

Mobile Infrastructure Sharing in Bangladesh: Bottlenecks and Way Forward

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***Abstract:** Mobile infrastructures sharing are principally two types: passive and active. Passive infrastructures are the non-electronic infrastructure e.g. site, tower etc and are the most common form of sharing where benefits are easily understood. Active sharing e.g. Radio Access Network (RAN) consumes lion's share of capital expenditures and is gaining increased acknowledgment. In Bangladesh, informal sharing started in 2003 followed by formal policy introduction in 2008 by Bangladesh Telecommunication Regulatory Commission (BTRC). However, the sharing is permitted for passive infrastructures only, and less than 18% of total passive resources are shared by the operators, keeping the larger portion still untapped. Given the appropriate environment, sharing benefit can be increased many folds both for the operators and consumers. While the operators face strategic and operational difficulties in sharing the resources, the regulator faces the challenge of ensuring a level playing ground for all the operators. To address the problem, existing policies should be reviewed by the regulators and the industries are to critically analyze different dimensions of infrastructures sharing for extracting the maximum benefit in the consistently changing technological environment.*

Introduction

Infrastructure sharing is renting out, leasing or swapping resources between operators. It has become a significant concern for Bangladesh mobile market considering its massive infrastructure with over 27000 towers and 45000 BTS in the inventory (BTRC.2014). Grameen Phone (GP), Banglalink, Robi, Airtel and Citycell have agreements to share structures. In fact, Citycell and Aktel (now Robi) have shared sites and towers since 2003, which was the first of infrastructure sharing initiative in the industry. BTRC initially issued the "Guidelines for Infrastructure Sharing" in September 2008, later amended in 2011. It has permitted passive infrastructures sharing only, whereas many regulators across the globe have permitted both active and passive infrastructure sharing. Presently the mobile network operators (MNOs) in Bangladesh are sharing about 18% of their resources but are also facing host of technical, logistics, and operational challenges to implement the agreements. Besides addressing the existing hindrances, there seems to

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be a need for review of the policies to build a progressive sharing environment for Bangladesh mobile market.

In light of above, this paper makes an endeavour to briefly discuss pertinent aspects of infrastructure sharing, referring examples from the global market but keeping Bangladesh's need in mind. The study tries to identify some of the key considerations and impediments towards the infrastructure sharing in Bangladesh and aims to provoke discussion on this issue. Finally, it recommends few measures to minimize the bottleneck; however, does not propose any definitive infrastructures sharing solution for Bangladesh mobile industries.

Objectives of the Study

The broad purpose of this study is to generate responsiveness amongst the stakeholders for better utilization of mobile infrastructures in Bangladesh. Specifically the study is designed to:

- Identify some of the key considerations associated with infrastructure sharing.
- Highlight the present state of infrastructures sharing between the operators.
- Ascertain the problems that hinder the optimum utilization of resource sharing.

Literature Review

A number of articles and researches on mobile communication infrastructure sharing have been done in various countries; however no significant study on this issue was conducted specific to Bangladesh.

'Guidelines for Infrastructure Sharing', published in 08 September 2008 by BTRC introduced the first formal policy for infrastructure sharing, which was later amended in July 2011. These Guidelines identify broad categories of infrastructure sharing, set sharing objectives, list out terms and conditions for sharing and finally lay down the procedure for infrastructure sharing. There are debates on some key issue of these Guidelines; however by implementing these Guidelines BTRC commendably structured the structure sharing in Bangladesh.

Ifty Islam (November 2010) of 'AT Capital Research' conducted a study on 'Bangladesh Telecoms Sector - Challenges & Opportunities'. The research shows that tower sharing offer significant reduction in Operational and Capital Expenditure (Opex and Capex) to the operators; and forming independent tower company can generate considerable additional revenue. However, the study principally focuses on tower sharing in India, thereby leaving scope for further study for Bangladesh market.

Commercial consideration is the prime mover for infrastructure sharing. Sharing optimizes scarce resources, decreases duplication of investment, improves quality of services (QoS), reduces Opex and Capex, and saves consumers cost and marks positive environmental impacts. However, despite many advantages, technical and environmental consideration often makes the implementation complex (GSMA Report 2012).

Nikolai Dobberstein, Ajay Gupta and others (2012) in their 'The Rise of the Tower Business', published by A.T. Kearney, describe the success story of independent tower business with special reference to Indus Tower of India. Though recent industry development have raised questions about the sustainability of tower business but they argue that exploding data traffic leading to more in-building solutions and smaller cell sites will keep the tower growth vibrant in foreseeable future.

