NIGERIAN COMMUNICATIONS COMMISSION

AN OVERVIEW OF PROVISION OF OVER-THE-TOP [OTT] SERVICES

Policy, Competition & Economic Analysis Department
NIGERIAN COMMUNICATIONS COMMISSION

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EXECUTIVE SUMMARY

Telecommunications and indeed communication services in general has transited from first generation cellular networks to third and more recently fourth generation networks (which largely ride on internet protocol) in various parts of the world. This evolution brought about a transition from the use of visual signals such as beacons, smoke signals, semaphore telegraphs, signal flags, and optical heliographs, or audio messages via coded drumbeats, lung-blown horns to telegraphs, telephones as well as the use of the orbiting satellites and the Internet. (Rathod [n.d])

The access to 3G and 4G networks which offer mobile broadband and high speed IP data networks has further encouraged the uptake and growth of new modes of communication such as over-the-top (OTT) services which in turn enables the provision of services such as live streaming; and voice over internet protocol (VoIP).

These OTT services are provided through the Internet Protocol Telephony which is a general term for the technologies that use Internet Protocols packet-switched connections to exchange voice, fax and other forms of information that have traditionally been carried over the dedicated circuit-switched connections of the public switched telephone network (PSTN).

There are four distinct types of VoIP services which are (1) Computer-to-Computer (2) Computer VoIP calls (3) Computer-to-Telephone (4) Telephone-to-Computer.

The regulation of VoIP services remains a topical issue around the world as it is mostly perceived by traditional telephone network operators to be a threat to their continuous existence. Different countries have at some point or the other attempted to or developed a framework to regulate the provision of VoIP services. Some of these countries include:

1. ***India:*** The Telecom Regulatory Authority of India [TRAI] in year 2015 produced a Consultative paper on Regulatory Framework for over-the –top (OTT) services following a consultative forum conducted in year 2014 where representatives of Telecommunications Service Providers [TSPs], OTT providers and legal experts were invited to present their views. However, TRAI is yet to take a final position on the matter and they are soliciting for further comments from stakeholders.

2. ***United States of America:*** The Federal Communications Commission [FCC] publicly states has worked to bring specific VoIP services, applications, and capabilities under its control. The FCC, regulates VoIP in five (5) categories namely- (i) 911 Services (ii) Portability (iii) Call Records (iv) Universal Service (v) Accessibility.

3. ***European Union Telecommunications Markets:*** The EU Commission initially declared that VoIP was not "voice telephony" and after extensive stakeholder consultations, no immediate regulation was provided however, four evaluation criteria were enumerated which, if later found to be present, would make VoIP subject to regulation (Blythe, 2005). The criteria include: (i) Whether VoIP communications are the "Subject of a Commercial Offer (ii) Whether VoIP communications are for the Public- (iii) Whether VoIP communications are "To and From PSTN Termination Points" (iv) Whether VoIP communications "Involve Direct Transport and Switching of Speech in Real Time" (Blythe, 2005).

CHAPTER ONE: INTRODUCTION

Telecommunications has evolved significantly over the past centuries from an era where telecommunications basically involved the use of visual signals such as beacons, smoke signals, semaphore telegraphs, signal flags, and optical heliographs, or audio messages via coded drumbeats, lung-blown horns, to the modern era where telecommunications now includes the use of electrical devices such as telegraphs, telephones, and teletypes, the use of radio and microwave communications, fibre optics and their associated electronics, as well as the use of the orbiting satellites and the Internet (Rathod [n.d]).

The evolution of telephony and indeed communication services in general has led to the transition from first generation cellular networks to third and more recently fourth generation networks (which largely ride on internet protocol) in various parts of the world. 3G networks are increasingly being overwhelmed by the growth of bandwidth-intensive applications thereby leading to more uptake of data-optimized 4th-generation technologies which offer speed improvements over existing technologies.

