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| **SOUTH ASIAN TELECOMMUNICATIONS REGULATOR’S COUNCIL** **(SATRC)** |  |
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**SATRC REPORT ON**

**POLICY AND REGULATORY ASPECTS OF INFRASTRUCTURE SHARING**

**Prepared by**

**SATRC Working Group on Policy, Regulation and Services**

Adopted by

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**Executive Summary**

1. Infrastructure sharing may reduce operational costs, expand coverage, increases competition and provide additional capacity. It maximizes the use of existing network facilities which includes network capacity and capabilities. Infrastructure sharing can take a number of forms based on the degree of sharing between the networks. In its simplest form it can involve passive infrastructure sharing of cell sites and masts however can extend to sharing of various active elements of the network including sharing of RAN, spectrum allocated to individual Telecom Service providers (TSPs) and the core network. Network infrastructure sharing is prevalent in both mature and developing markets though the extent varies.
2. Infrastructure sharing also assists in improving Quality of service (QoS). It can enhance capacity in congested areas where space for sites and towers is limited. Sharing also facilitates in provision of roaming services wherein two or more service providers can provide service to their subscribers when their subscribers are outside the coverage area of home network.
3. In many countries the problem of non-availability of sites in congested areas reducing the coverage and signal strength exists. In order to address this issue some 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 equipment, allocation of such critical infrastructure is regulated. There is a need to consider if such steps are required to be mandated so that all service providers can have access to such critical sites.
4. Infrastructure sharing model can be categorized into two broad categories: Passive Infrastructure sharing and Active Infrastructure Sharing. Passive infrastructure sharing means sharing of physical sites, buildings, shelters, towers/masts, power supply and battery backup, etc. Active infrastructure sharing involves sharing the active electronic network elements – the intelligence in the network – embodied in base stations and other equipment for mobile networks and access node switches and management systems for fibre networks.
5. Spectrum sharing is of utmost importance to ensure optimal utilization of the available spectrum. The basic objective of spectrum sharing is to enhance spectral efficiency by combining/pooling the spectrum holding of two licensees. The gain in spectral efficiency increases non-linearly with the quantum of spectrum.
6. In India, as per the terms and conditions of the Cellular Mobile Telecommunication Service (CMTS) and/or Unified Access Service (UAS) licence, the access service providers were initially permitted sharing of “passive” infrastructure viz., building, tower, dark fibre etc. only, among themselves.
7. The ever growing data traffic along with decreasing ARPUs puts pressure on the Telecom Service Providers to find out innovative ways to optimally utilize their resources so as to reduce costs. Passive as well as active infrastructure assists Telecom Service Providers in attaining this objective. Infrastructure sharing enables faster growth and rollout of telecom services, especially in developing countries. It also brings down both capital and operating cost of establishing and running the networks.
8. The global trend is a move towards infrastructure sharing. Worldwide, the Regulators have considered infrastructure sharing as a tool to promote infrastructure deployment in their country, especially in un-served areas. Promoting sharing of telecom infrastructure among telecom service providers is a good strategy to increase tele-density especially in rural areas; to enable access for not only wireline broadband services to the unconnected but also wireless broadband services at affordable prices; to encourage development of public Wi-Fi hotspots in the country and to achieve broadband targets.
9. Regulators usually take a competition-based approach to assessing requests for sharing approval, based upon an analysis of efficiencies versus competitive harm and considering national market conditions. For the most part, this has led to passive infrastructure sharing and RAN sharing being approved and often actively encouraged and, increasingly, for more active forms of sharing to be allowed, subject to roll-out obligations[[1]](#footnote-1). In consultation with the stakeholders the policy makers and regulators may come up with an enabling framework that on one hand promotes infrastructure sharing on a transparent and non-discriminatory basis while encourages competition on the other hand. Active network sharing may necessitate comparatively more rigorous market and competition analysis than passive sharing. The extent of sharing that needs to be promoted will depend upon the country specific circumstances. The regulatory policy should not restrict competing service providers to build their own infrastructure.
10. The extent of Infrastructure sharing that may be promoted/permitted depends on various factors such as maturity of markets, level of competition, infrastructure status, etc. All SATRC member countries may explore the possibilities of promoting both active and passive infrastructure sharing including spectrum sharing and other innovative spectrum sharing techniques such as TV whitespaces and Licensed Shared Access (LSA).
11. Appropriate regulatory framework that promotes infrastructure-based competition, in addition to service-based competition, needs to be devised that also promotes innovation. Infrastructure sharing, however, may also lead to reduced competition and therefore appropriate country-specific policies in the National interest needs to be devised. Depending on the market, policies and regulations should encourage and facilitate the highest level of infrastructure sharing possible. Governments and regulators need to be proactive in establishing enabling frameworks for infrastructure sharing to boost the growth of the telecom sector.

# Chapter-1: Introduction

* 1. Infrastructure Sharing generally refers to the sharing of mobile tower for installing the antennae for provision of wireless service between service providers, sharing existing base station sites, A.C. power, backbone, radio links, and other resources in order to avoid infrastructure duplication and reduce costs. Infrastructure sharing generally involves two or more operators who come together to share various parts of their network infrastructure for the purposes of the service provisioning. It allows mobile operators to jointly use masts, buildings and even antennae, thus avoiding unnecessary duplication of infrastructure and saves costs. Infrastructure Sharing facilitates in maximizing the use of existing network facilities which includes network capacity and capabilities.

**Advantages of Infrastructure sharing**

* 1. Infrastructure sharing optimises the utilisation of assets, facilitates quicker roll out and avoids duplication of infrastructure. It has the potential to strengthen competition and promote provision of services in un-served areas, while reducing costs i.e. capital expenditure (Capex) and operating expenditure (Opex) for operators. It is very useful in initial phase of network roll out as it facilitates in building coverage quickly when revenue and traffic demands are low and the costs for network deployment are relatively high. In the long run it assists in providing cost effective coverage in underserved geographic areas.

* 1. Infrastructure Sharing can also promote greater service-based competition. It encourages services providers to offer new and innovative services at cheaper costs to the consumers. Instead of competing on coverage it leads to competing for innovation, service quality and differentiation.
	2. Infrastructure sharing also assists in improving Quality of service (QoS). It can enhance capacity in congested areas where space for sites and towers is limited. In many countries the problem of non-availability of sites in congested areas reducing the coverage and signal strength exists. In order to address this issue some 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 to be mandated so that all service providers can have access to such critical sites.
	3. Infrastructure sharing assist in reducing the carbon footprint of mobile networks and also offer environmental benefits, as the sites are most effectively shared including reduced numbers of antennae.
	4. Sharing also facilitates in provision of roaming services wherein two or more service providers can provide service to their subscribers when their subscribers are outside the coverage area of home network.
	5. Substantial network investments are required to meet the ever increasing demand for data usage. With intense competition resulting in pressure on telecom service providers revenues and ever increasing bandwidth requirements for Over-the-Top (OTTs) applications, TSPs should focus more on deriving optimal efficiency by investing on research on higher network layers. Infrastructure sharing assist in deriving optimal efficiencies while reducing costs. It promotes optimal use of scarce resources.
	6. Significant investment required to develop telecom infrastructure is a big deterrent for many small service providers. As per a study, deployment of infrastructure amounts to approximately 60% of total cost for service provisioning. The problem gets further aggravated by fast pace of technological developments that constantly requires upgradation of existing infrastructure. Therefore, there is a need for appropriate policies to encourage sharing of passive and active infrastructure among TSPs to ensure that wide variety of services are available to consumers at affordable costs.

