

Framework for Telecommunications Infrastructure Sharing

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ABSTRACT: - Telecommunication Infrastructure sharing is no longer an optional course of action to be adopted by service providers and industry regulators, for it has evolved into a public policy issue. This is due to the impact it has on the telecommunication sector ecosystem and the environment. Two broad categories of Telecommunication Infrastructure sharing, active and passive sharing, are implemented by various types of sharing, namely, equipment and resource sharing, collocation, leasing, hosting and national roaming. Successive implementation of these sharing types is anchored on key Telecommunication Infrastructure sharing principles, namely, Mutual Negotiation, Non-Discriminatory Offers, Technical Feasibility, Cost Effectiveness and Environmental Considerations. Development of a robust policy on sharing of Telecommunication Infrastructure therefore requires adherence to a framework that takes into consideration all concepts and fundamental principles of Telecommunication Infrastructure sharing. All these are dependent on the Network Infrastructure Open Access theory whose building blocks are open access regulation and open access network model.

KEYWORDS: Active, Passive, Infrastructure Sharing, Public Policy, Open Access Theory

I. INTRODUCTION

Due to the high cost of setting up Telecommunication Infrastructure, most jurisdictions encourage Telecommunications Infrastructure sharing which is the joint utilisation of assets and/or services necessary to provide telecommunication service in order to reduce the costs of building, operating, and maintaining network infrastructure[1].

Regulatory reasons for Telecommunications Infrastructure sharing posits three considerations, namely, efficiency, competition and environmental aspects, while among the telecommunication players, commercial considerations are the drivers for Telecommunications Infrastructure sharing[2].

The considerations from the stakeholders to the Telecommunications Infrastructure sharing yields two categories of sharing, namely, passive Telecommunications Infrastructure Sharing which involves joint use of non-electronic components like Masts and Pylons, electrical or fibre optic cables, physical space on the ground, towers, roof tops and other premises, power supply, air conditioning, alarm installations and other passive equipments[3].

The other category of sharing, active Infrastructure sharing, involves joint use of electronic components of the network and the radio spectrum, which includes: Radio Access Network (RAN) sharing where the shared equipment includes Base Transceiver Station (BTS), NodeB, Base Station Controller (BSC), Radio Network Controller (RNC) and may extend to feeder cables and antennas; Backhaul sharing, where operators may decide to share the transmission channel; and Core network sharing, where the Home Location Register (HLR), the billing platform and the Value Added System (VAS) can be shared[4].

II. TYPES OF TELECOMMUNICATIONS INFRASTRUCTURE SHARING

The two categories of Telecommunications Infrastructure Sharing, namely, active and passive, are implemented by various telecommunications infrastructure sharing types and at different levels by Telecommunications Service Providers. The types are Equipment and Resource Sharing (ERS), Collocation, Leasing, National Roaming and Hosting. The contextual definitions and description of these forms of Telecommunications Infrastructure Sharing are detailed in the subsequent sections.

2.1 Equipment and Resource Sharing (ERS)

Equipment and Resource Sharing (ERS) refers to joint use of electronic equipment and/or frequency by telecommunication service providers. Examples of what could be shared include Spectrum Switches, Antenna, Transceivers and Microwave equipment[5]. The level of sharing of this Equipment and Resource can vary on a graduating scale from sharing antennas only to sharing antennas, BTS, BSC, the entire RAN, the core transmission ring as well as VAS platforms[2]. The other resources sharable under this type of Infrastructure sharing are power supply, generators and batteries[6].

Frequency resource sharing is the simultaneous usage of a specific radio frequency band in a specific geographical area by a number of independent entities, leveraged through mechanisms other than traditional multiple and random access techniques[7].

The two operational models for frequency sharing are cooperation or coexistence and sharing among equals or primarysecondary sharing[7].

The sharing could be inter service or intra service[8] and the sharing could be done in four dimensions , namely, frequency separation, spatial separation , time separation and signal separation , with the key technology enabling dynamic spectrum sharing being Cognitive Radio[7].

