Consultation Paper No 17/2006

Telecom Regulatory Authority of India

Consultation Paper on Infrastructure Sharing

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CONTENT

PREFACE

Indian Telecom Sector was opened to competition in 1994 with the announcement of NTP-1994. The tele-density in 1994 was meager 0.89/100 population. In order to boost the growth of telecommunication, huge investments were required in telecom sector. Equally critical were efficiency issues. As such opening of the sector to attract investments, boost telecom infrastructure development resulting in improved tele-density and better availability of telecom services, was the chosen path.

The wireless subscribers in India have already crossed 100 Million in May 2006 making India the fifth country in the world to achieve this distinction. More than 5 Million mobile subscribers are being added per month. Considering the pace of growth and future projections, huge investments in telecom infrastructure, is the crying need.

Department of telecommunication (DOT) has also flagged the milestone of passive infrastructure sharing. DOT has sought the views of Telecom Regulatory Authority of India (TRAI) for any amendments/changes in existing licensing conditions or legislation to encourage sharing of Infrastructure.

The need of the hour is to roll out telecom services at faster pace and at affordable price to ensure higher penetration of telecom services in rural areas. Providing telecom services in remote villages will require both additional resource and time to roll out the services. In order to maintain the affordability of telecom services and faster roll out, leveraging on the existing infrastructure will be necessary.

The goal is to provide 250 million telephones by December 2007 and 500 million telephones by 2010. Presently to cater to 136 million mobile subscribers, all service providers together have commissioned approx. 90,000 towers in the country. To meet the targets fixed by the Government, the number of towers required would be about 1, 35,000 by 2007 and 3, 30,000 by 2010. Installing such a large number of mobile tower sites is a huge task. The service providers are exploring all possibilities of reducing cost and time to roll out of service in vast rural areas of the country. Creation of infrastructure like erecting towers, backhaul connectivity with nearest network element account for about 60% of cost. Hence it is important to explore the possibilities of sharing existing as well as new infrastructure by mobile service providers. The aesthetics of the landscape also demands infrastructure sharing.

It is in this background and to facilitate faster roll out of services at affordable cost and to encourage fair competition in the market place, TRAI has come up with this consultation paper on '**Infrastructure Sharing"**. The stakeholders are requested to send their comments on the various issues mentioned in the consultation paper by 15th December 2006. In case of any clarification/information, please contact Sh. S. K. Gupta, Advisor (CN), Tel.No.+91-11-26167914 or +91-11-23217914, Fax: +91-11-26191998 or +91-11-23211998 or email at skgupta@trai.gov.in

(Nripendra Misra)
Chairman

Chapter 1- INFRASTRUCTURE SHARING –An Introduction

1.1   An Introduction

1.1.1 The total number of subscribers by Oct 2006 is 176.78 Millions with wireless subscribers contributing 136 Million. India had achieved the distinction of over 100 million mobile subscribers in May 2006 and adds approximately 5 to 6 million subscribers per month.

1.1.2 The growth pattern of wireless telephony services since its commercial launch in 1996 is depicted in the graph as under:
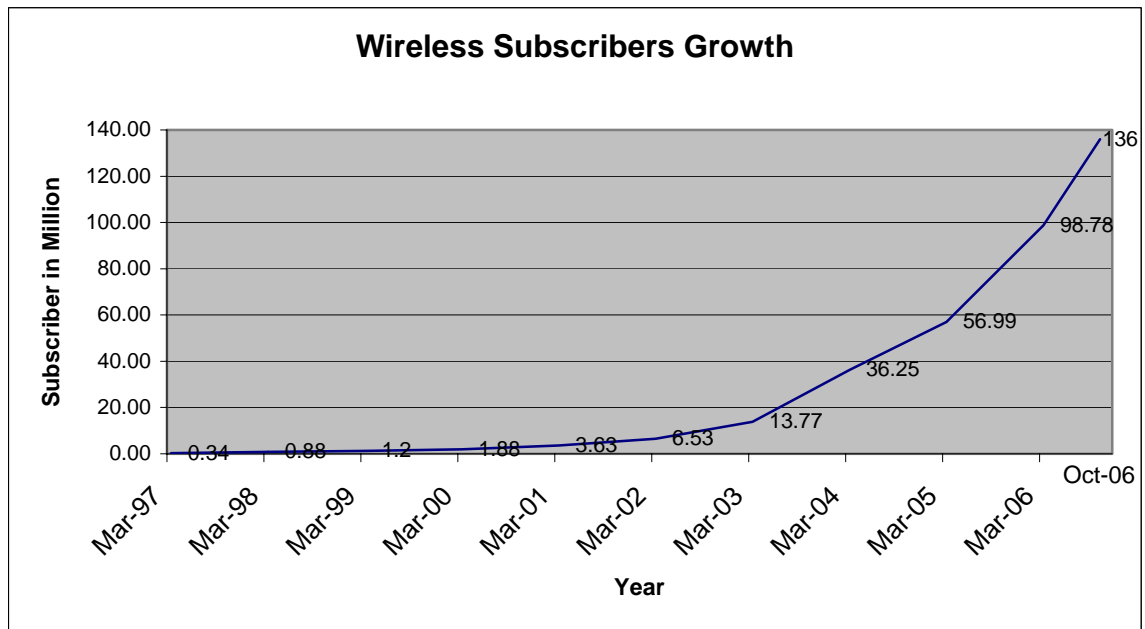

Wireless Subscribers Growth

Table-1

1.1.3 Department of telecommunication has taken note of exponential growth of the mobile subscribers in the country. Mobile service providers will require large number of the towers to sustain this growth pattern, which will need huge expenditure and time to roll out services. It is likely to further deteriorate the skyline by erecting more towers. Passive infrastructure sharing will help to reduce mushroom growth of towers.

1.1.4 DOT has sought the views of the authority (Annexure I) regarding bringing in an appropriate legislation/ amendment in the license agreement for ensuring effective sharing of passive infrastructure (Towers) by the mobile service providers. DOT has further desired that nature of proposed legislation/ amendment may also be suggested if authority feels change in license agreement is required.

1.1.5 DOT has also expressed its concern that while increasing effectiveness of infrastructure sharing, it should be ensured that such sharing should not come in the way of growth of mobile subscribers in the country.

1.1.6 Let us now analyze the present scenario. Mobile telecom service is now available in more than 5,000 towns and cities and in more than one lakh villages across the country. A robust backbone has already been laid. India has huge optical fiber network spread across the county. This can be well utilized to provide required back haul to quickly roll out telecom services.

1.1.7 The demographic spread across the country is depicted below. It indicates that at one hand 33% villages' account for 75% village population, whereas on other hand approximately 42% of villages account far just 9.2% of village population. This naturally indicates mixed scenario. There are villages with high concentration of population and villages with vast spread. Provision of telecom services in vast spread villages will entail huge cost of service provisioning. In order to leverage on existing infrastructure, it is obvious to resort to sharing of existing and future infrastructure.

Distribution of population

The top 2 lakh villages (33% of total) account for 74% of rural population.
Distribution of population across India's 6.07 lakh villages (%)

Category	Value
Top 33%	74
34-58%	16.8
59-82%	7.8
Bottom 18%	1.4

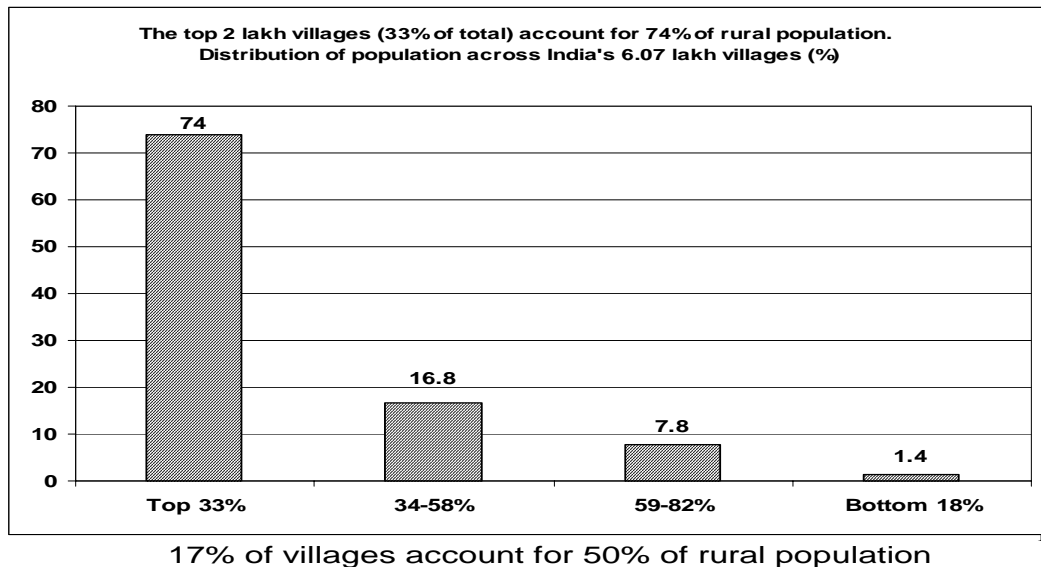17% of villages account for 50% of rural population

