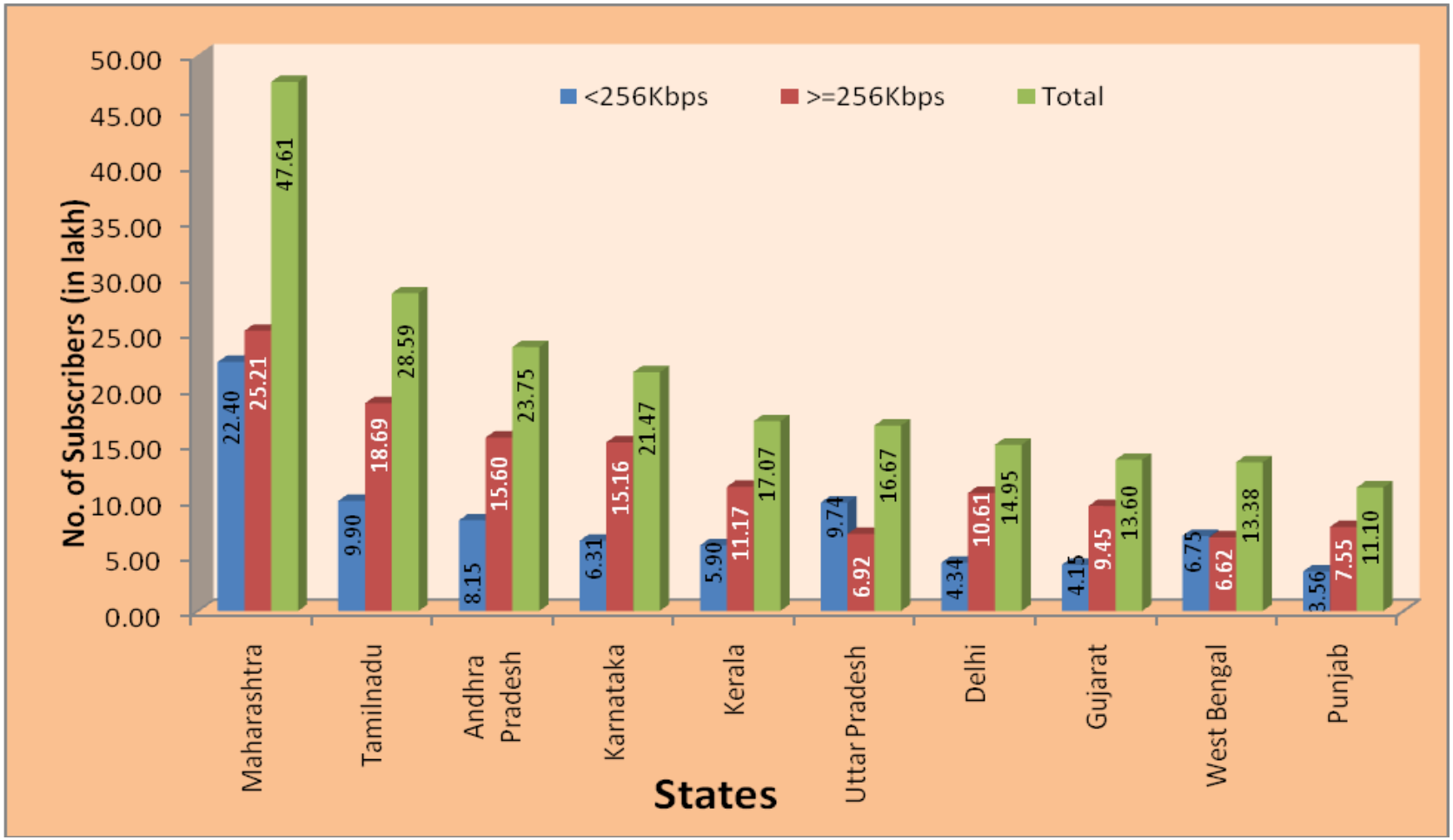
Growth of wireless subscribers capable of Accessing Data services/Internet