The access to 3G and 4G networks which offer mobile broadband and high speed IP data networks has further encouraged the uptake and growth of new modes of communication such as over-the-top (OTT) services which in turn enables the provision of services such as live streaming; and voice over internet protocol (VoIP).

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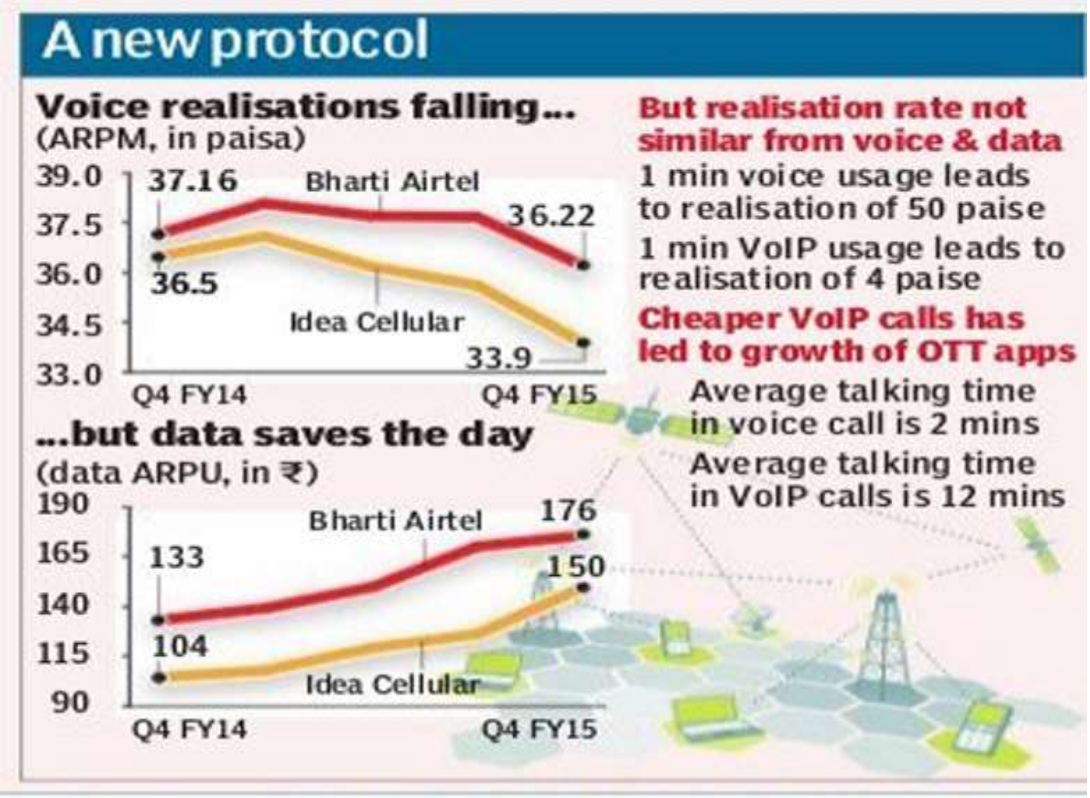

*(*Source: Financial Express)*

Using the Internet, calls travel as packets of data on shared lines. The uptake of new modes of communication through the voice over internet protocol (VoIP) indeed pose a threat to the survival of the more traditional telephone network technologies as these services avoid the tolls of the PSTN and are offered to the subscribers for free or at very low costs. However, it is appreciated that the traditional telephone networks had made huge investments and the voice services were a dominant business for them, the evolution of technology cannot be stopped. "Technology can be disruptive and operators have to adapt their business models or perish" Financial Express, 2015.

The subsequent sections will therefore examine in detail the concept of over-the-top services such as voice over internet protocol (VoIP) services, its uptake, net neutrality and the impact/implications on traditional telephony.

