

Infrastructure Sharing : Case Study India

**ITU ASP COE Workshop
on**

**Infrastructure Sharing
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Overview

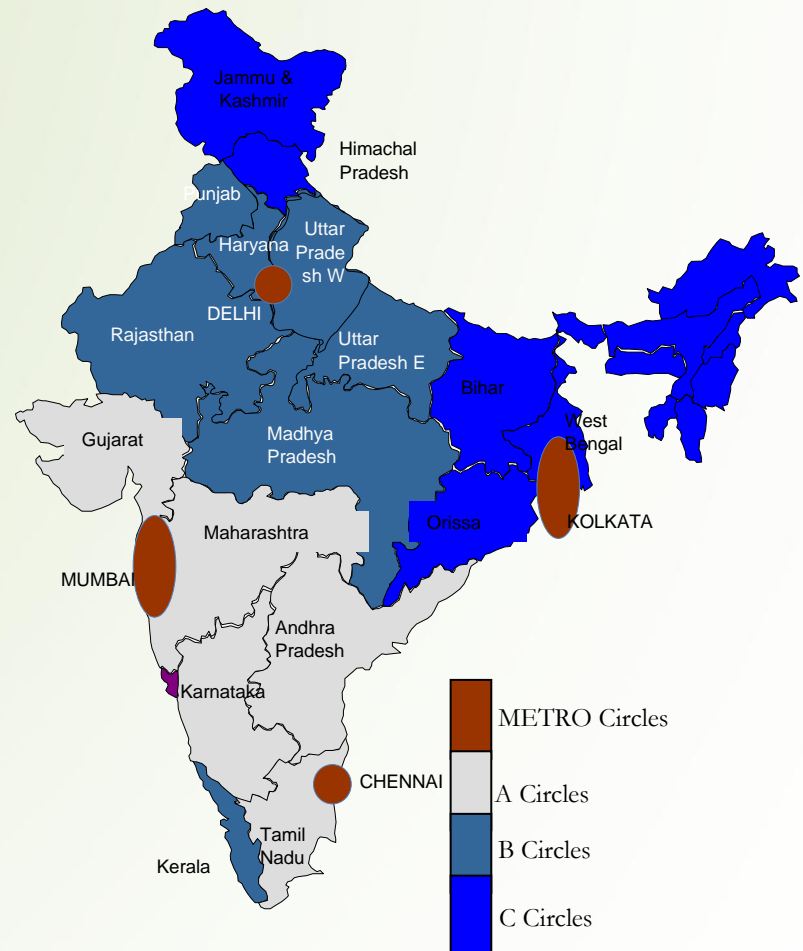
- Brief on Indian Telecom Industry
- Infrastructure Sharing: Need & Scope
- Infrastructure Sharing in practice
 - Policy and Regulatory initiatives
 - Present Status
- Conclusions

