A Consultative Document

Towards the Treatment of Over-The-Top (OTT) Services

Maintenance History		
Date	**Change Details**	**Version**
June, 2015	Published for 1st Round Consultation	0.1

© Telecommunications Authority of Trinidad and Tobago 2015

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means or stored in any retrieval system of any nature without the prior written permission of the Telecommunications Authority of Trinidad and Tobago, except for permitted fair dealing under the Copyright Act Chapter 82:80 or in accordance with any permission granted by the Authority in respect of photocopying and/or reprographic reproduction. Full acknowledgement of author and source must be given when citing this publication.

Table of Contents

Maintenance History 2

Table of Contents 3

1 Executive Summary 7

2 Introduction 11

2.1 Background 11

2.1.1 ITU VoIP Statistics 11

2.2 Purpose 12

2.3 Objectives 12

2.4 Consultation Process 13

3 What is Over-The-Top? 15

4 Types of OTT Services 17

4.1 VoIP and VoIP Services 17

4.1.1 App to App 19

4.1.2 App to PSTN 20

4.1.3 PSTN to App 20

4.2 OTT Messaging Services 21

4.3 OTT Media 21

5 Regulatory Mandate of TATT 23

6 Consumer Impact 24
6.1 Advantages of OTT Services to Consumers 24
6.2 Disadvantages of Using OTT Services 25
6.3 Impact on Non-Telecommunications Businesses 26
6.4 Discussion points for Comment – Consumer Impact 27
7 Impact of OTT Services on Authorised Public Telecommunications Services Providers 28
7.1 The advent of OTT Services 28
7.2 Focus on OTT VoIP Services 29
7.3 Financial Impact 30
7.3.1 Global Data and Voice Revenue Trends 32
7.3.2 Global Mobile Data and Voice Revenue Forecast - 2018 33
7.3.3 Mobile Data and Voice Revenues / Traffic Analysis by Country 35
7.3.4 Conclusion on Global Financial Impact 36
7.4 Financial Impact on the Trinidad and Tobago Telecommunications Market 37
7.5 Discussion Points for Comment – Impact on Authorised Public Service Providers 42
8 International Regulatory Approaches 44
8.1 Introduction to Regulatory Approach 44
8.2 Approaches Adopted by Countries 45
8.2.1 BARBADOS – Telecommunications Unit 45
8.2.2 EUROPEAN UNION 47

8.2.3 USA – FCC 49
8.2.4 SINGAPORE – IDA 50
8.2.5 UNITED KINGDOM - OFCOM 51
8.2.6 AUSTRALIA - ACMA 52
8.2.7 INDIA – TRAI 53
8.2.8 JAMAICA- Office of the Utility Regulator (OUR) 54
8.3 Substitutability between PSTN services and OTT VoIP services 55
8.3.1 The Reactive strategy 55
8.3.2 The Aggressive strategy 55
8.3.3 The Opportunistic approach 56
8.3.4 The Collaborative approach 56
9 Other International Developments on the Internet / Internet Governance 57
9.1 World Summit on the Information Society 57
9.2 World Conference on International Telecommunications 57
9.3 NETmundial 59
9.4 International Telecommunications Union 60
9.5 World Trade Organization 61
9.6 Caribbean Telecommunications Union 62
9.7 Caribbean Association of National Telecommunications Operators 62
10 ICT Perspectives in Trinidad and Tobago 65

10.1 Government Perspective – Infrastructure Building 65

10.1.1 GoRTT Pillars 65

10.1.2 GoRTT Medium Term Policy Framework 65

10.1.3 SmarTT Plan 66

10.2 Stakeholder Perspective – Content of the Internet 67

10.3 Position on Net Neutrality 68

10.4 Discussion Points for Comment – Treatment of Internet Governance and Network Neutrality 68

11 Current Regulatory Framework of the Authority 69

11.1 Public Telecommunications Services 69

11.2 Transport Medium Considerations 70

11.3 Value Added Services 71

11.4 Discussion Points for Comment – Regulatory Impact of OTT Services 72

12 Discussion 74

13 Strategic Options for Consideration 77

13.1 Discussion Points – Possible Approach to the Treatment of OTT Services 81

14 Recommendations 82

15 Bibliography 84

1 Executive Summary

This document is based on information from research conducted by the Telecommunications Authority of Trinidad and Tobago (the Authority) and discusses different aspects of Over-The-Top (OTT) services, focusing particularly on whether or not such services should be regulated and if so, determine what regulatory measures should be adopted to ensure that stakeholder interests can be best protected. It presents views on the possible impact of OTT services and how such services should be treated considering the recent developments taking place in the telecommunications space.

The publication of this document is intended to generate discussion and provide feedback from all stakeholders in the industry to the Authority.

The views and discussion points summarised within the document should not be interpreted as determinations of the Authority.

The document seeks comments on whether proposed regulation should be imposed on providers to protect stakeholder, including end-user, interests. It is therefore appropriate for consumers and operators to share their views on the document with the Authority, which would assist the Authority in the shaping of a final policy position.

The document is categorised into key sections: the Impact on Consumers, the Impact on Authorised Public Telecommunications Service Providers and the Regulatory Impact.

The key views and discussion points arising out of each section on which the Authority is seeking feedback are as follows:

a. Impact on Consumers:

1. OTT services, in particular OTT VoIP and messaging services, provide additional service options to consumers that are available within the environment. The availability of service options for consumers is consistent with one of TATT's key mandates, viz.:

'to establish conditions that promote the interests of customers, purchasers and other users in respect of the variety of telecommunications services supplied, and ensure persons are able to meet the financial obligations related to those services.'

2. OTT services, in particular OTT VoIP and messaging services, are becoming pervasively used instead of traditional telephone local and international calling and SMS messaging.

3. OTT services used on smartphones, whether OTT VoIP or messaging, are primarily used when connected to the Internet via a Wi-Fi access point, as an option to the Internet accessed through mobile data plans.

4. Mobile and Fixed Internet service providers should be allowed to apply an additional charge for subscribers who wish to access OTT services.

5. OTT services are used because they may be more affordable, accessible, and convenient than traditional telecommunications and broadcasting services.

6. OTT services are used even though they may be less reliable, offer lower quality and lack essential services such as access to emergency services.

b. Impact on Authorised Service Providers

1. For authorised cellular mobile operators, there is a relationship between the loss in voice and SMS revenues and the increase in mobile data revenues. The decline experienced in the mobile voice revenue market may be offset by an increase in mobile data revenues.

2. Mobile data subscribers pay to access the Internet with the understanding that it is inclusive of all services offered over the Internet. These subscription fees paid by customers should be sufficient to allow the authorised operator to cover its cost for the provision of OTT services to its customers and for any additional infrastructure build-out that may be necessary.

3. OTT services manifest themselves on networks as traffic. The decline experienced in the mobile voice revenue market may be offset by an increase in mobile data revenues.

4. Organizations that provide OTT services, particularly OTT VoIP services, should be required to register locally in order to fall under the country's regulatory oversight and for the Government to collect relevant tax revenues.

5. Organizations that provide OTT services should contribute fairly towards the use of the local telecommunications operators' networks.

6. In the event that an OTT service provider requires 'better than best effort', then an authorised operator can consider engaging in a commercial arrangement with the OTT provider which may allow the OTT service to traverse the network at a quality of service better than 'best effort' Internet traffic.

c. Impact on Internet Governance

1. Network (net) Neutrality is the term used to describe networks that are open to equal access, quality of service and price to all.

2. The concept of a "free and open" Internet should be applied in the treatment of OTT services, therefore there should be no blocking of lawful content.

d. Impact on Regulation

1. OTT telecommunications services may be classified as a public telecommunications service, based on the definition in the Telecommunications Act Ch 47:31 of Trinidad and Tobago.

2. It is recognised that OTT telecommunications services are carried via the Internet. If OTT services are classified as public telecommunications services, then the Internet, which "switches" OTT traffic, can be classified as a public telecommunications network.

3. Regulatory oversight of OTT services, in particular OTT telecommunications services, implies regulatory oversight of an aspect of the "Open" Internet.

4. In several jurisdictions, regulatory oversight of the Internet is not undertaken, and therefore a measure of forbearance may be needed in relation to OTT services.

5. If there is need for regulatory oversight of OTT services, there may be need to regulate the various types differently:

   i. OTT VoIP, Messaging and Media

   ii. Interconnected and non-interconnected OTT VoIP

   iii. Number based and non-number based OTT VoIP and Messaging Services

   iv. Access to Emergency Services

e. Approach to the Treatment of OTT Services

1. OTT VoIP services utilise network elements and capacity of authorised operators in the delivery of the service to customers. This can compromise the efficiency and effectiveness of authorised network operators.

2. OTT/OTT VoIP providers should be treated as customers of authorised PSTN operators and be required to negotiate commercial agreements to provide OTT services.

For each discussion point contained within the consultation document, commenting parties should indicate clearly whether they concur or disagree with the viewpoint presented, and provide explanations/reasons and supporting references for each response. Stakeholders are also invited to comment on the summary statements contained within each chapter of the document.

Should there be other viewpoints not covered in the above, stakeholders should feel free to identify such viewpoints and provide comments as appropriate.

2 Introduction

2.1 Background

Global advances in telecommunications, especially in the last decade, have significantly changed the way the world communicates, with consumers demanding greater mobility, more choice, increased capacity and higher data speeds in the use of their communications services. As an example, the shifting of Internet access and connectivity from dial-up to broadband offers faster data speeds through Digital Subscriber Line (DSL), cable modem and fibre access technologies, which have enabled users to communicate in more innovative, non-conventional ways. Another development in the industry has been the phenomenal growth of mobile broadband services, facilitated by the rollout of High Speed Packet Access (HSPA) and Long Term Evolution (LTE) networks.

Today, a huge volume of communications traffic is shared across Internet services such as VoIP, peer-to-peer, social networking, e-mail, instant messaging, blogs, forums, video conferencing etc. whilst particular traditional telecommunications services still focus on providing fixed and mobile voice, SMS, MMS (IBM Global Business Services 2010). The above has resulted in a changed communications landscape with the emergence of Over-The-Top (OTT) services entering and competing in the telecommunications industry.

Within recent times there have been rising concerns from authorised service providers[1] in some regions around the world with regards to the 'free' OTT services offered, particularly through VoIP technology and the consumption of network usage capacity by such OTT VoIP applications.

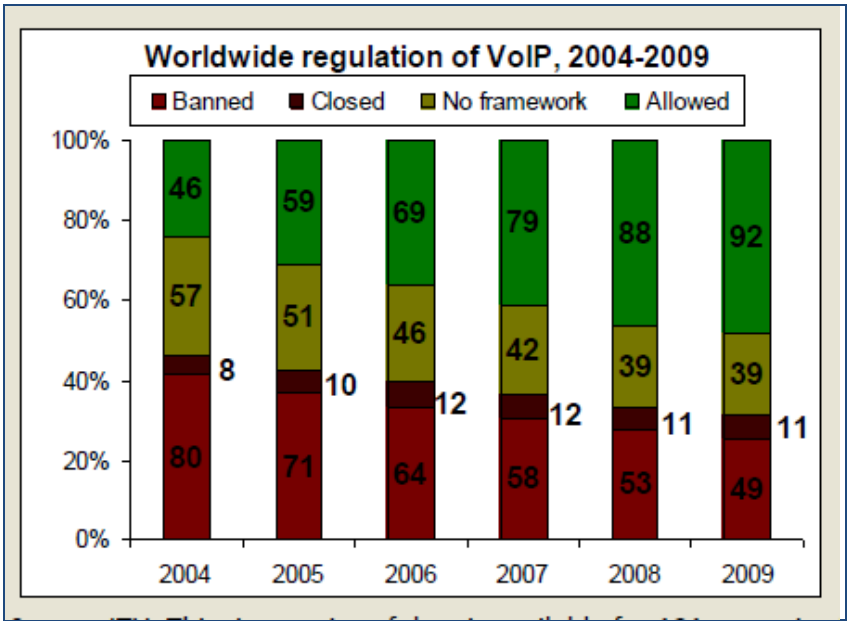
2.1.1 ITU VoIP Statistics

In the last survey conducted by the International Telecommunications Union (ITU) in 2010, as at 2009, 92 countries allowed the use of VoIP in their country, while 49 banned the use of the

[1] Authorised service providers refer to those entities licensed to operate within a particular jurisdiction.

technology. It is imperative to note that according to the ITU's 2004-2009 time series, the number of countries allowing the use of the technology increased to 48 per cent whilst the number of countries opposed to VoIP fell to 27 per cent. Figure 1 highlights the results of the 2010 ITU survey.

Figure 1: Time series of data is available for 191 countries for 2004-2009



Source: ITU. This time series of data is available for 191 countries for 2004-2009.

2.2 Purpose

This document is focused on understanding the interplay between the markets of OTT service providers and authorised telecommunications operators, and the impact such interactions are having on the telecommunications industry in Trinidad and Tobago.

2.3 Objectives

The objectives of this document are to:

1. Explore the nature of OTT telecommunications services, particularly as it relates to voice services;
2. Examine the impact of OTT VoIP services on stakeholders in the telecommunications industry;
3. Research the treatment of OTT VoIP services by regional and international jurisdictions;
4. Review and assess the impact of OTT VoIP services on Trinidad and Tobago's existing regulatory environment;
5. Assess the current legislative provisions for the operating of OTT VoIP services;
6. Recommend the approach to determine the regulatory treatment of OTT VoIP telecommunications services in Trinidad and Tobago;
7. Seek public feedback on the viewpoints contained within the document.

2.4 Consultation Process

The Authority is seeking the views and opinions of the general public and other stakeholders regarding the discussion points made in this document in accordance with its "*Procedures for Consultation in the Telecommunications Sector of Trinidad and Tobago*" (https://tatt.org.tt/Portals/0/documents/Procedures%20for%20Consultation%20in%20the%20Telecommunication%20and%20Broadcasting%20Sectors.pdf).

As indicated above, for each viewpoint/opinion and summary statement expressed within the consultation document, commenting parties should indicate whether they concur or disagree with the viewpoint or the summary statement, and provide explanations/reasons and supporting references for each response.

This document will be made available for public consultation for a four (4) week period, as recommended by the Authority's Consultation Procedures.

Based on consultative feedback received on the above, the Authority shall prescribe recommendations in determining the regulatory treatment of OTT services, particularly OTT VoIP services, in Trinidad and Tobago.

The Authority recognises the fast paced evolution of OTT services occurring in the industry and as such, will continue to assess the changes as they occur and where necessary, make amendments to any proposed recommendations/determinations of the Authority.

3 What is Over-The-Top?

The Authority views relevant to this discussion is a policy paper presented at the Caribbean Association of National Telecommunications Organizations (CANTO) meeting held in 2014, where OTT was described as 'a general term used for services that a customer may use which rides on top of a network to which the customer is connected.' (CANTO 2014)

OECD (Organisation for Economic Co-operation and Development) Communications Outlook 2013 has described OTT services as 'video, voice and other services provided over the Internet rather than solely over the provider's own managed network.' (OECD 2013)

OTT communication can also be referred to as services whose primary applications lie in communications but use the **Internet as the transport medium** rather than the legacy Public Switched Telephone Network infrastructure.

The openness and availability of the Internet, and increasing bandwidth for fixed and mobile users, have made OTT possible by creating new, 'disruptive' markets where application developers can compete. (Buckley 2013)

It is a prime example of a converged technology that exists in today's telecommunications industry being enabled by the de-layering of the service providers' networks and led by the growth of subscriptions in the broadband market. Internet Protocol (IP) has separated **carriage from content** and allowed OTT content and applications providers to interact with end users directly over networks whose owners and operators are directly excluded from these transactions. (ITU, InfoDev n.d.)

OTT services can take the forms of messaging, media, or voice services (also known as Voice over Internet Protocol or VoIP services), competing directly with those similar services which are offered by authorised telecommunications service providers. As a result, public telecommunications services offered by authorised providers, specifically voice and SMS, face a great deal of competitive pressure from OTT services.

