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August

**CONSULTATION PAPER ON INFRASTRUCTURE SHARING  
OF CELLULAR MOBILE COMPANIES**

*The purpose of this paper is to consult all stakeholders like CMTO's on the questions listed in the Paper for the formulation of guidelines on infrastructure sharing. The stakeholders are requested to send their comments on the Paper within 15 days of posting on PTA website. This Paper does not convey in any sense a decision of the Authority in respect of the issues discussed.*

*Consultation paper comprises of four portions;*

- a. Current mobile regime and scenario in Pakistan*
- b. Regulatory provisions*
- c. Infrastructure sharing concept and International scenario*
- d. Proposed guidelines*
- e. Questionnaire*

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**A. INTRODUCTION**

1. The Pakistan Telecommunication Authority (The Authority) is responsible for regulating the telecom sector, through following sections of the Telecommunication (Reorganization) Act, 1996 (Amended in 2006):

Section 4 (a) (d);

- (a) The Authority shall regulate the establishment, operation and maintenance of telecommunication systems and the provision of telecommunication services in Pakistan;
- (b) Promote the availability of a wide range of high quality, efficient, cost effective and competitive telecommunication services throughout Pakistan;
- (c) Promote rapid modernization of telecommunication

2. As per Cellular Mobile Policy 2003 the clause 6.4 deals with infrastructure sharing is as under;

***“All Licensees are encouraged to implement infrastructure sharing in accordance with the guidelines issued by PTA and FAB.”***

It is important to encourage Infrastructure sharing as a matter of policy keeping in view the environmental issues related with towers and masts. Infrastructure sharing includes requirement to lease out facilities on a nondiscriminatory basis to other service providers. The facilities provided may include space, electrical power, air conditioning, security, cable ducts, space on antenna masts or towers, rooms etc. Infrastructure sharing, including co-location and facility sharing, shall be provided based on the guidelines established by PTA/FAB on the principles of neutrality, non-discrimination, equal access and commercial arrangements.”

3. PTA seeks views and comments of the industry and members of the public so as to have a better understanding of different needs and requirements of affected and interested parties. This will help in assessing, from a public interest perspective, an appropriate approach to frame policy for infrastructure sharing. A key deliverable of this consultation exercise is to assess and determine when and how to allow infrastructure sharing and set the objectives and criteria to help in the assessment, and monitoring, of infrastructure sharing amongst licensees.

### **THE PURPOSE**

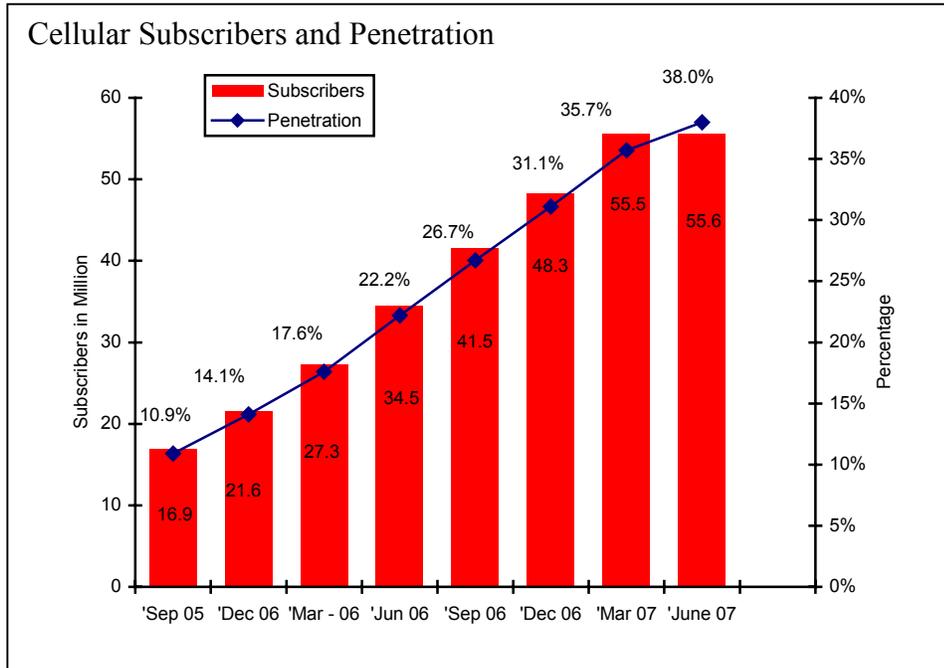
4. The purpose of this Consultation Paper is to formulate Policy Guidelines on infrastructure sharing after obtaining comments from stakeholders involved and then follow the best international practices in implanting the same. It contains a brief description of different kinds of infrastructure sharing possibilities and describes the general principles of regulations applied on infrastructure sharing.

5. The issues raised in the Paper require feedback from the stakeholders to assist the Authority in formulating the guidelines.