1.1 Over-the-Top Services:

Over-the-top (OTT) services are services carried over the networks, delivering value to customers, but without any carrier service provider being involved in planning, selling, provisioning, or servicing them, thereby implying that traditional telcos cannot directly

earn revenue from such services. These over-the-top services include services such as Internet Protocol (IP) Telephony, live streaming and other social media applications.

According to Patel, (2007) "Internet Protocol (IP) telephony (also known as 'Internet telephony') uses a broadband Internet connection to transmit conversations as data packets. In addition to replacing the traditional Plain Old Telephone Service POTS system. IP telephony is also competing with mobile phone networks by offering free or lower cost connections via WiFi hotspots."

It is a service based on the Voice over IP communication protocol (VoIP), a disruptive technology that is rapidly gaining ground against traditional telephone network technologies. VoIP is also used on private wireless networks which may or may not have a connection to the outside telephone network (Patel, 2007).

(Source: Federal Communications Commission)

In its broadest definition, VoIP can be described as the conveyance of voice, fax and unrelated services publicly or wholly over packet switched IP-based networks including peer-to-peer VoIP and VoIP services connected to PSTN. (Wong, et. al, 2009).

1.2 Net Neutrality:

According to Naik (2012) “Net neutrality also referred to as Internet neutrality coined by Prof. Tim Wu is a regulatory concept which eliminates any type of discrimination in transmission and access of content on the Internet”. It means all end users are able to access content, applications and services of their choice at the same level of service quality, Internet speed and price with no priority or degradation based on the type of content, applications or services. “This will protect all innovators and consumers and preserve the Internet’s role as a core of free expression and democratic principles” Tom Wheeler, FCC 2015.

The basic principle of Net neutrality proposes that networks do not discriminate between different data packets ensuring that innovators or content developers do not need to ask permission for new projects, making internet a collection of a large amount of information, analysis, opinions and services with no sole content provider or regulator. (The Economist, 2015)

However, while some argue that strong legislation is required to ensure that internet service providers do not restrict or filter internet traffic that pass through their network as Net neutrality lends competitiveness to the market, with users getting more options to choose from; other argue against Net neutrality suggesting that it can be used as a tool for internet censorship or invasion of privacy when it is in wrong hands (Naik, 2012).

It is important to note that while there are presently no concrete laws or regulations for the enforcement of Net neutrality, Internet access is generally unrestricted across the world except in a few countries where their governments impose specific restrictions in such jurisdictions.

CHAPTER TWO: LITERATURE REVIEW:

According to Wong, et. al. (2009) “VoIP is a technology by which oral communications can be transferred from circuit-switched networks to or over Internet Protocol networks, and vice versa. VoIP transforms standard oral telephone signals into compressed data packets that are sent over the Internet Protocol. VoIP can be used with either a telephone (mobile or land-line) or a PC as the user terminal thereby providing different modes of operation: PC to PC, PC to telephone, telephone to PC and telephone to telephone or mobile-to-mobile, all via the internet.”

Federal Communications Commission [FCC] defines Voice over Internet Protocol (VoIP), as “a technology that allows you to make voice calls using a broadband Internet connection instead of a regular (or analog) phone line. They further noted that while some VoIP services may only allow you to call other people using the same service, others may allow you to call anyone who has a telephone number - including local, long distance, mobile, and international numbers. Also, while some VoIP services only work over your computer or a special VoIP phone, other services allow you to use a traditional phone connected to a VoIP adapter.”

The FCC notes that “VoIP services convert your voice into a digital signal that travels over the Internet. If you are calling a regular phone number, the signal is converted to a regular telephone signal before it reaches the destination. VoIP can allow you to make a call directly from a computer, a special VoIP phone, or a traditional phone connected to a special adapter. In addition, wireless "hot spots" allow you to connect to the Internet and may enable you to use VoIP service wirelessly.”