Table-2

1.1.8 The capital costs for creating new infrastructures are formidable. It is estimated that 60% roll-out cost of a mobile service is towards setting up of passive infrastructure and only 40% contributes towards active

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infrastructure / electronics. Therefore passive infrastructure sharing amongst mobile service providers assumes crucial importance, as it allows more than one service providers to leverage and ride on common infrastructure.

1.1.9 Infrastructure sharing is equally relevant to the urban areas also. Here, the presence of 6 to 8 service providers and a fast exploding mobile subscriber base is resulting in more cell-sites being put up by each service provider to cater to the growing traffic requirements. This mars the landscape because of the large number of towers disturbing the aesthetic look of the city.

1.1.10   The growing mobile subscriber base is putting immense pressure on the scarce resources of spectrum, infrastructure and interconnection. As of today, lack of point of interconnect is a critical bottleneck hampering the expansion of telecom service. It is also adversely impacting the quality of service parameters of all the service providers.

1.1.11   The ground is ripe for introduction of third-generation (3G) services in India. Its high speed and data throughputs will facilitate delivery of a wide range of multimedia services including video telephony, television, etc. To ensure maximum benefit, 3G services should be cost effective which further highlights the need for infrastructure sharing.

1. 2   What is Infrastructure Sharing?

1.2.1 The term Infrastructure Sharing generally refers to the sharing of mobile tower for putting up the antennae for provision of wireless service between service providers, sharing existing base station sites, A.C. power, backbone, radio links, and other resources to reduce infrastructure duplication and costs. The objective of Infrastructure Sharing is to maximize the use of existing network facilities which includes network capacity and capabilities.

 1.2.2 Infrastructure sharing can take a number of forms based on the degree of sharing between the networks. In its simplest form it can involve the sharing of space on masts and associated buildings or sites however can extend to sharing of various active elements of the network including sharing of spectrum allocated to individual partners.

1.2.3 Sharing can also facilitate two or more service providers to provide service to their subscribers when they are outside the coverage area of their network.

1.3   Why is Infrastructure Sharing Important?

1.3.1 Infrastructure sharing is viewed largely as a measure to reduce costs i.e. Capex and Opex. Infrastructure Sharing is useful initially to build coverage quickly and in the longer term to build more cost-effective coverage in un-serviced areas. The willingness for infrastructure sharing is likely to be strong in the start-up phase, when service providers plan to provide quick coverage in a large geographical area while traffic demands are low and the costs for network deployment are relatively high.

1.3.2 Infrastructure Sharing can also promote greater service-based competition and reduce infrastructure duplication.

1.3.3 Infrastructure sharing is also important for improved Quality of service (QoS). It has been observed that due to non- availability of the site to host mast in congested areas and busy markets, there are large number of black spots resulting in non-availability of coverage, impairing QoS, and resulting in network congestion, call drop etc. It is increasingly experienced in various parts of the country. The test drive in Patna reveals several black spots resulting in very poor quality of service. The Libyans zone (LBZ) and Cantonment areas is Delhi are other examples. Large parts of Mumbai have also reported very poor quality of voice service.

1.3.4 The problem of non-availability of sites in congested areas reducing the coverage and signal strength is common in many countries. Some of the countries have defined such places where acquiring sites and resources are difficult as critical infrastructure (CI). In order to ensure that all service providers get necessary space for putting up of their equipments, allocation of such critical infrastructure is regulated. There is a need to consider if such steps are required in India so that all service providers can have access to such critical sites.

1.3.5 Shared networks also offer environmental benefits, as the sites are most effectively shared including reduced numbers of antennae. It will force service providers to compete on new and innovative services. An important effect for the consumers of Shared Networks may be that service providers will now be more focused competing on End- User Services and Customer Care, as the coverage area may be similar for the different service providers.

1.3.6 Infrastructure Sharing has some restrictive features. Service providers will necessarily cede some of their independence and their control over the network in exchange for cost savings. Some feel that the service providers, may in some cases, be reluctant to improve service

requirements, as their coverage area/service level will always be 'equal' to the other sharing network roll-out and operations. As such it can also be advocated that sharing may reduce the competitive spirit of the service providers.

1.4   Issues for consultation:

1.   **Is there a need to mandate or promote passive infrastructure sharing through policy intervention?**

2.   **a) Is there a need of defining critical infrastructure (CI) for the purpose of passive infrastructure sharing? If so, what shall be the basis to identify Critical Infrastructure? Which agency should identify critical infrastructure?**

   b) Is tower structure in identified critical Infrastructure areas be set up by third party infrastructure providers like IP I and shared between various service providers or left to the market forces?

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Chapter 2. MODES OF INFRASTRUCTURE SHARING

2.1 Introduction:

2.1.1 Mobile networks infrastructure can be shared to different degrees. The degrees of infrastructure sharing increase the complexity and inter dependence of the service providers. In such scenario, it is difficult to exit from sharing arrangement case of a dispute between the service providers. The Network elements that can be shared in infrastructure sharing are illustrated in Figure 1.
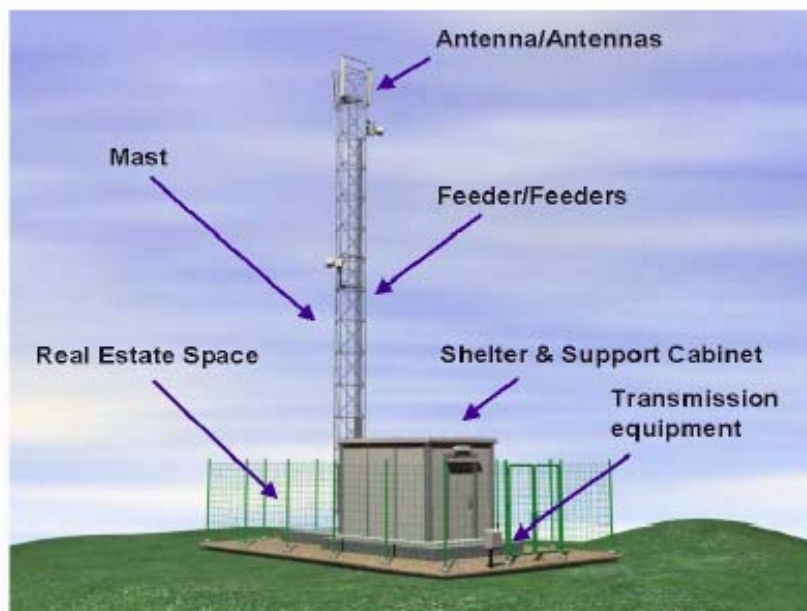

Fig 1: Site sharing among service providers

Infrastructure sharing can be classified broadly in two categories:

(i) Passive infrastructure sharing

(ii) Active infrastructure sharing

2.2   Passive Infrastructure Sharing.

2.2.1 Sharing of passive infrastructure means sharing of physical sites, buildings, shelters, towers/masts, power supply and battery backup, etc. Usually, the space on masts is shared. The service providers while

sharing sites may share all site related infrastructure which includes ownership rights or right to-use the site.   Site sharing is suitable for densely populated/congested areas with limited availability of space, as well as for rural areas for providing coverage to sparsely populated areas.

2.2.2 In passive site sharing, service providers (including infrastructure provider) acquire a common site to host the Base Transceiver Station (BTS), share space in shelter or transmission room etc. Service providers have their own antennae and separate feeder cables. This is the simplest version of the site sharing. In this case exit from sharing arrangement between service providers is easy and chances of dispute are minimal.