2.2 Collocation

Collocation refers to installation of telecommunications facilities on the premises of other telecommunications carriers[9] , or placement of telecommunication equipment of one service provider into the equipment room or space of another service provider [10]. Internet Exchange Points (IXPs) provide collocation services, providing space as well as equipment for Internet routing, transmission, webhosting and other services [10].

2.3 Leasing

In the realm of telecommunications, leasing could be done for physical equipment , structure, network capacity and frequencies.

Frequency leasing is defined as partial transfer of a licensee's rights to frequency spectrum to another user for a limited period and/or for a portion of the spectrum included in the licence [11].

Lease of capacity on an operators network involves rights to use their dark fibre or wavelength [12].

In the context of telecommunications therefore , leasing is obtaining rights to use the equipment , space, frequency or network of a third party, who may or may not be a telecommunications service provider, by one or more telecommunication service providers.

2.4 Hosting

The concept of hosting within the context of telecommunications refers to the Mobile Virtual Network Operators(MVNO) business model.

Mobile Virtual Network Operators (MVNOs) are telecommunication service providers that do not hold spectrum licenses and own little or no network infrastructure, but resell mobile services by purchasing airtime at wholesale rates from mobile network operators (MNOs)[13].

The business models under MVNOs are Branded reseller, Full MVNO, Light MVNO and MVNE [14].

In Branded reseller, the venture provides its brand and its distribution channels while the MNO provides the rest of the business [14]

For Full MVNO, the MNO provides the access network infrastructure and part of the core network, while the MVNO provides the rest of the elements of the value chain [14]

The Light MVNO takes control of the marketing and sales areas and, in some cases, increase the level of control over the backoffice processes and valuedadded services definition and operations [14]

Network Enablers, focus on the provision of infrastructure that facilitate the launch of MVNO operations by being positioned between a host MNO and an MVNO venture to provide services ranging from value added services and back office processes [14].

2.5 National Roaming

Roaming is a form of sharing that allows subscribers of a mobile network operator to use mobile services when they are in an area not covered by their operator [15]. It is implemented by virtually extending the geographic coverage of an operator by allowing its subscribers to use another operator's network [15].

National roaming is an instrument of public policy, used mainly to facilitate market entry, reducing concentration and thus increasing competition [16] .

New entrant have a period of time in which they can offer a national service without having completed construction of their own national network [16]

III. THE FRAMEWORK

A framework is as an encapsulation of ideas, rules, concepts and fundamental principles of a particular domain or system in a static and structured way, and how they are interrelated, to aid in better understanding of the system or domain and in decision making processes[17].

In the context of Telecommunication Infrastructure sharing , the main principles considered when developing regulatory instruments to foster the sharing are Mutual Negotiation in Non Discriminatory ways, Technical Feasibility , Cost Effectiveness [18] and Environmental Considerations [19].

Various commercial models exist that facilitate telecommunications Infrastructure sharing , namely , Joint Venture , Towercos, Fibre Companies , Public Entities and Consortiums and Public Private Partnerships [20].

The standard institutional structure that governs the telecommunication industry in developed market economies handles three main telecommunication functions, namely, Policy development , Regulation and service provision, separately [21].