## BRIEF OVERVIEW OF CELLULAR MOBILE SECTOR IN PAKISTAN

### Subscribers, Coverage & Penetration

#### Subscribers Analysis

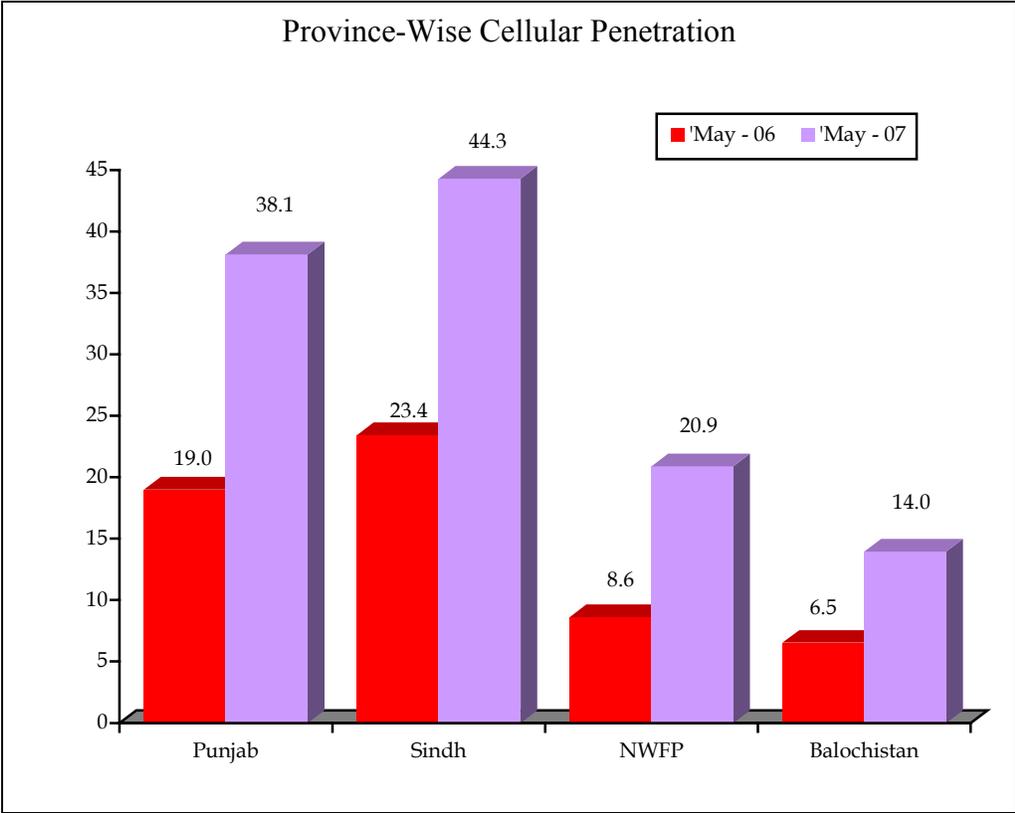


6. Mobile sector alone has surpassed all records of subscriber growth rate in Pakistan. There are currently 64.05 million subscribers in the country, including AJ&K and NAs; and on average 20-25 lacs are adding up every month

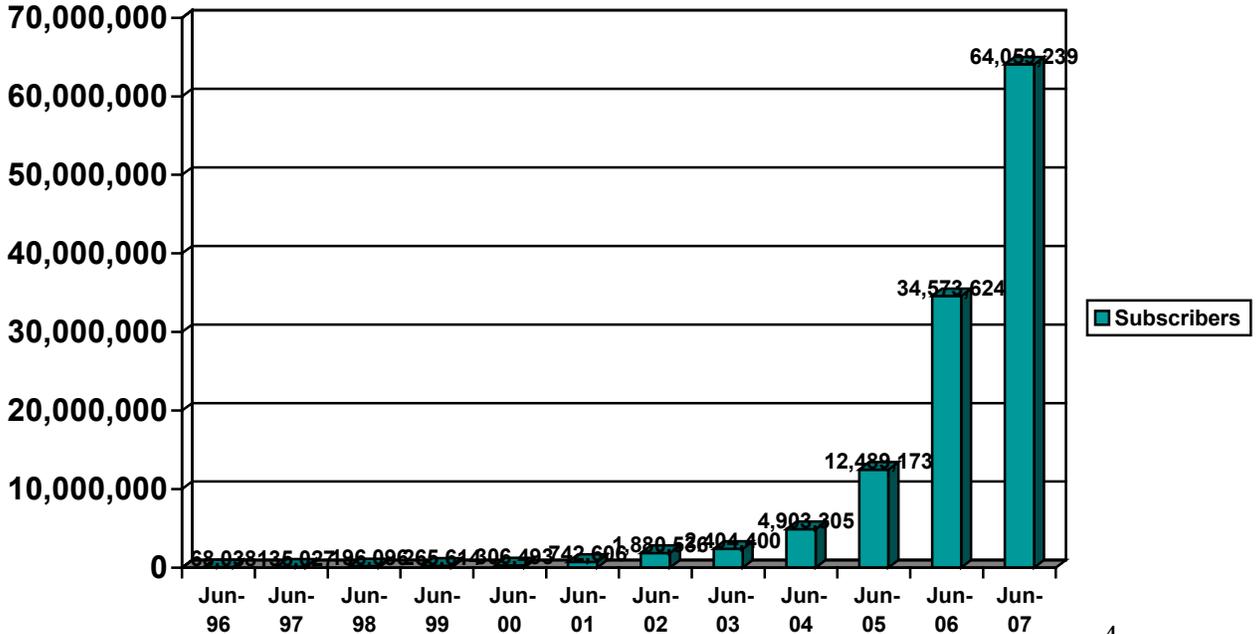
where mobile operators have just entered for provision of their services. The subscriber growth rate was 154 % in 2004-05, 170 % in 2005-07 and has crossed 170 % in 2005-06.