Alb. L.J. SC. & Tech (2007) further notes that “The difference between VoIP calls and PSTN calls is the way the subscriber's information (i.e., the voice communication) is transmitted. In PSTN calls, a dedicated connection is set up end- to-end so that the calling and called parties have full use of that circuit at all times until the call is completed and the circuit is torn down. In VoIP calls, the calling and called parties' voice communications "packetize," that is they are broken up into small pieces or packets, which are transmitted across the Internet and finally reassembled at the destination point." When the voice packets traverse the Internet they mix with many other packets of information traversing

that same circuit, so the circuit is not dedicated to only that one voice call, but rather is acting as a highway transporting a large number of packets from their origination points to their destination points".

Wong, et. al. (2009) however notes that "the regulation of VoIP in Europe is slightly complex because there is no consensus over the categorization of VoIP services. The European Commission takes a "light touch" approach to VoIP regulation. Whether VoIP service is regulated would depend on whether a VoIP service is considered as an electronic communication service (ECS) or a publicly available telecommunications service (PATS)."

According to Wong, et. al. (2009) "An ECS is defined in the EU Framework Directive as a service normally provided for remuneration, which consists wholly or mainly in the conveyance of signals on electronic communications networks. Therefore, a VoIP service that provided a product such as a software program to be run on personal computer with no ongoing provision of service would fall outside the scope of the EU regulatory framework."

According to Alb. L.J. SC. & Tech (2007) "The 1996 Telecom Act defined 'telecommunications,' 'telecommunications services,' and 'information services' in an attempt to classify both existing and yet-to-be developed services and to create a regulatory framework to govern both telecommunications and information services. For regulatory purposes, the question is whether the various VoIP services are classified as "telecommunications services" or "information services." If the VoIP services are categorized as "telecommunications services," then they are subject to regulation by the FCC. On the other hand, if they are categorized as "information services," they are not subject to regulation under the 1996 Telecom Act.

Dinkes (2005) notes that "as telecommunication platforms converge and new technologies emerge, there has been a call for new legislation to repeal much of the current telecommunications regulatory structure. The uncertain regulatory status of applications such as Voice over Internet Protocol (VoIP) and other IP-enhanced services are often cited as examples of how the current regulatory structure could stymie the deployment and development of emerging technologies. While such examples are useful in advancing the cause of market-oriented approaches for emerging technologies, these arguments are seldom applied to legacy networks because of technological differences."

According to Quarantini (2005) “The issue of the regulation of voice over broadband (VoB)/voice over internet protocol (VoIP) has become one of the most hotly contested in telecommunications, alongside the related issue of broadband access to the internet. Here we find an intersection of two very different markets: the traditionally regulated telephony market and the traditionally unregulated data services markets.”

CHAPTER THREE: INFORMATION ANALYSIS:

3.1 Regulation of OTT Services in Nigeria:

The Nigerian Communications Commission in line with one of its mandate of issuing communications licenses for the operation and provision of communication services, and to determine the eligibility criteria and other general terms and conditions of licenses, issued Guidelines on International Gateway Access and Voice over Internet Protocol (VoIP) for the Nigerian Telecommunications Industry. It is the expectation of the Commission that the networks of licensees operating under Full Gateway and International Data Access Licenses may convey data, voice and video signals either in their natural forms or in digitized formats. Operators of these gateways may also inter-work and exchange information by using appropriate protocol and signaling conversion devices. The IDA License is issued as a standalone license and is not be tied to any specific transmission medium for the purpose of conveying out-bound or in- bound traffic hence grants automatic authorization.

While this license is meant to cover provision of VoIP services, it does explicitly address the current challenges and threats pose by the growth and uptake of these services over the traditional telephone networks.