**Challenges in Infrastructure Sharing**

* 1. One of main challenges of Infrastructure Sharing includes technical limitations of the networks. Operators may face challenges in implementing a shared network formed from existing networks, as their architectures have evolved independently over a period of time.
	2. Infrastructure sharing may discourage investment in the network as operators may prefer to share network of existing service providers for quicker roll out and saving costs. Infrastructure sharing also limits service provider’s independence and their control over the network. It may reduce the competitive spirit of the service providers.

**Structure of the Report**

* 1. This report has five chapters in all. Chapter 2 discusses the different types of infrastructure sharing models. International practices on Infrastructure Sharing are discussed in Chapter 3. Chapter 4 discusses regulatory framework for Infrastructure Sharing in India. Chapter 5 provides recommendations for SATRC member countries on the subject matter.

# Chapter- 2: Infrastructure Sharing Models

* 1. Network infrastructure sharing is prevalent in both mature and developing markets though the extent varies. Infrastructure sharing can take a number of forms based on the degree of sharing between the networks. In its simplest form it can involve passive infrastructure sharing of cell sites and masts however can extend to sharing of various active elements of the network including sharing of RAN, spectrum allocated to individual Telecom Service providers (TSPs) and the core network. The various types of infrastructure sharing are discussed in the subsequent paragraphs.

**Dimensions of Infrastructure Sharing**

* 1. As per Coleago consulting report (prepared for Communications Regulators’ Association of Southern Africa (CRASA) and International Telecommunications Union (ITU), there are five dimensions[[2]](#footnote-2) of Infrastructure sharing:
		+ **Technology:** The technological dimension identifies the technology to which the sharing applies, for example: 2G, 3G, 4G, WiFi, xDSL, DOCSIS, etc. There are many cases where, for whatever reason, two MNOs have agreed to share 4G but not 2G or 3G.
		+ **Geography**: The geographical dimension concerns where in the country the sharing will occur. Typically areas are described according to population density (urban, suburban, rural or remote) or administrative boundaries but, in the case of mobile networks, may also differentiate between in-building and outdoor antennas. Urban areas usually present more valuable opportunities than rural areas for competitive differentiation in terms of network quality, in-building coverage, service features, etc. and so it often makes strategic sense for MNOs not to share in such areas.
		+ **Architecture:** The architectural dimension is the one that most people use to describe infrastructure sharing. It defines the (passive and active) assets and related activities that are shared; the active assets differ according to the technology scope.
		+ **Partners:** Potential partners in a sharing deal includes any entity such as an MNO, fixed network operator, cable TV operator, terrestrial broadcaster, utility company, tower company, etc. that owns or leases the infrastructure assets to be shared. From the regulatory perspective difficulties may arise if the NRA’s mandate or the current licensing regime do not apply to an entity – this happens most often in the case of a utility company falling under the mandate of a different regulatory authority.
		+ **Sourcing**: There are a number of sourcing possibilities for sharing infrastructure such as Joint Venture (JV), partners, etc. The sourcing arrangement is particularly important when considering the competitive aspects of a sharing agreement.

**Types of Infrastructure Sharing**

* 1. Infrastructure sharing model can be categorized into two broad categories: Passive Infrastructure sharing and Active Infrastructure Sharing.

**Passive Sharing**

* 1. Passive infrastructure sharing means sharing of physical sites, buildings, shelters, towers/masts, power supply and battery backup, etc. Figure 1 illustrates the sharable network elements.
	2. Forms of passive sharing include site and mast sharing. In site sharing, the service providers may share all infrastructure related to the site which includes ownership rights. In this case, the service providers use the same physical components but have different site masts, antennae, cabinets and backhaul. In site sharing the service providers may acquire a common site to install their Base Transceiver Station (BTS), share space in shelter or transmission room etc. Antennae and feeder cables are not shared.

**Figure 1: Site sharing among service providers[[3]](#footnote-3)**



* 1. Site sharing is the simplest form of infrastructure sharing. Rooftop installations are example of site sharing. In site sharing chances of dispute between the service providers is very low, however, availability of space and rights of the property are some of the main challenges that may need to be addressed. The number of antennae per tower is also a limitation. Proper operation and maintenance of shared site also needs to be ensured. Site sharing is very useful in densely populated and congested areas with limited space availability. It is also useful in providing coverage in rural areas to sparsely populated areas.
	2. Another type of passive infrastructure sharing is mast sharing, where the antennae of different service providers are placed on the same mast, but the radio transmission equipment remains separate.

**Active Sharing**

* 1. Active infrastructure sharing involves sharing the active electronic network elements – the intelligence in the network – embodied in base stations and other equipment for mobile networks and access node switches and management systems for fibre networks. Sharing active infrastructure is a much more contested issue, as it goes to the heart of the value-producing elements of a business. Many countries have restricted active infrastructure sharing out of concern that it could enable anti-competitive conduct, such as collusion on prices or service offerings[[4]](#footnote-4).
	2. Different kinds of active infrastructure sharing vary in terms of the degree of sharing. 3GPP has defined and ratified different kinds of architecture with varying degrees of sharing (see Figure 2)[[5]](#footnote-5):
* Multi-Operator RAN (MORAN) is the simplest scenario, in which only equipment is shared
* Multi-Operator Core Network (MOCN), in which both spectrum and equipment are shared
* Gateway Core Network (GWCN) is where both the RAN and some elements of the core network are shared.

Figure 2: Different kinds of active infrastructure sharing [Source: Analysys Mason, 2014]



**Spectrum Sharing**

* 1. Spectrum sharing is of utmost importance to ensure optimal utilization of the available spectrum. The basic objective of spectrum sharing is to enhance spectral efficiency by combining/pooling the spectrum holding of two licensees. The gain in spectral efficiency increases non-linearly with the quantum of spectrum.
	2. Spectrum sharing refers to an arrangement between two access licensees (CMTS/UASL/UL(AS)/UL) in a LSA, where both licensees having access spectrum in the same band, pool their respective spectrum in that LSA for their simultaneous use, using a common Radio Access Network (RAN). The shared RAN will be connected to the core networks of each of the licensee. Both licensees will continue to hold their primary right over their own spectrum.

**Roaming**

* 1. Roaming may also be considered as a form of infrastructure sharing though it does not involve use of common network elements. In the case of roaming, the traffic of one service provider is routed on another service provider’s network. The service providers enter into roaming agreements for this purpose.