#### Company wise Subscribers Growth

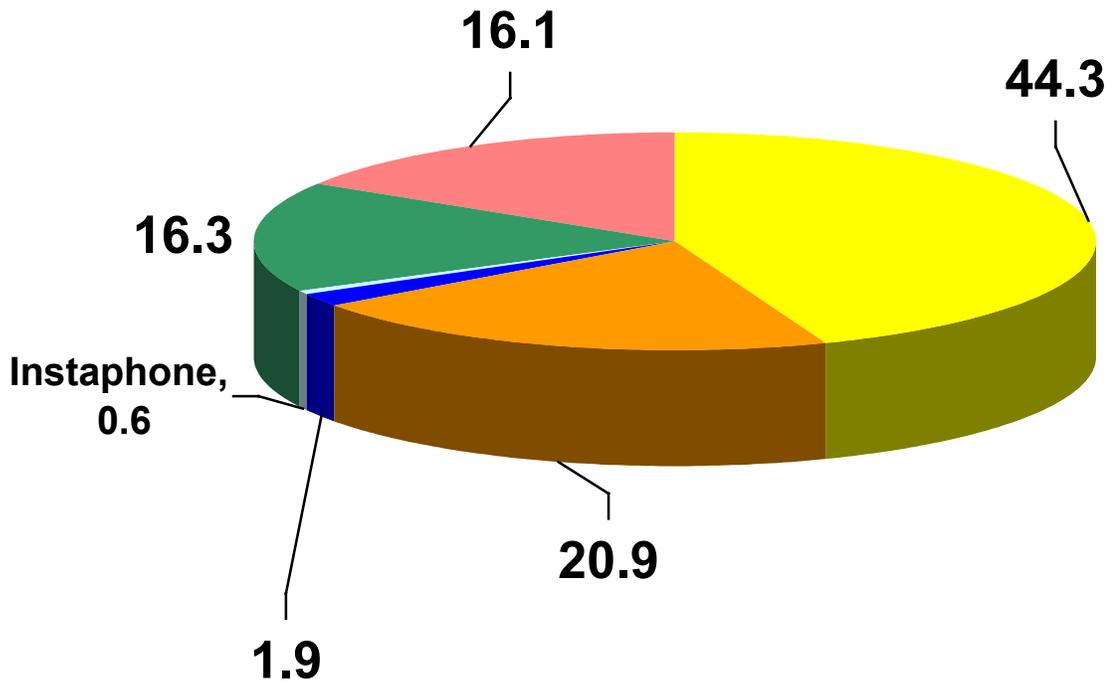
7. As of Mar-07, Mobilink and Ufone have respectively achieved subscriber base of 24.6 & 11.6 million. Two new operators Telenor & Warid launched their services in March and May 2005 respectively have performed excellent. Telenor added 9.1million and Warid acquired 8.9m subscribers till Mar 2007. China Mobile (Paktel) GSM has shown below average growth in subscribers, however, they have been innovative in introducing new commercial concepts such as credit on incoming calls, low international tariffs, per second billing, monthly flat rates billing etc.



## Mobile Subscribers



Cellular Market Share  
June 07



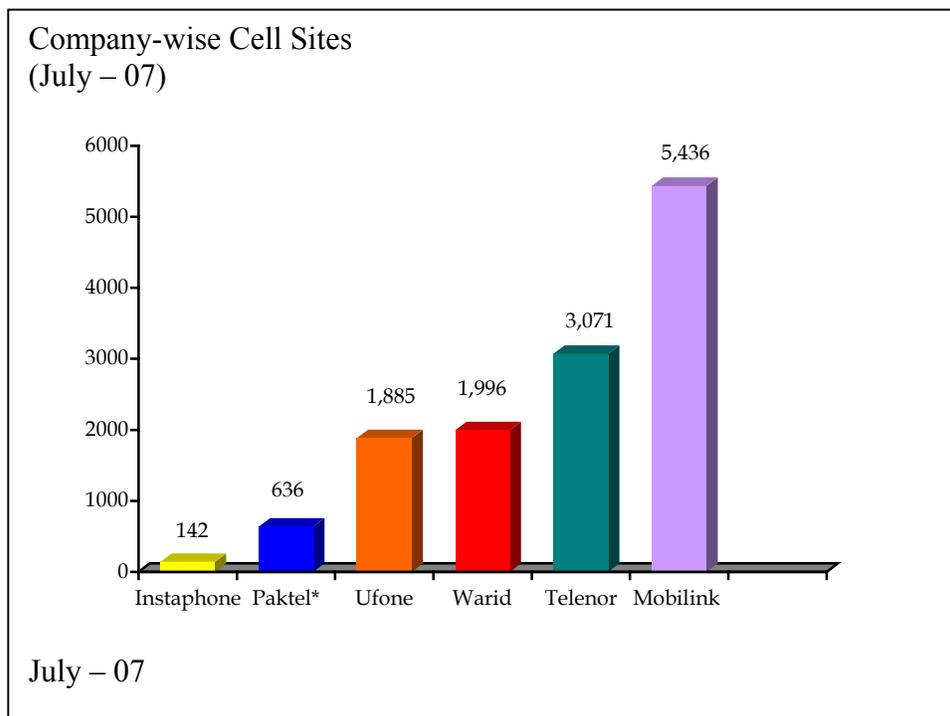
**Legend:**

Mobilink 44.3 %, Ufone 20.9 %, Paktel 1.9%, Instaphone 0.6 %, Telenor 16.3% ,Warid 16.1%

## B. Current Scenario:

13. Currently regulatory environment in Pakistan does not oblige the licensees to share infrastructure with their competitors. Each licensee is expected to build or lease the infrastructure it requires, although the license they own allows them to share their infrastructure on commercial arrangements. PTA, so far, has not issued any guidelines to regulate the matter. Penetration in rural areas is increasing. The construction of towers is mushrooming and in near future towers population across the country will change urban and rural landscape. A need is thus felt to have a framework in place guiding and promoting the sharing of communication infrastructure. Present individualism is reflecting underutilization of BTS sites and resources and is also a burden on the operators. There is also general public concern over effects on health and environment due to growing numbers of BTS's in cities towns and rural areas. It is therefore imperative that resources are pooled and cost shared in planning and setting of BTS. Relevant clause in the Cellular mobile license regarding infrastructure sharing is as under;

a. "The Licensee is encouraged to share infrastructure with other telecom service providers on the principles of neutrality, non-discrimination, equal access and commercial arrangements. The sharing includes collocation and facility sharing. Infrastructure sharing includes leasing facilities for space, electrical power, air conditioning, security, cable ducts, space on antenna masts or towers, rooms etc. Licensee shall follow the guidelines issued on the subject by the Authority, from time to time."