Public telecommunications service that is provided in Trinidad and Tobago through the acquisition of a concession by the Authority is referred to throughout this document as an

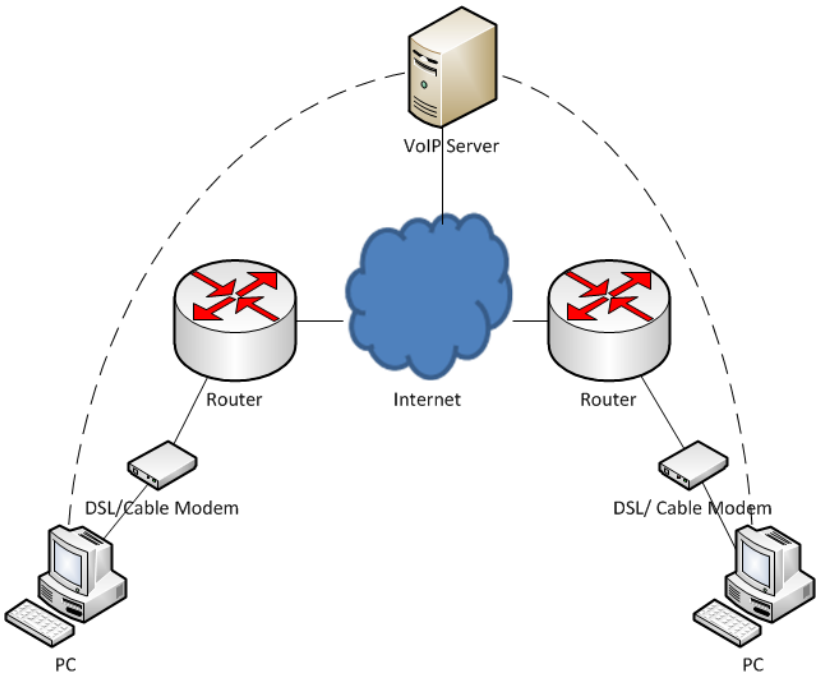
authorised service. This differs from OTT services since the majority of public OTT services offered in Trinidad and Tobago are not authorised by the Authority through the award of a concession.

4 Types of OTT Services

4.1 VoIP and VoIP Services

Voice over Internet Protocol (VoIP) is a technology or group of technologies used to deliver voice communications over private and/or public IP networks, such as the Internet. This is illustrated in Figure 2:

Figure 2: VoIP in the beginning



Source: TATT

VoIP has evolved today not only as a substitute to the traditional circuit-switched mode of voice communications via the traditional Public Switched Telephone Network (PSTN), but is now used as a legitimate mode for carrier-grade voice traffic through bona fide public and private networks. This has resulted from the development of private IP networks (i.e. using an IP PBX on Local/Wide Area Networks (LAN/WAN)) and the evolution of the PSTN to an IP network (i.e. Next Generation Network using IP/MPLS (multiprotocol layer switching)), in an effort to more efficiently utilize the infrastructure, based on the growing demands for more capacity to provision services.

Even the traditional 'circuit-switched' 2G cellular mobile networks have evolved into 3G and 4G 'packet-switched' networks, utilising IP to efficiently move voice traffic through the network (e.g. Voice over HSPA and Voice over LTE). The traditional "PC-to-PC" VoIP (via the Internet) is quickly being replaced by new end-user devices such as smartphones and tablets.

There are three (3) modes for the utilization of VoIP technology today:

i. VoIP over private networks (using and IP-PBX on a LAN/WAN);
ii. VoIP over public fixed and mobile telecommunications networks (carrier-grade VoIP); and
iii. VoIP over the Internet (Over the Top (OTT) VoIP).

The concern for authorised public fixed and mobile telecommunications service providers who offer voice services and Internet access is that OTT VoIP:

i. Utilises the Internet as its transport medium;
ii. Can be readily used by subscribers to reduce the costs levied by authorised providers for voice calls, and international calls in particular ; and
iii. Is transparent to the billing system and rate regime employed by the authorised provider for its voice services.

The pervasiveness of the Internet and its ability to route traffic over different technologies (e.g. IP over MPLS for NGN and IP over HSPA and LTE for mobile networks) has made the Internet the preferred technology for routing innovative services such as VoIP.

OTT VoIP is routed in a similar manner to data and video traffic over the Internet. However, the VoIP applications employ protocols at the application layer and the transport layer in order for a voice call to be maintained like a traditional circuit-switched call (i.e. "unbroken" conversation).

Some examples of OTT VoIP services are provided below in Figure 3.

Figure 3: Examples of OTT VoIP Services

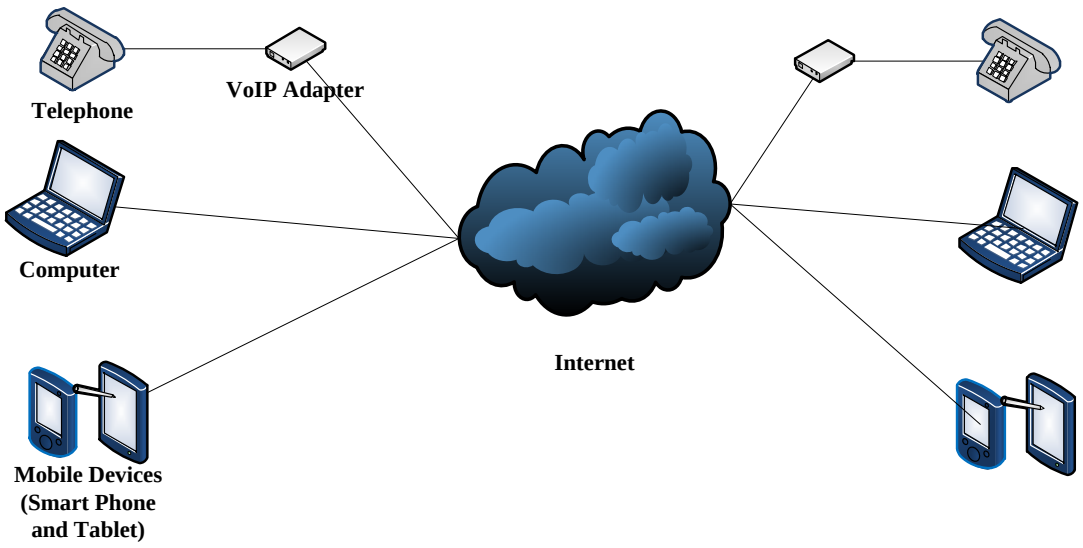
Skype	• 300 mn users (2013) • Allows for free voice/ video skype to skype calling • Enables calling to POTS via skype-out service
Facetime	• Allows for free video calling (using data when on mobile network) between iPhone ,iPad, Mac Book users
Viber	• 200 mn users (May 2013) • Free calling between Viber users

Source: Detecon Consulting (The Telecommunications Regulatory Authority of the Kingdom of Bahrain, Detecon Consulting 2014)

The three variations in operations of OTT VoIP services are illustrated below.

4.1.1 App to App

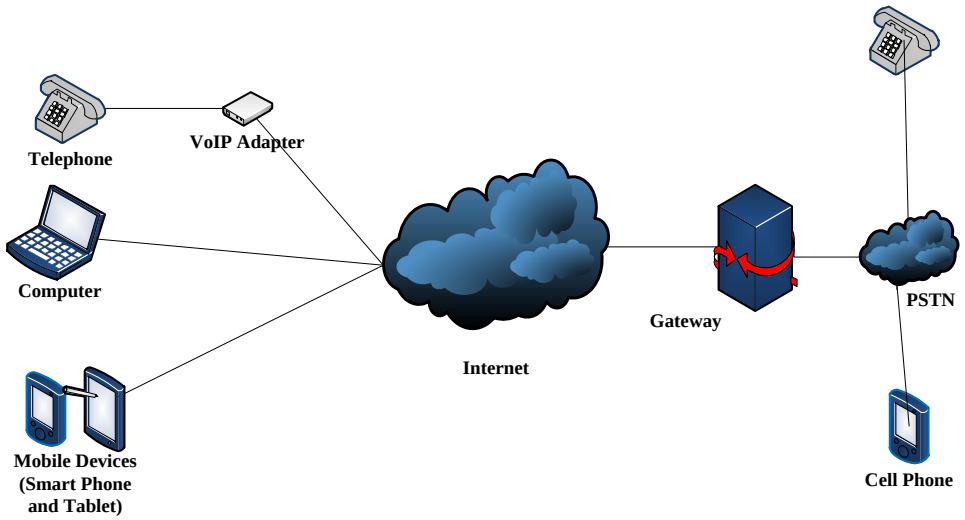
Figure 4: VoIP Service (App to App)



All VoIP apps provide this mode of VoIP service from app to app over the Internet, **available ONLY to subscribers who install and use the app**.

4.1.2 App to PSTN

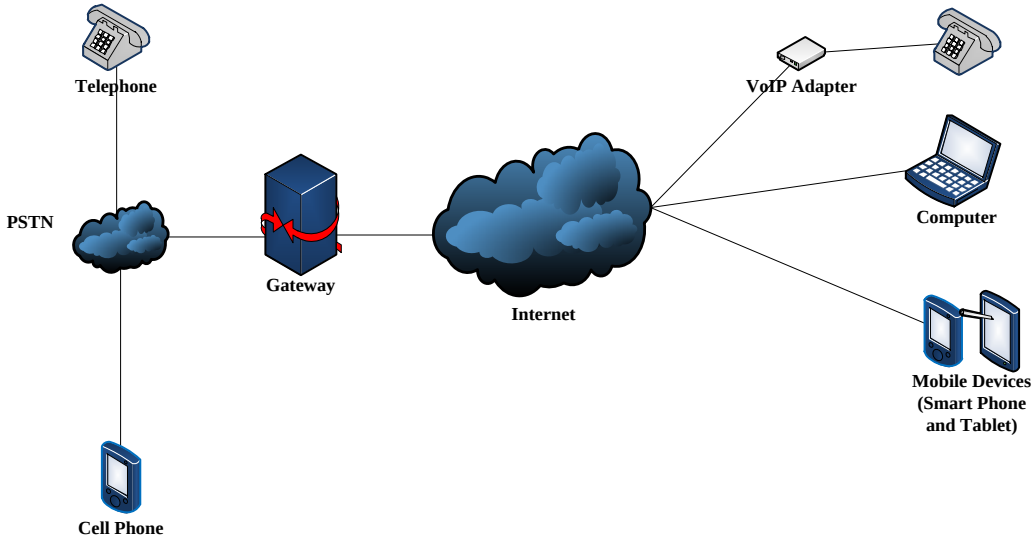
Figure 5: VoIP service (App to PSTN)



Most VoIP apps provide this mode of VoIP service of App to PSTN-connected devices. For example, MagicJack offers services free of charge to some destinations, while others simply allow users to purchase credit to call any destination. **Subscribers of the app can call non-subscribers via the PSTN**.

4.1.3 PSTN to App

Figure 6: VoIP service (PSTN to App)



Currently, Skype, MagicJack, Vonage and Viber provide this mode of VoIP service. **Calls from non-subscribers (from the PSTN) can be terminated on subscribers' devices via the app.** Specifically**,** Viber achieves this without assigning the user a number from the national numbering resource but using instead the number already assigned by the user's mobile service provider. It should be noted that the user can also deactivate this 'Viber in' service in the app.

4.2 OTT Messaging Services

OTT messaging is similar to OTT VoIP services in terms of the IP technology used. However, it is understood that the difference lies in the ability of a third party to provide instant messaging services to the consumer over the Internet, as an alternative to text messaging services (SMS) provided by authorised telecommunications mobile operators.

Some examples of OTT messaging services are provided in Figure 7.

Figure 7: Examples of OTT messaging services

WhatsApp	• Top selling app in 47 countries • Processing 27bn messages daily (June 2013) • 300 m active users (May 2013) • Available on all Smartphone platforms
Tencent	• 800m active accounts (March 2013) • Available on all Smartphone platforms • Primarily China/ Asia based

Source: Detecon Consulting (The Telecommunications Regulatory Authority of the Kingdom of Bahrain, Detecon Consulting 2014)

4.3 OTT Media

OTT media describes broadband delivery of video and audio without a cable or satellite service operator being involved in the control or distribution of the content itself. It is understood that the content arrives from a third party and is delivered to an end user device, leaving the Internet

service provider (ISP) responsible only for providing the transport medium for the IP packets. Moreover, it refers to video and audio content being streamed and/or downloaded over the Internet.

OTT media can be categorised into:

- Video
- Audio

Examples of OTT media services are listed in Figure 8.

Figure 8: Examples of OTT media services

YouTube™ Youtube	• User Generated Content • Owned by Google • 100 hours of videos uploaded every minute • 1 bn users every month • Accounts for 17.1% of all US peak downstream fixed access traffic[11]
NETFLIX Netflix	• Curated/ Studio programming • ~40 mn subscribers (May 2013) • Accounts for 32.3% of all US peak downstream fixed access traffic
Spotify Spotify	• Audio Streaming • 24mn active users including 6mn paying subscribers (May 2013) • Access to over 20mn songs in library

Source: Detecon Consulting (The Telecommunications Regulatory Authority of the Kingdom of Bahrain, Detecon Consulting 2014)

5 Regulatory Mandate of TATT

The Telecommunications Act Chap. 47:31 provides the regulatory mandate for the Telecommunications Authority of Trinidad and Tobago (TATT) and, within its clauses, outlines the terms required for the operations of any public telecommunications network and/or service. In particular, Section 21 states:

> *21. (1) No person shall operate a public telecommunications network, provide a public telecommunications service or broadcasting service, without a concession granted by the Minister.*
>
> *(2) A person who wishes to operate a network or provide a service described in subsection (1), shall apply to the Authority in the manner prescribed.*

Therefore it should be noted that any entity engaged in the provision of a public telecommunications service or broadcasting service is required to obtain a Concession from the Minister.

Furthermore, the Act highlighted the importance of maintaining technology neutrality in the definition of telecommunications services. Therefore, *'a service using telecommunications whereby one user can communicate with any other user in real time, regardless of the technology used to provide such a service and includes a public telecommunications service, a private telecommunications service, a closed user group service and a radio communication service'*, is a telecommunications service.

6 Consumer Impact

In determining the overall treatment of OTT services, particular emphasis should be placed on the impact such services may have on both users and potential users.

One such user to be considered includes the citizens of country. For those persons belonging to underserved population groups by virtue of the lack of **affordability**, the opportunity to access telecommunications services can be possible through the use of an OTT medium. In addition, the emergence of WiFi hotspots provides an opportunity to **access** OTT services by those persons who are unable to obtain such services at home.

Summary Statement:

With the increase in demand for OTT services by the public, there may be a negative impact on the market if such services are removed.

6.1 Advantages of OTT Services to Consumers

There are several advantages associated with the availability of OTT services. Such advantages include:

Low Cost

The demand for OTT services like Skype, WhatsApp, Tango and Viber has been increasing extensively compared to traditional voice packages, due to the cost advantages to consumers of cheaper communications options such as local and long distance calling, savings on roaming charges etc.

Choice

OTT services provide additional options within the environment to consumers. In turn, the consumer is empowered by having the choice to decide which services best fit his/her need.

Portability

Portability also makes OTT services a convenient option where one can be reached regardless of location. Communication can happen anywhere and at any time as long as there is a broadband connection.

Availability

In cases where fixed lines do not exist, mobile Internet can create opportunities for communication through VoIP services, contributing to the facilitation of universal service.

Features

These services also offer similar features to those available via traditional public telecommunications services, for example, call forwarding, call waiting, voicemail, three-way calling etc. .

6.2 Disadvantages of Using OTT Services

There are, however, some disadvantages with OTT services:

Reliability

The ability to use OTT VoIP services depends highly on the quality of Internet connection. A poor Internet connection or highly congested networks can result in the quality of service being compromised.

Power Outages

Because these services rely on an Internet connection, power outages will cause the lines of communication to be down while the traditional phone system remains active.

Emergency calls

Traditional phone systems are designed for emergency calls to be diverted to emergency call centres like 999 and 990. With OTT VoIP technology, however, one may be unable to establish a physical location from which the call originated.