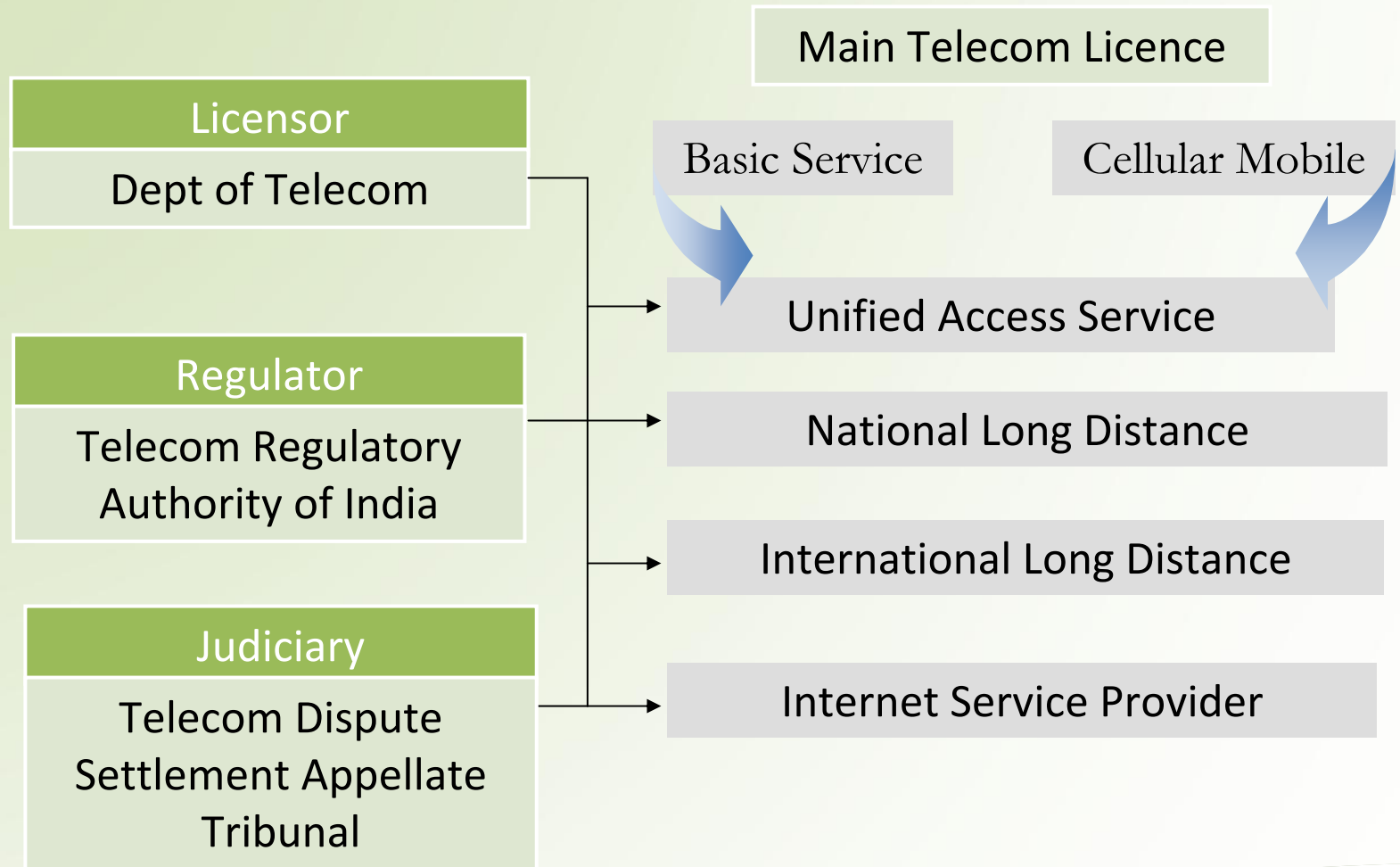
Snapshot India

Population	1.17 billion
Geographical area	3.28 million Sq. Kms
Telecom subscribers	671.69 million
Teledensity	56.83 %
Fixed line subscriber	36.18 million
Wireless subscriber	635.51 million
Monthly mobile additions	17.98 million
Broadband subscribers	9.45 million

Licensing Framework

- India is divided into 22 Service Areas/Circles
- Access Providers licensed on the basis of Circles
- Inter Circle calls to be routed through National Long Distance Operator.
- International Calls to be routed through International Long Distance Operator (ILDO) directly or indirectly through NLDO





Licence	Telecom Services Provided	No. of Licencees
Basic Service	Wireline Telephony, WLL	2
Cellular Mobile Telecom Service	Wireless Telephony	38
Unified Access Service	Access service including Wire line, Wireless Telephony, Internet access services, Triple Play including IPTV	240
National Long Distance	Domestic Long Distance service, IP-VPN, Domestic Leased Circuits	29
International Long Distance	International Long Distance service, IP-VPN, IPLC	24
Internet Service Provider	Internet Access Service, Restricted Internet telephony	373

Aug. 2000

Infrastructure Provider

IP-I

- can provide assets such as Dark Fibre, Right of Way, Duct space & Tower
- Permission through simple registration
- No License Fee
- 100% FDI

**Scope Enhanced
(March 2009)**

- Can create active infrastructure, if created on behalf of licensee

IP-II

- can lease / rent out /sell end to end bandwidth
- Indian registered companies are eligible to apply
- 74% FDI
- **Issuance discontinued (Dec 2005)**
- NLD entry fee reduced (Rs.1 billion to Rs 25 Mn)
- NLD Licence fee reduced (15% to 6% of AGR)
- IP-II allowed to migrate to NLD

Tariffs

- Regulated in the initial days.
- After emergence of competition- brought under forbearance except roaming, leased circuits and rural fixed line.

Interconnection Usage Charges

- Interconnection Usage charges (IUC) were specified by TRAI for inter-operator payments.
- Governed by IUC Regulations.
- Recent amendment dated 9th March 2009 (effective from 01.04.2009)