**WLL Status**

S.No.	Co.Org. Ref.	Approved
1	M/s PTCL	101
2	Great Bear International (Pvt.) Limited	29
3	M/s Telegard	118
4	M/s World Call	188
5	M/s DVCom	121
6	M/s Mytel	2
7	M/s Wateen Telecom	137
8	M/s Cybernet	6 cases under process
9	M/s Burraq Telecom Ltd.	15
<b>Total</b>		<b>790</b>

**Pricing information** of network elements in cellular network are the current estimated information of network elements i.e BTS, BSC as under;

Name of Equipment	Cost /unit
Transceivers	Rs 604,400 approx.
BTS	Rs 8,020,980 approx
BSC	Rs 8,503,340
Microwave Equipment	Rs 1,252,000
Average Rent	Average Rs 20 to 40 thousands per month per BTS
Electricity expenditures	Rs 20000 per month average

Security Expenditures	Rs 6000 security personal armed per BTS site (Average)
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As against the growth of the mobile infrastructure in Pakistan, some examples of other nations are;

- a. Great Britain 60,000 (despite tower sharing)
- b. India 85,000 (3-5 operators sharing)

At present mobile companies have installed about 12000 towers countrywide and it is safely predicted that this number will cross 30,000 in 2010. The prediction is based on the growth rate, market structure, competitive forces, economic conditions of the country, leftover portion of the country for service provision and 3 G licensing in pipeline. Due to this phenomenal growth forth mentioned concerns are attracting attention for arising need of infrastructure sharing. In the course operators are encouraged initially to work out their plans and modalities to make it success.

- a. Aesthetic landscape of the country is changing
- b. Without sharing, the networks are underutilized and inefficient.
- c. Land hiring and agreements with land owners posing complications
- d. Security issues are rising
- e. Clearance procedure delays hamper rollout.
- f. Due to inefficient, systems are cost ineffective.

### **C. Infrastructure sharing Concept**

14 Infrastructure sharing in Europe is translated as having simply two or more operators coming together to share various parts of their network infrastructure for the purposes of their service provisioning. These can take numerous forms, ranging from the simplest one of sharing of space on masts and in associated buildings/sites and typically results in two or more physically separate networks; to geographic division of a market; to an arrangement whereby separate licensees share a single network, which could be run by a separate entity on behalf of the licensees. In essence, one network supporting the rest who are effectively Mobile Virtual Network Operators (MVNOs)

Infrastructure sharing can have a number of variants, but has as its ultimate objective the reduction of costs associated with setting up any mobile radio network by sharing such facilities between one or more mobile operators. In its simplest form it is the sharing of space on masts and in associated buildings/sites (sometimes referred to as "mast sharing"). In this form there are still two physically separate networks.

Another variant might be a form of geographic division of the country market. One example might be for operator A to cover Lahore, and operator B to cover Rawalpindi, on the understanding that network A will allow B's users onto its Lahore network. Similarly operator B would allow A's customers onto its network in Rawalpindi. Another example might be for operators to carve up rural areas, while rolling out separate networks in core areas. These variants would amount to a form of "national roaming" (and in effect is an agreement to divide up the Pakistan market between two or more operators).

The most involved and complex form of infrastructure sharing would be for two separate licensees to share more and more of the elements that make up such a network. At one extreme this would be equivalent to mast sharing, at the other a single network would be run by a separate entity on behalf of two or more Licensees. Thus the model becomes a single network company with the licensees becoming service companies.

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.

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

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.

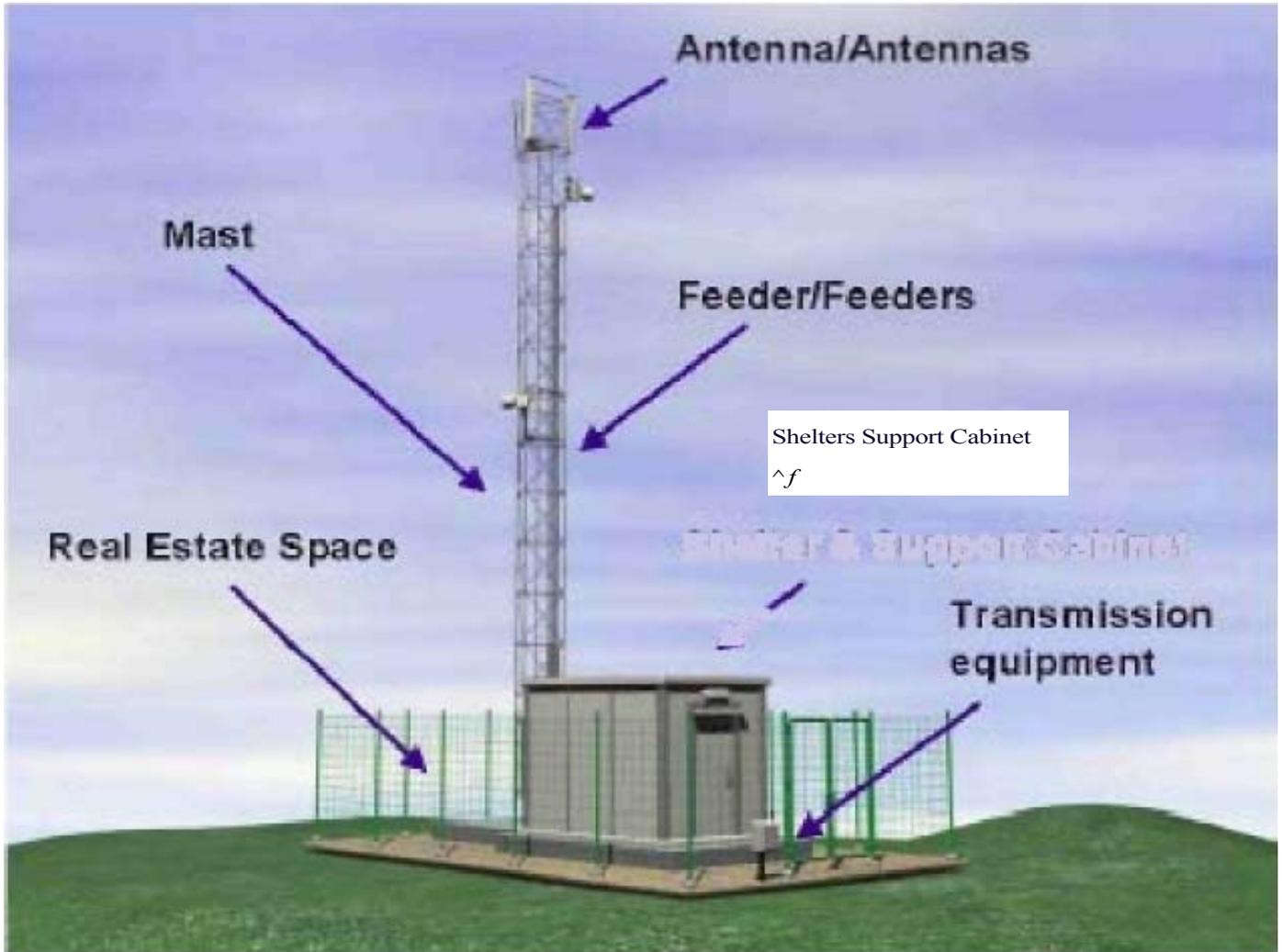
The problem of non-availability of sites in congested areas reducing the coverage and signal strength is common in many countries. Some of the countries have defined such places where acquiring sites and resources are difficult as critical infrastructure (CI). In order to ensure that all service providers 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 Pakistan so that all service providers can have access to such critical sites.