2.2.3 Passive infrastructure sharing though simplest but still requires consideration of load bearing capacity of the tower, azimuth angle of different service providers, tilt of the antenna, height of the antennae, before executing the agreement.

2.2.4 While new towers can be built taking into consideration the ultimate load bearing capacity required, some of the existing towers may not have been designed to cater to combined load of antennae of service providers sharing the tower resulting in unsuitability of such towers for sharing. In case of roof top mounted antennae, load bearing capacity of the building/ foundation also becomes very important and may limit the possibility of sharing.

2.2.5 Infrastructure has to be designed keeping in view the ultimate requirement including those of other service providers interested in sharing the infrastructure. Tower has to be designed for higher load bearing capacity, the base space requirement etc. All this will change the tower specifications, which will have direct impact on selection of sites, the foundation for erection of such towers.

2.2.6 The azimuth orientation of the antennae as decided by the service provider is another crucial parameter. If service providers (especially GSM) sharing the infrastructure, have same azimuth orientation requirement, then it will pose technical limitation.   Height of the antenna mounting and tilt of the antenna are also very important parameters. Though individually they may not be very critical, but where service providers' azimuth angle requirements are same, they become very critical and may result in serious interference if not resolved properly. The near end and far end interferences in passive tower sharing are also important considerations. Though different service providers sharing the tower have distinctly different spectrum, thus minimizing any prospect of interference, yet non-availability of sharp cutoff filters may create some interference. Hence this factor has to be considered while deciding passive infrastructure sharing.

2.2.7 The number of antennae per tower is also a limitation. For example in some of the states total number of the service providers working in GSM and CDMA are up to 7. This may considerably increase the number of antennae required on one tower even after excluding antennae requirement for the purpose of back haul.

2.2.8 The large number of antennae on one tower is likely to pose serious problems in sharing towers in busy areas. Hence, it is important to note that design of tower in congested areas will be complicated, as it will require special type of tower capable of bearing much higher load.

2.2.9 The operation and maintenance of shared site is a critical issue. Unsatisfactory maintenance may badly affect Quality of service and coverage. Insufficient Power supply/ Power backup can totally paralyze the operation of the mobile service in that area.

2.3   ACTIVE INFRASTRUCTURE SHARING

2.3.1 The active infrastructure sharing can broadly be defined sharing of the active elements in the network amongst service providers. Active infrastructure sharing is complex and need thorough understanding between the service providers. Though active infrastructure sharing is beneficial for the service providers because it considerably reduces the cost and time to roll-out networks by the service providers, the issues involved are more complex as compared to passive infrastructure sharing. Provision of exit clause in case of dispute will be almost impossible as separation of Networks between the service providers may not be easy.

2.3.2 Active infrastructure sharing includes sharing of antenna, feeder cables, node B, transmission equipment and can ultimately include sharing of spectrums allocated to service providers individually.

2.3.3 Active infrastructure sharing is not popular across the globe. There are various reasons, the most important being increased inter dependency between the service providers. Increased degree of sharing may reduce competitive edge of the service providers due to increased interdependence.

2.3.4 Sharing Radio Access Network (RAN):

2.3.4.1 This is the simplest type of active infrastructure sharing. Here antenna, feeder cable and transmission equipment is shared. Figure 2 illustrates the elements being shared in this model.
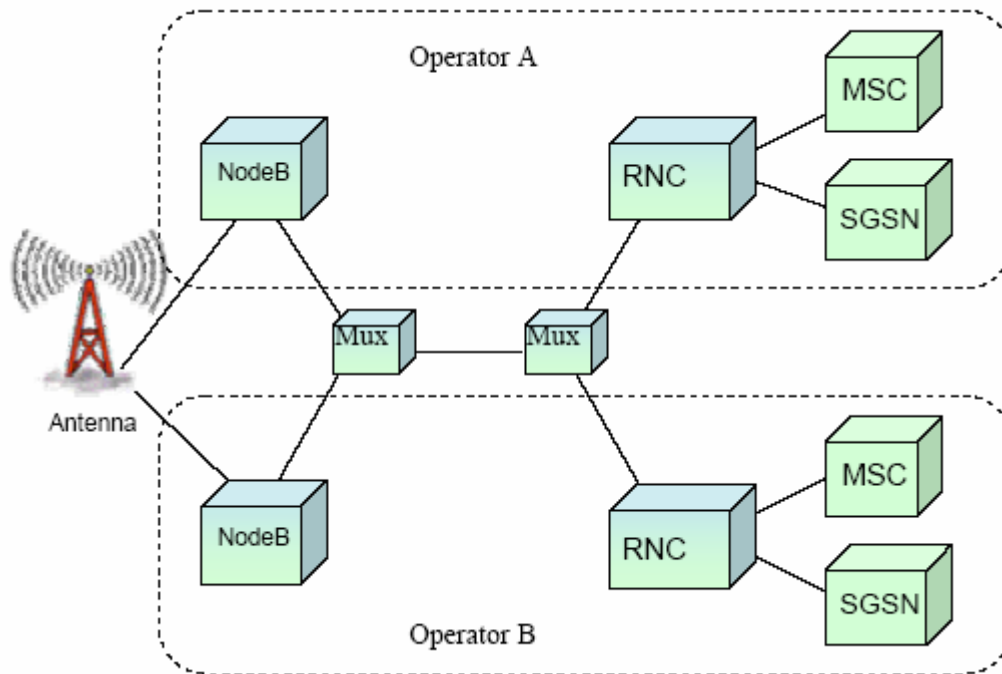
Fig 2: RAN site sharing

2.3.4.2   This type of sharing may have adverse effect on QoS due to reduction of the signal strength. This fact was acknowledged during the MOST initiative when service providers felt that use of common antenna may pose problem as the strength of the signal may be reduced by at least 3 db by combining the signals. This may result in poor coverage and may reduce signal to such an extent that fulfillment of QoS parameters may not be possible in some pockets.

2.3.4.3 In RAN site sharing service providers maintain full control of their spectrum allocated to them.

2.3.4.4 An extended version of Radio access network sharing (RAN) can be in the form of intra-circle roaming. Service providers can have agreement to provide mobile services to their subscribers wherever their own network signal is not available or weak. This may be very useful to increase the coverage area and Quality of service. Stakeholders may consider this option to increase their coverage and QoS with almost no additional expenditure.

2.3.5 NODE B   Sharing

2.3.5.1 In Node B sharing model, two logically distinct Node Bs share one physical unit. The Radio network controller (RNC) and Core Network are not shared in this model, so that each service provider can maintain control of their equipment and spectrum use. The separation of the Core

Networks also allows each service provider to offer differentiated services to their subscribers. The potential savings in capital expenditure (CapEx) and operational expenditure (OpEx) are incremental in node B sharing model as compared with site sharing model.

2.3.5.2 Node B sharing will increase the complexity of the operational model for service providers. Future hardware upgrades of the network to add capacity or functionality may be difficult to negotiate, as the requirements of the service providers sharing the network may differ. Node B sharing is a complex technical solution.

2.3.6 Back haul Sharing

2.3.6.1 Common back-haul sharing will be very useful in rural environment where traffic from BTS to BSC is very low. A common RF or Optical fiber medium can be utilized. This will reduce cost and maintenance efforts. Exit from such sharing arrangements can easily be provided if it is warranted at later date due to increase of traffic or other administrative reasons. Back haul sharing can be of great use in Indian scenario while provisioning telecom services in rural and remote areas.

2.3.6.2 As per the existing license condition, provision of point to point bandwidth from one service provider's infrastructure with in his service area to other licensed telecom service provider for their own use (resale not permitted) is permitted. It is argued that back haul sharing will require resale as it will be shared among various service providers on commercial considerations.

2.3.6.3 Since resale is not permitted, hence sharing of back haul cannot be done unless license conditions are suitably modified.

2.3.6.4 While resale of lease line per say is much wider issue and not in the scope of discussion of this paper, the resale for limited consideration of back haul sharing is an important issue of discussion. Stack holders are requested to give their valuable comments whether license condition needs to be modified to permit resale of point to point bandwidth for limited purpose of back haul sharing.