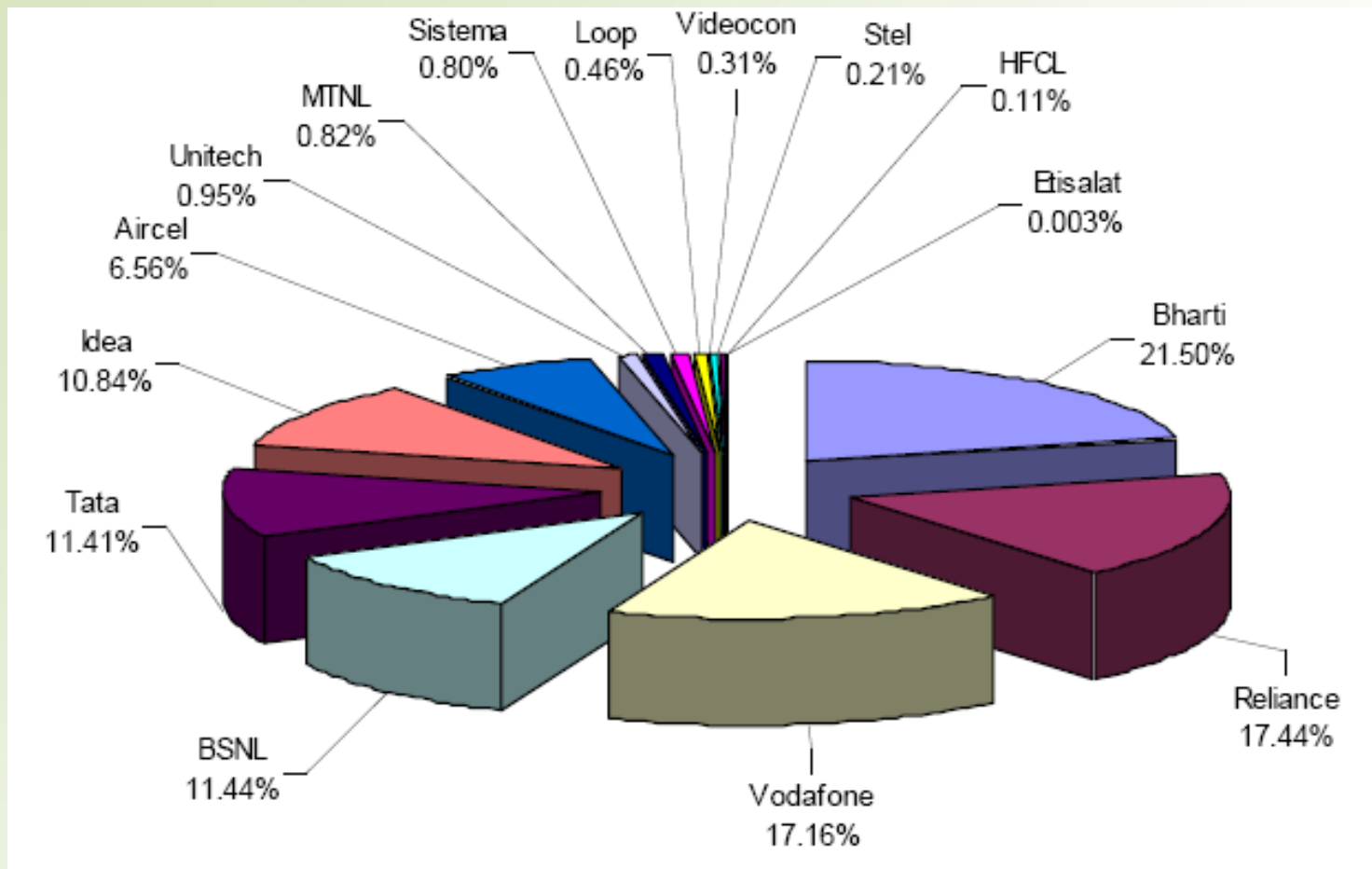
Existing Interconnection Usage Charge

Origination Charge	Under Forbearance
Termination Charge	Uniform for all types of domestic calls viz fixed to fixed, fixed to mobile, mobile to fixed and mobile to mobile. 20 Paise/minute (about 4 Cents/minute)
Termination charge for 3G voice calls	Same as 2G voice calls
Termination charge for incoming international calls	40 paise per minute (about 8 Cents/minute)
Domestic Carriage charge	Ceiling of Rs 0.65 per minute (about 13 Cents/minute)
International Carriage Charge	Under Forbearance.
IUC for SMS	Under forbearance. However, these charges should be transparent, reciprocal and non-discriminatory.

ARPU & MOU of Mobile Service Providers (QE March 2010)

GSM Subscriber	82%
CDMA Subscribers	18%
Average Revenue Per User (ARPU) GSM	INR 131 (about 2.79 USD)
Average Revenue Per User (ARPU) CDMA	INR 76 (about 1.62 USD)
Minutes of Usage (MOU) GSM	410 Minute
Minutes of Usage (MOU) CDMA	307 Minute

Service Provider wise market share of Wireless services (As on 30.06.2010)



Explosive mobile subscriber growth requires:

- New Infrastructure like towers etc
- Additional space for hosting of towers
- Additional spectrum
- More interconnection.

Disturb esthetic of
Cities

Underserved areas coverage

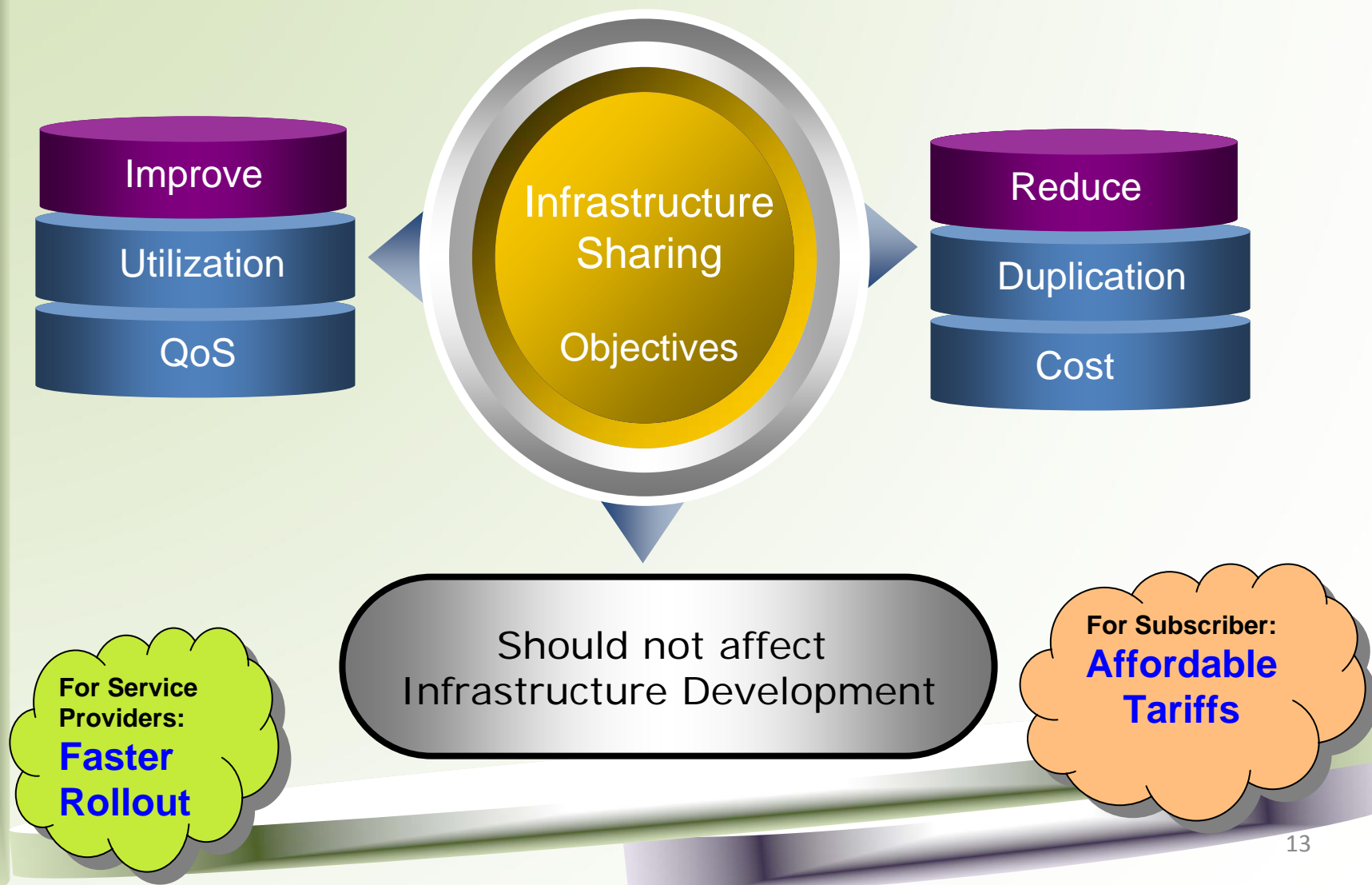
Infrastructure creation requires huge capital expenditure