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.

## **TYPES OF INFRASTRUCTURE SHARING**

15. 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



## Fig 1: Site sharing among service providers

Infrastructure sharing can be classified broadly in two categories: (i) Passive infrastructure sharing (ii) Active infrastructure sharing

### **Passive Infrastructure Sharing**

Sharing of passive infrastructure means sharing of physical sites, buildings, shelters, towers/masts, power supply and battery backup. 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.

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.

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.

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.

Infrastructure has to be designed keeping in view the ultimate requirement including those of other service providers potentially 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 etc.

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.

The number of antennae per tower is also a limitation. For example in some of the cities total number of the service providers working in GSM and CDMA are up to 5. This may considerably increase the number of antennae required on one tower even after excluding antennae requirement for the purpose of back haul.

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.

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.

### **ACTIVE INFRASTRUCTURE SHARING**

16. 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 rollout 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.

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

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.

### **Sharing Radio Access Network (RAN)**

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.

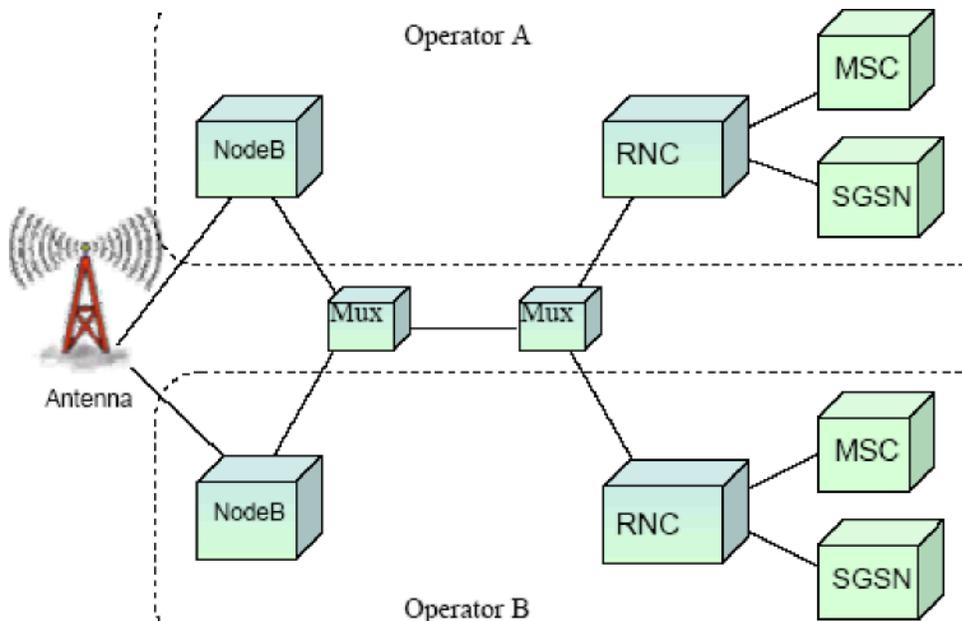


Fig 2: RAN site sharing

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 in India 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.

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

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.

### **NODE B Sharing**

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.

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.

### **Back haul Sharing**

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 our scenario while provisioning telecom services in rural and remote areas.

As per the existing license condition, provision of point to point bandwidth from one service provider's infrastructure within 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.

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

While resale of lease line per se 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. Stake 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.

### **Pooling of spectrum by partners sharing infrastructure**

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.

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.

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.

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.

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 in huge savings in terms of Capex and Opex.

### **D. INTERNATIONAL SCENARIO**

18. Different countries have adopted different approaches concerning regulation of Infrastructure sharing. In order to examine regulatory practices, case studies of few countries have been analyzed. A brief synopsis of the prevailing regulatory regime in few countries is discussed in the following paragraphs;

## Case Studies

### **a. HONG KONG**

In Hong Kong, telecommunications operators are encouraged to negotiate for sharing of facilities commercially. Said that, under section 36AA of the Telecommunications Ordinance, the Telecommunications Authority (TA) may direct the licensees to share use of facilities where it is in the public interest to do so.