**Virtual Network Operators (VNO)**

* 1. Mobile Virtual Network Operators (MVNOs) are the service providers who offer mobile services to end users without an allotted spectrum by using the radio spectrum of a licenced mobile network operator (MNO) who has the radio spectrum and hosting services through commercial agreements with an MNO.
	2. MVNO may have little or no network infrastructure of their own. They may build, buy or lease network capacity from a MNO to obtain essentially the same possibilities to offer mobile services to end-users as an MNO. Usually their services are augmented by brand appeal and product differentiation with focused customer segments.
	3. Depending on the technical approach chosen and commercial agreements made between the MVNO and the existing MNOs, the MVNO may be able to offer different packages of services and tariffs from those available today from service providers. Because of low OPEX and investments, MVNOs may be able to offer innovative services at lower costs.

**License Exempt (Unlicensed) Spectrum**

* 1. In an effort to provide maximum flexibility for innovation and lower entry costs for some type of ubiquitous wireless devices, many countries have set aside certain bands exclusively for unlicensed users. The use and growth of Wi-Fi to offload mobile data traffic and free up licensed spectrum for use of the huge growth in mobile data traffic has been a key development. A summary of the unlicensed spectrum in USA and Europe is shown in Table below:

**Table Unlicensed Spectrum in USA and Europe (in MHz)**



* 1. Unlicensed/inclusive use also facilitates provision of social services, such as, public service, free access and easy entry for new service providers, which encourages new technologies. The use of unlicensed bands greatly helps in offload.
	2. Most countries have already de-licensed 60 GHz band which has a good device ecosystem. The 60 GHz band is also known as V-band or WiGig band (Wi-Fi at 60 GHz) using IEEE 802.11ad protocol.

**Alternative Approaches of Spectrum Sharing**

* 1. Two types of spectrum sharing schemes are being widely considered. The first one is the TV whitespaces. According to the ITU[[6]](#footnote-6), TV white spaces (TVWS) are “portions of spectrum left unused by broadcasting, also referred to as interleaved spectrum”.
	2. Another approach to spectrum sharing is Licensed Shared Access (LSA). According to radio Spectrum Policy Group (RSPG) LSA is defined as follows: “A regulatory approach aiming to facilitate the introduction of radiocommunication systems operated by a limited number of licensees under an individual licensing regime in a frequency band already assigned or expected to be assigned to one or more incumbent users. Under the Licensed Shared Access (LSA) approach, the additional users are authorised to use the spectrum (or part of the spectrum) in accordance with sharing rules included in their rights of use of spectrum, thereby allowing all the authorized users, including incumbents, to provide a certain Quality of Service (QoS)”.
	3. LSA allows the new user to use unused spectrum to offer commercial services without interfering with the incumbent user. It is a right to utilise under-used spectrum without interfering with the incumbent user, subject to the terms defined by the relevant authority (government/ regulator) and/or upon an agreement with the incumbent user. LSA allows the introduction of the new users as well as maintaining incumbent services in the same frequency band.

# Chapter 3: International practices on Infrastructure Sharing

* 1. Several countries worldwide have recognised the importance of infrastructure sharing and have initiated several measures to encourage this.
	2. In Brazil, National Telecommunications Agency (ANATEL) has historically been promoting and creating regulatory mechanisms to promote infrastructure sharing. Among public policies that have favoured the sharing of infrastructure and networks, the following stand out:
* The Decrees of the General Plan of the Universalisation Goals (PGMU) of the public switched telephone network, which promoted access to the fixed telephone service and, later, the broadband service, in a universal and equal manner to the majority of the country’s population. Because of this, it was necessary to use the electricity poles to provide the service.
* The bidding documents of the radiofrequency for personal mobile service that obliged players interested in radio frequencies to buy the radio frequencies not only in the areas in which they could generate economic interest, but all over Brazil, including service obligations for all Brazilian municipalities. This made it necessary to share the mobile base stations for the provision of the service[[7]](#footnote-7).
	1. 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 of network resources. The Telecom Authority is empowered under the Telecommunication Ordinance in Hong Kong to direct the cooperation and coordination among the licencees in public interest to share the use of network facility after considering the factors such as bottleneck facility and duplication of network resources. The Telecom Authority can also make any determination in terms and conditions of the shared use of facility should the operators have failed to reach an agreement.
	2. The Commerce Commission of New Zealand, in the year 2008 had issued Standard Terms Determination (STD) for the specified service co-location on Cellular Mobile transmission sites. As per this, access providers must make co-location on cellular mobile transmission sites (the Mobile Co-location Service) available to other mobile network operators.

**EU Position**

* 1. Within the EU[[8]](#footnote-8), NRAs must adhere to European Competition Law, specifically Article 81, and the EU Communications Directives when assessing proposals from the MNOs to share infrastructure. The NRAs are obliged to consider each proposal separately and there is no blanket approval mechanism from the EU.
	2. Chapter 1 of the EU Competition Guidelines defines the criteria under which infrastructure sharing, or indeed any merger, could be considered anti-competitive. However, NRAs also typically look towards article 81(3) which discusses efficiency gains and the notion that efficiency gains should be weighted against competitive harm however any competitive harm must not be greater than that needed to achieve the efficiency gain.
	3. Article 12 Section 2 of the Framework Directive (2002/21/EC) sets out that where undertakings are deprived of viable alternatives because of the need to protect the environment, public health, public security or to meet town and country planning objectives, Member States may impose the sharing of facilities or property (including physical co-location) on an undertaking operating an electronic communications network only after an appropriate period of public consultation.
	4. It is further provided that the national regulator shall encourage the sharing of facilities or properties. Article 12 of the Access Directive (2002/19/EC) sets out that a national regulator may impose obligations on operators with SMP status, i.e. an operator with power to act independent of its competitors and customers on a specific market, to meet reasonable requests for access to, and use of, specific network elements and associated facilities where the regulator considers that denial of access or unreasonable terms and conditions having a similar effect would hinder the emergence of a sustainable competitive market at the retail level, or would not be in the end-user’s interest. Operators with SMP status may, under this Article, sub-section (f), be required to provide co-location or other forms of facility sharing including duct, building or mast sharing. It follows from this that an operator may become obliged not to withdraw access to facilities already granted.
	5. In Bangladesh, at present passive sharing is promoted through the Guideline for Infrastructure Sharing and discussions are going on to allow active sharing. The regulator is working to prepare the guideline for active sharing.
	6. In Bhutan at present only passive infrastructure sharing amongst the licensees is encouraged.

Regulatory framework for Infrastructure Sharing in India

* 1. The National Telecom Policy (NTP)-2012 of India is conceived with the vision to transform the country into an empowered and inclusive knowledge-based society, using telecommunications as a platform. One of the strategies outlined in NTP-2012 is:

“*To move towards Unified Licence regime in order to exploit the attendant benefits of convergence, spectrum liberalisation and facilitate delinking of the licensing of Networks from the delivery of Services to the end users in order to enable operators to optimally and efficiently utilise their networks and spectrum by sharing active and passive infrastructure*.”