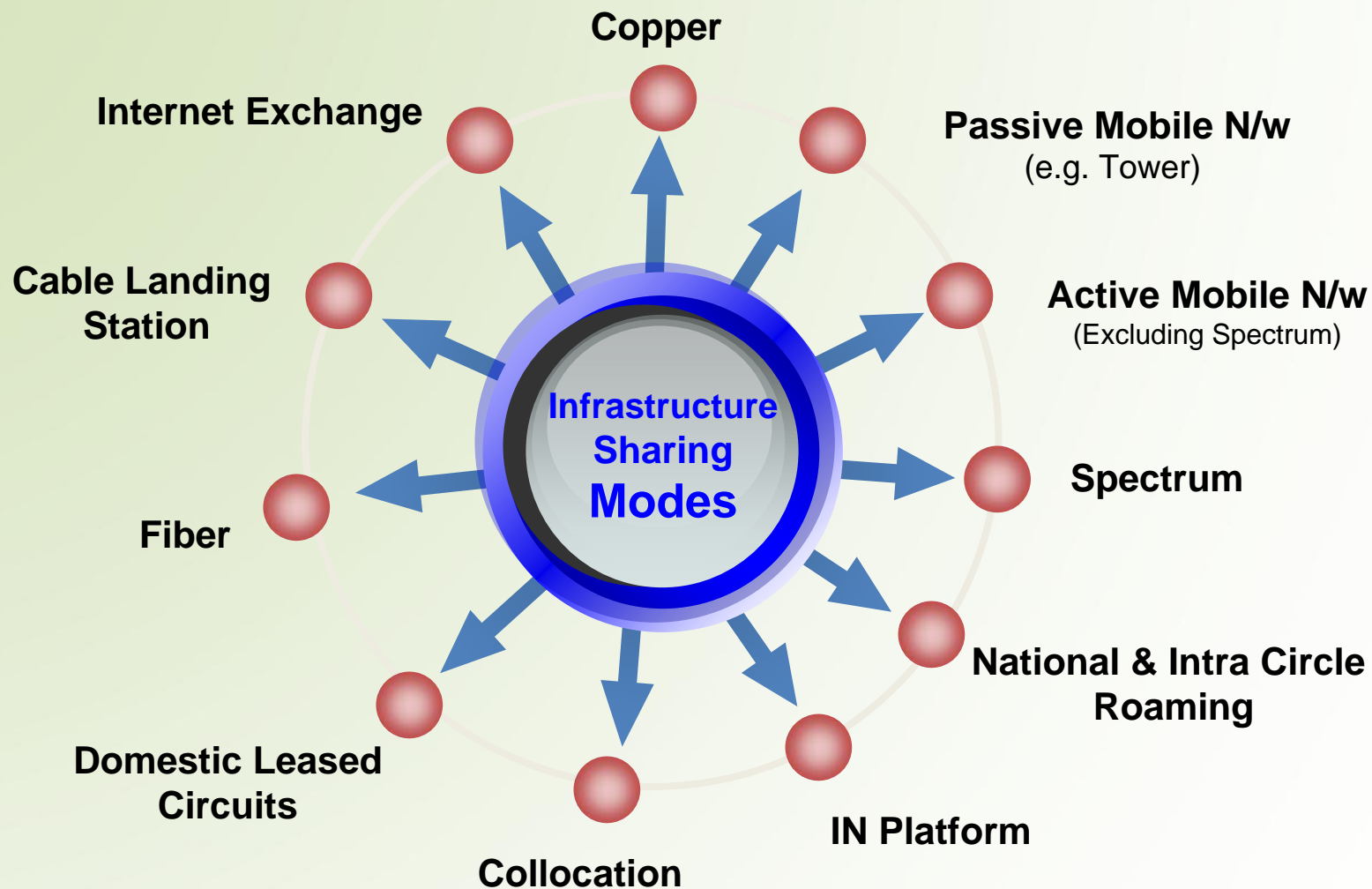
The
answer
is



Infrastructure
Sharing

Infrastructure Sharing - Refers to the sharing of resources and/ or network facilities between one or more operators.