Treatment of Complaints

Whilst complaints made against authorised service providers can be dealt with by regulatory bodies, similar treatment is not afforded to unregulated services.

Summary Statements:

- ***The rapid pace of emerging technologies has driven the level of innovativeness in the telecommunications industry, making more services available to consumers.***
- ***There are advantages, including consumer choice and affordability, associated with OTT services. However, there are disadvantages which must also be weighed.***

6.3 Impact on Non-Telecommunications Businesses

While OTT services offer a lower cost alternative to mobile voice and SMS services from authorised providers, they also provide additional communication services such as video calls, group chats and non-text-based communications including voice recordings. These services considerably reduce the communications costs incurred on a daily basis in the operations of the business community. For example, technologies such as webRTC (Real-Time Communications) that allow audio-visual communication, screen sharing and file transfer services via a browser, can potentially extend the reach of communication-over-IP services (inclusive of OTT services), to non-mobile devices. (DotEcon 2014)

Such applications are being utilised by the business community on a daily basis and form an integral part of their business operations.

Summary Statements:

- ***OTT services offer a lower cost alternative to mobile voice and SMS services, and provide additional communications services such as video calls, group chats and non-***

text-based communications including voice recordings.

- ***These services may reduce the communications costs incurred on a daily basis in the operations of the business community.***

6.4 Discussion points for Comment – Consumer Impact

Based on the information presented above examining the potential impact OTT services may have on consumers of telecommunications and broadcasting services, the following discussion points are presented below for comments:

1. OTT services, in particular OTT VoIP and messaging services, provide additional service options to consumers that are available within the environment. The availability of service options for consumers is consistent with one of TATT's key mandates, viz.:

   'to establish conditions that promote the interests of customers, purchasers and other users in respect of the variety of telecommunications services supplied, and ensure persons are able to meet the financial obligations related to those services.'

2. OTT services, in particular OTT VoIP and messaging services, are becoming pervasively used instead of traditional telephone local and international calling and SMS messaging.

3. OTT services used on smartphones, whether OTT VoIP or messaging, are primarily used when connected to the Internet via a Wi-Fi access point, as an option to the Internet accessed through mobile data plans.

4. Mobile and Fixed Internet service providers should be allowed to apply an additional charge for subscribers who wish to access OTT services.

5. OTT services are used because they may be more affordable, accessible, and convenient than traditional telecommunications and broadcasting services.

6. OTT services are used even though they may be less reliable, offer lower quality and even lack essential services such as access to emergency services.

7 Impact of OTT Services on Authorised Public Telecommunications Services Providers

7.1 The advent of OTT Services

Authorised telecommunications service providers argue that they have, over the years of operations, invested billions in procuring relevant telecommunications licences and setting-up infrastructure to offer quality service to their customers. For example, CANTO members have argued that, while they are regulated bona fide operators, OTT service providers:

- Use the services on their networks without making any contribution to the sustainability of the infrastructure;
- May not be licensed by the country to provide regulated services to its citizens;
- Are not registered as operating entities within the country, and therefore do not pay relevant taxes, fees and exercise corporate social responsibility (e.g. payments towards Universal Service Fund);
- Offer OTT applications which are free of cost for use by customers

(CANTO 2014)

Authorised service providers have lobbied for the regulation of OTT operators in the industry. It is debatable whether regulation would ensure that both the authorised telecommunications service providers and the OTT players operate on a level playing field by forcing OTT players to acquire the relevant licences and comply with the legislative requirements of countries. Such regulatory oversight may lessen the disparity between the costs incurred by authorised service providers and those incurred by OTT providers. It may be argued that if such regulations are applied, some OTT players who currently offer their services free of any charge may need to change this policy by charging customers a fee in order to meet the costs of acquiring licences and conforming to legislative requirements of countries.

Authorised telecommunications operators are also of the view that, since OTT applications use their network and/or service, OTT providers should meet the related financial obligations (e.g. network maintenance and other costs) that are required by the authorised telecommunications service providers.

OTT players have countered the above statements by claiming that any such move to seek payment for the provision of OTT services may constitute regulation of the Internet and violate the concept of net neutrality.

Summary Statements:

- ***Authorised telecommunications service providers have lobbied for the regulation of OTT operators, particularly for the acquisition of relevant licences and compliance with the legislative requirements of countries.***
- ***OTT players have countered such statements that any move to seek payment for the provision of OTT services may constitute regulation of the Internet and violate the concept of net neutrality.***

7.2 Focus on OTT VoIP Services

At present, local authorised telecommunications service providers have raised concerns over the financial impact of OTT VoIP services on revenues. It was further pointed out that while OTT messaging services encourage additional data consumption by subscribers, therefore contributing positively towards its revenues, OTT VoIP services deliver the opposite effect. There is contention that OTT VoIP services significantly 'utilised dedicated resources' from its networks and, as such, adversely affect the provision of authorised services.

Therefore, on assessing the impact of OTT services on the Trinidad and Tobago telecommunications and broadcasting industry, **the Authority has decided to limit the scope of this analysis to OTT VoIP telecommunications services.**

Summary Statement:

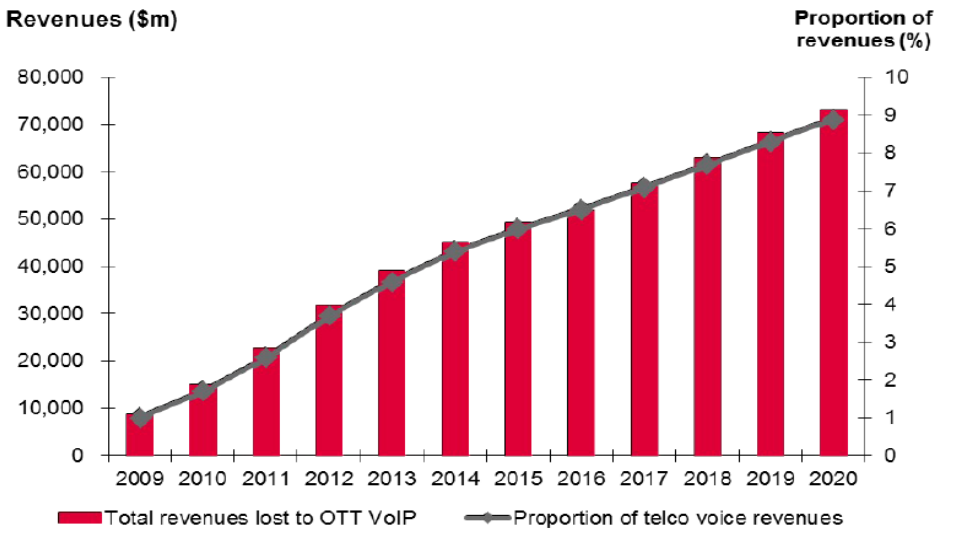
- ***The Authority has limited the scope of this analysis to OTT VoIP telecommunications services.***

7.3 Financial Impact

In measuring the impact on the industry, the financial weight of OTT VoIP services must be examined.

From a study conducted by Ovum, a leading international telecommunications market research company, it is predicted that by 2020, OTT VoIP will cost traditional telecommunications operators US$71 billion globally in potential lost revenues, or 9 per cent of total voice revenues possibly foregone. Ovum also stated that in 2016, an estimated US$52 billion of revenues will be lost to OTT VoIP globally. This represents 7 per cent of global fixed voice and 3.5 per cent of global mobile voice revenues. Refer to Figure 9 (Cheung, Reserarch Fellow, Consulting Director, Asia-Pacific 2014).

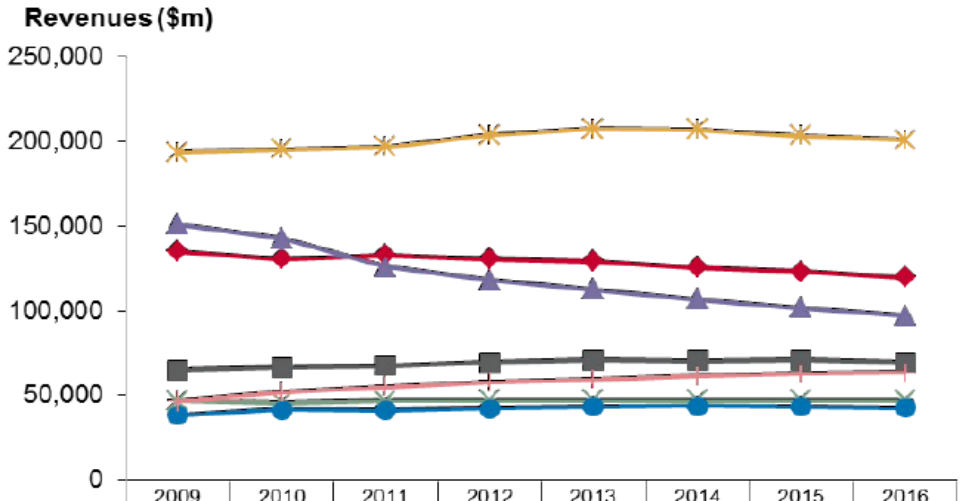
Figure 9: Total revenues lost to OTT VoIP for the period 2009 – 2020



Source: Ovum

It must be noted, however, that Ovum also stated that telecommunications operators' voice revenues (mobile and fixed) were generally eroding even without OTT VoIP (Cheung, Why WebRTC is Essential to all Telcos and OTT Players 2014)**.** Ovum projected that fixed and mobile compound annual growth rates (CAGR) would decrease by 2.4 per cent and 0.8 per cent respectively, between the periods 2009 to 2016. Figures 10 & 11 refer.

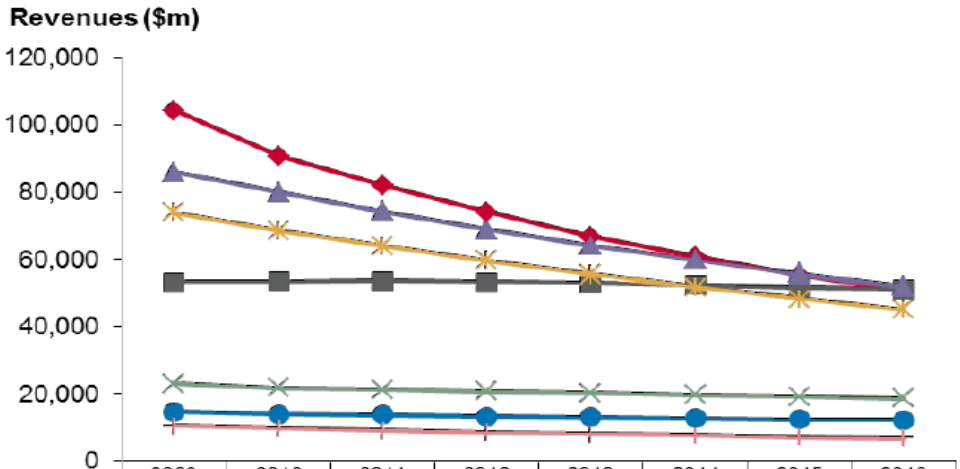
Figure 10: Mobile Voice Revenues by Region (2009 – 2016)



	2009	2010	2011	2012	2013	2014	2015	2016
North America	$135,162	$130,861	$132,937	$130,746	$129,373	$125,847	$123,353	$119,998
South & Central America	$64,948	$66,342	$67,538	$69,402	$70,811	$70,568	$70,841	$69,231
Western Europe	$151,241	$142,961	$126,168	$118,233	$112,720	$106,940	$101,848	$96,987
Eastern Europe	$46,781	$45,892	$46,761	$47,154	$47,160	$47,253	$47,286	$47,102
Asia-Pacific	$193,699	$195,670	$196,984	$204,099	$207,538	$207,265	$203,689	$200,880
Middle East	$38,446	$41,634	$41,467	$42,510	$43,459	$43,943	$43,579	$42,978
Africa	$47,041	$52,190	$55,281	$58,091	$59,656	$61,254	$62,953	$63,467

Source: Ovum

Figure 11: Fixed Voice Revenues by Region (2009 – 2016)



	2009	2010	2011	2012	2013	2014	2015	2016
North America	$104,277	$90,772	$81,984	$73,999	$66,802	$60,790	$55,389	$50,597
South & Central America	$53,256	$53,424	$53,482	$53,144	$52,842	$52,278	$51,691	$51,104
Western Europe	$85,852	$79,928	$74,163	$68,879	$64,217	$59,976	$55,905	$52,012
Eastern Europe	$23,008	$21,739	$21,185	$20,675	$20,137	$19,636	$19,162	$18,685
Asia Pacific	$73,856	$68,501	$64,042	$59,691	$55,586	$51,795	$48,294	$45,018
Middle East	$14,595	$14,013	$13,708	$13,333	$13,029	$12,736	$12,473	$12,232
Africa	$10,453	$9,771	$9,136	$8,604	$8,123	$7,681	$7,253	$6,866

Source: Ovum

7.3.1 Global Data and Voice Revenue Trends

From Figures 10 and 11 above, it can be noted that the average voice revenue a telecommunications operator receives per customer has been in decline. While mobile operators have experienced a tremendous amount of traffic on their networks, it is mainly due to data usage as opposed to voice traffic. Voice and SMS, which had been cash cows at one time, are on the decline due to natural commoditisation, competition and the introduction of OTT services (Nair 2012).

With increasing penetration and gradual fall in prices, mobile data will drive up the share of the non-voice revenue for telecommunications operators (CARE Ratings 2014). CARE Ratings, the second largest credit rating agency in India, expects share of revenue from non-voice usage to

increase to 25 per cent – 30 per cent over the next couple of years from the current levels of around 20 per cent. In CARE Ratings' opinion, the increasing data revenue, arising from the increasing number of customers accessing mobile data and greater data consumption per customer, is critical to supplement the traditional voice revenue. This will provide telecommunications operators with diversity in growth avenues and better profitability.

According to CARE Ratings, the proliferation of affordable smart phones and lucrative data plan offers have fuelled the growth of the mobile data segment; mobile data now contributes around 50 per cent of the total non-voice mobile revenue of telecommunications operators.

7.3.2 Global Mobile Data and Voice Revenue Forecast - 2018

With the advent of the Internet and the proliferation of emerging technologies, the demand for services on the traditional telephone networks is gradually decreasing. In its place, the demand for data services has increased rapidly, with data traffic now overtaking voice demand.

Network providers are therefore moving in the direction of Internet Protocol (IP) networks. This is due to the emergence of new technologies, which have been the driving force behind the transition of PSTN networks to IP networks. With the change in the landscape through the advent of OTT VoIP services, the transition to IP-based networks will be accelerated.

Two major factors in the transition to IP-based networks is the reduced cost of telecommunications and the provision of more communications options. Authorised service providers will benefit from a considerable reduction in the cost of infrastructure of IP networks as opposed to PSTN networks. With little infrastructure costs incurred, OTT VoIP companies have succeeded in offering services such as Skype and Viber to the market, resulting in a decrease in demand for PSTN voice services.

Whilst the decrease in demand for PSTN voice services may have led to revenue losses in this area, the rapid increase in demand for data services has provided the opportunity for considerably higher revenue streams for operators. Evidence for this was presented in Section 3.3 above.

GSMA, an association of mobile operator related companies devoted to supporting the standardisation, deployment and promotion of the GSM mobile telephone system, have forecast that mobile operator data revenues will overtake voice revenues globally by 2018 as we move to a fully connected world. Table 1 below shows the projected revenues for both data and voice revenues in year 2018 (GSMA 2013).