3.2 Regulation of OTT Services in other Jurisdictions:

The regulation of VoIP services remains a topical issue around the world as it is mostly perceived by traditional telephone network operators to be a threat to their continuous existence. In this regard different countries have as some point or the other attempted to or developed a framework to regulate the provision of VoIP services. Some of these countries are outlined below:

3.2.1 India:

The Telecom Regulatory Authority of India [TRAI] has commenced discussions on a regulatory framework for over-the-top services in India. A consultative paper was published in March, 2015 which outlined the Authority's intent to analyze the implications of the growth of OTTs and consider whether or not changes are required in the current regulatory framework. To understand the underlying issues, a seminar was conducted by the Authority on "Regulatory Framework for OTT services" in year 2014, in which representatives of Telecommunications Service Providers [TSPs], OTT providers and legal experts presented their views and those views are reflected in the published consultative paper.

The consultative paper noted that the starting point for a suitable regulatory framework is the need to define the basis for classification of OTT players either as Communications Service Providers (CSPs) or as Application Service Providers (ASPs).

Highlights of the consultative paper presented by TRAI identified that:

- Traditional Voice calling rates in India are one of the lowest in the world implying that there can compete favorably with VoIP service providers;
- Mobile Internet penetration rate is still very low in India (about 20%) therefore implying that the uptake of OTT services or substitutability of traditional telephony with VoIP services is relatively low; and
- Quality of service of OTT services is lower than what is offered by traditional telephony services.

However, OTT services are still unpopular with mobile carriers in India who want to earn higher revenue from such services beyond the charges incurred for data. One of the Telephone Service Providers in India (Bharti Airtel) recently announced differentiated tariff plans for voice calls over the Internet and data surfing as VoIP calls were charged almost three times more than regular data surfing. However, this tariff plan was eventually withdrawn following protests by users who accused the TSP of violating the principles of net neutrality. Regarded as an essential ground for open internet, net neutrality standards mean that mobile carriers should treat all data equally and not impose differential treatment or charges on different kinds of data.

Further to the publication of the Consultation paper by TRAI, they have requested for further comments and suggestions from stakeholders before the process is finalized.

3.2.2 United States of America [US]:

The FCC publicly states that it encourages competition and service provider innovation for the Internet as a whole, but it has also worked to bring specific VoIP services, applications, and capabilities under its control. According to the FCC, the U.S regulates VoIP in the following categories-

- **911 Services:** Providers of interconnected VoIP services which allow users generally to make calls to and receive calls from the regular network- do 911 service obligations (FCC, 2015);
- ***Portability:*** Interconnected VoIP providers and telephone companies are required to comply with Local Number Portability (LNP) rules;
- ***Calling Records:*** Interconnected VoIP providers are limited in the use of customer propriety network information such as telephone calling records, and are also required to protect it from disclosure (FCC, 2015);
- ***Universal Service:*** Interconnected VoIP providers are required to contribute to the Universal Service Fund;
- ***Accessibility:*** Interconnected VoIP providers must contribute to the Telecommunications Relay Service Fund used to support the provision of telecommunications services to persons with speech or hearing disabilities (FCC, 2015).

However, in a recent move in year 2015, the FCC voted to regulate broadband Internet services as a public utility. The vote implies that high speed Internet in the US has been reclassified as a telecommunications service instead of an information service under their Telecommunications Act thereby granting the FCC powers to regulate the activities of players like the OTT service providers in the market.

According to Tom Wheeler, (2015) “the move is intended to ensure that no content is blocked and that the Internet is not divided into pay-to-play fast lanes for Internet and media companies that can afford it and slow lanes for everyone else. These prohibitions are hallmark of the net neutrality concept. However, the FCC will not get involved in

pricing decisions or the engineering decisions companies make in managing their networks."

3.2.3 European Union [EU]:

Further to the liberalization of most of the EU's telecommunications market, the EU Commission in one of its supplementary directives in 1997 initially declared that VoIP was not "voice telephony" and therefore fell "within the liberalized area." Blythe (2005) though noted that "the EU emphasized this was a preliminary viewpoint and was subject to change after consideration of stakeholder opinions". However, following extensive stakeholder consultations, no immediate regulation was provided but four evaluation criteria were enumerated which, if later found to be present, would make VoIP subject to regulation. The criteria include:

(i) Whether VoIP communications are the "Subject of a Commercial Offer"- in order to meet this criterion, the VoIP service would have to be offered on a "standalone" basis, not merely as a supplement to an existing Internet service (Blythe 2005).