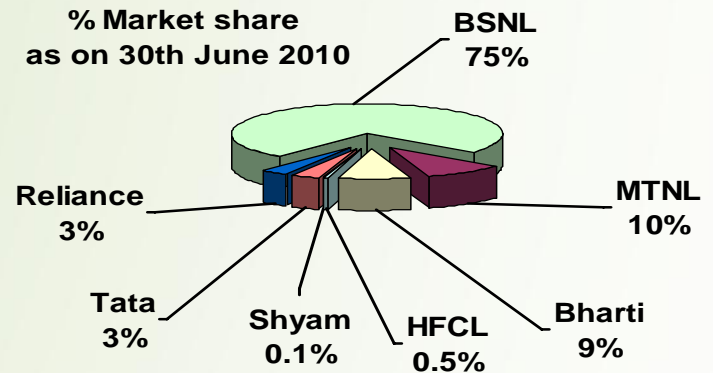
Sharing of Copper (Local loop)

Fixed Wireline Market

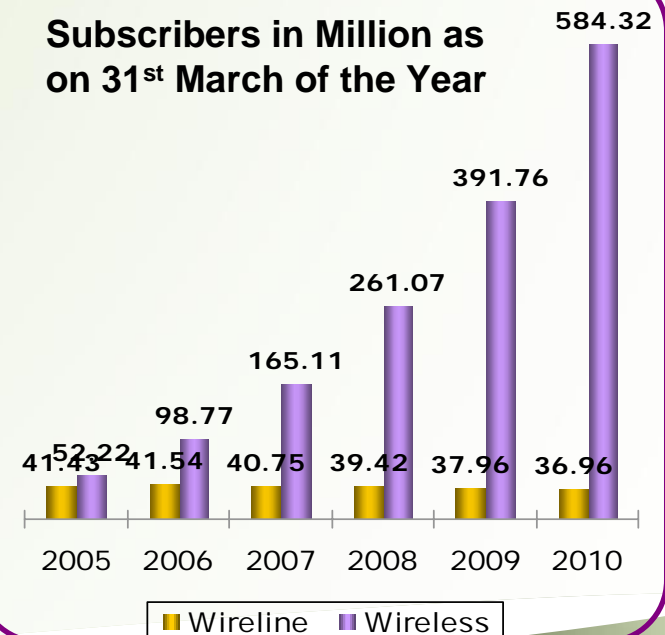
- Historically been dominated by the incumbents.
- Growth was steady over the years until around 2004.
- Thereafter, Fixed mobile substitution setting in, there has been negative growth in fixed line connections.

Sharing of Copper (Local Loop)

- Not Mandated
- Limited Availability of copper.
- The growth in Copper network is dismal.



Subscribers in Million as on 31st March of the Year



Mobile Network

Passive Infrastructure

- Physical Sites
 - Buildings
 - Shelters
 - Towers
 - Power
 - Battery backup

Backhaul

Intermediate Links
between
the Core &
Sub networks

Active Infrastructure

- Antenna
- Feeder
- Cables
- Node-B
- Tx. eqpmt
- Spectrum



Passive Site Sharing: Operators acquire and rent a common site to host the Base Transceiver Station (BTS) space in shelter or transmission room, real estate space etc.

Active Site Sharing: Operators agree to share active equipments such as antenna systems, cables, filters, etc.

A common site is acquired for the purpose of housing the operator's individual Node B along with the use of common antennas and feeders, masts and cables.

TRAI's recommendations to the licensor (DoT) on Infrastructure Sharing (11 April 2007)

- Passive infrastructure sharing **not mandated though encouraged**.
- Active infrastructure sharing facilitated by modifying restrictive clauses in the existing licenses.
 - TRAI recommended that Access providers to be allowed to share active infrastructure, **limited to antenna, feeder cable, Node B, Radio Access network (RAN) and transmission system only**.
 - Spectrum Sharing was not recommended at that time.
- Financial support for creation of infrastructure in rural and far flung areas was recommended.
- Use of non conventional energy sources in areas where electric power supply is erratic should be encourage.

Recommendations accepted by the Government

Guidelines released in April 2008



PROJECT MOST

- To encourage tower sharing among the operators, Govt. of India initiated project “**Mobile Operator Shared Tower (MOST)**” in March 2006.

Flagship Sight: Delhi High court

2 Roof-top Towers of 15 meter height.

First Tower

- 3 Operator Sharing (GSM) -Airtel, Hutch & Idea
- Single Tower supporting 9 GSM & 3 Microwave antenna.

Second Tower

- 3 Operators Sharing (1 GSM + 2 CDMA) (MTNL, Reliance & TTSL)