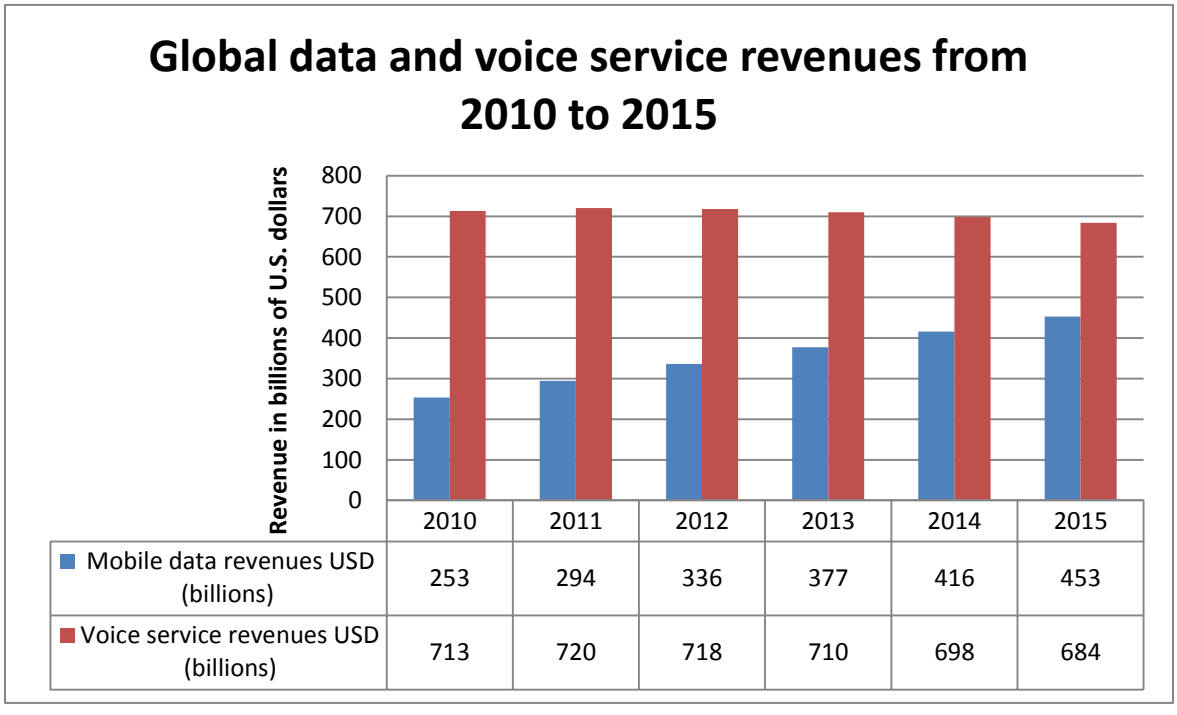
Table 1: Global Mobile Operator Data vs Voice Revenue Forecast 2018

Region	Year	Data Revenues (USD)	Voice Revenues (USD)
Global	**2018**	**$559 billion**	**$547 billion**

Source: 2018 Extrapolation of Ovum2012-2017Mobile Voice and Data Revenue Forecast

Figure 12 (Statista 2014) below shows the global mobile data service revenue from 2010 to 2015, projected to grow to US$453 billion, while the global mobile voice service revenue is projected to rise to US$684 billion in 2015.

Figure 12: Global data and voice service revenues 2010 – 2015



Source: Statista

7.3.3 Mobile Data and Voice Revenues / Traffic Analysis by Country

The increase in mobile operator data revenues is a global trend across developed and emerging markets. In 2012, Japan became the first country where data revenues exceeded voice revenues, due largely to the availability of advanced mobile broadband networks and a higher adoption of smartphones, tablets and connected devices. Further forecasts show that Kenya will experience this shift in 2016, with other emerging economies expected to follow as mobile broadband continues to thrive. As a result, it can be suggested that the fall in voice revenue may be absorbed by a larger proportionate increase in revenues collected from the data market. Service providers may therefore experience an overall growth in revenues. (GSMA 2013)

Table 2 below depicts the actual, and where applicable, the projected voice and data revenues for selected countries.

Table 2: Mobile operator data vs voice revenue breakdown by Country

Region	Year	Data Revenues (USD)	Voice Revenues (USD)
Japan	2012	$48 billion	$46.5 billion
Argentina	2013	$5.22 billion	$5.16 billion
US	2014	$123.9 billion	$105.8 billion
UK	2014	$14.2 billion	$13.9 billion
Kenya	2016	$828 million	$789 million

Source: Ovum

Table 3 (Booz&co. 2013) below highlights countries that have experienced an increase in data traffic.

Table 3: Examples of countries currently experiencing an upsurge in data traffic

Region	Mobile Traffic Growth Examples
Korea	As reported by Korean regulator, KCC, mobile data traffic on 2G, 3G and 4G networks increased approximately 80% between January and November of 2012.
China	China Mobile's mobile data traffic grew 77% from mid-2011 to mid-2012.
	China Unicom's mobile traffic data grew 112% from mid-2011 to mid-2012.
Japan	As measured by Japanese regulator, MIC, mobile data traffic grew 113% from September 2011 to September 2012.
Australia	As reported by Australian regulator ACMA, mobile data traffic grew 40% from mid-2011 to mid-2012.
Italy	As reported by Italian regulator, AGCOM, mobile traffic in Italy in 3Q12 was up 32% year-over-year.
Global	Telefonica's total year-over-year mobile traffic growth was 35% in 1Q12.
	Vodafone's year-over-year mobile traffic growth was 34% in FY2012.

Source: Cisco VNI Mobile Forecast, 2013

7.3.4 Conclusion on Global Financial Impact

Based on the investigative research and analysis above, the Authority believes that with the growth in data traffic, driven by both – increasing number of customers accessing mobile data and higher amount of data consumption per customer, revenue earned from providing data services will provide a boost to profitability of service providers.

In fact, telecommunications operators in some countries have introduced the following strategies to minimise the impact on operators' revenues by OTT players in the market:

i. offering appropriate service bundling;

ii. charging more for data usage; and/or

iii. building their own OTT platforms

The transition to IP-enabled networks and services is taking place across the telecommunications industry. New business and pricing models are being developed to accommodate new services that do not follow traditional parameters. Voice traffic services are no longer growing and in some segments, they are shrinking. However, considerable growth is anticipated in mobile internet and data services. The Authority is of the view that with the increased penetration of smartphones and subscribers' growing tendency to use data services, the average revenue per user (ARPU) will increase, ensuring continued growth in the sector.

Summary Statements:

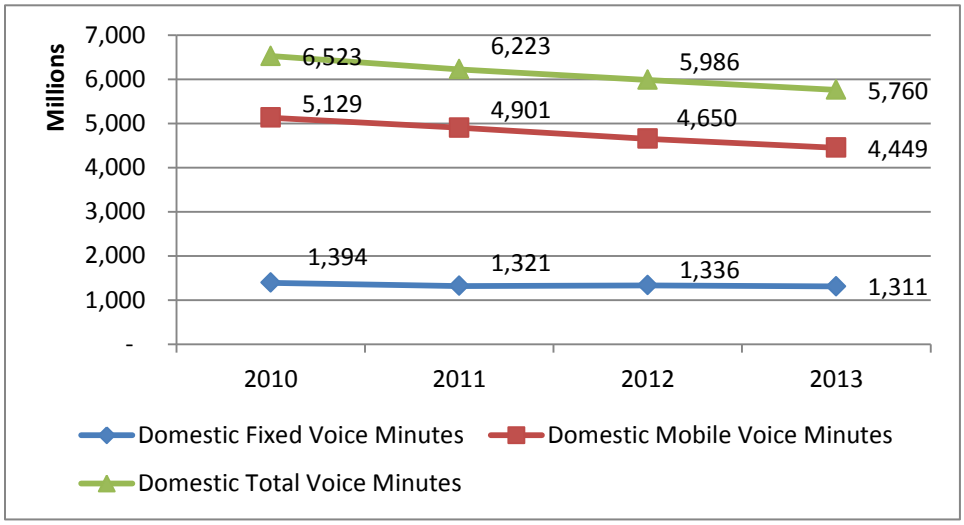
- ***With the introduction of various communications platforms including OTT, the reliance on traditional voice and SMS communication is declining;***
- ***Authorised service providers will lose revenues from voice services with the proliferation of OTT VoIP services;***
- ***The fall in the mobile voice revenue market may be offset by an increase in mobile data revenues;***
- ***It is forecast that mobile data revenue will overtake voice revenue globally by 2018.***

7.4 Financial Impact on the Trinidad and Tobago Telecommunications Market

Based on data collected by the Authority over the period 2010-2013, the following graphs portray the trends occurring in the domestic voice minutes, voice and SMS revenues and mobile Internet revenues markets.

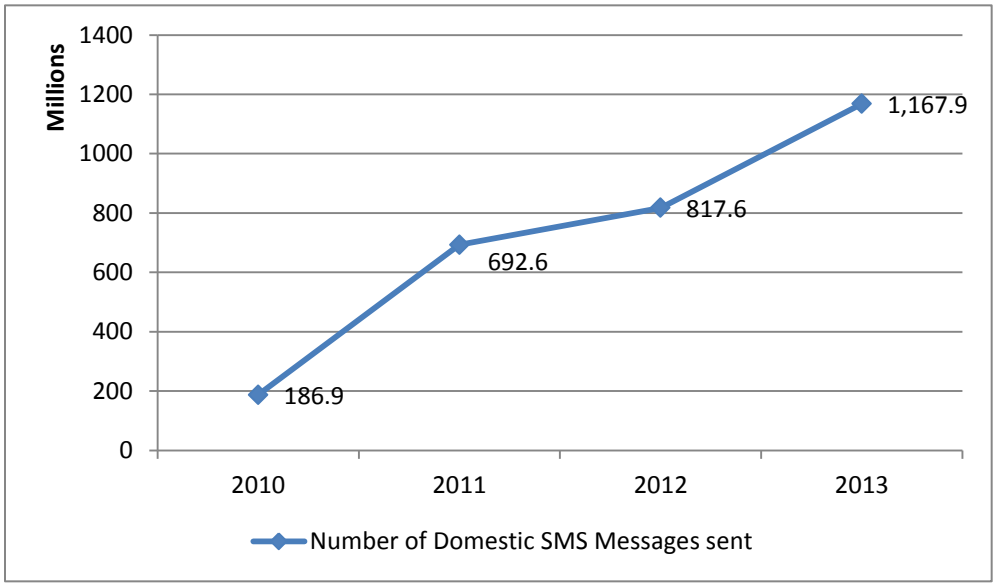
Figure 13 depicts a small drop in total domestic voice minutes over the years, while Figure 14 shows that the number of domestic SMS messages sent have been increasing substantially.

Figure 13: Number of domestic voice minutes



Source: TATT

Figure 14: Number of domestic SMS messages sent

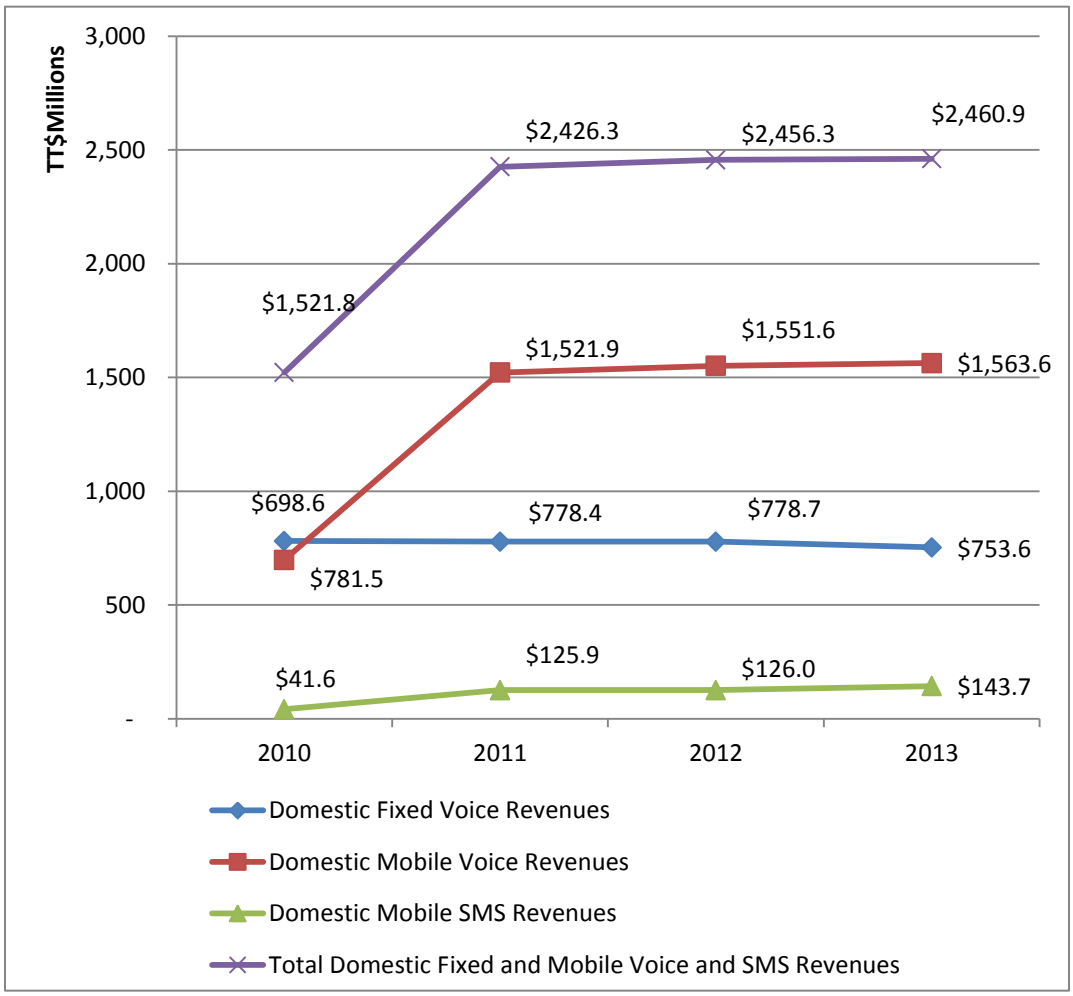


Source: TATT

Conversely, consistent with the drop in minutes, domestic fixed voice revenues declined slightly, while both domestic SMS and mobile voice revenues continued to increase. This is illustrated in Figure 15. Based on this data showing the increase in total domestic revenues, it may be inconclusive to infer that the introduction of OTT voice and messaging services in the Trinidad

and Tobago market has negatively affect the revenue streams of authorised telecommunications service providers in the market.

Figure 15: Domestic voice and SMS revenues



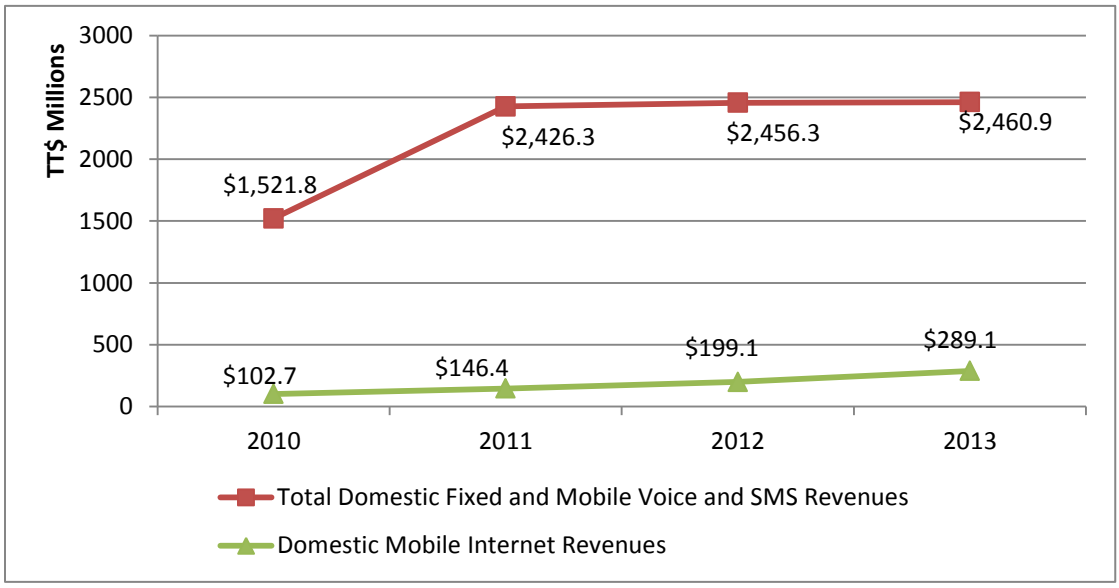
Source: TATT

Figure 16 shows a comparison of mobile Internet revenues with domestic voice and SMS revenues. It is quite evident that revenues in both markets are rising. In particular, revenues generated in the domestic mobile Internet market are growing at a faster rate when compared to the revenues produced in the domestic fixed and mobile voice and SMS markets.