(ii) Whether VoIP communications are for the Public- the Commission concluded this criterion would be met, since computer-to-phone and phone-to-phone voice communications transmitted over the Internet would be available to all members of the general public (Blythe 2005).

(iii) Whether VoIP communications are "To and From PSTN Termination Points"- this criterion is not met "if access to the Internet is obtained via leased circuits," but that it would be met if local loops are used instead of leased circuits to connect two termination points (Blythe 2005).

(iv) Whether VoIP communications "Involve Direct Transport and Switching of Speech in Real Time"- the Commission stated this criterion was not met because of the "unpredictable congestion risk" of VoIP in its current state which made it difficult to attain a comparable level of reliability and speech quality as produced by PSTN. However, the Commission noted that, "Where organizations offering phone-to-phone Internet voice are guaranteeing quality of speech by bandwidth reservation and claim themselves that the quality of the service is the same as circuit- switched PSTN voice, this element of the voice telephony definition will obviously already have been met"(Blythe 2005).

The implications therefore were that: since all of the criteria had not currently been met, VoIP fell within the liberalized area of telecommunications services; no requirements for individual licenses could be imposed; no universal service charges could be assessed from VoIP providers; and neither did interconnection requirements apply to VoIP providers (Blythe 2005).

3.3 Impact/Implications of Unregulated Over-The-Top Services:

Internet Telephony, also known as Voice over the Internet Protocol ("VoIP") has changed the way people communicate with one another. Not only is it cheap, but it also offers many features previously unavailable with telephones. According to Winberg, (2007) “the advent of VoIP as a competitor for traditional telephone service undermines the existing regulatory structure and challenges the assumptions underlying current regulations”. This innovation, comes at a price for regulators, as the nature of the technology creates unique (and previously unheard of) regulatory obstacles. Some of these issues inherent in this technology/ service are identified below:

3.3.1 Security Implications

According to Kuhn, et.al. (2005) “VOIP like many new technologies, introduces both security risks and opportunities. VOIP has a very different architecture than traditional circuit-based telephony, and these differences result in significant security issues”. The fact that VoIP relies on Internet connection makes it is just as susceptible to glitches confronted by computers, in addition to those peculiar to the VoIP technology. Kuhn, et.al. (2005) further also noted that “attackers may be able to perform activities such as intercepting communications, eavesdropping, taking control of phones, making fraudulent calls from an account, conducting effective phishing attacks by manipulating one’s caller ID, and causing service to crash”. There are also inherent problems to routing telephone over broadband connection, for instance unlike traditional telephone lines, which operate despite an electrical outage, loss of power may make VoIP unavailable and VoIP services may also introduce problems for location-dependent systems (McDowell, US-Cert, 2010).

3.4 Suggested Strategies for Sustainable Growth of Traditional Telephony in the era of Provision of OTT Services:

The transmission of voice over packet-switched IP networks and messaging provided by OTT players are unarguably of one of the most important emerging trends in telecommunications as these services continue to gaining grounds across the world over traditional telephony. In order to retain their market, providers of traditional telephony therefore need to think of and implement business models that are agile and adaptable to compete favorably with these new services.