In considering whether or not to issue a direction in the public interest to share a facility, the TA will take into account relevant matters, including the following:-

- whether the facility is a bottle neck facility;
- whether the facility can be reasonably duplicated or substituted;
- the existence of technical alternatives;
- whether the facility is critical to the supply of service by the licensees;
- whether the facility has available capacity having regard to the current and reasonable future needs of the licensee or person to whom the facility belongs;
- whether joint use of the facility encourages the effective and efficient use of telecommunications infrastructure;
- the costs, time, penalties and inconvenience to the licensees and the public of the alternatives to shared provision and use of the facility prior to issuing such direction, the TA will provide the licensees reasonable opportunities to make representations.

As far as the terms and conditions of the shared use (including the rental prices), the parties are required to reach an agreement within a reasonable time. If the parties cannot reach an agreement, the TA may determine the terms and conditions for the shared use of the facility and provide for fair and reasonable compensation payable in the circumstances of the case. The compensation determined by the TA will include the relevant reasonable costs attributable to the provision, use or sharing of the facility. In calculating the costs, the TA may select from alternative methods what he considers to be a fair and reasonable costing method

### **b. ENGLAND**

To provide a mobile radio service in the UK requires mobile network operators to comply with the requirements of the Wireless Telegraphy (WT) Act and the Telecommunications (T) Act. The WT Act deals with the use of radio spectrum within the UK, and places duties on and gives powers to the Secretary of State. These functions are primarily exercised by the Radiocommunications Agency on behalf of the Secretary of State. In relation to 3G the main issues are those associated with the requirements of the WT Act Licenses.

The T Act provides for the Director General of Telecommunications to promote the interests of consumers and users of telecommunication services, and to promote and maintain effective competition for such services within the UK. Of tel also has powers, which are held concurrently with the Office of Fair Trading (OFT), with regard to general

competition law under the Competition Act 1998. Depending on the precise form and extent of any infrastructure agreements, they may fall to be considered by the European Commission under Article 81 of the Treaty, if they affect trade between Member States.

The licenses issued under the Telecommunications and Wireless Telegraphy Acts do not a priori exclude infrastructure sharing. Some forms of infrastructure sharing are positively encouraged (mast sharing).

c. **AUSTRALIA:**

Due to the recent spectrum auction, new mobile operators besides Telstra, also Optus and Vodafone will need to provide sharing to other new carriers, which may seek access to Optus and Vodafone towers.

d. **MALAYSIA**

Malaysian Communications and Multimedia Commission (MCMC) issued applicant Information Package (AIP) of 2002. 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) Maximizing 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

e. **INDIA**

India is in the process of consultation with the stakeholders for infrastructure sharing. On finalization recommendations to the Government will be sent by TRA. Present scenario is as under:

India has registered exponential growth in the mobile telephony market in the past couple of years. As on 31st August, 2006 there were 123 million mobile subscribers. Presently, all the operators together have commissioned about 85,000 towers in the country to cater to the need of mobile subscribers. Government of India has set a target of 250 million mobile subscribers by December 2007 and 500 million mobile subscribers by 2010. As per set targets, the number of towers required would be about 1,40,000 by 2007 and 3,50,000 by 2010. Identifying such a large number of mobile tower sites is likely to pose problems.

## **The Authority recommends**

(i) There is urgency for passive infrastructure sharing. The existing provisions in the licenses of BSOs, CMSP, and UASL permit passive infrastructure sharing. The Authority is of the view that mandating passive infrastructure sharing at this stage is not required. Accordingly the Authority does not recommend any legislation/ amendment in the license conditions.

(ii) SACFA clearance needs to be given in a stipulated time frame. If no communication is received in the prescribed time frame, the request may be deemed to be approved. Infrastructure Providers (IP) Category-I may also be allowed to seek SACFA clearance if they have at least one agreement with existing wireless service providers for leasing infrastructure.

(iii) The process of sharing infrastructure should be transparent and non discriminatory. All licensees must announce on their web site the details regarding the existing and future infrastructure installations available for sharing with other service providers. A time limit of 30 days for negotiation between access seeker and provider should be the normal practice. This criterion should be specifically provided in the license conditions. At this stage, the mode of commercial agreement is being left to telecom service providers however the Authority could consider standard commercial format in future if process of infrastructure sharing does not pickup.

## **f. NORWAY**

The Storting, Norway's parliament, supported the Government's proposal for a framework for infrastructure sharing.

On the basis of a recommendation from the Norwegian Post and Telecommunications Authority (NPT), the Ministry of Transport and Communications has decided the following regarding 3G infrastructure sharing.

### **Within the minimum coverage requirements**

The following components may be shared within the area covered by the concessions' minimum coverage requirement:

- Antennas and masts: All sites, masts, antennas, cables, combiners, power supply, buildings etc.
- Node B: Node B may be shared physically, but operators must retain logical control over their own base station.
- RNC (Radio Network Controllers): RNCs may be shared physically, but operators must retain logical control over their networks and spectrum.
- Transmission: All transmission routes, i.e. optic fibre, cables, P-P radio lines may be shared.

- **Core networks: The MSC (Mobile Switching Center) may not be shared.**
- **Frequencies will not be shared**

g. **USA**

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.

h. **FRANCE**

ART (Autorité de Régulation des Télécommunications) also favoured sharing of 3G infrastructures 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 markets, 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.

**j. GERMANY**

In Germany, the regulator RegTP (Regulierungsbehörde für Post und Telecommunication) 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

**k. 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:

- a) Only infrastructure over-capacity may be shared with other telecommunications companies;

- b) Acts or omissions aimed at protracting an agreement between telecommunications companies will be treated as unfair competition under antitrust laws; and
- c) Caps on the amount payable by the telecommunications service providers applying for use of another service provider's infrastructure were adopted.