The increase in domestic mobile Internet revenues may be attributable to the recent surge in mobile Internet subscribers and use of the data service. Therefore, any reduction in growth in the

voice revenue market is being absorbed by the increase in growth from the mobile Internet revenues market.

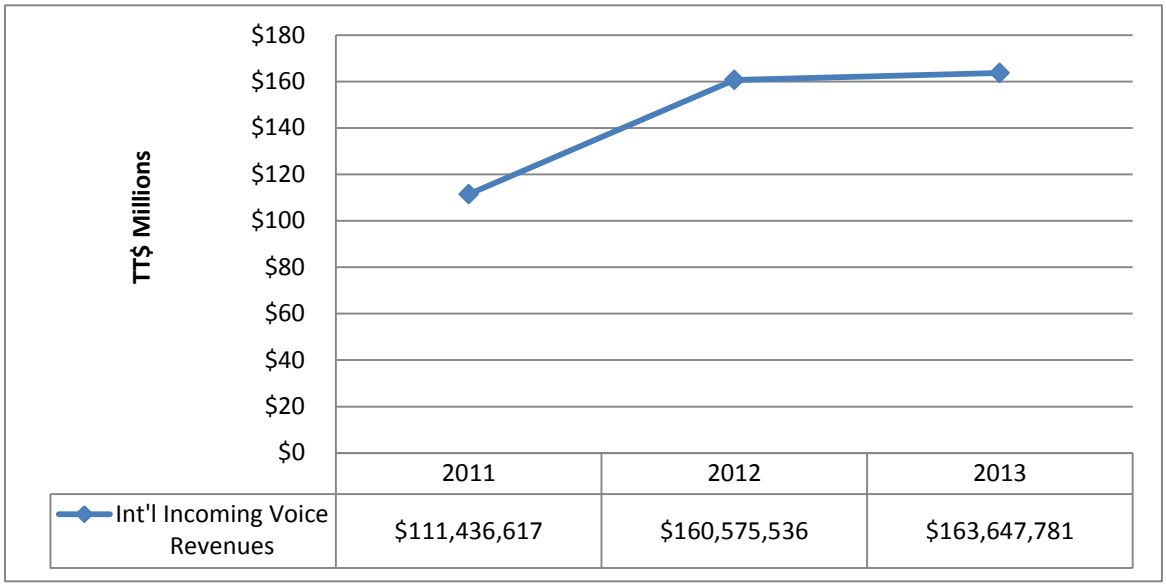
Figure 16: Comparison of mobile Internet with domestic voice and SMS revenues



Source: TATT

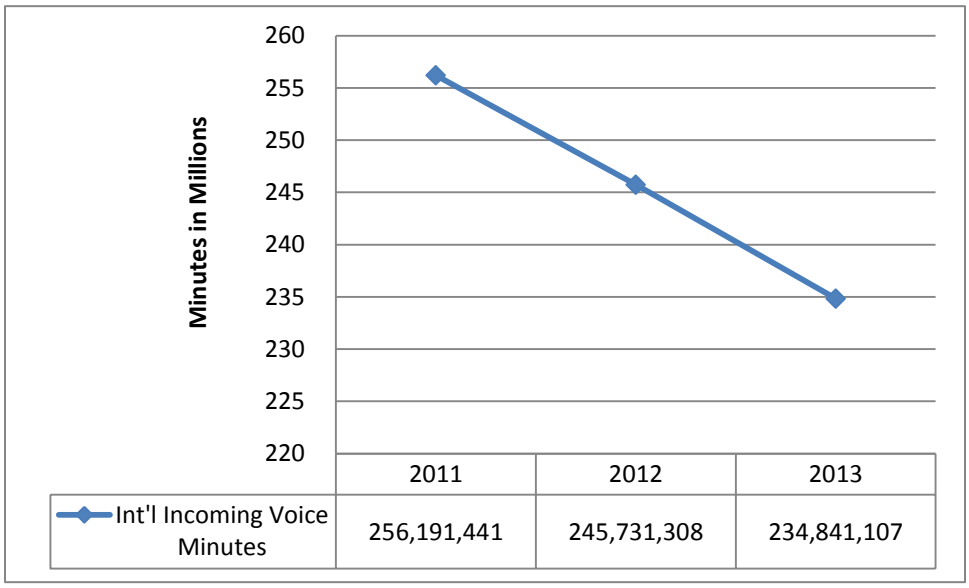
In 2014, a concern was raised by an authorised domestic service provider that international incoming voice revenues were being affected the advent of OTT VoIP services in Trinidad and Tobago. Figure 17 and 18 illustrate that, notwithstanding the slowdown in growth in international incoming minutes over the past three years, international revenues are rising but at a decreasing rate.

Figure 17: International incoming voice revenues



Source: TATT

Figure 18: International incoming voice minutes



Source: TATT

Summary Statement:

- ***Even with the introduction of OTT services, revenues generated by the domestic voice and SMS markets, as well as the domestic mobile Internet market, have increased in Trinidad and Tobago over the last four years.***
- ***The analysis of the Trinidad and Tobago market trends is consistent with global telecommunications revenue trends, that is, revenue generated by the mobile Internet market are growing at a faster rate than revenue from the domestic voice markets.***
- ***As a result of the slowdown of growth in the international incoming voice market, it may be inferred that one of the reasons local telecommunications service providers may be losing potential international incoming voice revenues is the proliferation of OTT VoIP services.***

7.5 Discussion Points for Comment – Impact on Authorised Public Service Providers

Based on the information presented above, which examines the potential impact OTT services may have on authorised public service providers, the following discussion points are presented below for comments:

1. For authorised cellular mobile operators, there is a relationship between the loss in voice and SMS revenues and the increase in mobile data revenues. The decline experienced in the mobile voice revenue market may be offset by an increase in mobile data revenues.

2. Mobile data subscribers pay to access the Internet with the understanding that it is inclusive of all services offered over the Internet. These subscription fees paid by customers should be sufficient to allow the authorised operator to cover its cost for the provision of OTT services to its customers and for any additional infrastructure build-out that may be necessary.

3. OTT services manifest themselves on networks as traffic. The fall experienced in the mobile voice revenue market may be offset by an increase in mobile data revenues.

4. Organizations that provide OTT services, particularly OTT VoIP services, should be required to register locally in order to fall under the country's regulatory oversight and for the Government to collect relevant tax revenues.

5. Organizations that provide OTT services should contribute fairly towards the use of the local telecommunications operators' networks.

6. In the event that an OTT service provider requires 'better than best effort', then an authorised operator can consider engaging in a commercial arrangement with the OTT firm, which may allow the OTT service to traverse the network at a quality of service better than 'best effort' Internet traffic.

8 International Regulatory Approaches

8.1 Introduction to Regulatory Approach

A common protest from authorised network operators is that their business models are determined to a large extent by regulatory requirements, whereas those of the Internet application providers (and particularly the OTT players) are free of such limitations. (TRA Bahrain/Detecon International GmbH 2014)

The approach taken by different regulators in overcoming this challenge has varied. One regulatory approach has been to block the provision of OTT VoIP services, which has been the case in some Middle Eastern countries.

In Saudi Arabia, a ban on Viber was implemented by The Communications and Information Technology Commission (CITC), on the basis that it had failed to comply with the communications rules and regulations of the kingdom. On March 2014, the Commission released a statement indicating the possibility that it would ban a number of Internet communications services, including Viber, Skype, and WhatsApp, unless the companies modified their products to comply with Saudi communications laws. However, thus far, only Viber has been banned. In 2010, Egypt's National Telecoms Regulatory Authority (NTRA) implemented a ban on Skype. According to Egyptian law, all international calls are required to go through 'the legal gateway', a network controlled by majority state-owned Telecom Egypt. In 2013, it was reported that the NTRA was considering blocking Viber and WhatsApp "due to economic and security concerns."

Notwithstanding the approach by some regulators to block OTT VoIP services, (similar) to those cited above, in other jurisdictions such services remain unregulated.

The rise of VoIP technology created a unique regulatory situation around the world, as regulators contended with how to fit this emerging technology into their existing legacy frameworks. The regulatory approach in countries such as the United Kingdom and Australia has been to classify the different types of VoIP. Since VoIP may be considered by regulators as functionally similar

to the service provided by the traditional PSTN service, the regulatory approach has sometimes been to licence such providers, as is the case in Singapore.

Where VoIP services that are not designed to substitute directly for, or to interconnect with the PSTN, they may be left unregulated, for example 'peer-to-peer' VoIP services. However, those that are designed to substitute traditional telephone services have been regulated with a light handed approach. This 'light touch' regulation is confined to specific matters such as access to telephone numbers, number portability, access to emergency services, universal service and national security, to name a few examples.

In August 2014, the Telecom Regulatory Authority of India (TRAI) announced that it had decided to shelve its plans to initiate a consultation paper on regulating companies offering OTT VoIP and messaging services, stating that telecom companies have been able to make good on their losses via data usage revenue. (Mankotia 2014)

8.2 Approaches Adopted by Countries

8.2.1 BARBADOS – Telecommunications Unit

VoIP services that are regulated in Barbados are those that connect to the Barbados PSTN, which is a regulated network. VoIP services have been classified as seen in the table below:

Table 4: Barbados VoIP classifications

Class 1: Primary Line VoIP Services	Class 2: Secondary Line VoIP Services	Class 3: Internet Telephony VOIP Services	Class 4: Peer-2-Peer (P2P) VoIP Services
Service offerings providing telephony services appropriate for use as a consumer's sole or primary means of access to the PSTN. The service provider controls the network end-to-end. Class 1 is considered a	Services are Barbados facilities-based, but without the service provider delivering the customer-end of the transport. The customer may "bring their own bandwidth". Thus, this class of service is not	Services may or may not be Barbados facilities - based, and cover all domestic providers and resellers of VoIP telephony services not using Barbados numbering, and without local interconnection to	P2P VoIP Services involve connections between two or more devices entirely over one or more networks, possibly including the Internet, and thus are entirely independent of the Barbados PSTN. P2P is

telecommunications service, and includes "any-to-any" dialing to and from Barbados PSTN numbers.	appropriate as a customer's primary phone connection.	the Barbados PSTN. Class 3 is considered an information service and does not include "any-to-any" dialling to and from Barbados PSTN numbers.	completely unregulated.

Class 1 VoIP service providers have certain rights and obligations and are an option for Universal Service fulfilment.

Class 1 VoIP service providers have the following rights:

- Interconnection to Barbados PSTN
- Barbados PSTN Numbering

Class 1 VoIP service providers have the following obligations:

- Quality of Service Standards
- Last Mile Transport – Service Provider Supplies
- Disclosure to Customers
- Fax and Modem Support
- Core Network Usable during power failures
- Public Emergency Call Services
- Directory Inquiry Services
- Number Portability
- Universal Service
- Indirect/Equal Access

Class 2 VoIP service providers have the following rights:

- Interconnection to Barbados PSTN and Internet
- Barbados PSTN Numbering

Class 2 VoIP service providers have the following obligations:

- Last Mile Transport – Customer Provided,
- Quality of Service Standards,
- Disclosure to Customers, ,
- Indirect / Equal Access.

Class 3 VoIP service providers specifically may not interconnect with the Barbados PSTN, but may interconnect with the Barbados Internet. Class 3 VoIP services providers have a Disclosure to Customers obligation. (Barbados Telecommunications Unit 2007)

Class 4 VoIP service providers are unregulated and therefore have no rights or obligations.

8.2.2 EUROPEAN UNION

VoIP can be used to provide a variety of services and, as such, not all VoIP services fall under the EU regulatory framework. For instance, a VoIP offering that comprises provision of a product (e.g. a software program to be run on a personal computer) with no on-going provision of a service, is not within the scope of the EU regulatory framework if it does not entail provision of an Electronic Communications Service. On the other hand, publicly available VoIP services, where there is access to and from E.164 telephone numbers, do fall under the EU regulatory framework. Even under this category, however, the regulatory treatment is dependent on the nature of the service being offered.

Accordingly, VoIP service may be categorised either as an (i) Electronic Communications Service (ECS), which is a

"- service normally provided for remuneration

- which consists wholly or mainly in the conveyance of signals on Electronic Communication Networks…" (European Parliament 2002)

or (ii) a Publicly Available Telephone Service (PATS) which means a:

"service available to the public; for originating and receiving national and international calls; access to emergency services; through a number or numbers in a national or international telephone numbering plan" (European Parliament 2002)

The set of obligations applicable to providing publicly available Electronic Communications Services (ECS) is different from those that apply to Publicly Available Telephone Services (PATS).

If an operator chooses to offer a generally available telephone service (PATS), it will be subject to the same rights and obligations as operators of traditional voice telephony. These include: number portability; calls to emergency services; publication of information on prices; rights for subscribers to an entry in the public directory; and access to carrier selection and pre-selection. If, however, an operator chooses to design its services as a public electronic communications service (ECS), it will only have to comply with a number of obligations, which mostly relate to consumer protection. (Stevens, Valcke and Lievens 2005)

Under the EU regulatory framework, players are free to enter the market for electronic communications services without prior authorisation/licence, provided they abide by the conditions set out in the general authorisation applicable in each Member State.

The general authorisation sets out rights and obligations for the providers of publicly available electronic communications networks and services. There are additional rights and obligations for providers of publicly available telephone services and for those providers that have Universal Service Obligations (USOs). The degree to which a provider of VoIP-based services will face obligations under the EU framework depends on the type of service offered.

In April 2014, the European Union approved new rules aimed at guaranteeing equal access to the Internet and cutting cell phone charges. In general, the new rules had two objectives: first, to ensure equal access by firms and individuals to online services, such as video on demand, streaming audio and cloud computing; and second, to harmonise rules across national borders in order to create a unified European market. (Jayakar and Park 2014)

8.2.3 USA – FCC

In its attempt to be technology-neutral, that is, to regulate similar services similarly, regardless of how they are delivered, the Federal Communications Commission (FCC) determined that consumers were using interconnected VoIP – but not non-interconnected VoIP – as a substitute for PSTN POTS. Accordingly, the Commission applied partial telephone-type regulation to interconnected VoIP. Much like wireline and cell companies, interconnected VoIP providers are regulated as to 911, law-enforcement wiretap capability, disability access, number portability, universal service contributions, protection of subscriber information, and various reporting requirements. Other traditional telephone regulations, like carrier-of-last-resort and interconnection obligations, do not apply to VoIP. (Non-interconnected VoIP is essentially not regulated at all, except for a few handicapped-accessibility requirements.) (Lazarus 2013)

FCC requires that providers of interconnected VoIP services meet Enhanced 911 (E911) obligations in order to ensure that the consumer's choice of VoIP does not adversely affect the consumer's ability to access emergency services. E911 systems automatically provide to emergency service personnel a 911 caller's call back number and, in most cases, location information.

The FCC also requires interconnected VoIP providers and telephone companies that obtain numbers from them to comply with local number portability (LNP) rules. VoIP providers must also contribute to funds established to share LNP and numbering administration costs among all telecommunications providers benefiting from these services.

The FCC also limits interconnected VoIP providers' use of customer proprietary network information (CPNI) such as customer telephone calling records, and requires interconnected VoIP providers to protect it from disclosure.

Interconnected VoIP providers must also comply with the Commission's Telecommunications Relay Services (TRS) requirements, including contributing to the TRS Fund used to support the provision of telecommunications services to persons with speech or hearing disabilities, and offering 711 abbreviated dialling for access to relay services.

In August 2014, the FCC adopted new Text-to-911 Rules that require all wireless carriers and certain over-the-top messaging providers to support text-to-911 services. The rules, however, only apply to Internet-based text messaging services that are set up to send texts to phone numbers.