PROJECT MOST

Ground Based Towers of 40 Meter height

6 Operator Sharing

(4 GSM + 2 CDMA) Airtel, Hutch, Idea, MTNL, Reliance & TTSL

Single Tower supporting 12 GSM, 6 CDMA & 6 Microwave Antennas

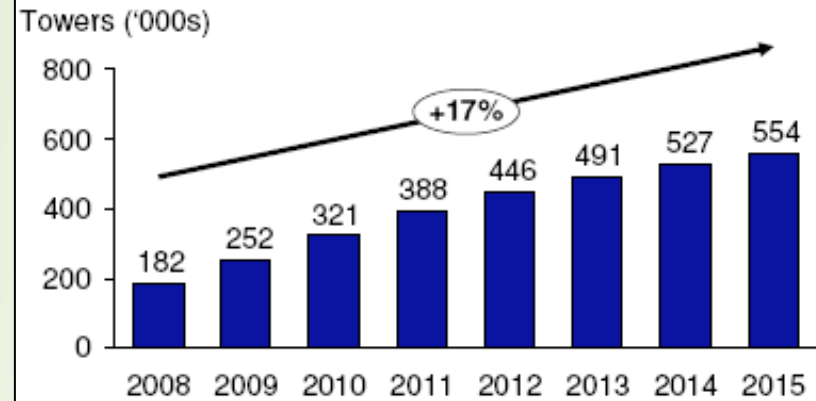
Tower Design Certified by IIT, Delhi



Tower Sharing

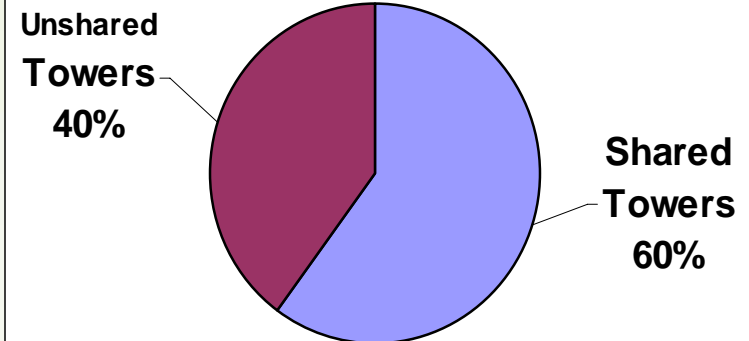
- Estimated requirement of towers is 0.5 million by 2015.
- Tower infrastructure is increasingly becoming independent of telecom operators.
- At present there are about 0.3 million Towers.
- About 60% towers are being shared.
- Average Tenancy is about 1.5.

Tower requirement estimates¹



Source: IDBI Bank

Level of Tower Sharing



Business models used for Tower Sharing

Captive

- Towers are owned & operated by telecom operators.

Operator Controlled entity

- Operator consolidates tower infrastructure &
- Transfer to a separate operator owned entity.
(WTTIL, Bharti Infratel, Reliance Infratel)

Pool and share

- Operators jointly set up an independent company.
- Each operator contributes infrastructure to the joint entity or venture. Indus (Bharti, Vodafone, Idea)

Build and operate

- Independent tower companies builds & manages tower infrastructure.
- Leased to operators under long term contracts.
(e.g. Quippo, ATC, Tower vision)

Tower camouflaged as a tree



Tower Tube
The Wall Street Journal
Technology Innovation Award 2008



Increased level of sharing: Issues

- Large no. of antennas on a tower: concern of radiation
- Load Bearing Capacity
- Installed on the roof top: Safety issues
- Permission from Local Civic Authorities.
- Right of way (ROW) for tower installation and laying of backhaul network.
- Pollution generated through DG sets.

TRAI is in the process of issuing consultation paper on the above issues.

Sharing of Spectrum

- Existing license conditions do not allow Spectrum sharing.
- TRAI in its recommendations dated 11th May 2010 reconsidered this issue.
- TRAI recommended that spectrum sharing be allowed (limited to access spectrum only), subject to

- With the prior permission of the licensor
- Permission for max. 5 years. No renewal.
- In the same licence service area.
- Only between the parties so long as each of whom does not hold more than 4.4/2.5 MHz of spectrum (GSM/CDMA).
- Only if there are at least six operators in the LSA, post-sharing arrangement.
- Not permitted among licensees having 3G spectrum.
- Leasing not permitted.
- Will deemed to be considered sharing their entire spectrum, for the purpose of charging.
- Both the parties will pay the prorated current price for spectrum beyond 6.2/5 MHz, in the ratio of the spectrum held by them individually.
- Spectrum usage charges will be levied on both, but on the total spectrum held by both the operators together.

National Roaming

- **Roaming**: Ability for a cellular subscriber to make & receive calls and have access to services, when travelling outside the geographical coverage area of the home network by means of using a visited network.
- When home network and visited network are both in the same country, it is called national roaming.
- National roaming is relevant for India as the licences are service area wise.
- Roaming arrangements between the operators are on mutual agreement basis.
- Ceiling has been specified by TRAI for roaming tariffs.

<http://www.trai.gov.in/WriteReadData/trai/upload/TariffOrders/61/torder24jan07.pdf>

Intra Circle Roaming

- Intra Circle Roaming is permitted since June 2008.
- Service providers can enter into commercial arrangements for intra circle roaming facilities with other licences CMTS/UAS license.
- Service providers are mandated to inform Law enforcement agencies (LEA) about their intra circle roaming arrangements.
- Some of the service providers already entered into such agreements.
- Such initiative has benefited New licencees:
 - to quickly expand coverage and
 - in instances where initial cash flow is limited.

3G and BWA

- In India, auctions for 3G and BWA have been recently completed.
- Apart from State owned PSU, three private operators in a service area have been given spectrum of 5MHz for 3G.
- For provision of BWA, two private operators and the State owned PSU were given 20 MHz.
- 3G technology requires dense coverage and would require a number of base stations to deliver capacity as per demand.
- Existing towers can be used.
- Proper infrastructure sharing can act as a better solution for faster rollout.

Inter operator Sharing of IN Platform

Intelligent Network: Telecommunication Network Architecture for provisioning of advanced Services which are not normally available in the switching systems.

e.g. Virtual Calling Cards (VCC), Free phone services, Televoting etc.