Service Provider's Subscribers Base for Data access

S.No.	Service Provider		Data Subscribers as on 31st December, 2012 (in million)
1	Aircel		20.62
2	Bharti		163.76
3	Loop		3.00
4	BSNL*	GPRS	83.33
		CDMA 2000 XI	0.02
5	Quadrant#		1.68
6	Vodafone		61.01
7	Idea		20.90
8	MTNL*	GPRS#	2.71
		CDMA 2000 XI	0.03
9	RTL		5.34
10	RCL*	GPRS	9.75
		CDMA 2000 XI	5.99
11	Sistema@		1.78
12	Tata*	GPRS	4.24
		CDMA 2000 XI	1.28
13	Unitech#		42.15
14	Videocon#		3.64
	Total		**430.60**

Internet/Broadband Subscribers for top 10 states



Tariff Plans for USO funded fixed Broadband

Tariff Plan	Minimum Speed of the Broadband connection	Free Down load	Rate per MB for extra usage (Rs)	Monthly charges (Rs)	Registration Security, and installation charges	CPE rental (for Type I ADSL Modem)
1	512 kbps	0.4GB	0.4	99/-	Nil	Nil
2	512 kbps	1GB	0.4	150/-	Nil	Nil
3	512 Kbps/ upto 2Mbps	1.5 GB	0.20 up to 3 GB, 0.10 Beyond 3 GB	250/-	Nil	Nil
4	512 Kbps upto 6 GB & 256 Kbps beyond 6 GB	Unlimited	N/A	500/-	Nil	Nil
5	512 Kbps up to 2 Mbps	20 GB	0.10	999/-	Nil	Nil

Contribution of Telcos for Internet Services

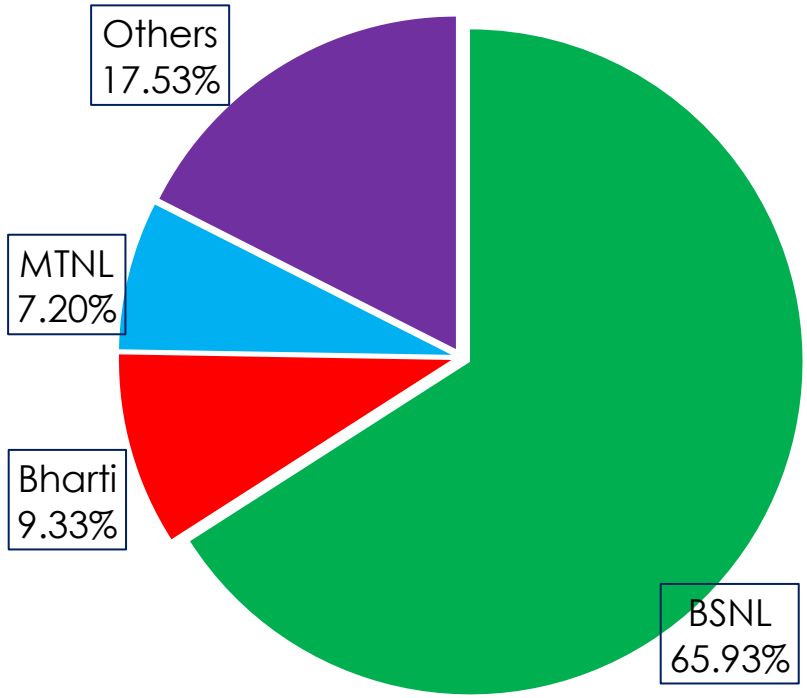
Unified Telcos provide complete Bouquet of telecom services

- **Wireline voice Services**
- **WLL Limited Mobility Services**
- **GSM/CDMA Mobile Services including 3G & VAS**
- **Internet and Broadband services including FTTH**
- **IN services viz. Pre paid Calling cards etc.**
- **IPTV Services.**
- **Enterprise Data Services such as Leased circuits, MPLS VPN etc**
- **Data Center Services**
- **National Long Distance Services**
- **International Long Distance Services**