2.3.7 Pooling of spectrum by partners sharing infrastructure

2.3.7.1 The sharing parties may agree to share the allocated spectrum to increase the economy of operation especially in WCDMA scenario. Active sharing of infrastructure including sharing or pooling of spectrum is most complex model. Unless service providers have very close association/coordination, such models cannot be successful.

2.3.7.2 Ensuring QoS and other parameters may be very difficult. Such models do not provide easy exit path in case of the dispute between the service providers.

2.3.7.3 International experience indicates that the active infrastructure sharing is taking place in some countries in limited way and only through mutual agreements reached between service providers. No regulatory interventions have been made except that such sharing is permitted.

2.3.7.4 International experience also indicates that spectrum pooling has not been permitted in any country so far. It is felt that if service providers are permitted to pool or share the spectrum then the group can get added advantage in deployment of services. In such a scenario, level playing field is disturbed and one service provider may be better placed as compared to its competitor.

2.3.7.5 To summarize, the active infrastructure sharing can be achieved through various models and several variations are possible. Stake holders have to analyze various options and give their opinion on possibilities of active infrastructure sharing as it can result is huge savings in terms of Capex and Opex.

2.3.8 MVNO in Infrastructure sharing

2.3.8.1 A mobile virtual network operator (MVNO) in general term is an operator who does not have its own spectrum. In the simplest form, the MVNO usually does not have its own infrastructure, except for a subscriber database, buys minutes in bulk from a mobile network operator (MNO), and uses its own brand to sell to subscribers.

2.3.8.2 There is divergence of opinion about whether active infrastructure sharing is pre-requisite for introduction of MVNO in Indian market. The authority will like specific comments from the stakeholders on this issue.

2.4 Issues for consultation:

1. **Presently back haul sharing is not permitted as per licensing conditions. Since sharing of back haul optical fiber and radio link from BTS to BSC will be very useful for deeper penetration and coverage, would you suggest suitable modification in licensing conditions?**

2. **In your opinion, is there a need of regulatory intervention to encourage active infrastructure sharing?**

3. **In your view whether you consider active infrastructure sharing as pre-requisite to MVNO? If so, suggest future course of action to encourage MVNO in Indian market?**

4. **What other modes of active infrastructure sharing will be useful in Indian scenario and suggest actions which you feel necessary to encourage such sharing?**

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Chapter 3.   REGULATORY AND LICENSING ISSUES IN INFRASTRUCTURE SHARING

3.1   Licensing Issues

3.1.1 The coverage in rural areas is still much less as compared to urban coverage. In order to faster roll-out and to provide affordable tariffs to rural population, it is imperative that cost of service provisioning in rural area is low. There is a need to recognize sharing of infrastructure as one such effective measure for reducing Capex and Opex. The government has already permitted passive infrastructure sharing as evident from licensing conditions of UASL and CMTS service providers. The relevant clauses of the license are reproduced below:

Clause No 33 of USAL License:

(i)   *Sharing of "passive" infrastructure viz. building, tower, dark fibre etc. is permitted,*
(ii)   *Provision of point to point bandwidth from their own infrastructure within their Service Area to other licensed telecom service providers for their own use (resale not to be permitted) is also permitted.*
(iii)   *Sharing of switch by the LICENSEE for providing other licensed services is permitted.*

Clause NO 34 of CMTS License:

(i)   *Sharing of "passive" infrastructure viz., building, tower, dark fiber etc. is permitted.*
(ii)   *Provision of point to point bandwidth from their own infrastructure within their Service Area to other licensed telecom service providers for their own use (resale not to be permitted) is also permitted.*

3.1.2 Though India already has robust backbone as well as supportive licensing provisions to encourage infrastructure sharing, still even passive infrastructure sharing is not widely practised by telecom service providers.

3.1.3 The intention of government to encourage infrastructure sharing is very clear from its action when it recognized a separate category of service providers in form of Infrastructure provider category-I (IP-I). This was introduced with effect from 13.08.2000. All Indian registered companies are eligible to apply. No license is issued for IP-I. Companies registered as IP-I can provide assets, resources such as Dark Fibre, Right

of Way, Duct space and Towers. There is no restriction on foreign equity and number of entrants. There is no entry fee and no bank guarantee. The applicant company is required to pay Rs. 5000/- as one time processing fee along with the application.

3.1.4 The fast developments on availability of the new equipment permitting active sharing are becoming popular. While virtual separation between operators provide them required control, sharing with other operators reduces cost of equipment and operations. It becomes important in this context whether active infrastructure sharing needs to be permitted in India by modifying the licensing conditions. Views of stakeholders will be of great importance.

3.1.5 A friendly regulatory framework is needed to ensure that the sharing scheme is successful. The advantages of efficiency, cost savings and time-to-market are counter balanced by the drawbacks of potential consolidation, possible lack of adequate competition and reduced service differentiation. The commercial and regulatory environment will determine the spread of infrastructure sharing.

3.1.6 Infrastructure sharing arrangements may affect the competitive independence of service providers in the market as a result of the network integration through such cooperation. A significant concern has been raised regarding the potential of Infrastructure Sharing to lower the level of competition in the marketplace, depending on the extent of Infrastructure Sharing arrangements.

3.1.7 The overriding concern is to ensure that any derived efficiencies do not result in tainting the competitive environment. This has been one of the prime reasons that regulators world over have been desisting to mandate infrastructure sharing. Active sharing has not been favoured by various regulators in this background.

3.1.8 Regulators all over the world favour passive sharing of infrastructure. For example, the European Commission gave permission for a 3G site sharing agreement with specified safeguards between T-Mobile and T2 in the United Kingdom in April 2003. In July 2003 it approved a plan by mm 02 and T-Mobile to share 3G infrastructures in Germany. United Kingdom stressed that there were no competition concerns on the proposed infrastructure sharing because it is restricted to smaller cities and rural areas. Further more, this arrangement may also avoid competition concerns since it is restricted to sharing basic network infrastructure such as masts, power supply, racking and cooling. In Germany, the regulator stated that each 3G license holder would be required to build its own network, each of which needed to ensure its `competitive independence' during the lifetime of the license, though

permitting passive sharing. This means that service providers would not be allowed to share backbone facilities such as switching centers even though they could share network elements such as masts and antennas. In France, the regulator ART indicated in December 2001 that sharing of mobile infrastructure (site, base station and controllers) was possible provided that the frequencies are managed independently by each service provider. In Spain, the government agreed to permit 3G infrastructures sharing between service providers in January 2004. In Finland, service providers are allowed to share 3G networks from April 2004, although each license holder must still have their own network covering 35% of the population.

3.1.9 In contrast, some countries put conditions on infrastructure sharing. In Ireland, for example, infrastructure sharing will only be permissible when each service provider has established a 3G-radio access network infrastructure capable of serving at least 20% of the population-using infrastructure, which is wholly under the control, or ownership of that operator. In the Netherlands, NMA (Netherlands Competition Authority), OPTA (Independent Post and Telecommunications Authority), and the V&W (Ministry of Transport, Public Networks and Water management) issued a joint memorandum that provided comprehensive clarification on collaboration in the deployment of 3G networks in September 2001. They agreed to allow 3G service providers to collaborate in the construction of 3G network deployment could contribute to a more rapid 3G rollout, they clarified that collaboration must be limited to the joint construction and use of the 3G network infrastructures such as masts, aerials and network operation. On this basis, they did not permit the joint use of frequencies and core networks. In Sweden network infrastructure sharing is allowed under the present 3G licensing regime as long as each service providers has 30% of the population covered with its own infrastructure, the 70% remaining being sharable.

3.1.10 Some countries do not intervene in infrastructure sharing issues. The policy of the United States is an example. Although the US regulator has not issued regulations specifically addressed to 3G infrastructures sharing, in recent years, the regulator has been called upon to scrutinize on a case-by-case basis several infrastructure sharing joint ventures between various mobile service providers. Based on this experience, the US approach generally has been not to intervene in infrastructure sharing issues, but the regulator has the authority to do so if issues of competitive harm are raised. The same general approach would be applicable to 3G infrastructure sharing should the issue arise. FCC, which examines whether infrastructure sharing is promoted or not as a means of bringing competition to rural areas, follows same approach.

3.2   Economic Issues

3.2.1 The infrastructure sharing reduced the CapEX, OpEX and time required to roll out of the services. It is an established fact that project costs are reduced by 25 to 40 % depending on the type of infrastructure sharing utilized. The willingness in infrastructure sharing is high when service providers want to provide quick coverage in a large geographical area while traffic demands are low and the costs for network deployment are relatively high.