Methodology

The article is a limited research study principally based upon different primary sources. Data collected from the MNOs was accessed through BTRC. Interview and discussion with officials at BTRC, mobile operators and infrastructure providers helped in shaping the study. Some secondary sources including examples of infrastructure sharing in other countries were also consulted.

Defining Sharing

BTRC Guideline (2011) identifies two types of infrastructure sharing: active and passive. Active Infrastructure Sharing is the sharing of electronic infrastructure & facility. It includes sharing of Base Transceiver Station (BTS)/Node B, spectrum, antenna, feeder cable, Radio Access Network (RAN), microwave radio equipment, billing platform, switching centres, router, Base Station Controller (BSC)/Radio Network Controller (RNC), optical fibre/wired access and backbone transmission network, database etc.

Passive Infrastructure Sharing is the sharing of non-electronic infrastructure & facility. It includes sharing of physical sites, buildings, shelters, towers/masts, electric power supply and battery backup, grounding, air conditioning, security arrangement, poles, ducts, trenches, right of way.

Infrastructure Sharing Models

Site and Mast sharing

In site sharing, operators share the same physical compound but install separate masts, antennas, cabinets and power system sharing. It is perhaps the easiest form of sharing. Mast, or tower, sharing is simply sharing the same mast, antenna frame or rooftop. It is

the most commonly implemented form of sharing and has given birth to the enormous tower business all over the world.

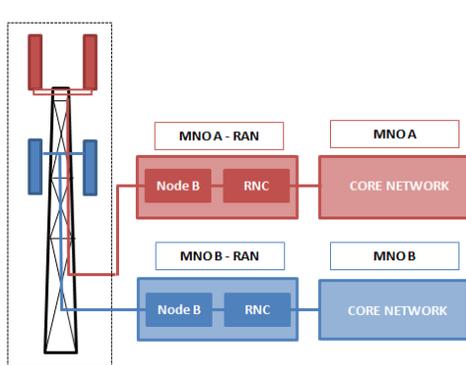


Figure 1: Passive Sharing

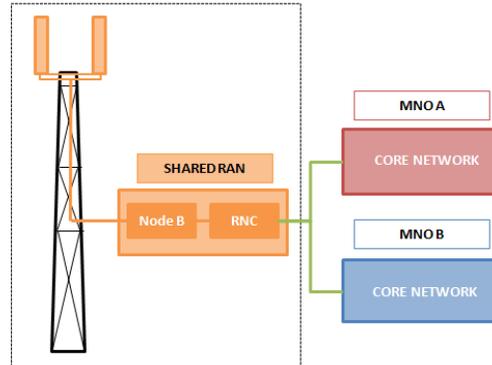


Figure 2: Active Sharing

RAN Sharing

RAN sharing involves the sharing of all access network equipment, including the antenna, mast and backhaul equipment but it does not share spectrum. Operators' focus for network sharing to date has concentrated on elements in the access network since the cost savings in this area are typically more significant and better understood.

Core Network Sharing

At a basic level, the core network consists of: core transmission ring, switching centre with the home location register (HLR), billing platform and value added systems (VAS). The core network shares all components of RAN and the radio spectrum also. It has the advantages of shared operation and efficiency by pooling off spectrum; however the benefits are not as clearly defined as those for sharing the access network.

Network Roaming

In Network Roaming, traffic from one operator's subscriber is carried and routed on another operator's network. However, it does not require any shared investment in infrastructure, and it is more of an agreement than common network elements sharing.

Why Infrastructure Sharing?

Commercial benefit is the major consideration for resource sharing. In the early phases of network development, infrastructure sharing is used to facilitate quick network roll-out, at a lower cost, by new entrants. As networks mature, and their focus shifts from deployment to service innovation, cost reduction become increasingly important as operators seek to optimise profits and revenues. BTRC (2011), in its Guideline states,