A.T Kearney (2012) notes that "the OTT invasion is occurring on four distinct battlegrounds, and telecommunication operators that have a variety of strategic weapons in their arsenal stand the best chance of gaining a foothold." Two of these categories which affect mobile voice and messaging and the suggested strategies for winning the battle are highlighted below:

1. **Mobile Voice**: with the increase in uptake of mobile VoIP services provided by apps such as Skype, Viber, WhatsApp etc., Operators across the world face the risk of eroding revenues and profitability but still have the opportunity to influence consumer behaviours, defend the perception that circuit-switched voice is superior in quality, and slow which would invariably help slow the global impact of VoIP. A.T Kearney (2012). To further address this issue A.T Kearney recommends the following:

    - Introduce "smart" plans- as is the case with matured markets, operators create integrated voice and data bundles and link them to devices;
    - Create differentiated quality positioning- Operators have the ability to shape the quality perception of traditional voice networks considering the challenges in delivering quality VOIP calls;
    - Launch an OTT solution- some operators around the world are beginning to either launch in-house OTT services or partner with OTT providers with the aim of adapting the services to the operators within the competitive text;

2. **Messaging**: while it may not be possible for operators to reverse the shift in consumer behavior from peer-to-peer messaging to social networking, instant messaging, and peer-to-many communications, there is no reason to assume that

SMS will disappear A.T Kearney (2012). Operators may also consider the following strategies recommended by A.T Kearney (2012):

- Leverage defensive SMS plans- Operators can offer tiered SMS bundles which can help slow down the impact these other OTT messaging services have on SMS services;
- Emphasize enterprise messaging -
- Change the paradigm in subscriber identity module (SMI) connectivity, and move to M2M- operators can leverage on third parties by opening up network applications.

PWC (2013) is however of the opinion that "rather than looking for a solution with the traditional telecom business model and value chain, operators must ask themselves how they can capture a large share of the value pools now being opened up through new technologies and business models in a variety of industry verticals."

CHAPTER FOUR: CONCLUSION & RECOMMENDATIONS

4.1 Conclusion

Many traditional telecom service providers are of the opinion that traditional telephony and SMS revenues are under threat from newer, IP based alternatives like WhatsApp, Skype, Viber etc. Similarly, third party web content and social networking companies such as Google and Facebook are increasingly generating huge revenues and driving high levels of data traffic which ride on the broadband networks of traditional telecom operators'. To further worsen this issue, the traditional operators still have to make significant investments in upgrading their networks to handle the increasing volume of data generated by the same providers of OTT services. Most traditional telephone network service providers therefore argue that unless there is a revenue flow to them from such services, they do not have an incentive to continue to maintain or upgrade the networks (Disruptive Analysis, 2012).

While to a large extent this argument may be true, traditional telephone network providers need to start exploring more innovative and cost effective ways of competing with these OTT service providers. PWC (2013) suggests that "if telecom operators are to develop a successful strategic response to the rise of OTT competitors, they must first take stock of the considerable assets and capabilities they already possess, and determine how they can leverage them in order to compete against, or work with, the OTT players."

However, to better understand the nature of OTT services and how it directly impacts the Nigerian Telecoms market as well as what steps need to be taken by the Commission if any, several pertinent questions need to be addressed. Some of such questions may include:

- *The appropriate time for establishing a regulatory framework for OTT Services considering issues such as internet/broadband penetration and internet access speed;*

- *Licensing structure/ regime for OTT Players if necessary;*
- *Impact of OTT services on traditional revenue streams; and*
- What security measures should be taken to address the security challenges of OTT services?

4.2 Recommendations:

I. *The Commission should conduct a stakeholder's consultative forum on the provision of over-the-top services in Nigeria to determine if regulation is required for such services and its impact on the growth of the Nigerian Telecoms industry.*

II. *Following the consultations, the Commission should review its Guidelines on the provision of International Gateway and Voice over Internet Service and also consider an appropriate Framework for Provision and Regulation of over-the-top services in the Nigerian Telecoms market.*

III. *The Commission must ensure that it does not stifle innovation since internet penetration is still evolving, access speeds are still low and there is limited coverage of high speed broadband in Nigeria.*

IV. *The Commission should encourage network providers in Nigeria to innovate and explore more efficient business models that would enable them compete favorably with OTT service providers. Network providers can also take advantage of the internet protocol technology in the design for their network upgrades.*

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