In March 2015 the FCC announced its net neutrality rules. We recognise that these rules may bear relevance on the treatment of OTT services. For example, the ruling to prohibit the blocking, throttling and paid prioritisation for Internet traffic and the application of these rules to public mobile telecommunications networks as well.

The Authority proposes to treat with net neutrality in a separate consultation and as such the FCC's net neutrality announcement is not fully treated with in this document.

8.2.4 SINGAPORE – IDA

VoIP services, also referred to as IP telephony services in Singapore, are regulated once those services are offered using an E.164 telephone number ("IP telephony number") allocated to customers in Singapore, and which allow customers to make and receive voice, data and/or video calls using the same IP telephone number from any domestic or overseas location where broadband Internet access is available.

To provide IP telephony services in Singapore, applicants need to acquire either a Facilities-Based Operation ("FBO") or Services-Based Operation ("SBO") (Individual) licence from the IDA, depending on whether the service provider intends to deploy network infrastructure (FBO). An SBO (Individual) licence will be issued to those that lease transmission facilities from an FBO to operate their own network.

In addition to the existing FBO/SBO licence general conditions, the Telecommunications Act (Cap 323), its Regulations and any Codes of Practice, licensees would also be required to comply with the specific terms and conditions for the provision of IP telephony service if they are intending to use E.164 telephone numbers and assign them to their customers in Singapore.

Depending on the type of licence, licensees will be allocated 8-digit number blocks starting with level "6" or "3". FBO licensees are eligible for both level "6" and "3" numbers, while SBO (Individual) licensees will be eligible for level "3" numbers only.

FBO and SBO licensees offering IP telephony services with 8-digit numbers starting with level "3", or other E.164 telephone numbers issued by overseas administrators, will not be required to comply with any Quality of Service (QoS) standards established by IDA, unless otherwise informed by IDA. However, FBO and SBO licensees providing IP telephony service with level "6" numbers are required to comply with the same QoS standards set for basic local call services associated with number level "6". (Info-communications Development Authority of Singapore n.d.)

8.2.5 UNITED KINGDOM - OFCOM

Consistent with European Union law, an undertaking in the UK wishing to provide any form of VoIP services will require authorisation as "other publicly available electronic communications services" (ECS) or "publicly available telephone service" (PATS). Classification within one category or the other will mean that different rights and obligations will apply.

Ofcom defines the various types of VoIP services as follows:

- Type 1: Peer-to-peer services to make and receive voice calls over the Internet only, usually within the same application community.
- Type 2: VoIP Out services to make calls over the Internet to the PSTN (public switched telephony network, the standard public phone network), but not to receive calls from the PSTN.
- Type 3: VoIP In services to receive voice calls over the Internet from the PSTN, but not to make calls to the PSTN. Customers can be allocated an ordinary geographic number or a VoIP number (056).
- Type 4: VoIP In and Out services to receive voice calls over the Internet from the PSTN and to make voice calls over the Internet to the PSTN. Customers can be allocated an ordinary geographic number or a VoIP number. (OFCOM 2007)

8.2.6 AUSTRALIA - ACMA

The ACMA has classified VoIP services into four types:

1. Peer to peer – Internet only; calls do not use the traditional telephone network, PSTN
2. VoIP Out – a service where calls can be made from the VoIP network to the PSTN
3. VoIP In – a service which allow calls to be made from the PSTN to the VoIP service using a telephone number
4. Two way – a service which allows calls to be made both ways between the VoIP service and the PSTN using telephone numbers. (ACMA 2014)

Generally, the telecommunications regulatory framework only applies to service types 2, 3 and 4.

VoIP service providers of types 2, 3 and 4 are considered to be a Carriage Service Provider (CSP) and a range of legislation, codes and standards apply to them:

i. Telecommunications Act 1997
ii. Telecommunications (Consumer Protection and Service Standards) Act 1999
iii. Related legislation, legislative instruments and standards including:
iv. Membership of the Telecommunications Industry Ombudsman (TIO) scheme
v. Provision of free access to 000 emergency numbers
vi. The Numbering Plan – Telecommunications Numbering Plan 1997
vii. IPND Notification
viii. Number portability
ix. Privacy of customer information
x. Calling line identification
xi. Conformance to Industry Codes and Standards
xii. A range of public interest obligations including:
xiii. Law Enforcement (interception and national interests)
xiv. Defence and natural disaster assistance.

VoIP providers are unlikely to require a carrier licence unless they intend owning a network unit. A carrier licence is needed if you are installing your own transmission lines or radio facilities.

VoIP providers offering a Type 4 two-way service enabling customers to make calls to and receive calls from users of the PSTN may be considered a Standard Telephone Service as defined by section 6 of the Telecommunications (Consumer Protection and Service Standards) Act 1999. This places several further obligations on the service including:

i. The CSG - Telecommunications Customer Service Guarantee Standard 2000
ii. Access to the National Relay Service
iii. Operator services
iv. Directory Assistance
v. Access to the National Relay Service
vi. Itemised Billing.

VoIP providers offering Type 2 out only services are required to:

i. Provide free of charge access to Triple Zero (000); or,
ii. If unable to do so, clearly inform customers that access is not available. The Determination sets out minimum standards for how this information must be presented and requires the customer to acknowledge they understand the limitations of the service. CSPs are not required to register with the ACMA.

VoIP providers are also subject to parts of the Competition and Consumer Act 2010 dealing with topics such as pricing, anti-competitive behaviour and number portability.

8.2.7 INDIA – TRAI

The present regulatory framework permits Basic Service Operators (BSO), Unified Access Service Licensee (UASL) and Cellular Mobile Telecom Service (CMTS) licensees to provide traditional voice services within country.

Internet telephony is also permitted to Internet service providers (ISPs) under new ISP licensing conditions issued by government in October 2007. However, ISPs are not allowed to make calls to PSTN/PLMN subscribers as they are not permitted to have interconnection with PSTN/PLMN networks to terminate Internet telephony calls within the country.

8.2.8 JAMAICA- Office of the Utility Regulator (OUR)

The OUR is currently conducting an investigation into the decision by their local telecommunications service providers, LIME and Digicel, to block certain providers of VoIP services on their network. The considerations for the OUR is whether certain VoIP providers are engaging in bypass operations.

The Jamaican Telecommunications Act defines bypass operations as "operations that circumvent the international network of a licensed international voice carrier in the provision of international voice services". (Jamaica Telecommunications Act No. 1 of 2000 n.d.)

Summary Statements:

- ***Barbados regulates only VoIP services that connect to the Barbados PSTN.***
- ***In the European Union and the UK, the set of obligations applicable to providing publicly available electronic communications services (ECS) is different from those that apply to publicly available telephone services (PATS).***
  If an operator chooses to offer a generally available telephone service (a Publicly Available Telephone Service or PATS), it will be subject to the same rights and obligations as operators of traditional voice telephony. If, however, an operator chooses to design its services as a public electronic communication service (ECS), it will only have to comply with obligations which mostly relate to consumer protection.
- ***The FCC has defined VoIP into two categories: interconnected VoIP and non-interconnected VoIP. OTT services can fall within either of these categories depending on the nature of the service provided. Regulations related to PSTN services are applicable to interconnected VoIP services, while non-interconnected VoIP services are only subjected to emergency and handicapped-accessibility regulations.***
- ***Australia applies regulatory oversight to all VoIP services except for peer-to-peer Internet services that do not use the PSTN.***

• ***India does not allow Internet telephony calls to interconnect with the country's PSTNs.*** • ***Based on the above, the principle of regulatory parity requires that regulation must treat like things alike. As is the case with all jurisdictions, the regulatory approach to be adopted towards OTT VoIP services in Trinidad and Tobago will be dependent on the legislative remit permitted by national laws.***	

8.3 Substitutability between PSTN services and OTT VoIP services

The question being asked at the moment is whether OTT services and, more particularly, OTT VoIP should be regulated. As indicated above, the regulatory approach thus far has been to regulate those OTT services that can be substituted in lieu of the traditional services. Accordingly, if the emerging technology can provide a service that would allow the user to substitute it with the traditional service then it would only be fair to impose the same obligations on the 'new' service for the purpose of, for example, protecting the consumer. However, if the OTT service cannot be used as, or is seen to be, an alternative to the traditional services, in spite of the fact that they are providing the same service, then should the same obligations be imposed?

According to Gartner (Telecom Italia 2013) some of the strategies that telecom operators have used and/or are currently using to manage OTT services are:-

8.3.1 The Reactive Strategy

Adopting traffic management and optimisation, throttling and Wi-Fi offloading

8.3.2 The Aggressive Strategy

This involves blocking the content of select OTT players. We have already seen attempts to employ this strategy in the regional markets by authorised service providers.

8.3.3 The Opportunistic Approach

This approach involves charging consumers a premium for OTT services, e.g. only offering OTT VoIP services with premium data plans.

8.3.4 The Collaborative Approach

This approach involves partnering with select OTT VoIP players to develop a mutually beneficial relationship. The traditional player leverages its core competencies, e.g control over the network, to promote and add value to the partners' services. The business model is often a revenue share between both parties. A lighter form of collaboration can involve the traditional service provider acting as an aggregator of OTT services.

9 Other International Developments on the Internet / Internet Governance

A holistic understanding of the pertinent issues and considerations towards the treatment of OTT services may be derived based on the direction(s) resolved by international bodies, as it relates to OTT or, more pervasively, Internet governance.

9.1 World Summit on the Information Society

The World Summit on the Information Society (WSIS) was held in two (2) phases in 2003 and 2005. It recognized ICT as an enabler to development. There was agreement on a Vision and guiding principles which were transposed into a Plan of Action towards building an Information Society and bridging the global digital divide.

The Action lines, such as "Information and communication infrastructure: an essential foundation for the Information Society" and "Access to information and knowledge" does not provide direct guidance to address OTT services, but creates an atmosphere of understanding that the Internet, a form of ICT, and its content should be accessible to all.

9.2 World Conference on International Telecommunications

The World Conference on International Telecommunications (WCIT) was held in 2012 with the intention of revising the International Telecommunications Union (ITU) treaty on International Telecommunications Regulations (ITR) in order to take into consideration changes in the telecommunications environment since its last update in 1988, which included the use of the Internet as a medium for the provision of international telecommunications services.

In addition to the Internet governance-related matters discussed at this meeting, such as the role of the ITU with regard to international public policy issues pertaining to the Internet and the management of Internet resources, including domain names and addresses, two areas pertinent to the discussion on OTT services were addressed:

i. The updated treaty explicitly recognizes commercial arrangements in addition to the old accounting rate regime for telecommunications, based on modifications made to Article

6 of the ITRs. This effectively recognises the Internet traffic interconnection accounting rate settlement whereby tier 1 network interconnect and terminate Internet traffic via settlement-free peering, and all other networks purchase IP transit or pay a settlement to peer with the tier 1 networks.

ii. Net neutrality was advocated for, albeit subtly, in a modification to Article 4.3, replacing "[…] minimum quality of service […]" with "[…] satisfactory quality of service […]" as follows: (International Telecommunications Union 2012)

"4.3 Subject to national law, Member States shall endeavour to ensure that authorized operating agencies provide and maintain, to the greatest extent practicable, ***a satisfactory quality of service*** *corresponding to the relevant ITU-T Recommendations with respect to:*

a) access to the international network by users using terminals which are permitted to be connected to the network and which do not cause harm to technical facilities and personnel;

b) international telecommunication facilities and services available to users for their dedicated use;

c) at least a form of telecommunication service which is reasonably accessible to the public, including those who may not be subscribers to a specific telecommunication service; and

d) a capability for interworking between different services, as appropriate, to facilitate international telecommunication services."

This modification encourages Member States to address situations where an ordinary user of the Internet experiences a slow connection or access to bandwidth intensive websites or services are being impaired / blocked because of intentional techniques employed by an operator or ISP to throttle or block traffic.

9.3 NETmundial

NETmundial, the global multi-stakeholder meeting on the future of Internet Governance was convened by the Government of Brazil to address issues of concern related to Internet governance. The outcome of the meeting was the NETmundial Multi-stakeholder Statement (NETmundial 2014) on Internet Governance (Sao Paulo), which comprised two parts, namely:

i. Internet governance principles; and

ii. Roadmap to the future evolution of the Internet governance ecosystem.

Some of the common themes arising from the addresses and policy statements made at the meeting included:

i. Designing an Internet governance framework in a manner that preserves the openness of the Internet;

ii. Consideration of the Internet as public good/commons; and

iii. The Internet should serve as a tool for human and social development, which would provide the basis for the development of inclusive, non-discriminatory societies.

Net neutrality was one of the key issues highlighted for consideration in developing the future Internet governance ecosystem. Net neutrality continues to be a complex issue and its inclusion in the text was strongly advocated for by the technical community, academia and civil society. There were divergent views on whether the term should be included as a specific principle and it was not surprising that, while it is mentioned in the final document, it is identified as an area in which further work is to be pursued having regard to continuing discussion on related issues such as competition, consumer choice and transparency.

9.4 International Telecommunications Union

The International Telecommunications Union (ITU) has incorporated, in its ICT Regulation Toolkit, (International Telecommunications Union, InfoDev 2014) guidance on regulating OTT services. This toolkit provides information for addressing the policy issues raised by VoIP and other OTT services and the new concepts that apply before turning to regulatory options for managing VoIP and other OTT services.

The policy issues highlighted in the toolkit acknowledge that text-based and VoIP OTT services compete with the underlying network provider's business model, resulting in the loss of revenues, whilst also operating without the same regulatory obligations (e.g. regulatory fees, quality of service obligations, universal service obligations). Video-based OTT services may also threaten the economics of investing in further broadband network build out by the network provider.

Notwithstanding the above issues, the toolkit indicates/proposes, as one solution, that the current business and pricing models be modified based on the data-centric nature of networks and services today, with the view that it would be counterproductive for regulators to resist the changes influenced by OTT services. Furthermore, and more specifically, the toolkit documents the manner in which countries have treated with VoIP and other OTT services, noting that policy makers are finding different paths to balancing innovation, investment and competition. It recognises the 'light-handed' approach employed by the US and the European Commission, noting that the number of countries that ban VoIP is declining, and the blocking of OTT services by network providers is now being stopped in Europe, for example, on the basis of net neutrality. .

Additionally, the "Best Practice Guidelines for Enabling Open Access" issued by ITU's Global Symposium for Regulators (GSR) in 2010, recommended that regulators only allow differentiation of Internet traffic when it is objectively justifiable. Many regulators have since launched public consultations into practices that differentiate between the ways various data streams are treated.

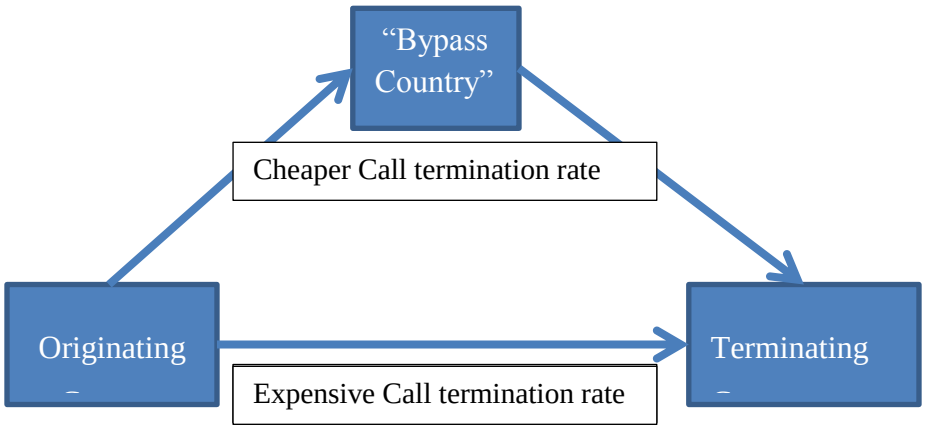
9.5 World Trade Organization

The World Trade Organization defines "bypass" in telecommunications as follows: (World Trade Organization 2014)

"Bypass — Arrangements or facilities whereby a customer can access long-distance, international, or other services without using the local operating company's switched network, thus avoiding payment of access charges. More generally, any means whereby customers avoid usage of a monopoly service or facility."