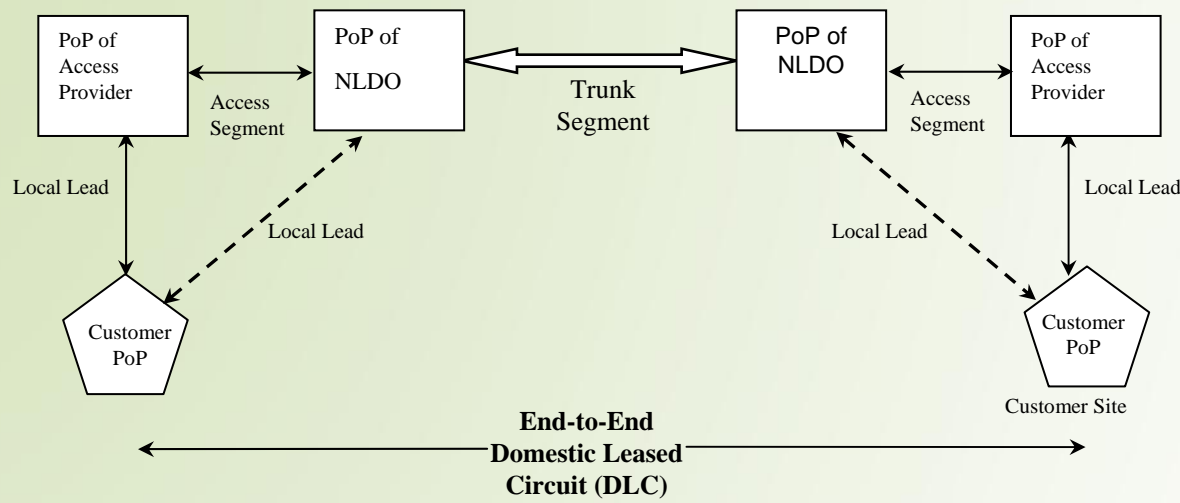
- Prior to issue of IN services Regulation, the subscribers were able to access the IN services of their own Access Service Provider.
- To ensure that subscriber should be able to access, IN services of all other service providers, TRAI issued [Intelligent Network Services in Multi Operator Multi Service Scenario Regulations, 2006 \(13 of 2006\)](#) in November 2006.
- For free phone services, most of the service providers have entered into arrangements on mutual agreement basis
- TRAI has specified origination charge for IN based free phone service on 5th December, 2007.

Calling Cards by Long Distance Service Providers

- To provide choice to the consumer to select long distance operator
- To further enhance competition
- TRAI has recommended to the DOT in August 2008 to allow NLDOs /ILDOs to have direct access to consumers for provision of national and international voice telephony services, respectively, through calling cards.
- Recommendations accepted by the Government.
- NLD/ILD license amended accordingly (August 2009).

Collocation facilities

- For the purposes of providing interconnection, certain equipment has to be placed or collocated at the one service provider's exchange by the other service provider.
- Types: (a) Physical Collocation (b) Virtual Collocation
- The Collocation facilities include:
 - Building Space
 - Power
 - Environmental Services
 - Security
 - Site maintenance
- To frame guidelines so that the fixation of Collocation Charges by service providers is not done arbitrarily and is based on use of sound criteria, TRAI issued a [consultation paper on "Collocation Charges"](#) (March 2010).
- OHD held on 6/8/2010, Service Providers assured to discuss amongst themselves and come back with consensus on charges.



Domestic Leased Circuits

- As on date, domestic bandwidth can be provided to end user by Access Provider or NLDO.
- Tariffs for DLC are regulated and prescribed in TTO.
- TRAI issued DLC Regulations on 14th September 2007 :
 - To ensure transparency, reasonableness
 - To allow provision of DLC/local lead in a non-discriminatory manner

Optical Fiber

Advantages:

- ✓ Necessary to support high bandwidth requirement in Core network.
 - ✓ Also desirable in access network
 - ✓ Reliable, stable and long term solution.
 - ✓ Can provide enormous bandwidth to support Broadband.
 - ✓ Capacity of the Optical fiber to carry information can be enormously enhanced by just upgrading the end equipments.
- Presently about **7,50,000 route Km** of optical fiber network is available in India.
 - It includes 5,00,000 route Km optical fiber network of state owned BSNL.
 - TRAI's consultation paper dated 10.06.2010 on "National Broadband plan" emphasized the need to build "**National Optical Fiber Network**", which extends up to village level.
 - National Optical Fiber Network is proposed to be shared among operators.

Proposed “National Optical Fiber Network” Options for funding

TRAI estimated cost for covering all villages with optical fiber (excluding RoW Cost) Rs 323 billion (Approx).

Options suggested for funding in the consultation paper:

- Funding through USOF (if labour cost can be managed through other ongoing projects).
- Creation of an Autonomous National Level Agency.
 - All Optical fiber network resources may be handled by this agency for laying, maintenance and leasing purposes.
 - Such OF structure shall be shared by all Public/ Private users.
- PPP
- Consortium

IPLC & Resale

TRAI has prescribed tariffs for IPLC in TTO.

Earlier, IPLC can be provided only by International Long Distance Operators (ILDOs).

To promote competition and affordability in International Private Leased Circuits (IPLC) Segment TRAI recommended for Resale in IPLC Segment.

“Resale” is the sale or lease of telecom services to an end consumer on retail basis after leasing from a telecom service provider on commercial basis at wholesale prices.

The Resellers can access the subscribers for provision of IPLC only and not for any other purpose.