**l. JORDAN**

Telecommunications Regulatory Commission of Jordan issued a statement 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."

**m. 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.

**n. 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.

**o. 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.

**Issues for Consideration:**

**a. Encouragement of infrastructure sharing**

There is a need to formulate standard terms and conditions to facilitate infrastructure sharing. The infrastructure sharing if mandated would raise issues and will be seen as highly interventionist in nature. Therefore, incentivisation of infrastructure sharing perhaps may be considered more effective and useful.

There is urgency for passive infrastructure sharing. The existing provisions in the licenses permit passive infrastructure sharing. The Authority is of the view that mandating passive infrastructure sharing at this stage is not required.

The process of sharing infrastructure should be transparent and non discriminatory by the operators. All licensees should announce on their web site the details regarding the existing and future infrastructure installations available for sharing with other service providers.

b. **Permission to setup mobile towers in critical areas** is restricted e.g. cantonments area, one option is to mandate sharing to all service providers to make best use of available sites.

**c. Active Sharing (backhaul sharing)**

Existing license conditions only allows the tower, mast and its associated accessories sharing subject to mutual agreement. It is now possible to share antenna, feeder cable from antenna to transmission equipment and other transmission equipments by for various mobile service providers maintaining separate allocated spectrum. The quality of service and other parameters can be maintained. Amendment of license condition can be made for active infrastructure sharing limited to antenna, feeder cable, Node B, Radio Access network (RAN) and transmission system only without sharing of the allocated

spectrum .The active infrastructure sharing arrangements may be left to service providers based on mutual agreements.

Considering the importance of **backhaul sharing for provision of mobile services in rural and far-flung areas**, licensing conditions can be amended to allow service providers to share their backhaul from BTS to BSC only. Such sharing would be permitted on optical fiber as well as Radio medium. No sharing of spectrum at access network side should be permitted.

**d. Infrastructure sharing in rural areas**

In order to promote the mobile coverage in rural areas it is suggested that the it would be made mandatory for the mobile operators to design the mobile tower such that it should have capacity to accommodate at least three service providers. Passive and backhaul except spectrum be left to the operators by interconnect agreement.

**Need for Guidelines**

19. 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. Infrastructure sharing will help to reduce mushroom growth of towers.

20. Infrastructure sharing between cellular operators offers tremendous benefits however the implementation has to be handled diligently to avoid possible pitfalls. The plan is to adopt infrastructure sharing on full-scale basis among cellular operators within the purview of interconnect agreement.

**Guidelines for Infrastructure Sharing of Tower**

The Cellular mobile licensee shall provide the right to use the infrastructure equipment /tower installed and/or owned by it on rental/lease basis according to following guidelines within purview of interconnect agreement.

**i. Infrastructure sharing shall be done on the following two types of sites.**

- a. Existing sites (owned by any one of the operators)
- b. New sites

**ii. Information sharing and selection of Site:**

- a. The operators should conduct joint research and discussions on the Site sharing and formulate a site sharing plan and layout acceptable to all operators. For the purpose of formulating the plan and layout, all operators should share with each

other all relevant information regarding design, construction and shall extend necessary co-operation.

- b. Operators should facilitate each other in conducting search and survey including physical inspection and Line of Site check.

### **iii. Site Sharing**

BTS sites are categorized namely:

- City Sites
  - Suburban Sites
  - Rural Sites
- a. Operators should share the Sites of each other on reciprocal one-to-one basis within any of the above Categories; however Site Owner/first party may allow the Sharing Party/second party to share its Site on terms and conditions mutually worked out.
  - b. For new and existing Sites the Site Owner should be responsible for providing sufficient primary power and back-up power to the Sharing Party including upgrading existing commercial transformer, sanctioned load and generator sets. The Site Owner shall also be responsible ensuring the regular maintenance thereof.
  - c. The Site Owner should be responsible for payment of bills related to commercial power, maintenances of the generators and ancillary equipment and the fueling of generator sets on a monthly basis.
  - d. For all Sites obtaining NOCs/approvals/permits from relevant authorities and the costs related thereto should be the responsibility of the Site Owner.
  - e. Owner will be responsible for maintaining adequate present and future capacity in terms of power, space, loading, cable track etc at the shared site. In case the capacity is not available on an existing site this capacity will be built by the SOO (e.g additional land acquisition, shelter addition, rectifier addition etc)
  - f. The other operator will co-locate and pay rental for the following components. (Co-location Component) CC
    - i. Tower sharing (BTS and Backhauling Antennas)
    - ii. Air-conditioned space for Microwave Equipment inside the shelter room.
    - iii. (Equipped with complete fire & intrusion detection & fire suppression system)
    - iv. Space on cable ducts (Power and Telecom Cables)

- v. Primary and Secondary (Back up) A/C power
- vi. DC power supply (Rectifier/Batteries (backup of at least 4 hours/DC Brakers)
- vii. Maintenance of DG set installed (plus additional fuel tank)
- viii. Security
- ix. Grounding /earthing

**iv. Site sharing on existing sites:**

- a. For all Existing Sites, the Site Owner should provide secured space for equipment of Sharing operator.
- b. The Sharing Party should submit engineering design and drawings for approval to the Site Owner in soft format prior to starting installation, which approval shall not be unreasonably withheld. After approval the Sharing Party should carry out its work as per approved design and drawings with minimum disturbance to the operations of the Site Owner.
- c. Operators should take due care during installation, and later maintenance, of their respective equipment on the shared site. Any damage or injury committed by a party through lack of such care shall be indemnified by the same to the injured party sharing the site
- d. Operators should ensure reasonable access to the premises.
- e. In case one sharing party receives any legal notice, complaint, or issue of dispute, etc, from any third party it must inform the other party of it in writing immediately.
- f. The sharing parties shall have the right to install any equipment.