Traditionally, before the advent of the Internet, bypass occurred when it was cheaper to use an indirect route for originating a call, rather than a direct route between two countries, as seen in the diagram below:

Figure 19: Traditional bypass



It evolved one step further when originating international calls, where the asymmetric termination rates made it cost effective to employ a feature called, 'call-back.

Call-back is implemented when a user in a country where calls are cheaper to terminate makes a call to an international 'call-back' number in the destination country, where calls are more expensive to terminate. The call-back system hangs up the call origination and calls the user

back, thus making the call origination now a call termination (i.e. benefiting from the cheaper termination rates of the user's country). The user can then dial the person in the destination country and the call is billed as a local call, plus the lower termination rate and a surcharge for using the call-back service.

The advent of the Internet and VoIP services has brought about new innovations that, in some countries, are considered forms of bypass.

9.6 Caribbean Telecommunications Union

The Caribbean Telecommunications Union (CTU) has championed the development of a Caribbean Internet Policy Framework (Caribbean Telecommunications Union 2013) that is in its second draft form. Currently, this framework treats with high-level policy recommendations focused on broader Internet governance matters. Issues related to OTT are not specifically addressed in this framework, except for an indication that net neutrality should be addressed.

9.7 Caribbean Association of National Telecommunications Operators

The Caribbean Association of National Telecommunications Operators (CANTO) comprises primarily the operators within the Caribbean region. CANTO tabled an information paper at its 30th Annual Conference in August, 2014 entitled, "OTT Services – Balancing Innovation, Investment and Competition". (CANTO 2014)

This information paper sensitised its membership to the issues faced by operators within the region from the explosion in use of OTT services, primarily VoIP OTT services, highlighting that OTT services must bear their fair share of costs. The paper also put forward recommendations for Caribbean regulators and Ministers, as follows:

i. License OTT providers;

ii. Licence conditions? must include interconnection where services will be terminating on or originating from a domestic telephone number, however configured;
iii. Payment of relevant taxes, fees and contributions by OTT providers; and
iv. Recognition of the right of network operators to block any OTT service that harms its network, or causes the network to be vulnerable to viruses or denial of service attacks.

The paper identified the characteristics of OTT services in Caribbean markets as follows:

a) Do not pay, for the most part, to terminate traffic on a mobile or fixed network, where the service is actually terminated on the local network of the fixed or mobile provider. That is, they make no contribution to the sustainability of the network on which they must rely;
b) Are providing services in markets in which they are not licensed to provide such services;
c) Do not pay taxes to any Caribbean governments or contribute to any universal service funds, which are used to develop the ICT infrastructure in the countries;
d) Provide services which deplete the quality of service on both mobile and fixed networks because such services use increasing amounts of network capacity and bandwidth;
e) Some OTT services, by nature of their architecture, like Viber, can result in denial of service attacks on domestic networks;
f) Provide video services that spec their traffic so that most video traffic adapts to network congestion by shifting to lower bitrates and quality, which impacts the subscriber experience on broadband. When capacity is increased, adaptive video simply upshifts to a higher fidelity and fills the new capacity. Therefore no network operators will ever be able to build enough capacity to satisfy bandwidth hungry video. The alternative is to force network operators to augment their networks to keep up with the growth in video traffic on which they earn very little. This is unsustainable; and
g) Offer cheap, innovative services.

There are some key points to note from positions taken by international bodies in their deliberations on the Internet, Internet governance and more specifically, OTT VoIP services. Essentially, the openness of the Internet is a common area of concern resonating amongst the

international and regional bodies. The principle of net neutrality has also been discussed. However, although there is guidance towards advocating net neutrality, the details therein are still very much the topic of much debate, as there is no definitive resolution towards its treatment.

With respect to the treatment of OTT services, the ITU offered the following guidance, (International Telecommunications Union, InfoDev 2014) *"Notwithstanding the above issues, the toolkit indicated that one solution can be that the current business and pricing models may need to be modified based on the data-centric nature of networks and services today and that it would be counter-productive for regulators to resist the changes influenced by OTT services."*

10 ICT Perspectives in Trinidad and Tobago

10.1 Government Perspective – Infrastructure Building

10.1.1 GoRTT Pillars

One of the current priorities identified by the Trinidad and Tobago government (GoRTT) is the promotion and leveraging of Information and Communications Technology (ICTs) to ensure the socio-economic development of our nation. The ICT sector is recognised as a discrete sector and as a crucial enabler to many other sectors, which is necessary for the diversification of the economy and key to the strengthening of the country's competitiveness and viability in the global market.

GoRTT has identified seven interconnected pillars aimed at developing and sustaining the economy of Trinidad and Tobago, two of which the ICT sector plays a significant role in developing.

Pillar No. 4 identifies a key role for ICTs in 'Connecting Trinidad and Tobago and Building the New Economy' (Ministry of Planning and the Economy 2011). This addresses the need for a more connected society and the development of supporting infrastructure to facilitate connectivity to the Internet as a critical platform for innovation and growth.

Pillar No. 5 speaks to the building of a 'More Diversified and Knowledge-Intensive Economy' (Ministry of Planning and the Economy 2011). Again, importance is placed on connectivity to promote a knowledge-based information society with an intended outcome of producing a diversified economy.

10.1.2 GoRTT Medium Term Policy Framework

In addition to the above pillars, the GoRTT devised a medium term policy framework for the period 2011-2014 (Ministry of Planning and the Economy 2011), which defined the strategies to be adopted to sustain economic development. One such strategy is to 'Create a Modern and Efficient Economic Infrastructure Base: Information and Communication Technology (Network)' . This strategy emphasises that:

- the critical element for building a knowledge-based economy is widespread access to affordable high-speed broadband services throughout the country; and
- the GoRTT will promote the following:
    - Increased broadband coverage and affordable video conferencing;
    - Wider ICT coverage for citizens at lower costs;
    - Expansion of internet connection capabilities to ensure that every citizen has access and is able to conduct business for a wide range of services;
    - Drafting of the Cybercrime Bill and the Cyber Security Agency Bill;
    - Drafting of the Data Protection Act and Regulations;
    - Drafting of the Electronic Transaction Act and Regulations;
    - Drafting of the Electronic Transfer of Funds Crime Amendment Act and Regulations; and
    - Drafting of the Exchequer and Audit Act Amendment and Regulations.

10.1.3 SmarTT Plan

Aligning with the medium term policy framework, emphasis was placed on the development of a plan that documented the national ICT initiatives to be implemented. This led to the creation of SmarTT plan with a vision "To create a dynamic knowledge-based society, driven by the innovative use of ICTs to enhance the social, economic and cultural development of the people of Trinidad and Tobago". (Ministry of Science and Technology 2013)

Specific to the area of high-level broadband, the key objective seeks:

To promote widespread access to high-speed broadband services throughout the country as a significant driver of economic growth, job creation, and development; and a critical component of GoRTT's broader objective of building a knowledge-based economy. (Ministry of Science and Technology 2013)

This key objective focuses on making ICT infrastructure and services universally available and accessible at affordable prices to facilitate adoption. Ubiquitous connectivity of ICT

infrastructure is important to support both the telecommunications and broadcasting infrastructures and the services they provide.

The availability of broadband ICT infrastructure and related services is critical to the realisation of the benefits identified under all areas of SmarTT.

10.2 Stakeholder Perspective – Content of the Internet

In a statement released by the Trinidad and Tobago Computer Society (TTCS), the Internet Society Trinidad and Tobago Chapter (ISOCTT), and the IEEE Trinidad and Tobago Section (IEEETT), the following views were expressed with respect to content on the Internet:

> *'The Internet Society in 2012 stated that:*
>
> *Internet Access Service allows users to essentially conduct three (3) basic sets of activities:*
>
> *1. Communicate*
>
> *2. Access and provide content*
>
> *3. Use and develop applications*
>
> *To this end, the Internet is end-user centric. In general, users expect Internet traffic to be conveyed in a manner that is independent of its source, content or destination and in a manner that respects their privacy.*
>
> *Choice and transparency are at the heart of a user's Internet experience, enabling them to remain in control of their Internet experience, and thereby allowing them to benefit from, and participate in, the open Internet.'*

The above associations therefore continue to promote the independence and openness associated with the use of the Internet in Trinidad and Tobago.

10.3 Position on Net Neutrality

The Authority recognises that network neutrality can have an impact on the treatment of OTT services. The Authority is drafting a parallel discussion paper that focuses primarily on the subject of network neutrality which will be issued for consultation in due course.

Summary Statements:

- ***ICT infrastructure and services should be made universally available and accessible at affordable prices to encourage the building of a knowledge-based information society.***

- ***SmarTT (The National ICT Plan) promotes the development of pervasive broadband infrastructure throughout Trinidad and Tobago to facilitate, inter alia, access to the Internet.***

10.4 Discussion Points for Comment – Treatment of Internet Governance and Network Neutrality

Based on the information presented above examining the concept of network neutrality and its impact on OTT services, the following discussion points are presented below for comments:

1. Network (net) Neutrality is the term used to describe networks that are open to equal access, quality of service and price to all.

2. The concept of a "free and open" Internet should be applied in the treatment of OTT services, therefore there should be no blocking of lawful content.

11 Current Regulatory Framework of the Authority

While there is no specific provision of the Telecommunications Act or any policy that speaks to the provision of OTT VoIP services in Trinidad and Tobago, the Act does take a technology neutral approach in the regulation of telecommunications and broadcasting services.

11.1 Public Telecommunications Services

In accordance with the Telecommunications Act Chap. 47:31, “telecommunications”, “public telephone service” and a “public telecommunications service” have been defined as follows:

“Telecommunications” includes the transmission, emission or reception of signals, writing, pulses, images, sounds or other intelligence of any kind by wire, wireless, optical or electromagnetic spectrum or by way of any other technology.

“Public telephone service means the commercial provision to the public of interactive voice communication in real time from and to points at which users are connected to a network such that a user can use terminal equipment to communicate with another user.

"Public telecommunications service” means a telecommunications service, including a public telephone service, offered to members of the general public, whereby one user can communicate with any other user in real time, regardless of the technology used to provide such service.

Based on the above definitions, OTT VoIP services may be considered a "public telecommunications service".

The framework also states that public telecommunications services can be provided by either a service provider who owns or operates a physical network, or a service provider who does not own or operate a physical network but who uses the facilities of another network provider.

Further, anyone wishing to provide a public telecommunications service must apply to the Authority for a concession in order to do so, as the Act mandates in Section 21(1) against the provision of a public telecommunications service without a concession. It further states in

Section 65 of the Act that any person failing to comply with the provision in 21(1) commits an offence.

s.21 (1) "No person shall operate a public telecommunications network, provide a public telecommunications service or broadcasting service, without a concession granted by the Minister."

s. 65 "A person who - (a) fails to comply with or acts in contravention of section 21(1), 33, 36(1), or 73;… commits an offence and is liable on summary conviction to a fine of two hundred and fifty thousand dollars and to imprisonment for five years, and, in the case of a continuing offence, to a further fine of ten thousand dollars for each day that the offence continues after conviction."

Summary Statements:

- ***Based on the definitions within the Telecommunications Act, OTT VoIP services may be considered a "public telecommunications service".***
- ***Any entity wishing to provide a public telecommunications service must apply to the Authority for a Concession in order to do so.***

11.2 Transport Medium Considerations

Most authorised domestic telecommunications service providers in Trinidad and Tobago operate both as Internet service providers as well as authorised telecommunications service providers (services over the PSTN). Services to the customers may be provided through the Internet connection or through the PSTN, while using the same physical plant and the same transport medium. It should therefore be noted that OTT VoIP services may originate or terminate on the Internet connection without necessarily traversing the PSTN.

Summary Statements:

- ***OTT VoIP services may be offered over the Internet and considered an Internet service.***

11.3 Value Added Services

Traditionally, value added services (VAS) have been defined as enhanced services, which add value to standard or core tele-services like voice calls and fax transmission. Examples of value added services include call-related services like call waiting, call forwarding, multi-party conferencing, voice mail, email, SMS, MMS etc. In recent years, however, SMS, MMS call--related services and data access are now considered standard services. . Current examples of value added services include mobile TV, Ring Back Tone (RBT & RRBT), music tracks play, download and ring tones, sports and infotainment services, location-based services, e-commerce and e-finance services to name a few.

According to the World Trade Organization (WTO) Basic Telecommunications Agreement, value added services are defined as:
"services for which suppliers enhance the form or content of the customer's information, thereby "adding value" to the customer's information, and include electronic mail, voice mail, on-line information and data base retrieval, Electronic Data Interchange (EDI), enhanced/value-added facsimile services, including store and forward, and store and retrieve, code and protocol conversion, online information and/or data processing (including transaction processing), and other services."

This definition can be differentiated from the WTO's definition of basic telecommunications services, which have been defined as all telecommunications services, both public and private, that involve end-to-end transmission of customer supplier information, such as voice telephone services, packet-switched data transmission services, circuit-switched data transmission services and telex services.

The Telecommunications Act of Trinidad and Tobago has defined value added service as:
"*a service, other than a public telecommunications service that, using a telecommunications service, provides or modifies content and applications not associated with the telecommunications service*."

A value added service (VAS) therefore is a service provided via a public telecommunications service but itself is not a public telecommunications service.

Summary Statement:

- ***In accordance with the Telecommunications Act, OTT VoIP is not considered a value-added service.***

The current regulatory framework of the Authority has taken a technology neutral approach regarding its regulation of telecommunications services in Trinidad and Tobago, with the aim of creating a level playing field for new and existing service providers. This approach is particularly demonstrated in its definition of telecommunications services under the Act. Whilst providers of public telecommunications services require authorisation, providers of value added services do not.

According to the Authority's Authorisation Framework, only if a provider of a VAS uses spectrum resources in the provision of its services, is a licence authorisation needed.

11.4 Discussion Points for Comment – Regulatory Impact of OTT Services

Based on the information presented above examining the potential impact OTT services may have on current regulatory instruments, the following discussion points are presented below for comments:

1. OTT telecommunications service may be classified as a public telecommunications service, based on the definition in the Telecommunications Act Ch 47:31 of Trinidad and Tobago.

2. It is recognised that OTT telecommunications services are carried via the Internet. If OTT services are classified as public telecommunications services, then the Internet, which "switches" OTT traffic, can be classified as a public telecommunications network.

3. Regulatory oversight of OTT services, in particular OTT telecommunications services, implies regulatory oversight of an aspect of the "Open" Internet.

4. In several jurisdictions, regulatory oversight of the Internet is not undertaken, and therefore a measure of forbearance may be needed in relation to OTT services.

5. If there is need for regulatory oversight of OTT services, there may be need to regulate the various types differently:

    i. OTT VoIP, Messaging and Media

    ii. Interconnected and non-interconnected OTT VoIP

    iii. Number based and non-number based OTT VoIP and Messaging Services

    iv. Access to Emergency Services

12 Discussion

Globally, most public telecommunications providers have identified the fact that the revenues from public voice communications (over the PSTN) have been eroded because of the emergence of OTT VoIP services. Many view the operation of OTT VoIP as 'bypass' and in some jurisdictions, regulators have agreed with authorised public telecommunications operators and have sought to restrict the operations of OTT VoIP operators by allowing the "blocking" of certain OTT VoIP operators. In other jurisdictions, regulators have taken a "softer" stance and have recommended a "collaborative" approach between the authorised public telecommunications operators and OTT VoIP operators. In such cases, regulators have recommended the use of "commercial agreements" between the authorised public telecommunications operators and OTT VoIP operators.

However, it should be noted that there has been an upsurge in demand for services over the Internet (such an Netflix, social security networks, OTT services, etc.) and the loss in revenues from PSTN voice services have been "offset" by the exponential increase in data services (via Internet access and usage). It would be prudent for TATT to continue monitoring this trend in the market.

Voice over IP (VoIP) was developed as an interactive real time voice service over the Internet. The growth in popularity of VoIP over the Internet increased as Internet speeds improved via the PSTN. The authorised telecommunications service providers also recognised the value and began utilising VoIP technology as a means of carrying public voice communication over their upgraded public telecommunications networks.