* 1. As per the terms and conditions of the Cellular Mobile Telecommunication Service (CMTS) and/or Unified Access Service (UAS) licence, the access service providers were initially permitted sharing of “passive” infrastructure viz., building, tower, dark fibre etc. only, among themselves.
	2. Department of Telecommunication (DoT) introduced a new class of service providers called Infrastructure Provider Category–I (IP-I) in the year 2000. The infrastructure Providers Category-I are those Infrastructure providers who provide assets such as dark fibres, Right of Way, duct space and tower.
	3. As per the revised guidelines of IP-I of July 2017, the applicant must be an Indian company, registered under the Companies Act, 1956/2013. No license is issued for IP-I. The applicant company is required to be registered with DoT only. 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 processing fee along with the application. Infrastructure Providers Category-I (IP-I) can establish and maintain the assets such as Dark Fibres, Right of Way, Duct Space and Tower for the purpose to grant on lease/rent/sale basis to the licensees of Telecom Services licensed under Section 4 of Indian Telegraph Act, 1885 on mutually agreed terms and conditions. In no case the company shall work and operate or provide telegraph service including end to end bandwidth as defined in Indian Telegraph Act, 1885 either to any service provider or any other customer. As on 27.06.2018 there are 862 IP-I registered Companies[[9]](#footnote-9).
	4. In order to reduce input capital cost of telecom access service providers towards fixed infrastructure, thereby facilitating further reduction in tariff and to enhance the teledensity in the rural areas, DoT in April 2008 had issued ‘Guidelines on Infrastructure sharing”. Through these guidelines sharing of active infrastructure was also permitted amongst the Service Providers. Some of the main points of these Guidelines were:
		+ Sharing of active infrastructure amongst Service Providers based on the mutual agreements entered amongst them is permitted. Active infrastructure sharing, limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system only, was permitted. Sharing of the allocated spectrum will not be permitted;
		+ Infrastructure Providers (IP) Category-I were allowed to seek SACFA siting clearance for erecting towers with or without agreement with licensed Service Providers;
		+ To provide incentives on the infrastructure sharing in the urban areas, State Governments were requested to charge same amounts for setting up of the shared tower, irrespective of the number of Service Providers sharing the same tower at par with unshared tower;
	5. The DoT, vide its letter dated 9th March 2009 has clarified that the scope of IP-I, which was limited to sharing of passive infrastructure only, has been enhanced to cover the active infrastructure if this active infrastructure is provided on behalf of the licencees, i.e. they can create active infrastructure limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system only for/on behalf of UASL/CMSP licencees.

Sharing of Passive Infrastructure created through USO Fund

* 1. Creation of infrastructure for provision of telecom Services in rural and remote areas and provision of fibre connectivity to villages in a phased manner is supported by the Government through the use of USO Fund (USOF).
	2. The New Telecom Policy - 1999 (NTP’99) provided that the resources for meeting the Universal Service Obligation (USO) would be raised through a ‘Universal Access Levy (UAL)’, which would be a certain percentage of the revenue earned by the operators under various licenses.
	3. The Universal Service Support Policy came into effect from 01.04.2002. Under Universal Service Obligation Fund (USOF), schemes are planned from time to time to extend financial support for provisioning of mobile communication services in uncovered villages of the country in a phased manner.
	4. In 2007, USOF launched a Shared Mobile Infrastructure Scheme to provide subsidy support for setting up and managing 7,353 infrastructure sites/towers in 500 districts spread over 27 states for provision of mobile services in the specified rural and remote areas, where there was no existing fixed wireless or mobile coverage. It aims to provide mobile services to approximately 0.2 million villages.
	5. It was a unique initiative as it is based on sharing of subsidized passive infrastructure (tower, boundary wall, electric connection, power backup etc) by three telecom service providers who will put up their own active infrastructure and roll out wireless services. Service providers shall not pay any rental to infrastructure provider for using it till five years except sharing operational cost.
	6. To bridge the rural coverage gap both for broadband penetration and voice, Government has undertaken to establish the National Optical Fibre Network (NOFN) laying incremental optical fibre to connect all 2,50,000 Gram Panchayats in the country. The project is being funded by USOF and is being executed by a Special Purpose Vehicle (SPV) namely Bharat Broadband Network Limited (BBNL), which has been incorporated on 25.02.2012. Non-discriminatory access to the network will be provided to all the telecom service providers. These access providers like mobile operators, Internet Service Providers (ISPs), cable TV operators, content providers can launch various services in rural areas. Various applications for e-health, e-education, e-governance etc. will be provided.

Active Infrastructure sharing

* 1. In India, the Government issued a notification on February 11, 2016 permitting sharing of active infrastructure amongst service providers based on mutual agreements. The active sharing will be limited to antenna, feeder cable, Node B, Radio Access network (RAN) and transmission systems. This measure would help in provision of better and speedy services to the consumers while alleviating the cost burden incurred by the operators for laying telecom infrastructure.
	2. Further in its recommendations to the Government on Proliferation of Broadband through Public Wi-Fi Networks dated 09.03.2017, TRAI has recommended that DoT may amend the terms of the ISP license to allow for sharing of active infrastructure, in line with the Unified License (UL). Further, the Authority recommended that a clarification be provided in respect of all license categories, that sharing of infrastructure related to Wi-Fi equipment such as Wi-Fi router, Access point, and backhaul is also allowed.[[10]](#footnote-10)

Spectrum Sharing

* 1. The Telecom Regulatory Authority of India (TRAI) has forwarded its recommendations on ‘Guidelines on Spectrum Sharing’ (Proposed Guidelines) in 2014, suggesting that sharing of spectrum between operators should be permitted, as long as certain minimum conditions are fulfilled. The Government had approved the guidelines on spectrum sharing in 2015.
	2. The salient features spectrum sharing guidelines, among other things, include the following:
	3. Spectrum sharing would be allowed only for the access service providers in a Licensed Service Area (LSA), where both the licensees are having spectrum in the same band.

Illustration: It is assumed that two Licensees ‘A’ and ‘B’ have spectrum holding in 900 MHz, 1800 MHz and 2100 MHz band as shown in Table below:

|  |  |  |
| --- | --- | --- |
| Licensee | Licensee A | Licensee B |
| Spectrum Band | 900 MHz | 1800 MHz | 2100 MHz | 900 MHz | 1800 MHz | 2100 MHz |
| Spectrum holding (MHz) | 6.2 | 3 | 0 | 0 | 4.4 | 5 |

In such a scenario, the bands, in which spectrum sharing is permitted are shown in the Table below:

|  |  |  |  |
| --- | --- | --- | --- |
| Spectrum Band | 900 MHz | 1800 MHz | 2100 MHz |
| Can Licensee A and B share their spectrum? | No, because B does not have spectrum in 900 MHz Band | Yes, Because both A and B have spectrum spectrum in 1800 MHz band | No, Because A does not have spectrum in 900 MHz Band |

* 1. Sharing will be permitted when sharing entities possess spectrum which is either acquired through auctions or for which market price has been paid.
	2. All access spectrum will be sharable.
	3. Leasing of spectrum will not be permitted.
	4. For the purpose of charging Spectrum Usage Charges (SUC), licensees shall be considered as sharing their entire spectrum holding in the particular band in the entire LSA.
	5. The right to share spectrum shall be subject to fulfillment of relevant license conditions and any other conditions that may be specified by the licensor/Government from time to time.
	6. A licensee shall not be eligible to share its spectrum, if it has been established that it is in breach of terms and conditions of the licence, and the licensor has ordered for revocation/termination of its licence.
	7. The use of technology shall be governed by the terms and conditions of respective Notice Inviting Application (NIA)/license.
	8. Both licensees will be individually and collectively responsible for complying with sharing guidelines, including interference norms.
	9. Spectrum sharing will be restricted to sharing by only two licensees subject to the condition that there will be at least two independent networks provided in the same band.