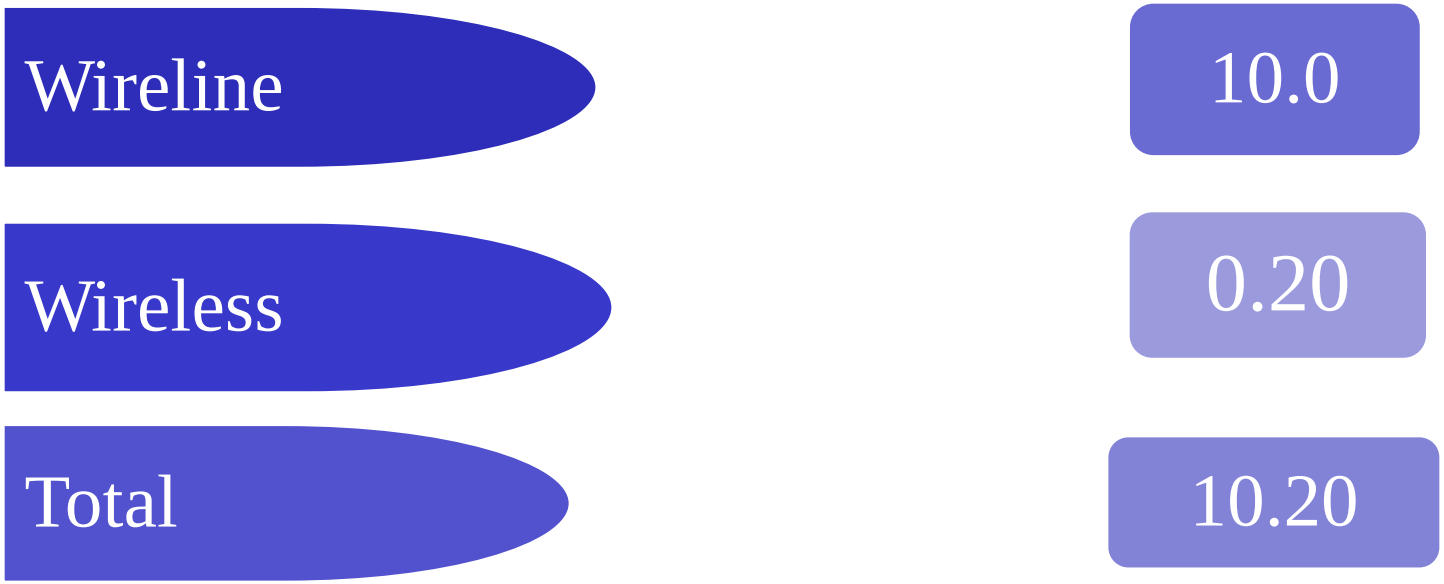
Broadband Market Share of top Telcos as on 28.02.2013 (≥ 256 Kbps download)

Working Connections (in Million)

BSNL	9.89
Bharti	1.40
MTNL	1.08
Others	2.63
Total	15.00



BSNL Broadband Connections(Mn)



BSNL is the biggest Broadband Service Provider

BSNL BROADBAND GROWTH

Status as on	31.03.08	31.03.09	31.03.10	31.03.11	31.03.12	31.03.13
Customer Base (in Mn.)	2.032	3.557	5.376	7.491	8.911	9.927
BSNL Market Share (%)	52.11	57.19	61.44	63.11	64.62	65.94

Note:

- **The above figure includes only Wireline (DSL) broadband**
- **BSNL has also provided 1.02 lakh connection on EVDO,0.85 lakh connections on WiMAX & 0.12 lakh connection on FTTH as on 31-03-2013.**
- **3G Facility has been given to all 2G connections**

BSNL RURAL BROADBAND COVERAGE (As on 31.03.2013)

S. No	Parameter	Total Village	Villages Covered	%coverage
1	VPT (Village Public Telephones)	5,93,601	5,77,882	97.35
2	GSM	5,93,601	4,06,594	68.50
3	CDMA	5,93,601	4,82,456	81.28
4	Broadband	5,93,601	1,69,201	28.50

BSNL Broadband Coverage (As on 31.03.2013)

S. No.	Parameter	Total	Covered	%coverage
1	DHQ	632	628	99.37
2	BHQ	6,210	6,003	96.67
3	Cities	4,629	4,417	95.42
4	Villages	6,01,625	1,69,201	28.12

Note: 4 DHQs not covered are Seppa, Kolarlang, Anini and Hawaii in Arunachal Pradesh

The missing broadband access in about 70% of Villeges is what BBNL is mandated to plug

THANK YOU

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