3.2.2 Regulation of the commercial agreements for the sharing of the site is difficult as the cost of the site is dependent on the location, cost of setting up of infrastructure, type and extent of sharing, number of the service providers sharing the infrastructure etc. As such at the most some sharing models can be worked out but sharing agreements have to be between service providers. It is important to note that sharing of infrastructure is between two service providers and it depends on number of factors like cost of setting up infrastructure, possibility of sharing of infrastructure, technological suitability etc. Sharing possibilities varies from location to location and cities to cities.

3.2.3 Even if it is assumed that there will be savings in infrastructure sharing, the next issues of concern would be, whether savings out of infrastructure sharing will be passed on to subscriber. Likelihood of reduction in tariffs as a result of infrastructure sharing may be meager. Such advantages are generally retained by service providers unless there is tough competition. The monitoring and regulating such costs becomes almost impossible since the sharing pattern is not uniform all across the country and between service providers.

3.2.4 Passive infrastructure sharing was not permitted by many regulators at initial stage of liberalization in some countries. This was perhaps to boost development of infrastructure in the country. In India, the mobile sector has already developed significantly having more then 90000 towers across the country. The total wireless subscribers (GSM +CDMA+WLL-F) by October, 2006 ends have already reached 136 million. We can commonly see mobile towers of different service providers in close vicinity especially in big cities and metros. This indicates that Indian market is set to make benefits out of Infrastructure sharing.

3.2.5 The important concern is how to ensure substantial advantages to service providers out of Infrastructure sharing and ensure that the same is passed on to subscribers.

3.2.6 Some State Governments have also started regulating the erection of mobile towers and has issued policy guidelines. The towers should be put on commercial buildings, community buildings or open space and should avoid putting towers in residential areas. The clearance from local bodies is also being made mandatory and one-time as well as annual renewal fee has been fixed. It has been suggested that towers should be shared among service providers as per technical specifications.

3.3 Social Issues:

3.3.1 The increasing numbers of the towers day by day are putting a lot of stress on the aesthetics of the city. Tall masts can be seen in close vicinity all across the cities. Similar scenes will soon appear in rural areas as well if timely action is not taken. Metro cities in India already have much pressure on availability of the land. Such mushroom growth of the towers is likely to adversely affect the situation.

3.3.2 Many masts are being put on the roof tops of the buildings. The locations of such masts are decided based on the RF coverage map. Many a time the suitability of the building and strength to support such loads are not properly checked. This may result in damages and risk to human life living near such installation especially in rainy season and windy weather. Infrastructure sharing definitely has potential environmental benefits of mast and site sharing.

3.3.3 Very close installation of the towers is likely to have RF concentration at some spots in the area. Though no such surveys have been conducted in Indian scenario, possibilities cannot be ruled out. As such, this advocates that infrastructure sharing must be encouraged and as far as possible erection of the towers must be controlled and allowed only when all options are explored.

3.4   Issues for consultation:

1.   **Do you feel the need to bring appropriate legislation/ amendment in licensing conditions to encourage passive infrastructure sharing?**

2.   **Do you feel that active infrastructure sharing be permitted by modifying the existing licensing conditions?**

3.   **Would any potential competition concerns arise with infrastructure sharing? If so, how would such competition concerns be addressed to ensure that**

there is no adverse impact on consumers' benefits in terms of choice of service providers, access, availability of services, range, quality of services and pricing?

4.   What benefits are expected to the subscribers by infrastructure sharing and how these can be monitored?

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Chapter 4. STATUS OF INFRASTRUCTURE SHARING AND POSSIBLE POLICY INITIATIVE

4.1 Present Status in country

4.2 Service providers are sharing infrastructure at their own initiative selectively. The available information suggests that about 25% tower sites are already shared for passive infrastructure only. This too is predominantly in rural areas and small towns.
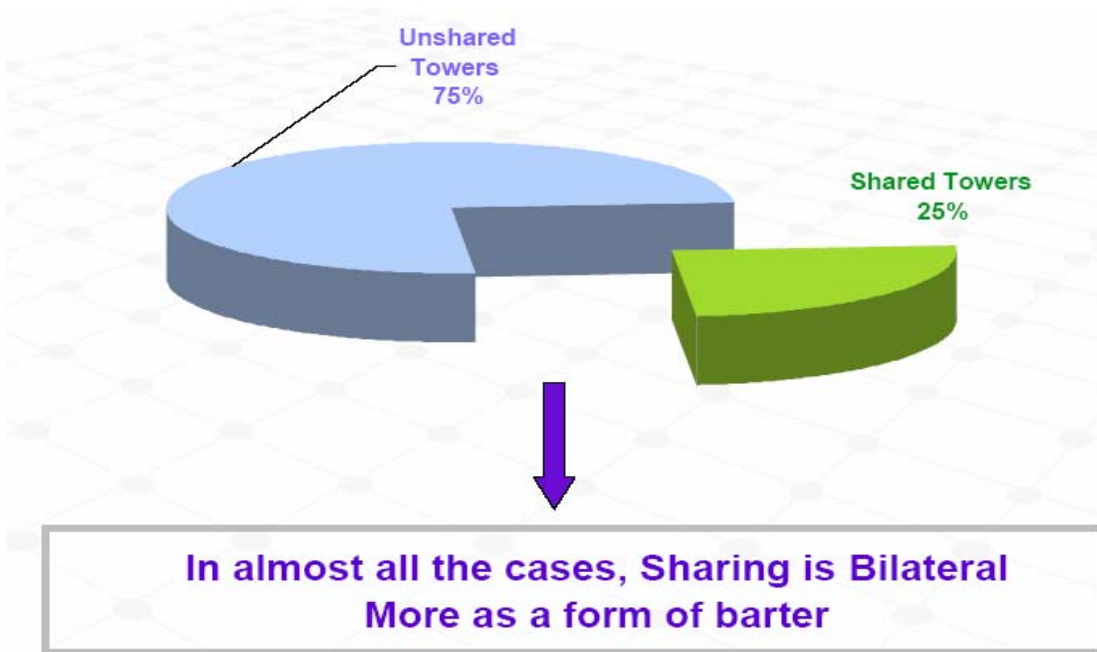
Source:COAI

4.3 Some companies have registered with Department of Telecommunications (DOT) as Infrastructure provider (IP-I) for setting up of basic infrastructure for telecom services. These IP-I service providers are negotiating with various mobile/UASL service providers for setting up towers in rural areas.

4.4 Government's Initiative on Infrastructure Sharing

4.4.1 Urban Areas

4.4.1.1 On Government initiative, a program named Mobile Operators Share Tower (MOST) has been started. The thrust has been to encourage mobile service providers to mutually negotiate and agree to share towers.

4.4.1.2 All major service providers and infrastructure providers represented through Cellular Operators Association of India (COAI), Association of Unified Service Providers (AUSPI), Telecom Equipment Manufacture Association (TEMA), and companies providing Infrastructure for mobile service providers like Quipro, GTL, ERICSSON etc are the members of 'Project MOST' (Mobile Service providers' Share Towers Initiative) . The initiative will first concentrate on metros and subsequently move to smaller cities and towns.

4.4.1.3 The MOST is planned to be implemented in phased manner. It was expected to share app 1450 existing and 285 green field sites by Sep 2006. The progress as of now in numbers is not very encouraging however all the service providers have been sensitized and willingness to share the towers to provide wireless services is strong. The initial teething problems have been resolved.

4.4.1.4 Recently initiatives have also been taken by mobile service providers to enter into long term mutual agreement for passive sharing of infrastructure among them in a big way. As per the press report the agreement between Hutch, Idea, and Reliance communication limited has been signed. It will enable sharing of over 23000 existing towers among them. Talks for sharing of towers between Reliance communications, Airtel, Aircel etc is also in progress.

4.4.1.5 As can be seen from above discussions that government initiative has sensitized mobile service operators about the need of infrastructure sharing and willingness for such sharing has increased amongst mobile operators, but it is still far below the expected level. It is still on mutual agreement basis and not becoming popular as expected.