Illustration

|  |  |  |
| --- | --- | --- |
|  | No. of Operators  | Whether Sharing of spectrum Permitted?  |
| In 1800 MHz band  | 6  | YES  |
| In 2300 MHz Band  | 2  | NO  |

* 1. Spectrum Usage Charges (SUC) rate of each of the licensees post-sharing shall increase by 0.5 percent of Aggregate Gross Revenue (AGR).

Illustration: Annual Spectrum charges is payable as % of adjusted Revenue of Operator. The % share depends upon the time when the spectrum was acquired by the licensee as illustrated below:

|  |  |
| --- | --- |
| Spectrum Acquired through auction of 2014 and 2015  | 5%  |
| Administratively Held Spectrum and Spectrum Acquired through auction of 2012 and 2013  | 3% to 8% depending upon quantum of spectrum possessed by the TSP |
| Spectrum in 2300 MHz band acquired through 2010 auctions  | 1%  |

In case of combination of spectrum acquired through different auctions/administrative assignments- Weighted average approach is adopted to determine the applicable SUC rate.

Post Sharing, Annual Spectrum Charges rate of each of the licensees post-sharing shall increase by 0.5% of AGR.

Illustration: In the following example, if Licensee ‘A’ and ‘B’ decide to share their spectrum; post-sharing they will be subjected to the following SUC rates.

|  |  |  |
| --- | --- | --- |
|  | Spectrum Usage Charges rate before sharing | Spectrum Usage Charges rate after sharing  |
| Licensee ‘A’ | 4% of AGR  | 4.5% of AGR  |
| Licensee ‘B’ | 5% of AGR  | 5.5% of AGR  |

The prescribed limits for spectrum cap shall be applicable for both licensees individually. Further, spectrum holding of any licensee post-sharing shall be counted after adding 50 percent of the spectrum held by the other licensee in the band being shared, being added as additional spectrum to the original spectrum, held by the licensee in the band.

Illustration: As per the prevailing regulations, Spectrum Cap is imposed on the spectrum holding of each operators in India on TWO Counts.

1. Band-Specific Spectrum Cap- 50% of the Total Spectrum assigned to Operators in that band.
2. Over-all Spectrum Cap- 25% of the Total Spectrum assigned to Operators in all bands.

Impact of sharing on the applicable spectrum cap has been shown in the following table.

|  |  |  |
| --- | --- | --- |
|  | Quantum of spectrum in a band before sharing | Quantum of spectrum after sharing that will be counted for the purpose of applying the stipulated spectrum cap  |
| Licensee ‘A’ | 10 MHz  | 10 MHz + half of 20 MHz i.e. 20 MHz  |
| Licensee ‘B’ | 20 MHz  | 20 MHz + half of 10 MHz i.e. 25 MHz  |

Both licensees sharing the spectrum shall jointly give a prior intimation for sharing the right to use the spectrum at least 45 days before the proposed effective date of the sharing. Both the licensees shall also give an undertaking that they are in compliance with all terms and conditions of the guidelines for spectrum sharing and licence conditions, and will agree that in the event it is established at any stage in the future, that either of the licensee was not in conformance with the terms and conditions of the guidelines for spectrum sharing or/and of the licence, at the time of giving intimation for sharing of right to use the spectrum, the Government will have the right to take appropriate action which among other things may include annulment of sharing arrangement. A processing fee, of Rs. 50,000/- which could be modified from time to time, shall be payable individually by each licensee for each service area at the time of intimation.

In-Building Access by Telecom Service Providers

* 1. With an estimated 80 percent of mobile traffic originating or terminating within a building, In-Building Solutions have become as vital to the buildings as water or electricity. Today's data-hungry devices simply cannot be served by the outdoor network. With the evolution to 5G, combined with the explosion of Internet of Things (IoT) devices, in-building solutions (IBS) and its sharing will become more important.
	2. To ensure that there is ubiquitous voice and data network inside the commercial and residential complexes and in the large public places like Airports, hotels, multiplexes, first and foremost requirement is that Telecom Service Providers (TSPs)/Infrastructure Providers Category-I (IPIs) gets an access to in-building facilities and infrastructure. Keeping in view the requirement to evolve a framework applicable to enable the Telecom Service Providers (TSPs) to obtain access on in-building facilities on reasonable terms and conditions, TRAI on 20th January 2017, gave its recommendations to the Government on “In-Building Access by Telecom Service Providers”[[11]](#footnote-11).
	3. In these recommendations TRAI recommended included the following:
* Considering the requirement of ubiquitous voice and data network inside the large public places/commercial complexes/residential complexes and considering the fact that it is not practical for each TSP to put its IBS and other telecom infrastructure inside such complexes, the requirement of sharing the In-building telecom infrastructure including IBS has become inevitable. Therefore, TSPs/IP-Is should be mandated to share the in-building infrastructure (IBS, OFC and other cables, ducts etc) with other TSPs, in large public places like Airports, hotels, multiplexes, etc., commercial complexes and residential complexes.
* The TSPs/IP-Is may be categorically disallowed to enter into any kind of agreement or contract, which results in exclusive access or lessening of competition. Indulgence into such a practice, through either formal or informal arrangement, may be treated as violation of the license agreement/registration.
* A system (time bound) may be developed, which may, inter-alia, include:
	+ The seeker-TSP i.e. who wish to access the Cables/IBS installed by an existing TSP/IP-I (provider-TSP), should place its requirement in writing to such provider-TSP.
	+ The provider-TSP shall respond in writing within 30 days time. In case of denial of request to access the infrastructure, the provider-TSP shall give reasons and justification for denial.
	+ Commercial terms for sharing of the in-building telecom infrastructure system, may be decided by the provider-TSP. However, the same shall be done in transparent, fair and nondiscriminatory manner.
	1. The Department of Telecommunication (DoT) had referred back certain issues to TRAI for re-consideration and submitting its reconsidered opinion / recommendations. TRAI had forwarded the same to DoT on 9.3.2018[[12]](#footnote-12).

Roaming

* 1. For provision of telecommunication services, India is divided into 22 Service Areas. Spectrum rights are awarded Service Area-wise. Some of the TSPs don’t have pan-India spectrum rights. Therefore, subscribers of such TSPs are required to ride the networks of other TSPs in those Service Areas where their operator does not have telecom network. Therefore, inter-Circle roaming has been permitted in India. Another arrangement is intra-Circle roaming, which permits two licensees having spectrum in the same band, to have intra-Circle roaming pact between them.