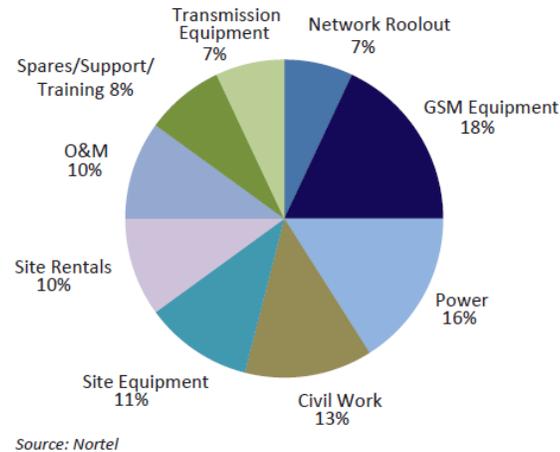
“Infrastructure sharing is an approach to ensure optimum utilization of telecommunication resources and infrastructure, to minimize the operational cost, to achieve higher economies of scale, to promote healthy competition by reducing the entry cost for new entrant and to reduce the wastage of land”. It further outlines the objectives of resource sharing as follows:

- Maximize the use of network facilities of the MNOs.
- Promote the availability of wide range of high quality, efficient, cost effective and competitive telecommunication services throughout Bangladesh.
- Minimize environmental effect, ensure minimum occupation of land and preserve the aesthetics beauty of the country’s landscape.
- Ensure optimum utilization of operator’s Capex on supporting infrastructure, thus facilitating the whole sector.

The Telecom Regulatory Authority of India (TRAI) echoes similar reasons for resource sharing. However, it also stresses on: reduced costs of infrastructure creation, faster service roll-out and affordable tariffs for consumers (GSMA, 2012).

Economic Considerations

At present capital cost required for active infrastructure is around 60% while that of passive infrastructure is 40%. Industry sources cite that RAN sharing alone can save 30-40% cost (Leza, 2014) and passive infrastructure sharing can potentially save overall cost as much as between 15% and 30%. Regarding RAN sharing, the cost savings noted above indicate that prices to consumers are likely to affect positively through competition (GSMA, 2012). Passive infrastructure sharing enables operators to convert their Capex into Opex, which they can defer over extended rental time. Graph-1 shows the distribution of site expenses. In India operating cost for running and maintenance of the tower alone form nearly 60% of Opex. For incumbent operators, sharing their existing tower assets help in reducing the cost of network operations significantly. For instance, in India, it is estimated that tower sharing with a tenancy ratio of two would enable operators to achieve an annual tower Opex reduction of 12-15% resulting in savings of US\$1 billion (Islam, 2010).



Graph 1: Breakdown of Tower Expenses, Capex and Opex as % of Total Cost

Source: Asian Tiger Research 2010

Decrease in duplication of investment reduces Opex. Land saved by sharing may be used for other economic purpose. In developing countries, network sharing facilitates faster roll-out of entrant networks. It allows them to quickly obtain a revenue stream from the start to begin to pay back the initial investment. In addition, end consumers are also benefitted in terms of more choices of service provider and a reduced cost that assists them to contribute through the social economic cycle.

Technical Considerations

Passive infrastructure sharing requires the consideration of many technical and logistical factors although the principle is simple in theory. Operators must consider items such as load bearing capacity of towers, azimuth angle of different service providers, tilt and height of the antenna etc before executing the agreement. Due to multiple antenna combination RAN sharing has adverse effect on the QoS. Complications also arise from inter-working of equipment purchased from different vendors, operational procedures and control mechanisms. Core network sharing poses technical limitations with regards to the technology platform of the operator and the standards employed by the equipment vendor. However, the 3G network is considered a more flexible platform for sharing as they already employ the standards and architectural components required for sharing (GSMA. 2012).

Environmental Considerations

The main environmental impact of networks relate to: proliferation of masts and power consumption. To achieve deeper penetration number of telecom towers is growing at a

rapid rate. Roof top towers are especially cropping up in congested residential areas. Altering city landscape, harmful radiation, noise, public safety, interference with other non-communication equipments in hospital, laboratories, research centre etc are increasingly growing public concern. However, debate also persists about harmful impact of radio emission. As for power, operators have to keep their networks running on a continuous basis 24 hours a day, 365 days a year, regardless of utilisation. One report from Actix, a company specialising in software solutions for Mobile operators, suggests that networks consume 61 billion kWh of energy per year with an average site responsible for yearly 10 tonnes of carbon emissions (GSMA.2012).