4.4.1.6 The exponential growth of mobile subscribers and limited availability of spectrum forces mobile operators to setup more and more BTS sites. It is resulting in mushroom growth of the towers requiring huge investments and further deteriorating skylines in urban areas. Cluster of towers in close vicinity in urban areas are getting very common. As such, sharing of the infrastructure is crying need.

4.4.1.7 Since mutual sharing of infrastructure is not getting popular, the other option could be to mandate the infrastructure sharing amongst the operators. However we have discussed this issue in chapter 3. It may perhaps not be desirable to mandate infrastructure sharing.

4.4.1.8 The other feasible option that needs to be considered for urban areas is to encourage infrastructure sharing through mechanism of financial incentives. The stakeholders are requested to give their views on this aspect.

4.4.2 Rural Areas

4.4.2.1 While infrastructure sharing in urban areas is important to control the mushroom growth of towers and to protect deteriorating skylines, infrastructure sharing in rural area is important to reduce the roll-out cost and increase expected rate of return on investment. The telecom traffic is such rural area is going to be meager hence having higher possibilities of leveraging on sharing of infrastructure.

4.4.2.2 DOT has taken note of importance of infrastructure sharing in rural areas. In order to facilitate deeper penetration in rural and remote areas, it has decided to provide financial support for setting up of the tower and active infrastructure like back haul etc to help service providers to roll-out their mobile services faster and with much lower investments.

4.4.2.3 A proposal is under active consideration of Universal Fund Administrator in the Department of Telecommunication to provide subsidy support for creation of infrastructure shared amongst three telecom service providers, for provision of mobile services in rural and remote areas of the country. About 8,000-10,000 towers along with electricity connection, power backup etc. is proposed to be set up, which are presently not covered by mobile signals. The Telecom Service Providers and the short-listed Infrastructure Providers shall be eligible to create the proposed infrastructure, while mobile services would be provided by the successful service providers only. Expression of interest (EOI) from infrastructure provider category I registered with DOT has been called for setting and managing passive infrastructure.

4.4.2.4 The existing tower data of all the telecom service providers as on March 2006 has been plotted on a GIS map and the uncovered areas have been identified after taking out the area already covered by existing towers assuming a uniform radius of coverage. The exact number of towers to be located in the uncovered area is being arrived at by simulating RF planning taking into consideration the terrain, topography of various areas etc.

4.4.2.5 The location of the towers proposed to be installed in Uttar Pradesh, Madhya Pradesh, Rajasthan, Gujrat and some other States has been worked out on a sample basis and is already available on DoT website. The number of towers to be installed may undergo a change depending upon the rationale adopted and the feedback received in this regard. DOT has invited comments/suggestions in respect of the proposed towers. The inputs received from stakeholders in this regard

would be of immense use in completing a similar exercise for other states and these details will form part of the draft tender document.

4.4.2.6 The tentative requirement of mobile towers for some of the states as issued by USO Fund Administrator seeking Expression of Interest (EOI) for providing coverage to rural, uncovered and remotely located areas is as under:

State	No. of Proposed Towers	No. of Villages Getting Covered by Proposed Towers	Population Getting Covered by Proposed Towers	Area Getting covered by Proposed Towers (Sq. Km.)
Assam	121	4717	2465793	19719
Uttar Pradesh	447	11126	13718971	35190
Madhya Pradesh	1845	27642	24041021	226272
Rajasthan	1484	7906	5009571	19093
Jharkhand	305	1872	2355642	24187
Karnatka	415	17276	21462376	165062
Maharashtra	1018	13349	17054560	151424
Andhra Pradesh	774	11866	21116444	177789
Orissa	679	9860	5692039	69535
West Bengal	159	5465	6375043	22198
Gujrat	246	1872	2355642	24187
Tamilnadu	68	862	1175372	6805
Total	**7561**	**113813**	**122822474**	**941461**

Table-3

4.4.2.7 It is expected that similar exercise for setting up of towers for other states is going on and details would be available soon.

4.4.2.8 The universal services Obligation fund (USOF) scheme to support infrastructure sharing is structured in two parts. Part 'A' deals with passive infrastructure sharing for three operators comprising of sharable components like land, towers, electrical connections, power backup, etc. Part 'B' Deals with active infrastructure sharing comprises of components like Base transceiver Station (BTS) equipment with associated antenna and part of back haul etc.

4.4.2.9 From the above deliberations it is clear that service providers as well as USOF administrator are taking initiatives to adopt passive

infrastructure sharing in big way. The initiative of the Universal services fund administrator to map the rural uncovered area of the country is commendable and expected to boost the mobile penetration in rural areas. The implementation of the scheme is likely to play very important role. The bids are likely to be called and the successful bidder, who seeks least subsidy will be awarded contract to setup the towers. The infrastructure so built shall be shared between three mobile service providers.

4.5   Policy alternatives to achieve infrastructure Sharing

4.5.1 The previous paragraphs have dealt on economic, social and technical implications of infrastructure sharing. There are three possible key routes for achieving this goal:

(a)   Some form of mandated infrastructure sharing achieved through regulatory intervention and amendment in license condition.

(b)   Voluntary infrastructure sharing left to the service providers with little or no intervention from either Regulator or the Department of Telecom.

(c)   Various modes of incentives particularly financial to motivate the service provider for sharing of infrastructure.

As previously discussed, the international experience is not in favour of legal or regulatory intervention. It is felt that such an intervention may retard the growth of infrastructure and perhaps may be inadequate to address all the technological and level playing issues. The telecom service providers have already adopted the voluntary mode of commercial arrangements amongst the service providers for infrastructure sharing. However, the process is slow and in patches and there is no planned action programme to achieve the goal. The Department of Telecom has already taken the first step for providing financial incentive to the mobile service operators who agree to a prescribed plan of infrastructure sharing in the rural areas. The Authority, therefore, has examined possible similar incentives in the entire telecom sector i.e. applicable to both urban and rural areas.

4.5.2 The Authority in its recommendation dated 3rd October, 2005 on "Growth of Telecom Services in Rural India" has given a framework

for financial incentives in the rural areas. Since then the concept has been further developed by Administrator, Universal Service Obligation Fund (USOF) and a concrete plan is already under implementation. The Sharing of infrastructure is equally critical to urban areas in view of explosive growth trend of mobile subscribers, limited availability of spectrum, deteriorating skyline and also reluctance of mobile operators towards the adoption of this concept. Therefore, it is necessary to offer an innovative scheme for urban areas to encourage infrastructure sharing.

4.5.3 Various modes of providing financial incentives could be considered. One way could be to permit certain percentage reduction in license fee or spectrum fee for those mobile operators who willingly come forward based on number of the towers shared. This would be welcomed by mobile operators as it will reduce net cash out flow, and provide further saving in terms of reduced Capex and Opex. License fee is charged as percentage of Annual Gross Revenue (AGR) ranging from 1% to 6%. Hence any reduction in license fee far sharing equal number of towers by two different mobile operators in a particular area will be different. Greater advantage shall be passed on to the mobile operator having higher gross revenue. Hence, the issues of level playing field amongst service providers arise. One possible solution is that instead of certain percentage reduction in license fee, a fixed amount per tower can be considered as incentive and adjusted against the license fee for the years in which such tower is operational and functional. In this scheme mobile operator must enter into agreement with at least two other mobile operators for infrastructure sharing. Service provider willing to setup tower and having reached agreement with other service providers will inform intention of sharing to identified agency in advance along with the copy of agreement. The builder of such tower would qualify for certain predetermined percentage of total financial incentive and the remaining installment may be paid on completion of the tower and provision of telecom services from this tower. Thus the balance incentive would be released after other telecom service provider sharing infrastructure also rolls out service. There will be well laid conditions backed by necessary security to check misuse of such scheme. The amount of such incentives in urban areas can either be fixed or linked with the rural incentive being provided by USO Fund Administrator or incentive in urban areas may be kept at reduced slab to maintain interest of mobile operators to go to rural and uncovered areas.