**v. Selection and site sharing on new sites:**

For all new Site selection, the following criteria should be considered:

- a. Each Site shall cover an area of ( - - -m x - - -m ) square meters; depending on cumulative requirement of each operator
- b. The term of the lease should be maximum 3 years;
- c. The Site Owner shall be responsible for completing the legal and documentary formalities for acquiring the Site both through lease or purchase.
- d. Costs of structure(s) to be constructed on the Sites shall be determined mutually in accordance with the stipulations under the relevant design documents.
- e. For all Sites, labor costs, costs relating to tower, business costs and other relevant expenses shall be the responsibility of the Site Owner; however if Sharing Party specify additional requirements then any additional cost incurred by the Site Owner to satisfy the requirements shall be paid by the Sharing Party.

- f. The Site Owner shall remain responsible for maintenance and security of the Site. However, the Sharing Party shall remain responsible for the operation and maintenance of its telecommunication equipment.

Cost analysis for 30 m shared site

<b>Case (30 m)</b>	<b>Host</b>	<b>Guest</b>
BTS cabinet & Transmission Link (Cabinet + PDH + Antenna line + Power System)	Same for Both	Same for Both
<b><u>Tower Cost:</u></b> (Steel mast + Foundation, Electrification, Equipment+ Services)	Borne by Host	N/A
Site Acquisition, Design, Installation, Commissioning, Integration	Based on mutual agreement, however proposed are 54 % approx	Based on mutual agreement, however proposed are 46 % approx
Yearly rent (with extended lease area)	Borne by Host	N/A
WAPDA	Borne by Host	NA

**vi. Relocation**

Operators should bear their own costs in the event of relocation due to circumstances beyond the reasonable control of Operators.

**vii. Termination**

**Termination of Over All Agreement**

Either party may terminate the Agreement upon giving 6 months notice to the other party. Upon termination the Sharing Party shall vacate all the Shared Sites within the notice period.

In the event that either party commits a breach of contract the affected party may terminate the Agreement.

**Termination of sharing arrangement of Individual Site**

Either party may terminate the sharing arrangement pertaining to an individual Shared Site by giving 6 months prior notice.

Upon termination of the sharing arrangement pertaining to an individual Site the Sharing Party shall vacate the Shared Site within the notice period.

### **Termination of Lease**

The Site owner shall have the right to terminate the Site with the Lessor (land owner). Provided however, that in such an event it shall give a notice of 6 months to the Site Sharing Party, which shall have the right to take over the lease with the Lessor (land owner).

### **viii. Insurance**

Operators acknowledge that each Party shall maintain insurance coverage with respect to its respective assets.

### **ix. Prior written consent**

- x The operator shall not sub lease further rent to another party without prior written consent of the Authority.
- xi. If the owner is in a monopolistic position or is declared significant Market Power (SMP) then Internal Rate of Return (IRR) charged for leasing its equipment shall be competitive with the market.
- xii The owner shall be responsible for the use of equipment by any authorized party i.e an unlicensed operator, or for any other violation of owner awarded by PTA or for violation of any other relevant clause/requirement of the Act 1996,policies, rules and regulations etc.
- xiii. In case of any dispute between the operators, the two parties shall resolve the dispute amongst themselves, if they fail to resolve the dispute amicable, they may refer the case to PTA.
- xiv. The operators shall be responsible for safety of public, public and government property near or around which equipment may be installed.
- xv. The sharing party shall not further lease the tower to any company.
- xvi. Core networks: The MSC (Mobile Switching Center) will not be shared.
- xvii. Frequencies will not be shared

## Questionnaire

Q1. Do you agree with the proposed model by PTA, please comment and suggest if required? Should PTA make the tower-sharing mandatory for the existing and new sites of CMTOs?

Q2. Do sharing of tower be made mandatory for the existing operators in cantt and AJK & NAs areas to make the best use of the available site and non discriminatory basis. Do all licensees announce on their web site the details regarding the existing and future infrastructure installations available for sharing with other service providers?

Q2. Do Cellular mobile tower sharing be allowed for two operators or more? Can the sharing be done with other service providers?

Q3. Is there any health hazard associated with tower sharing? Will it increase the risk of radiation exposure to general public?

Q4. Which type of infrastructure sharing will be useful in present scenario and suggest actions, where PTA can play a role to encourage such sharing?

Q5. Do you feel the need to issue Policy Guidelines by PTA/FAB regarding infrastructure sharing as per Cellular Mobile Policy? If so kindly suggest point for considerations. Can the arrangements be finalized mutually between two operators?

Q6. What benefits are expected to the subscribers by infrastructure sharing and how these can be monitored?

Q7. Do you agree that active and backhaul sharing also be allowed by PTA by incorporating modification in license conditions especially in rural areas? Do you agree PTA make it mandatory for the existing operator to design tower to accommodate/share three service providers?

Q8. What are the potential and benefits arising from infrastructure sharing that would accrue to our telecommunication industry as a whole and to consumers? Would infrastructure sharing actually lead to faster and better

*mobile services? How would infrastructure sharing lead to faster and better cellular mobile services?*

*Q9. Would any potential competition concerns arise with infrastructure sharing? If so, how should such competition concerns be addressed to ensure that there is no adverse impact to consumers benefits in terms of choice of service provider, access and availability of services as well as the range and quality of services and pricing?;*

*Q10. What are the monitoring, and enforcement, issues that may arise on the extent of infrastructure sharing? What would be appropriate monitoring criteria to ensure that infrastructure sharing takes place in accordance to an approved framework? How should scale-down of the infrastructure sharing be monitored?*

*Q11. What is the international practice and what guidance can be obtained or be taken as a lead for future in Pakistan?*

Respondents are also invited to comment on any other issues not covered herein that they consider of relevance in this review.

PTA will consider inputs submitted and make its Guidelines thereafter.