Promote non-facility / minimum facility based competition

Recommendations accepted by Licensor

Licence agreement for Resale of IPLC Service may be seen at

<http://www.dot.gov.in/Resale%20of%20IPLC/Resale%20of%20IPLC-index.htm>

Sharing At Submarine Cable Landing Station

- A number of submarine cables are landing or terminating in India at CLS operated and managed by few ILDOs.

Capacities of Submarine Cables in India (October 2006)

Submarine Cable	Landing Stations	Landing Station owned by	Type of Cable System	Designed capacity of existing cable	Equipped / owned capacity (Gbps)
SMW3	Mumbai	VSNL	Consortium, Protected	212 Gbps	20
SMW4	Chennai, Mumbai	Bharti VSNL	Consortium, Protected	1.20 Tbps	20 20
SAFE	Cochin	VSNL	Consortium, Unprotected	5 Gbps	5
FLAG (Reliance)	Mumbai	VSNL	Hybrid, Protected	160 Gbps *	20**
i2i	Chennai	Bharti	Private, Unprotected	8.40 Tbps	160
TIC	Chennai	VSNL	Private, Unprotected	5.10 Tbps	320
Falcon	Mumbai	Reliance	Private, Unprotected	2.56 Tbps	80
Indo-Sri Lanka Cable	Tuticorin	BSNL	Private, Unprotected	960 Gbps	10
Total	CLS-6 Cables 9	4		18.60 Tbps	655

* After the Arbitration Award by International Court FLAG is allowed to upgrade the capacity to 80 Gbps in both the directions.

** 10 Gbps each in both the direction, about 5 Gbps is used for transit traffic.

Source: Operators' Data

Source: TRAI Consultation Paper dated 13th April 2007

Sharing At Submarine Cable Landing Station

- Access to these CLS by other licensees is necessary for
 - creating a conducive environment &
 - boosting competition in the international bandwidth connectivity.
- TRAI issued Regulations on “International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulations, 2007” on 7th June 2007.
- The regulations provides for
 - Time limit for provision of access, collocation and landing facilities.
 - The owners of CLS are mandated to publish “Cable Landing Station – Reference Interconnect Offer (CLS-RIO)” with the approval of the Authority.
 - Transparent charges for access, collocation and landing facilities;

This regulation has been enabling non-discriminatory, fair and open access at the cable landing stations.

National Internet Exchange Of India (NIXI)

- Set up on the recommendation of TRAI by Department of Information Technology (DIT), Government of India in 2003.
- Purpose : To facilitate exchange of Internet traffic originated and destined within the country among peering Internet Service Provider (ISP) members.
- The key objective of NIXI is to:
 - enable domestic bandwidth utilization for routing of the domestic traffic.
 - improvement in QoS in terms of lower latency and number of hops.
 - help to effectively utilize International Internet bandwidth for routing International Internet traffic.
- TRAI also recommended to improve effectiveness of NIXI, on 20th April 2007.
- Presently 7 nodes of NIXI are operational and 2 are underway. (More details may be seen at www.nixi.in).

USO Fund & Infrastructure Sharing

About 71% of the population resides in rural areas.

Liberalization & Competition is not enough for rural areas penetration due to:

- Scattered Population
 - Low income
 - Low Usage
 - Lack of Industry/ Commercial User
 - Lack of Infrastructure, Road, Power etc
 - Difficult Terrain
 - Higher CAPEX & OPEX and Low ARPU
 - Constrains in both supply and demand side
- Role of USO is to provide Access in rural and remote areas at affordable rates.
 - In India, USO Fund was setup in 2002.
 - Encourage sharing of Infrastructure at discounted rates is one of the way adopted by USO Administrators to fulfill their Role.

Infrastructure Support For Mobile Services

- One of the project supported by USO is Infrastructure support for mobile services.
- This project was started in October 2006 to create infrastructure for rolling out mobile services in rural areas.
- Project consists of two parts:
 - Ist part : Setting up of passive infrastructure sites comprising of land, tower, electric power connection, power backup (generator) etc. in identified rural and remote areas.
 - IInd Part : Provisioning of mobiles services by access service providers by BTS equipments installation with associated antenna and backhaul.

Initially the infrastructure created will be for voice telephony which can later be used for broadband services as well.

Infrastructure Support For Mobile Services

Part- I

- The Infrastructure Provider (IP) shall be solely responsible to set up, operate and maintain infrastructure site.
- The infrastructure so created shall be shared by maximum 3 USPs to provide mobile services by installing necessary equipments.
- Subsidy is payable for a maximum period of 5 years within the validity period of agreement.
- IP shall enter into SLA with the USPs for 5 years period to ensure continued provision of services.
- IP shall not charge any rental from the USPs during this period.
- The new tower/ infrastructure sites shall not be installed within 3 Km radius of already installed by any access provider for providing fixed wireless or mobile services.

Conclusions

- In countries, where the number of operators are considerably large, the environment is conducive for infrastructure sharing.
- Regulators and policy makers should encourage sharing of infrastructure.
- Passive infrastructure sharing among service providers on mutual agreement basis may be preferred rather than regulatory mandates.
- Infrastructure sharing is usually commercially driven, however constant regulatory watch and time to time appropriate broad guidelines are necessary.
- Facilitation of active infrastructure sharing is required however to allow sharing of some of the active components like spectrum, requires more market specific analysis.
- Focus should also be on the nationwide infrastructure creation like National Fiber Network. This will promote broadband in uneconomic areas thereby reduce digital divide.

Conclusions

- Use of non conventional energy sources must be encouraged.
- Financial support for creation of infrastructure in rural and far flung areas.

Thank You

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