4.5.4 USO Fund Administrator has finalized a detailed scheme to provide subsidy support for passive infrastructure in rural particularly

uncovered areas. However, the winner under this scheme for installing passive infrastructure could either be infrastructure provider or telecom service provider. It envisages maximum number of three mobile operators to share the infrastructure. As number of service providers are more than three in all the circles, and infrastructure created with the support of USOF shall be able to support only up to three service providers, a question of level playing field may be raised as some service providers will be able to share the towers setup with USOF support for roll out of their services in rural area while others will be deprived from such support. Failure of the winner to setup tower in specified time frame can also deprive other service providers sharing infrastructure to roll out services in rural area and badly effect rural penetration. In order to overcome the limitations as discussed, another parallel model encouraging service providers to setup towers in identified rural and uncovered area can be considered. Service providers may be encouraged to come forward to setup tower and share the same with at least two more operators. A framework of financial incentives could be evolved to promote such an effort of encouraging all service providers to join the race. These, no doubt should qualify for subsidy at the reduced scale as may be determined for urban areas.

4.5.5 Any service provider who is willing to setup such towers in rural and uncovered area may inform its intention in writing to Department of Telecommunication (Say USOF administrator) and also submit a copy of his proposal enclosing copy of the agreement to share infrastructure with other service providers.. There after the service provider can setup such towers. Any tower erected in rural and uncovered area from a pre-determined date may be eligible for incentive. The norms for determining different subsidy methods can be evaluated. A flat subsidy say X amount per tower or the minimum support provided per tower to successful bidder/Infrastructure provider by USOF administrator in that circle, or lower of the two could be one of the options. Similar method based on stakeholders' comments can be worked out. The incentive schemes is likely to encourage role of more service providers and will increase competition in rural and uncovered areas resulting in faster roll out of services at affordable cost.

4.5.6 The provision of reliable power supply in rural area is another challenge. The operational cost becomes very high to provide backup power supply in case regular electric supply is erratic. Moreover, the use of generator for long hours results in pollution. There is a need to encourage use of non-conventional sources of

energy. If a service provider uses say solar energy to energize BTS, he may be considered for certain incentive taking clue from similar concept being used internationally to reduce pollution known as "Carbon Credit".

4.5.7 The concept of carbon credit came into vogue as part of an International agreement, popularly known as the Kyoto protocol. Carbon credits are certificates issued to countries that reduce their emission of GHG (Green house Gas) which affect the Ozone layer, leading to global warming. The countries having GHG emission below the target, can sell surplus credits to developed countries to earn financial incentives.

4.5.8 The environment protection is one of the serious concerns. We may workout some formula to encourage use of the non-conventional sources of energy like solar energy, wind energy wherever it is possible. Comments of the stakeholders in this regard will be very useful.

4.6   Issues for consultation:

1.   **Please comment on measures and incentive schemes discussed and suggest steps to popularize infrastructure sharing in telecom sector both urban and rural?**

2.   **Suggest innovative schemes to provide incentives for use of non-conventional sources of energy especially in rural areas?**

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Chapter 5. ISSUES FOR CONSULTATION

1.   Is there a need to mandate or promote passive infrastructure sharing through policy intervention?

2.   a) Is there a need of defining critical infrastructure (CI) for the purpose of passive infrastructure sharing? If so, what shall be the basis to identify Critical Infrastructure? Which agency should identify critical infrastructure?

3.

         b) Is tower structure in identified critical Infrastructure areas be set up by third party infrastructure providers like IP I and shared between various service providers or left to the market forces?

4.   Presently back haul sharing is not permitted as per licensing conditions. Since sharing of back haul optical fiber and radio link from BTS to BSC will be very useful for deeper penetration and coverage, would you suggest suitable modification in licensing conditions?

5.   In your opinion, is there a need of regulatory intervention to encourage active infrastructure sharing?

6.   In your view whether you consider active infrastructure sharing as pre-requisite to MVNO? If so, suggest future course of action to encourage MVNO in Indian market?

7.   What other modes of active infrastructure sharing will be useful in Indian scenario and suggest actions which you feel necessary to encourage such sharing?

8.   Do you feel the need to bring appropriate legislation/ amendment in licensing conditions to encourage passive infrastructure sharing?

9.   Do you feel that active infrastructure sharing be permitted by modifying the existing licensing conditions?

10. Would any potential competition concerns arise with infrastructure sharing? If so, how would such competition concerns be addressed to ensure that there is no adverse impact on consumers' benefits in terms of choice of service providers, access, availability of services, range, quality of services and pricing?

11. What benefits are expected to the subscribers by infrastructure sharing and how these can be monitored?

12. Please comment on measures and incentive schemes discussed and suggest steps to popularize infrastructure sharing in telecom sector both urban and rural?

13. Suggest innovative schemes to provide incentives for use of non-conventional sources of energy especially in rural areas?

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INTERNATIONAL EXPERIENCE

1   USA:

Telecommunications in the USA is regulated by the Telecommunications Act 1996, which contains requirements for both co-location and infrastructure sharing. These requirements are imposed by section 251 on Interconnection. There is a separate section 259 on Infrastructure Sharing, but section 259 applies only where the service provider who is sharing another service provider's facilities uses them only for services that do not compete with the provider of the infrastructure. Since all the issues are discussed in the context of section 251, there is no need to consider section 259 further.

Section 251 includes requirements for

1. All carriers to provide access to poles, ducts, conduits and rights-of-way to competing carriers;
2. Incumbent local exchange carriers (LEC) to:

➢   Negotiate in good faith
➢   Provide to any requesting carrier non-discriminatory access to network elements on an unbundled basis at any technically feasible point on terms that are non-discriminatory.
➢   The access must be provided in a way that enables the requesting carrier to combine such elements to provide a service.
➢   Provide on reasonable and non-discriminatory terms for the physical collocation of equipment necessary for interconnection or unbundled access at the premises of the LEC, except that virtual collocation may be provided if collocation is not practicable for technical or space reasons.

Rural telephone companies may gain exemption or modification from the requirements.

The FCC issued a Notice of Proposed Rule Making (Docket 96-98) followed by the First Report and Order (FCC-96-325) in August 1996. The First Report and Order contains an extensive discussion of the issues and the new Rules.

The FCC Rules require:

- ➢ Utilities to provide a carrier with non-discriminatory access to any pole, duct, conduit or right-of-way. Access may be denied if there is insufficient capacity or for safety, reliability or engineering reasons.
- ➢ Requests to be in writing and to be fulfilled within 45 days otherwise written reasons must be given why the request is being denied.
- ➢ 60 days notice must be given of removal or modification to facilities, apart from emergencies
- ➢ A carrier may file a petition against the removal or modification of a facility within15 days of receiving notice, and the respondent may file a reply within 7 days.

Although the US regulator has not issued regulations specifically addressed to 3G infrastructures sharing, in recent years, the regulator has been called upon to scrutinize on a case-by-case basis several infrastructure sharing joint ventures between various mobile service providers. Based on this experience, the US approach generally has been not to intervene in infrastructure sharing issues, but the regulator has the authority to do so if issues of competitive harm are raised. The same general approach would be applicable to 3G infrastructure sharing should the issue arise. There is also a proposal by the FCC, which examines whether infrastructure sharing is promoted or not as a means of bringing competition to rural areas.

2. France

ART (Autorité de Régulation des Télécommunications) also favoured sharing of 3G infrastructure between service providers, as long as they don't share frequencies. It added that it did not want the sharing agreement to prevent the development of effective competition in the 3G market, which must be beneficial for subscribers

ART defined following five levels of sharing and their compliance with conditions for issuing 3G authorizations:

a) Level 1: Sharing of sites and passive elements

This form of sharing consists of common use by multiple service providers of all or part of the passive elements of the infrastructure. This would include sites, civil engineering, technical premises and easements, pylons, electrical supply, air conditioning, etc.

This type of sharing is not only permitted, but encouraged.

This "level 1" sharing also includes the pooling of transmission elements that are not part of the UMTS architecture, such as connections between base station controllers (BSC) and network nodes (MSC and SGSN) or connections between base stations (node B) and base station controllers (BSC). Such pooling is possible if these elements are not directly from the UMTS network.

b)   Level 2: Antenna sharing

This level is defined as pooling of an antenna and all related connections (coupler, feeder cable), in addition to passive radio site elements. Since an antenna can be considered a passive element, antenna sharing can be included in the more general issue of passive infrastructure sharing mentioned above and therefore complies with the telecommunications act.

c)   Level 3: Base station sharing (Node B)

Base station sharing is possible as long as each service provider:

- maintains control over logical Node B so that it will be able to operate the frequencies assigned to the carrier, fully independent from the partner service provider
- retains control over active base station equipment such as the TRXs that control reception/transmission over radio channels

d)   Level 4: Base station controller (RNC)

RNC sharing is possible since it represents maintaining logical control over the RNC of each service provider independently.

e)   Level 5: Sharing of backbone elements

This consists of sharing switches (MSC) and routers (SGSN) on the service provider's fixed network. The frequency usage authorizations issued by the Authority are assigned intuitu personae and cannot be transferred. Accordingly, the Authority must exclude infrastructure sharing solutions that lead to a pooling of frequencies between service providers.