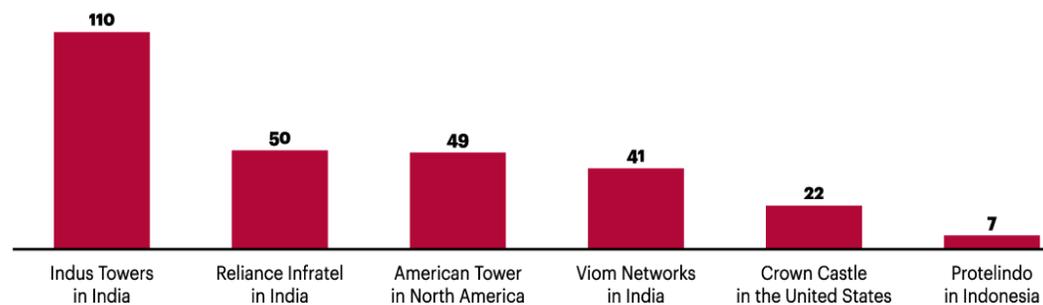
Global Trends in Infrastructure Sharing

Independent Tower Company

Indus Towers is the world's largest independent telecom tower Company with 113,490 towers and 237,562 tenancies (Company website. 2014). Incorporated in November 2007, Indus Towers Limited has been promoted under a joint venture between Bharti Group (Airtel) 42%, Vodafone India 42% and Aditya Birla Telecom 16% (Idea Cellular). This is an interesting concept as it implies cooperation by three of India's largest operators at the back-end operations while they compete for customers in the front-end. Graph 3 shows standing of Indus Tower at the global tower platform (Mumbai. A.T.Kearney, 2013).

Number of towers, 2011

(thousands)



Graph 3: Major Tower Sharing Companies in the World

Source: Company Website, media Publication

India and Malaysia

The Regulators of India initially restricted infrastructure sharing to site and mast only. Later, in April 2008, it permitted active infrastructure also. But sharing is limited to antenna, feeder cable, Node B, RAN and transmission system only. Sharing of the

allocated spectrum is not permitted. But MNOs have received subsidies from the universal service fund towards rolling out shared towers in rural areas. This has facilitated greater network coverage in rural areas. Press Release, India (2008).

Malaysia's Maxis and Redtone International have signed an infrastructure and spectrum sharing agreement in July 2012 to expedite the roll out of their 4G LTE networks. Maxis has also signed an agreement with U Mobile in October 2011, covering active RAN sharing for more than 1300 sites (Fiona, 2012).

Trend in Matured Markets

There is a move towards deeper sharing, including spectrum sharing, in the developed countries. In Australia, H3GA and Telstra created 3GIS, a 50:50 Joint venture in 2004 to jointly deploy 3G services, sharing the core network. Denmark, in 2012, Telia Denmark and Telenor entered onto a network sharing agreement, which involves RAN and spectrum pooling. Spain in 2006 entered into a RAN sharing agreement. Similarly UK has permitted RAN sharing in 2012 and Sweden has allowed core network sharing in April 2001 (GSMA.2012).

Infrastructure Sharing in Bangladesh

Policy Parameters

In Bangladesh, BTRC formally published 'Guidelines for Infrastructure Sharing' in September 2008, followed by amendment in July 2011. It is a non-discriminatory, non-mandated Guideline that encourages common build up of new structure and sharing on 'first come, first serve' basis but confines the sharing within the licensees only. Most debatable issue of the existing policy is the scope of sharing. The initial Guideline states, "The term Infrastructure Sharing for the purposes of these guidelines refers to the Passive Infrastructure, optical fibre /wired access and backbone transmission network sharing". However, in amended Guideline 'optical fibre/wired access and backbone transmission network sharing' are omitted from the scope, limiting the boundary within 'Passive Infrastructure Sharing' only. Since then it has raised a lot of questions and the industries have consistently requested for a policy review (BTRC. 2008 and 2011).