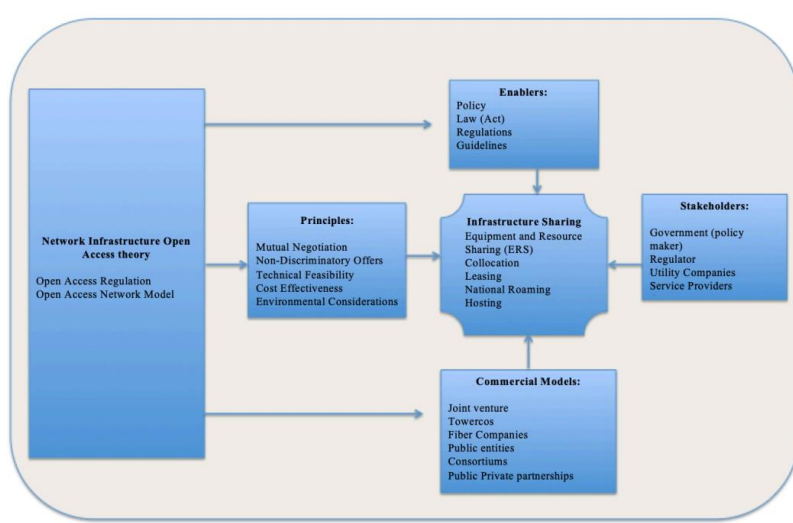
Policy development is handled by the executive arm of government ,regulation by an independent regulator and service provision by private licensed commercial enterprises [21].

The listed concepts and principles of infrastructure sharing are anchored on the network infrastructure open access theory.

The network infrastructure open access theory requires that noncompetitive parts of access networks should be accessible to all service providers on a nondiscriminatory basis, to ensure there are no conflicts of interest in provision of retail services and the wholesale services [22].

Based on the discussed concepts and principles on telecommunication infrastructure sharing, the derived framework is shown in figure 1.

Fig. 1 Framework for Telecommunications Infrastructure Sharing



IV. DISCUSSION

The building blocks of Network Infrastructure Open Access theory are open access network model and Open Access Regulation [23].

In the open access network model, the roles of the service provider and the network owner are distinct, thus the service providers get access to network and the end customers on fair and nondiscriminatory conditions [23].

The open access regulation is where there is mandated or voluntary provision of access to an upstream resource, publicly or privately owned, by access providers that may be vertically separated, integrated or a cooperative of multiple entities based on the principle of nondiscrimination [23].

Principles, Latin principium, means source, beginning or origin [24]. It is a primary truth that forms the basis for other beliefs , and also means a rule for ethical conduct, as put forward by Theologians [24].

This paper defines principles as fundamental truths and basic generalisations used as a basis of reasoning and conduct. This is meant to distinguish principles from values which are routed in the latin word "virtus" for strength .

As adopted by psychologists, sociologists and politicians, the word values means behaviour that is accepted by consensus [24], and values are therefore neither standards of intrinsic worth nor eternal verities, making them relative, not universal [24].

The principles of Telecommunications Infrastructure sharing as detailed in this paper are universal and applicable across both developing, emerging and developed economies.

Commercial models that foster telecommunication Infrastructure sharing are actualised differently in different telecommunication markets, with some being licensed by regulators as telecommunication infrastructure providers .

Public private partnerships are suited for underserved and unserved areas considered by service providers as economically unviable areas [25].

A sound telecommunication regulatory framework that encourages Joint Ventures can provide for a much needed impetus to introduce new services, until when the market is able to support full tariffs [26].

A report by the International Monetary Fund [27], on the Determinants of PublicPrivate Partnerships (PPPs) in Infrastructure, notes that PPPs tend to be more common in countries where governments have heavy debt burdens as well as where the aggregate demand and market size are large.

For the PPPs to be successful, macroeconomic stability is essential, as well as high institutional quality, implying less corruption and effective rule of law by the public entities involved [27].

Towercos gain entry into telecommunications market through an anchor client and expand through collocation, buildtosuit (BTS), and acquisition [28].

Dark fiber pairs in fibre optic cables can be used by multiple competing retail access network operators and wholesale operators by each of them installing their own active infrastructure [29].

V. CONCLUSION

Telecommunications infrastructure sharing, when grounded in an enabling regulatory environment, and if well implemented by the various stakeholders, has the potential to catalyse exponential growth of economies around the globe.

It will foster easier entry of new service providers , speed up recouping of capital expenditure for those who had already invested in the infrastructure, with the net effect being reduced service prices, high competition and better quality of services.

With telecommunications being an enabler and facilitator of other sectors of the economy, the ripple effect will be felt in other sectors hence rapid economic growth.

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