The sharing of backbone elements does not comply with the French regulatory framework if it leads to such pooling of frequencies. This is the case when backbone elements are shared along with the radio portion.

3.   Germany

In Germany, the regulator RegTP (Regulierungsbehörde für Post und Telekommunikation) stated that each 3G license holder would be required to build its own network, each of which needed to ensure its 'competitive independence' during the lifetime of the license. This means that service providers would not be allowed to share backbone facilities such as switching centers even though they could share network elements such as masts and antennas.

The regulator ruled that infrastructure sharing of wireless sites, masts, antennas, cables, combiners and cabinets was permissible – provided that full legal control of the networks and competitive independence remains intact. There is expectation that this will allow UMTS license holders (particularly new market entrants) to achieve meaningful economies in the build-out of their UMTS networks. Infrastructure sharing could also lead to an extension of 3G coverage, particularly outside urban areas

4.   Brazil

National Telecommunications Agency (ANATEL) laid the rules on infrastructure sharing among telecommunications service providers.

The rules set out the conditions and standards for sharing of ducts, conduits, poles, towers and utility easements in the telecommunications sector. Instead of a price list, ANATEL has prescribed a calculation methodology for actual infrastructure costs.

The major points in the Resolution are:

- only infrastructure over-capacity may be shared with other telecommunications companies;
- acts or omissions aimed at protracting an agreement between telecommunications companies will be treated as unfair competition under antitrust laws; and
- caps on the amount payable by the telecommunications service providers applying for use of another service provider's infrastructure were adopted.

5.   Jordan

Telecommunications Regulatory Commission of Jordan issued a statement is in regard to the implementation of Infrastructure Sharing and National Roaming for mobile telecommunications service providers.

In this statement, the TRC has concluded, "it is impractical to publish an exhaustive set of rules with respect to collocation and infrastructure sharing matters. Instead, the TRC will address any issues related to capacity, availability or other situations that may arise on a case by case basis. In instances where the requesting service provider and the other service provider fail to reach agreement in these matters, the TRC will conduct an investigation. Upon completion of its investigation, if the TRC has determined that infrastructure sharing or collocation is indeed feasible, it will then issue a decision regarding the terms, conditions and time frames under which infrastructure sharing or collocation (or both) will be provided."

6.   Netherlands

In the Netherlands, NMa (Netherlands Competition Authority), OPTA (Independent Post and Telecommunications Authority), and the V&W (Ministry of Transport, Public Networks and Water management) issued a joint memorandum that provided comprehensive clarification on collaboration in the deployment of 3G networks in September 2001. They agreed to allow 3G service providers to collaborate in the construction of 3G network components on the condition that competition between service providers continued to exist and that service providers compete against one another in providing 3G services. While they shared the opinion that collaboration in 3G network deployment could contribute to a more rapid 3G rollout, they clarified that collaboration must be limited to the joint construction and use of the 3G network infrastructures such as masts, aerials and network operation. On this basis, they did not permit the joint use of frequencies and core networks.

7.   Sweden

In Sweden, network infrastructure sharing is allowed under the present 3G licensing regime as long as each service provider has 30% of the population covered with its own infrastructure, the 70% remaining being sharable. The radio infrastructure includes antennas, transmission equipment and other intelligent parts of the network, while leaving aside masts, power supply, sites and so forth

8.   Norway

The different networks in Norway can share most of the infrastructure. Masts, antennas, power supplies, housing,

transmission routes etc. can be shared. Node B and Radio Network Controllers can be shared except from the intelligent control of the frequency resources. The core network can**not** be shared. The frequencies **cannot** be shared.

The licensing process specifically required the networks to meet the coverage requirements by using the licensee's own frequencies. This requirement could have been relaxed by allowing frequency sharing in parts of the country, especially in rural areas.

9. **UK**

Most such agreements are governed by UK Chapter I competition prohibitions (EC Treaty Article 81), which prohibit agreements which have the object or effect of preventing, restricting, or distorting competition and that may affect trade within the UK. Some agreements, depending on how they are structured, could fall to the European Commission under the EC Merger Regulation.

Service providers would need to satisfy themselves that any infrastructure agreements do not fall foul of general competition law; general guidelines have been published by both OFT and Oftel. However, service providers may ask Oftel for guidance or a decision under the Competition Act as to the compatibility of the agreement with competition rules. They may apply for an exemption if they apply for a decision. Oftel cannot give legal advice in advance of any agreement being notified to it for guidance, a decision or an exemption. It is up to the parties concerned to ensure that any agreements do not fall foul of the law. An exemption may be granted if the agreement satisfies the criteria set out in the Competition Act, and it may be subject to conditions if the Director General sees fit and with the agreement of OFT. The Commission can similarly grant an exemption if the conditions in Article 81(3) are met.

Any infrastructure sharing arrangements would need to ensure that consumers get a fair share of the benefits of such a deal, and that the terms of the deal only cover what is required to deliver those benefits

10. **Trinidad and Tobago**

TATT has attempted to prevent the proliferation of cellular towers throughout the country by mandating collocation (tower sharing) in the concession granted to cellular providers. The operators who availed concessions are required to share where the same is technically feasible. As per the guidelines issued by Ministry of

Planning and Development, any operators who wish to construct a tower, has to get the clearance/no objection from TATT.

TATT is not involved in fixing of price for collocation but TATT intervenes only when there is dispute between the parties.

No incentive is offered for collocation, however by way of ensuring fairness, maintaining control TATT has stipulated that concessionaires may only put their antennae on towers that are owned and controlled by another concessionaire.

11. **St. Vincent and the Grenadines**

Infrastructure sharing is done by a mutual agreement between operators. It is not mandated by a Regulation.

12. **Hong Kong**

In Hong Kong the network operators are encouraged to share facilities on a fair commercial and technical terms & conditions in order to avoid uneconomic duplication on network resources. The Telecom Authority is empowered under the Telecommunication Ordinance in Hong Kong to direct the cooperation and coordination among the licensees in the public interest to share the use of network facility after considering the factors such as bottleneck facility, duplication on network resources. The Telecom Authority may also make any determination in terms and conditions of the shared use of facility should the operators have failed to reach an agreement.

13. **Nigeria**

Infrastructure sharing is encouraged in Nigeria by the Regulator and it is being done by mutual agreement between the operators. The operator, who wishes to make use of the facility of other operator, should request in writing for availing the facility. The regulator steps in when there is a dispute or a refusal from an operator to share its infrastructure. It is not mandated by a regulation.

The Regulator encourage and promote the sharing of Right of Way, Masts, Poles, Antenna mast and tower-structure, Ducts, Trenches, Space in buildings, Electric Power etc.

14. Switzerland

According to the license, Swiss operators are obliged to use jointly the operations building and the antenna mast in so far as sufficient capacity exists and technical, legal and economic reasons do not prevent co-use of sites.

15. Malaysia

Applicant Information Package (AIP) of 2002 was issued by Malaysian Communications and Multimedia Commission (MCMC). In this they have identified Infrastructure Sharing as one of the criteria for evaluation. Among the criteria that was outlines in the AIP on infrastructure sharing are as follows :

i) Sharing or allowing access to the use of airtime and network facilities with other licensees and
ii) Maximising the use of existing network facilities including existing network capacity and capabilities, existing base station sites, backbone, radio links etc to enhance sharing and reduce duplication of network facilities.

16. Saudi Arabia

The Communications & Information Technology Commission (CITC) the regulator in Saudi Arabia, considers that the sharing of network infrastructure and facilities between Data telecommunications service providers can provide an efficient and cost-effective approach to the provisioning of Data telecommunication networks. The sharing of towers, poles, conduit, central office space and other facilities can benefit both the own and shared user of such facilities.

Bylaws mandate collocation to be provided where economically feasible and no major additional construction work is required. The service providers shall agree on the amount to be compensated for co-location provided.

CITC would be involved in case of any dispute.

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