Sharing Scenario

Towers are the most common item shared by the MNOs. In addition, they also share sites, equipment room space, power, passive elements of antenna system etc. Table-1 shows the state of tower sharing and table-2 shows the types of items shared by an operator. From table-1, it is noticed that only less than 18% towers of the MNOs are

shared, leaving the lion portion untapped. For GP it has a tenancy ratio of 1.37 and still has 5608 sites open for

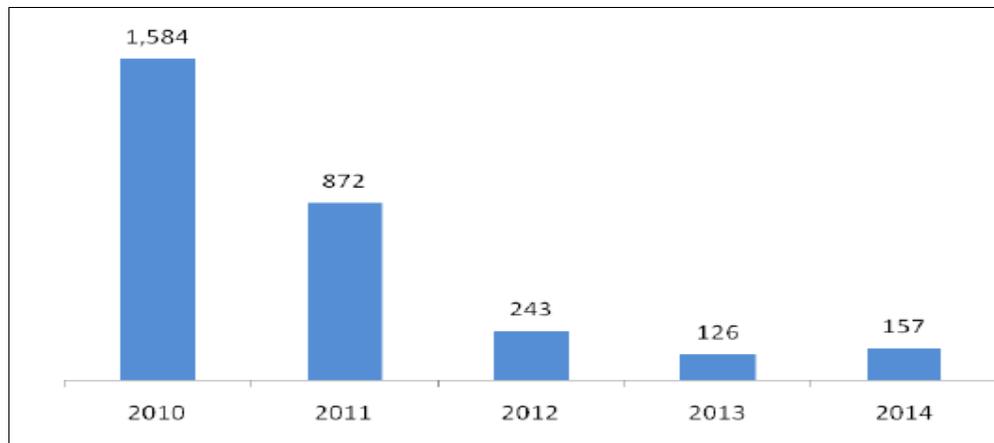
Table 1: Tower Sharing by MNOs in Bangladesh **Table 2: Resources Shared by GP**

Ser	MNO	Own Tower	Shared Tower (as Provider)	Shared Tower (as Seeker)
1	Banglalink	8374	488	1313
2	GP	8454	2836	233
3	Robi	5723	1069	1279
4	Airtel	3573	305	1472
5	CityCell	881	138	15
6	Teletalk	-	-	750 (BTCL)
	Total	27005	4836	4312 excl BTCL

Item Shared as Provider	Total
Greenfield tower with Space	2638
Rooftop tower with space	198
Electricity	779
Generator	106
Room Space	833
DC Power	370
Total	2836

Source: BTRC, August 2014

sharing, but the demand for tower sharing seems to be saturating as seen from Graph-2. However, one study by the industry also suggests that by 2023 more than 9000 towers shall be required by the mobile market (Ahmed.2014), leaving scope of building independent tower company in Bangladesh.



Graph 2: Five Years Tower Sharing State of GP
Source: BTRC, August 2014

Difficulties Experienced by the MNOs

Whilst technically it could be possible for operators to share any amount of equipment, implementation can be complex for some forms of sharing. In Bangladesh, power supplying authorities do not allow sharing of commercial power among the MNOs hampering faster roll out and QoS. Similarly, house or land owner's misperception about site sharing results in non-cooperation or higher site rents. Sometimes non-cooperation from resource providers also creates security threat leading to loss of battery, generator fuel etc. Meanwhile tower overloading or lack of needed height may technically disallow resource sharing. Besides, absence of guideline for active resource sharing specially RAN sharing significantly limits the benefit of resource sharing. Sometimes, MNOs even have to scrap expensive radio equipment to accept the newer technology, which otherwise could have been shared with ISPs or small companies who do not need latest technology. Moreover, MNOs are depositing 1% of their revenue earning to the 'Social Obligation Fund' (SOF) since November 2011 to assist in developing telecommunication facilities in the un-served areas. It is learned that a handsome amount of money has already been deposited, which is kept idle for non-issuance of guideline from the authority.

Industry View in Addressing the Difficulties

Globally industries are in favour of both passive and active sharing. They opine that infrastructure sharing agreements should be governed under commercial law, not mandated or subject to additional regulatory constraints or fees (GSMA.2013). Association of Mobile Telecom Organisations of Bangladesh has recommended, "to ensure the cost efficiency of the sector, BTRC should amend the infrastructure sharing guidelines allowing operators to share active structures such as radio access network, transmission network." (AMTOB.2014).

MNOs also are contemplating additional opportunities of sharing. For example, site sharing may not be limited to BTRC licensee only. The non-communication organisations e.g. Banks, Financial Institutions, Security houses, News paper, Industries etc have need for communication infrastructure even at limited scale. It costs them considerably to build standalone system; resource sharing thus can be a better option. Tenancy discount for the 2nd and follower tenant will also encourage sharing with lower Opex.