Virtual Network Operators

* 1. One of the strategy envisaged under National Telecom Policy, 2012 (NTP-2012) is to facilitate resale at the service level, both wholesale and retail, for example, by introduction of virtual operators.
	2. In context of NTP-2012, DoT through its reference dated 7th July 2014 had sought recommendations of the TRAI on ‘Delinking of licenses for networks from the delivery of services by way of Virtual Network Operators (VNOs) including associated issues of definition of Adjusted Gross Revenue (AGR) under the UL regime’. The TRAI after detailed consultation issued its recommendations on “Introducing Virtual Network Operators in telecom sector” on 1st May, 2015. Pursuant to these recommendations DoT issued guidelines and license agreement for the grant of Unified License on 31st May, 2016.
	3. Under Unified License (UL) policy, VNOs are created to exploit the benefits of convergence, spectrum liberalization and facilitate delinking of the licensing of networks from the delivery of services so as to enable the Telecom Service Providers (TSPs) to optimally and efficiently utilize their networks and spectrum by sharing active and passive infrastructure.
	4. On the Government reference, TRAI also forwarded its Recommendations to the Government on ‘Introduction of UL (VNO) for Access Service authorization for category B license with districts of a State as a service area’ on 8th September, 2017.[[13]](#footnote-13)
	5. In Nepal, to regularize the construction and use of telecommunications infrastructure and to make the telecommunications service affordable & easily available through the sharing of telecommunications infrastructure and thus bringing about a reduction of investment in the telecommunications infrastructure with anticipation of lowering the service user charge Government of Nepal promulgate the Telecommunications Infrastructure Regulation, 2074 (2017) and published a notice for Request For Applications (RFA) for a License to Provide Telecommunications Infrastructure Services in Nepal. After the enactment of present Infrastructure Regulation, sharing of mobile towers mandated in Nepal. However, Service Provider cannot share any Active Infrastructure.
	6. In Pakistan, Cellular Policy 2004 encourages passive infrastructure sharing and the same concept was included in the mobile licenses as well. However, active sharing was not considered then. Telecommunication Policy 2015 highlights passive as well as active infrastructure sharing for which regulations and guidelines will be prepared in the light of best international practises.
	7. As per the guidelines issued by Telecommunications Regulatory Commission of Sri Lanka[[14]](#footnote-14) in October 2017, to minimise the adverse impact to the aesthetic appearance and vegetation, it is encouraged to co-locate antenna structures erected by the TSPs. Telecommunications Regulatory Commission of Sri Lanka (TRCSL) should identify such locations which are named as Antenna Structure Farms (ASFs). TSPs may propose such locations to TRCSL. Antenna Structures of height more than 30m ground based and the total height more than 30m on roof top, excluding 5m poles, shall be used on shared basis. Hence the antenna structures shall be designed and constructed to accommodate the requirements of two other TSPs. Earlier in July 2009, TRCSL had issued a guidelines as per which Antenna Structures should be designed and constructed with provisions for more than one service provider. Such constructions are encouraged through incentive schemes.
	8. Details pertaining to International practice on Infrastucture sharing of some of the SATRC countries (received in response to questionnaire) are Annexed.

Chapter 4: Conclusions

1. The ever growing data traffic along with decreasing ARPUs puts pressure on the Telecom Service Providers to find out innovative ways to optimally utilize their resources so as to reduce costs. Passive as well as active infrastructure assists Telecom Service Providers in attaining this objective. Infrastructure sharing enables faster growth and rollout of telecom services, especially in developing countries. It also brings down both capital and operating cost of establishing and running the networks.
2. The global trend is a move towards infrastructure sharing. Worldwide, the Regulators have considered infrastructure sharing as a tool to promote infrastructure deployment in their country, especially in un-served areas. Promoting sharing of telecom infrastructure among telecom service providers is a good strategy to increase tele-density especially in rural areas; to enable access for not only wireline broadband services to the unconnected but also wireless broadband services at affordable prices; to encourage development of public Wi-Fi hotspots in the country and to achieve broadband targets.
3. Regulators usually take a competition-based approach to assessing requests for sharing approval, based upon an analysis of efficiencies versus competitive harm and considering national market conditions. For the most part, this has led to passive infrastructure sharing and RAN sharing being approved and often actively encouraged and, increasingly, for more active forms of sharing to be allowed, subject to roll-out obligations[[15]](#footnote-15). In consultation with the stakeholders the policy makers and regulators may come up with an enabling framework that on one hand promotes infrastructure sharing on a transparent and non-discriminatory basis while encourages competition on the other hand. Active network sharing may necessitate comparatively more rigorous market and competition analysis than passive sharing. The extent of sharing that needs to be promoted will depend upon the country specific circumstances. The regulatory policy should not restrict competing service providers to build their own infrastructure.
4. The extent of Infrastructure sharing that may be promoted/permitted depends on various factors such as maturity of markets, level of competition, infrastructure status, etc. All SATRC member countries may explore the possibilities of promoting both active and passive infrastructure sharing including spectrum sharing and other innovative spectrum sharing techniques such as TV whitespaces and Licensed Shared Access (LSA).
5. Appropriate regulatory framework that promotes infrastructure-based competition, in addition to service-based competition, needs to be devised that also promotes innovation. Infrastructure sharing, however, may also lead to reduced competition and therefore appropriate country-specific policies in the National interest needs to be devised. Depending on the market, policies and regulations should encourage and facilitate the highest level of infrastructure sharing possible. Governments and regulators need to be proactive in establishing enabling frameworks for infrastructure sharing to boost the growth of the telecom sector.

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# LIST OF ACRONYMS

|  |  |
| --- | --- |
| CI | Critical Infrastructure  |
| CMTS | Cellular Mobile Telecommunication Service  |
| DoT | Department of Telecommunication |
| GWCN | Gateway Core Network |
| IBS | In-building solutions  |
| ITU | International Telecommunications Union  |
| JV | Joint Venture  |
| LSA | Licensed Shared Access |
| MOCN | Multi-Operator Core Network |
| MORAN | Multi-Operator RAN |
| OTT | Over-the-Top  |
| QoS | Quality of service  |
| TRAI | Telecommunication Regulatory Authority of India |
| TSP | Telecom Service Provider |
| UAS | Unified Access Service  |

# Annex

# Annexure-I: Infrastructure Sharing Framework in Bangladesh

**Question 1: Please provide the details of the existing regulatory framework of infrastructure sharing in your country?**

**Answer 1:** Based on ‘Guideline for Infrastructure Sharing’ published in 2008, procedure for Infrastructure Sharing is given below-

1. Infrastructure Seeker shall submit request to Infrastructure provider expressing the interest of sharing infrastructure. Infrastructure Provider shall enter into negotiation with other operators to share the infrastructure.
2. Request for Infrastructure Sharing by the Infrastructure Seeker to the Infrastructure Providers and the approval / rejection of the request by the Infrastructure Provider must be in writing.
3. All negotiations for Infrastructure Sharing must be done in utmost good faith. The

Infrastructure Provider shall not:

(a) Obstruct, delay negotiations in resolving disputes.

(b) Refuse to provide information relevant to an agreement including information necessary to identify the facility needed.

(c) Refuse to designate proper representative to expedite negotiation.