Concomitantly, as the public telecommunications networks embraced a packet switched architecture and Internet speeds increased, interactive, real-time voice services over the Internet became more prevalent and innovative. Today, this service is generally referred to as Over the Top VoIP (OTT VoIP).

These types of OTT VoIP services are application to application, application to PSTN and more recently PSTN to application. Additionally, some OTT services are number-based as opposed to the more traditional non-number based.

In the early introduction of OTT VoIP service, the quality of service was not comparable to that of VoIP over the PSTN. ”Take-up” was therefore not significant and largely remained in the PC – PC domain. However, over the recent past, there has been a marked improvement in the quality of OTT VoIP, so much so that there is very little difference, in most cases, with the carrier grade VoIP service over the public telecommunications network offered by the authorised service provider. Examples of some of the entities who provide the OTT VoIP service include Skype, Vonage, Viber, etc.

A key issue raised by national authorised public telecommunications operators in Trinidad and Tobago, is that the operation of OTT VoIP over their network(s) has significantly compromised the efficiency and effectiveness of their networks since the OTT VoIP service offered by certain OTT VoIP operator(s) (e.g. Viber), because of the particular protocol employed in the OTT VoIP service, “‘ties up”’ elements of their network(s), which is not normally the case in the operation of public telecommunications network traffic.

A key fact to be noted here, however, is that the OTT VoIP service is offered over the Internet and accessed via the PSTN. This has not been highlighted in the case being made by the authorised public telecommunications network operators against the OTT VoIP operator(s).

Notwithstanding the increased quality of service offering from OTT VoIP, and the perceived substitutability of OTT VoIP and carrier grade VoIP, one of the major challenges in categorising OTT VoIP service as ***a public telecommunications service is the fact that OTT VoIP does not allow for the location of the call, as required in some regulatory jurisdictions (e.g. FCC) for emergency response (911 calls in USA).***

However, in some regulatory jurisdictions (e.g. Trinidad and Tobago), the “emergency” requirement does not now exist in the definition of public voice telecommunications and therefore, as noted under Section 11 of this paper, the OTT VoIP service can be classified as a

public telecommunications (voice) service and may therefore be subject to regulatory oversight from the regulatory body (TATT).

However, in seeking to impose regulatory oversight, it is noted that the OTT VoIP service is offered over the Internet and in some jurisdictions it is recognised therefore essentially as an information service.

It is recognised that the Government of Trinidad and Tobago (GoRTT), through various documents addressing national ICT development viz. the Medium Term Policy Framework for 2010 – 2014 and the National ICT Plan, has supported full and open access to the Internet. These policies and plans were referenced earlier in this paper under Section 10. In particular, as agreed in Cabinet Minute 3082-2013/10/31, GoRTT has directed:

> *'An internal policy model and external relations addressing the public policy aspects of the Internet should be formalized.'*

The Authority will need to consider all aspects of the above discussion in its treatment of OTT VoIP services.

Summary Statement:

- ***The issue of regulating OTT VoIP services over the Internet is not a simple issue because of the many interests to be affected.***

13 Strategic Options for Consideration

The two main strategies identified in this paper (aggressive or collaborative) are examined for possible application in the context of the existing regulatory framework in Trinidad and Tobago:

1. **Aggressive Strategy - Blocking of OTT VoIP services**

   In view of GoRTT's stated policy on the need for a "more connected" society, and the various initiatives identified in the National ICT Plan, the general thrust is to improve the national broadband capacity, given the development imperative of providing all citizens in Trinidad and Tobago with increased access to the Internet.

   While it is acknowledged that some oversight of the Internet is necessary as pertains to cyber security, data protection and privacy etc., the issue of the "regulation" of the Internet will merit serious consideration and national debate before any attempt should be made by the Authority to do so – in whatever form or shape.

   In fact, any attempt to "block" services offered over the Internet may be viewed as counterproductive to the national agenda.

   The Authority therefore recommends that no "blocking" of OTT VoIP services be allowed by authorised public telecommunications service providers.

2. **Adoption of a Collaborative Approach**

   One of the key reasons, as mentioned earlier, for the objection to the OTT VoIP service from authorised public telecommunications providers is their loss of revenues from voice services (primarily international) provided over the PSTN, citing the loss of much needed foreign exchange.

In order to deal with this issue, in some jurisdictions, (e.g. India) regulators have recommended the use of commercial agreements between the authorised telecommunications providers and OTT VoIP operators.

Given the fact that, within the T&T legal and regulatory framework, OTT VoIP services can be regarded as constituting a public telecommunications service, there may be an argument in favour of adopting an approach for the negotiation of a commercial agreement between the authorised public telecommunications providers in T&T and OTT VoIP operators.

However, there may be challenges/limitations to this approach:

i. Will it be viewed as selective or arbitrary to target OTT VoIP operators for such treatment, given the fact that there are currently several services offered over the Internet that may be viewed as public telecommunications or public broadcasting services? For example, several local broadcasters carry their broadcasts, which are normally carried over free to air radio and television, on the Internet. Additionally, there are subscription-based services offered exclusively over the Internet, example Netflix. Similarly, there are several messaging type services which are offered over the Internet and these also may be considered to be a subset of a public telecommunications service (services similar to SMS, etc).

   If such an approach is taken with OTT VoIP, there will need to be a similar type of arrangement with all operators/entities that offer a public telecommunications or broadcasting service in order to ensure non-discriminatory treatment on the part of the regulator.

   It may be argued that local broadcasters for example already have concessions and therefore negate the need for any further commercial agreement between them and local authorised public telecommunications providers. However, there are several entities that provide similar type broadcasting services (subscription TV) or messaging services (WhatsApp) which will similarly require such entities

to have commercial agreements with authorised telecommunications service providers.

ii. Another consideration may be treating the OTT VoIP service as "transiting" the authorised public telecommunications network, as opposed to the view held by authorised PSTN operators that the OTT VoIP calls are "bypassing" their networks.

As mentioned earlier, the OTT VoIP service is not carried via the public telecommunications network but over the Internet. However, it must be noted that the network facilities of the authorised telecommunications providers are used in the carriage of the OTT VoIP service, notwithstanding the fact that **the authorised public telecommunications provider is, in the case of OTT VoIP, operating as an Internet service provider (ISP) in the carriage of the service.**

This mode of carriage is exactly the same for all services carried over the Internet and therefore to make a particular distinction of OTT VoIP service as different from all other similar services will be disingenuous and the regulator may be viewed as operating in a discriminatory fashion.

iii. However, as identified earlier in this paper, there are some modes of OTT VoIP service which traverse the PSTN (e.g. Viber In and Viber Out). In such cases, the OTT VoIP call will originate or terminate on the PSTN and there will be a valid expectation from authorised telecommunications operators to pay/receive payment for the portion of the OTT VoIP calls traversing the PSTN.

iv. As noted earlier, OTT VoIP calls either are wholly carried via the Internet (as in the case of an App – App call) or in some cases, partially traverse the PSTN. In all cases, the carriage of the service, by the ISP, is on a best effort basis – as is the case for all services carried over the Internet. It is recognised that some content providers (e.g. Netflix) usually enter into a collaborative arrangement with ISPs to

provide higher capacity for their service and thus offer a better quality of service to their customers.

v. The issue raised by authorised telecommunications service operators is that certain OTT VoIP services (e.g. Viber) disproportionately utilise network elements and capacity in the delivery of the service to customers. This, authorised telecommunications service providers argue, compromises the efficiency and effectiveness of their networks. The opportunity for a collaborative arrangement between the OTT VoIP operator and the authorised telecommunications service provider (in this case operating as an Internet service provider) may therefore be appropriate in these situations.

vi. It may be argued that, in order to provide a sufficient quality of service to OTT VoIP customer, in some cases, it may be required that additional capacity (outside of best effort) may become necessary from the Internet service provider (PSTN operator, in almost all cases). A collaborative arrangement (negotiated agreement) will be considered appropriate in these situations.

3. The Opportunistic Approach

Another approach that can be considered is the creation of premium Internet access packages for use by customers. Such packages may be focused on the provision of OTT VoIP and OTT messaging services at a premium tariff.

13.1 Discussion Points – Possible Approach to the Treatment of OTT Services

1. OTT VoIP services utilise network elements and capacity of authorised operators in the delivery of the service to customers. This can compromise the efficiency and effectiveness of authorised network operators.

2. OTT/OTT VoIP providers should be treated as customers of authorised (PSTN) operators and be required to negotiate commercial agreements to provide OTT services.

14 Recommendations

In view of the findings in the paper and the various considerations with respect to OTT services and OTT VoIP service, in particular, the following recommendations are made:

i. TATT maintains the generally accepted "Free and Open" Internet policy and does not allow authorised public telecommunications services providers (operating as Internet service providers) to "block" any OTT services unless directed to so by the relevant authority, in accordance with national laws.

ii. OTT service providers who may be classified by TATT as providing public telecommunications services and broadcasting services may require some level of oversight by TATT. However, the scope of such oversight will require careful consideration by TATT and will be determined at a later date.

iii. With regard specifically to the treatment of OTT VoIP services, TATT recommends a collaborative arrangement (negotiated agreement) between OTT VoIP operators and authorised telecommunications service providers (who operate as Internet service providers) in the following situations:

   a) *connection to public telecommunications networks, where required, to originate/terminate OTT VoIP calls. This excludes OTT VoIP app to app connections.*

   b) *provision of comparable quality of service (better than best effort) by the Internet service provider (who may also be the authorized telecommunications service provider) to ensure a quality of service similar to public telephony (voice) services.*

Any such negotiated agreement between the parties to be undertaken in compliance with 'Guidelines for the Provision of OTT Services' to be established by the Authority.

iv. As an alternative recommendation to iii b) above, the authorised service provider considers the packaging/bundling of "premium" services (e.g. OTT services), offered over the Internet, to subscribers at appropriate tariff(s), which will be under regulatory oversight of the Authority.

v. The Authority liaises with the Ministry of Science and Technology (and other government ministries and agencies, as appropriate) to establish a National Internet Policy, within which the issue of telecommunications and broadcasting regulatory oversight will be explored.

vi. In the work to be undertaken in respect of v. above, emphasis be placed on public consultation to ensure a multi-stakeholder approach where the views of all stakeholders including academia, civil society, the business community and the average citizen are all taken into account.

15 Bibliography

ACMA. “Different Types of VOIP Services.” 1 July 2014.

Barbados Telecommunications Unit. “Barbados Voice over Internet Protocol (VoIP) Policy.” Bridgetown, 15 August 2007.

Booz&co. “2013 Booz and Company World Telecommunications Outlook.” *Booz&co.* Madrid: Booz&co, 2013. 4.

Buckley, Sean. “OTT Voice and Messaging: The Future of Telecom.” *Fierce Telecom* (Fierce Telecom), 2013.

CANTO. *OTT Services - Balancing Innovation, Investment and Competition.* Information Paper, CANTO, 2014.

—. “OTT Services - Balancing Innovation, Investment and Competition.” *CANTO Policy Paper 2014/2.* Nassau: CANTO, 2014.

CARE Ratings. “Mobile Data to Drive Profitability for Telcos; SMS RIP: CARE Ratings.” *CARE Ratings.* July 2014. http://www.careratings.com/ (accessed October 2014).

Caribbean Telecommunications Union. *A Caribbean Internet Governance Policy Framework.* Trinidad & Tobago: Caribbean Telecommunications Union, 2013.

Cheung, Dr. CW. “Reserarch Fellow, Consulting Director, Asia-Pacific.” *WebRTC Hong Kong Froum - How WebRTC will transform business communication and collaboration.* Hong Kong: Ovum Europe Limited, 2014. 15.

—. “Why WebRTC is Essential to all Telcos and OTT Players.” *WebRTC Hong Kong Forum - How WebRTC will transform business communication and collaboration.* Hong Kong: Ovum Europe Limited, 2014. 13.

DotEcon. “Going OTT?” *DotEcon.* February 2014. http://www.dotecon.com/publications/going-ott/ (accessed Novemeber 2014).

European Parliament. “EU Framework Directive 2002/21/EC.” 7th March 2002.

—. “EU Universal Directive 2002/22/EC.” 7th March 2002.

GSMA. “GSMA: The Rise of Connected Devices Will Drive Mobile Operator Data Revenues Past Voice Revenues Globally by 2018.” *GSMA.* 25 February 2013. http://www.gsma.com (accessed August 29, 2014).

IBM Global Business Services. “Telco 2015: Five telling years, four future scenarios.” *IBM Telco 2015 - United States.* 1 February 2010. http://www-148.ibm.com/docs/vrmhost/GBE03259USEN.pdf (accessed November 14, 2014).

Info-communications Development Authority of Singapore. “Guidelines on Licensing and Regulatory Framework for IP Telephony Services in Singapore.” n.d.

International Telecommunications Union. “International Telecommunications Regulations.” *Final Acts: of the World Conference on International Telecommunications.* Dubai: International Telecommunications Union, 2012. 4-5.

International Telecommunications Union, InfoDev. “Regulating 'Over-the-Top' Services.” *ICT Regulation Toolkit.* 8 September 2014. http://www.ictregulationtoolkit.org/2.5.1 (accessed September 8, 2014).

ITU, InfoDev. “ICT Regulation Toolkit.” n.d. www.ictregulationtoolkit.org (accessed November 2014).

“Jamaica Telecommunications Act No. 1 of 2000.” n.d.

Jayakar, Krishna, and Eun-A Park. “Emerging Frameworks for Regulation of Over-the-Top Services on Mobile Networks: An International Comparison.” 31 March 2014.

Lazarus, Mitchell. *Can the FCC handle phone service over the Internet.* 22 December 2013. http://www.commlawblog.com/2013/12/articles/cellular/can-the-fcc-handle-phone-service-over-the-internet/.

Mankotia, Anandita Singh. *The Economic Times - Telecom.* 19 August 2014.

Ministry of Planning and the Economy. “Innovation for Lasting Prosperity.” October 2011. http://finance.gov.tt/wp-content/uploads/2013/11/Medium-Term-Policy-Framework-2011-14.pdf (accessed November 2014).

Ministry of Science and Technology. “SmarTT National ICT Plan 2014-2018.” 2013. http://www.scitech.gov.tt/downloads/smarTT%20Draft%202014-05-07.pdf (accessed November 2014).

Nair, Biju. *Growing the Fourth Revenue Wave - It's Now or Never.* Position Paper, Bridgewater, New Jersey: Synchronoss, 2012.

NETmundial. *NETmundial Multistakeholder Statement.* Sao Paulo: Global Multistakeholder Meeting on the Future of Internet Governance, 2014.

OECD. *OECD Communications Outlook 2013.* OECD Publishing, 2013.

OFCOM. “Regulation of VoIP Services: Access to the Emergency Services Statement and publication of a statutory notification under Section 48(1) of the Communications Act 2003.” 5 December 2007.

Statista. “Global Mobile Voice and Data Service Revenues 2010-2015 Forecast.” *Statista* . 2014. http://www.statista.com (accessed August 29, 2014).

Stevens, David, Peggy Valcke, and Eva Lievens. “Voice over IP: law challenged by technology: the regulatory treatment of VoIP: a confrontation between technological neutrality and stimulating new technologies.” Porto, 4-6 September 2005.

Telecom Italia. “Telecom Italia's Solutions to address competition from OTT players.” Telecom Italia, 2013.

The Telecommunications Regulatory Authority of the Kingdom of Bahrain, Detecon Consulting. “Policy and Regulatory Framework for Governing Internet Applications.” March 2014. http://www.detecon.com/ap/ap/files/Study_Policy_Regulatory_Framework.pdf (accessed November 2014).

TRA Bahrain/Detecon International GmbH. *Policy and Regulatory Framework for Governing Internet Applications.* Study, Cologne: Detecon International GmbH, 2014.

World Trade Organization. *Telecommunications Services: Glossary.* 8 September 2014. https://www.wto.org/english/tratop_e/serv_e/telecom_e/tel12_e.htm (accessed September 8, 2014).