Regulatory Concerns and Challenges

Regulatory interest in infrastructure sharing is three-fold: efficiency, competition and environmental aspects. Their primary concern lies in the prevention of anti competitive behaviour. Regulators face the challenging task to correctly identify and moderate cases

where dominant firms tend to harm competition. They also need to ensure that the national resources are not exploited by MNO under the cover of sharing, e.g. spectrum sharing Vs spectrum trading. Furthermore, Regulators need to strike a balance to ensure that regulatory levies and taxes do not discourage the industry. They would need to set up arbitration mechanisms to resolve compliance related issues and disputes among operators that flow from setting up complex sharing agreements. Finally, any regulatory decision should be made based on an analysis of the competitive impact of infrastructure sharing and in line with good regulatory goals, for example transparency, efficiency, non-discrimination and independence.

Findings of the Study

Commercial benefit is the major consideration for resource sharing. Sharing reduces Capex and Opex for the MNOs, helps in faster service roll-out and network expansion into underserved areas, ensures optimum utilization of telecommunication infrastructure, promotes healthy competition, reduces entry cost for new entrant, minimizes environmental effect and offers affordable tariffs to the end users.

Capital cost required for active infrastructure is around 60% while that of passive infrastructure is 40%. RAN sharing can save 30-40% cost and passive infrastructure sharing can potentially save overall cost as much as between 15% and 30% (Leza, 2014).

Technical factors such as load bearing capacity of towers, azimuth angle of different service providers, tilt and height of the antenna, multiple antenna combination, inter-working of equipment purchased from different vendors, operational procedures, control mechanisms etc significantly affect infrastructure sharing.

The main environmental impact of networks relates to proliferation of masts and power consumption. Rapid growth of towers is increasingly growing public concern. One report suggests that an average site is responsible for 10 tonnes of carbon emissions per year.

Independent telecom tower Company has remarkable success story. Passive resource sharing is mostly preferred all over the globe. However, most of the developed countries allow RAN sharing including India and Malaysia, although India did not allow spectrum sharing till now.

In Bangladesh informal infrastructure sharing started in 2003 followed by formal policy introduction in 2008. Amended Guideline in July 2011 restricted sharing within passive infrastructures only, which became the most contentious issue amongst the stakeholders.

Tower is the most common item shared by the MNOs in Bangladesh. In addition, they also share sites, equipment room space, power, passive elements of antenna system etc.

However, only less than 18% of total towers of the MNOs are shared, leaving the lion portion untapped (BTRC, August 2014).

Multi dimensional strategic and operational challenges are making infrastructure sharing difficult. While many problems are external some are generated within also. But most importantly industry is repeatedly asking for a policy review to allow sharing of RAN and transmission network. Appropriate utilization of SOF is also an issue of concern.

Regulatory interest in infrastructure sharing is three-fold; efficiency, competition and environmental. The primary challenge for regulators lies in the prevention of cartels and anti competitive behaviour. Regulators need to limit dominant firms from harming competition. Regulatory decision should be in line with good regulatory goals, for example transparency, efficiency, non-discrimination and independence.

Recommendations

Infrastructures sharing should be driven by market matrix, not mandated. Regulators need to consider review of the existing Guidelines permitting active infrastructures sharing, specifically the RAN and transmission network but not the spectrum sharing. SOF should immediately be utilized for infrastructure development of the un-served areas. Industries are to weigh up different considerations for infrastructures sharing and propose a sharing modality, which is in consistent with The Bangladesh Telecommunication Act 2001 and regulatory framework, accepting the challenges of consistently growing newer technology.

Conclusion

Infrastructure sharing is mostly commercially driven rather than mandated by regulators. Mobile infrastructure sharing has generally taken the form of passive site and tower sharing, with independent tower companies playing a key role in many countries. Passive sharing is typically favoured and even encouraged by regulatory authorities all over the world including Bangladesh. Active infrastructure is less commonly supported, but is becoming more widely considered, especially because of its potential benefits for rural broadband. Cost savings in RAN sharing is more significant and better understood than core network sharing. As mobile broadband traffic grows and pressure to deploy new technologies increases, MNOs are seeking deeper sharing arrangements. However, deeper sharing increases potential savings, but reduces individual control over the network and this sharing may not be viable under existing spectrum usages regulations. For Bangladesh, concerned authorities may actively consider RAN and transmission network sharing. But full active network sharing including spectrum and core network sharing will require more analysis than passive sharing and RAN sharing. Finally, there

should be clear guidelines on how the Ministry and BTRC will disburse money from the social obligation fund.

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