1. Infrastructure Providers shall reserve the right to refuse an application for infrastructure sharing on grounds of insufficient capacity.
2. Infrastructure Providers have the right to reserve not more than 25% (twenty five percent) of spare capacity.
3. The period to respond (either acceptance or rejection) by the Infrastructure Provider to any request for Infrastructure Sharing shall be 4 (four) weeks and the timeframe for negotiation of an Infrastructure Sharing Agreement shall be 5 (five)weeks from the date of receiving the request. If no response is received within 4 (four) weeks of request, the Infrastructure Seeker shall refer the matter to the Commission and the Commission shall take necessary steps.
4. The Infrastructure Seekers may sub lease/rent out the shared infrastructures subject to the provision of agreement and copy of such sub lease /rent out agreement shall be submitted to the Commission within 15 (fifteen) days from the date of such agreement.
5. In the event of any differences or disputes between the Infrastructure Provider and Infrastructure Seeker and failure to resolve the differences or disputes amicably among themselves, aggrieved party shall refer the matter to the Commission for resolution of the same. The decision of the Commission in that regard will be final and binding.

**Question 2: Whether Infrastructure sharing is mandated or promoted through policy intervention in your country? If yes, provide the details thereof explicitly indicating the extent of infrastructure sharing mandated/promoted?**

**Answer 2:** At present passive sharing is promoted through the Guideline for Infrastructure Sharing. And discussion is going on to allow active sharing. BTRC is working to prepare the guideline for active sharing.

General Terms and Conditions for Infrastructure Sharing as per the guideline (Clause 4.1-4.10):

4.1 These guidelines are applicable for sharing of passive infrastructures; optical fiber/wired access and backbone transmission network amongst all existing and future telecommunication operators having license from the Commission. The licensees are permitted to share infrastructure within their respective licensing zone/area.

4.2 The operators shall provide capacity on its infrastructure to other operators on a non-discriminatory “first come, first serve” basis.

4.3 Operators shall enter into agreement for sharing infrastructure. Tariff and charges for Infrastructure Sharing shall be mutually agreed basing on the directives issued or to be issued by the Commission. In case of any dispute regarding the tariff and charges the decision of the Commission shall be final and binding upon the parties.

4.4 Any agreements to be executed shall be submitted to the Commission within 15 (fifteen) days from the date of agreement.

4.5 Agreements for sharing Infrastructure facilities, which were permitted by the Commission shall have to be revised as per provisions of the instant guidelines and submitted to the Commission within 60 (sixty) days of publication of these guidelines.

4.6 Operators shall jointly develop, build, maintain and operate new passive infrastructure for providing telecommunication services to the subscribers. However, an individual operator may build passive infrastructures with the permission of the Commission.

4.7 Licensees (except the Nationwide Telecommunication Transmission Network’s Licensee) will not be permitted to build optical/wired backbone transmission network if such networks of other operators are already available for sharing. Incumbent operators should take necessary measures to augment the capacity of existing optical /wired backbone transmission network for sharing.

4.8 Operators shall jointly develop, build, maintain and operate optical/wired backbone transmission network if such networks are not existing / not available for sharing from the existing infrastructures in a particular zone/area. However, an individual operator may build optical /wired backbone transmission network with the permission of the Commission.

4.9 All operators shall publish in their websites detailed information of infrastructures available for sharing with other operators. The list shall be updated on monthly basis. The operators may issue password to the Commission, licensed operators, and any other entities as permitted / nominated by the Commission to access the information from the website.

4.10 The operators shall have to fulfill all of their individual obligations including but not limited to rollout obligations as contained in their individual licenses irrespective of infrastructure sharing agreement with other operators.

**Question 3: Is sharing of mobile towers mandated in your country?**

**Answer 3:** Tower sharing (infrastructure sharing/passive sharing) is allowed in the country. But active sharing is not allowed right now. As per the guideline the operators shall provide capacity on its infrastructure to other operators on a non-discriminatory “first come, first serve” basis.

As per the guideline “Infrastructure Providers” shall reserve the right to refuse an application for infrastructure sharing on grounds of insufficient capacity.

BTRC is in process to develop tower sharing guidelines & license.

**Question 4: Is sharing of active infrastructure allowed in your country? If yes, please provide the details thereof?**

**Answer 4:** Active sharing is not allowed right now. But BTRC is working on to prepare the guideline on Active sharing.

**Question 5: What is the status of Infrastructure sharing amongst telecom operators in your country?**

**Answer 5:** At present all the licensed telecom operators are allowed to share their passive infrastructure. Usually they share their BTS site with passive equipment. Telecom operators shares more than 4000 site with other operators.

**Question 6: Please provide your views on policy and regulatory solutions to encourage efficient infrastructure sharing**

**Answer 6:** Depending on the market, policies and regulations should encourage and facilitate the highest level of infrastructure sharing possible. As infrastructure sharing reduces investment to build new infrastructures, increases utilization of resources, duplication of investment etc.

Infrastructure sharing will bring efficient tower building, resource management, and better environment. Bangladesh is moving towards Tower licensing regime through which better infrastructure sharing will be ensured. Upcoming tower guideline and intended active sharing guideline will further enable it in Bangladesh.

# Annexure-II: Infrastructure Sharing Framework in Bhutan

**Question 1: Please provide the details of the existing regulatory framework of infrastructure sharing in your country?**

**Answer 1:** At present, BICMA is only encouraging passive infrastructure sharing amongst the licensees.

**(**[**http://www.bicma.gov.bt/data/telecom/ISR.pdf**](http://www.bicma.gov.bt/data/telecom/ISR.pdf)**)**

**Question 2: Whether Infrastructure sharing is mandated or promoted through policy intervention in your country? If yes, provide the details thereof explicitly indicating the extent of infrastructure sharing mandated/promoted?**

**Answer 2:** The infrastructure sharing is being promoted. However, in the event if licensee fails to provide infrastructure sharing then the regulatory agency ( Authority) can intervene.

**Question 3: Is sharing of mobile towers mandated in your country?**

**Answer:** Yes, it is.

**Question 4: Is sharing of active infrastructure allowed in your country? If yes, please provide the details thereof?**

**Answer:** Right now, BICMA is only looking into sharing passive infrastructure.

**Question 5: What is the status of Infrastructure sharing amongst telecom operators in your country?**

**Answer 5:** The licensed operators have been sharing infrastructures, especially tower, shelters, power etc. Bhutan has managed to optimize the use of telecom infrastructures.

**Question 6: Please provide your views on policy and regulatory solutions to encourage efficient infrastructure sharing**

**Answer 6:** Infrastructure sharing should be encouraged amongst the service providers through policy and regulatory intervention. Without such intervention, infrastructure sharing cannot take place.

# Annexure-III: Infrastructure Sharing Framework in Nepal

**Question 1: Please provide the details of the existing regulatory framework of infrastructure sharing in your country?**

**Answer 1:** To regularize the construction and use of telecommunications infrastructure and to make the telecommunications service affordable & easily available through the sharing of telecommunications infrastructure and thus bringing about a reduction of investment in the telecommunications infrastructure with anticipation of lowering the service user charge Government of Nepal promulgate the Telecommunications Infrastructure Regulation, 2074 (2017) and published a notice for Request For Applications (RFA) for a License to Provide Telecommunications Infrastructure Services in Nepal.

For more information: http://nta.gov.np/en/public-notice-en/606-application-rfa-for-licence-to-providetelecommunications-infrastructure-services-in-nepal

**Question 2: Whether Infrastructure sharing is mandated or promoted through policy intervention in your country? If yes, provide the details thereof explicitly indicating the extent of infrastructure sharing mandated/promoted?**

**Answer 2:** Yes, Infrastructure is mandated with the enactment of Infrastructure sharing guidelines and now replaced by Infrastructure sharing Regulation with;

(i) A Service Provider may enter into agreement with a Licensee or another Service Provider with Infrastructure and engage in sharing activities.

(ii) While allowing sharing of infrastructure, Licensee or Service Provider with Infrastructure may not act in a manner resulting in discrimination among Service Providers or against fair competition,

(iii) If, any Service Provider is discriminated in sharing, the discriminated Service Provider may report it to the NTA; and once such discrimination is reported, NTA shall, after conducting necessary investigation, give appropriate order within thirty five (35) days. It shall be the duty of the Licensee or concerned Service Provider to abide by the NTA order in such matter.

**Question 3: Is sharing of mobile towers mandated in your country?**

**Answer 3:** After the enactment of present Infrastructure Regulation, sharing of mobile towers mandated in Nepal.

**Question 4: Is sharing of active infrastructure allowed in your country? If yes, please provide the details thereof?**

**Answer 4:** No, Licensee or Service Provider cannot share or allow to be shared any Active Infrastructure; these include Electronics infrastructure like Base Transmitter Station (BTS), NodeB, e-nodeB, Radio spectrum, Antenna, Feeder Cable, Radio Access Network (RAN), microwave radio equipment, billing platform, switching system, router, base station controller (BSC), radio network controller (RNC) and related services.

But, in the recommendation of Authority Ministry can make necessary arrangement by publication of notice in Gazette to share active infrastructure if that is appropriate on the basis of the infrastructure's cost, the revenue received for Government or consumer's benefit.

**Question 5: What is the status of Infrastructure sharing amongst telecom operators in your country?**

**Answer 5:** The guidelines and the Regulation is yet to come to practical implementation.

**Question 6: Please provide your views on policy and regulatory solutions to encourage efficient infrastructure sharing.**

**Answer 6:** There is a need for mandatory provisions to make the service provider share their Infrastructure. Leaving it to the market has not resulted in any sharing.

After the enactment of the present Infrastructure Regulation, it encourages efficient infrastructure sharing, regularize the construction and use of telecommunications infrastructure and it makes the telecommunications service affordable & easily available and thus bringing about a reduction of investment in the telecommunications infrastructure with anticipation of lowering the service user charge.

# Annexure-IV: Infrastructure Sharing Framework in Pakistan

**Question 1: Please provide the details of the existing regulatory framework of infrastructure sharing in your country?**

**Answer 1:**

* Cellular Policy 2004 encourages passive infrastructure sharing and the same concept was included in the mobile licenses as well. However, active sharing was not considered then.
* Telecommunication Policy 2015 highlights passive as well as active infrastructure sharing for which regulations and guidelines will be prepared in the light of best international practises.

**Question 2: Whether Infrastructure sharing is mandated or promoted through policy intervention in your country? If yes, provide the details thereof explicitly indicating the extent of infrastructure sharing mandated/promoted?**

**Answer 2:**

* Refer response to a) above.
* As per the Telecommunications Policy 2015 in vogue, sharing of passive and active infrastructure will be considered before granting a new right of way or space to build towers or for other infrastructure. Infrastructure sharing (passive and active) will be provided based on the regulations and guidelines established by PTA, in consultation with Federal Government (MoIT), on the principles of neutrality, non-discrimination and equal access.

**Question 3: Is sharing of mobile towers mandated in your country?**

**Answer 3:** Sharing of mobile towers is encouraged but it is not mandatory. However while applying for site clearance, mobile operators are required to consult operators having sites nearby for sharing.

**Question 4: Is sharing of active infrastructure allowed in your country?If yes, please provide the details thereof?**

**Answer 4:** As per a) above.

**Question 5: What is the status of Infrastructure sharing amongst telecom operators in your country?**

**Answer 5:** There has been an increase in the trend i.e. infrastructure sharing especially the tower sharing. PTA signed an MoU with mobile operators in 2010 to attain tenancy ratio of 1.5 in three years. An SOP was also issued by PTA in this regard to streamline the procedure. As per the last reports received the same has been achieved by all mobile operators. However, at present such stats are not being maintained.

**Question 6: Please provide your views on policy and regulatory solutions to encourage efficient infrastructure sharing.**

**Answer 6:**

* + - Site clearance process for shared sites be made easy.
		- Before granting a new right of way or space to build towers or for other infrastructure, sharing be given due consideration.
		- Shared sites should not be charged exuberant fees by concerned local bodies.

Close collaboration between the stakeholders i.e. regulator, industry, concerned government agencies, etc. in order to avoid cluttering of BTS sires and maintain aesthetics of an area.

1. GSMA: Mobile infrastructure sharing [↑](#footnote-ref-1)
2. Source: Coleageconsulting: http://www.sata-sec.net/downloads/2016/SADC%20Infrastructure%20Sharing%20Guidelines.pdf [↑](#footnote-ref-2)
3. Source: TRAI [↑](#footnote-ref-3)
4. ITU Trends in Telecommunication reform 2008. [↑](#footnote-ref-4)
5. http://www.analysysmason.com/About-Us/News/Newsletter/Active-RAN-sharing-Oct2014/ [↑](#footnote-ref-5)
6. Digital Dividend: Insights for Spectrum Decisions: https://www.itu.int/ITU-D/tech/digital\_broadcasting/Reports/DigitalDividend.pdf [↑](#footnote-ref-6)
7. https://news.itu.int/telecom-infrastructure-sharing-regulation-policies-brazil/ [↑](#footnote-ref-7)
8. GSMA Mobile infrastructure sharing [↑](#footnote-ref-8)
9. DoT website: http://www.dot.gov.in/infrastructure-provider [↑](#footnote-ref-9)
10. https://www.trai.gov.in/sites/default/files/WiFi\_Recommendation\_09032017.pdf [↑](#footnote-ref-10)
11. https://www.trai.gov.in/sites/default/files/Recommendation\_20\_01\_2017.pdf [↑](#footnote-ref-11)
12. https://www.trai.gov.in/sites/default/files/Recommendation\_IBS\_0932018.pdf [↑](#footnote-ref-12)
13. https://www.trai.gov.in/sites/default/files/Recommendations\_on\_VNO\_8092017.pdf [↑](#footnote-ref-13)
14. Guidelines on Antenna Structures Based on the National Policy on Antenna Structures : http://www.trc.gov.lk/images/pdf/guide\_l.pdf [↑](#footnote-ref-14)
15. GSMA: Mobile infrastructure sharing [↑](#footnote-ref-15)