



Telecom Regulatory Authority of India



Consultation Paper
On
Regulatory Framework for Over-the-top (OTT) services

27th March, 2015

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Stakeholders are requested to send their comments preferably in electronic form by 24th April, 2015 and counter comments by 8th May 2015 on email id advqos@traigov.in. For any clarification / information, Shri A. Robert. J. Ravi, Advisor (TD & QoS) may be contacted at Tel. No. +91-11-23230404, Fax: +91-11-23213036.

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Chapter 1: Introduction

1. The public internet that started in the 1980s has grown in scope over the last three decades. In its current form, it has the added ability to carry the entire gamut of services that are required to be delivered to a consumer of telecom services. It allows a telecom subscriber to access almost all the services required for information, education and entertainment. It has enabled an individual's commercial transactions including retail; in that respect, it has altogether redefined the conventional marketplace. Even personalized services, such as a taxi ride can be accessed on a person's fingertips. This growth has also brought about a fundamental shift in other spheres including telecom and TV. Earlier, networks used to be built around specific applications, say voice, internet or Pay TV. Voice, message and video content have now been reduced to mere bytes.
2. Telecom service providers (TSPs)¹ offering fixed and mobile telephony are currently being overwhelmed by online content, known as over-the-top (OTT) applications and services. The term over-the-top (OTT)² refers to applications and services which are accessible over the internet and ride on operators' networks offering internet access services e.g. social networks, search engines, amateur video aggregation sites etc. The best known examples of OTT are Skype, Viber, WhatsApp, Chat On, Snapchat, Instagram, Kik, Google Talk, Hike, Line, WeChat, Tango, e-commerce sites (Amazon, Flipkart etc.), Ola, Facebook messenger, Black Berry Messenger, iMessage, online video games and movies (Netflix, Pandora). Today, users can directly access these applications online from any place, at any time, using a variety of internet connected consumer

¹Telecom Service Providers also means Network providers, Internet Service Providers, fixed and mobile broadband providers, data service providers, wireless net providers and access providers.

²ITU Secretary General's Report for the Fifth WTPF- 2013

devices. It is becoming increasingly difficult for consumers to know if there is an economic difference in connecting various networks via a land phone, cell phone, or a computer. In fact, young users find it difficult to distinguish among these three networks; from their perspective, all that matters is connectivity. They visualize these not as a layered and interconnected series of discreet networks, but as an organic whole.

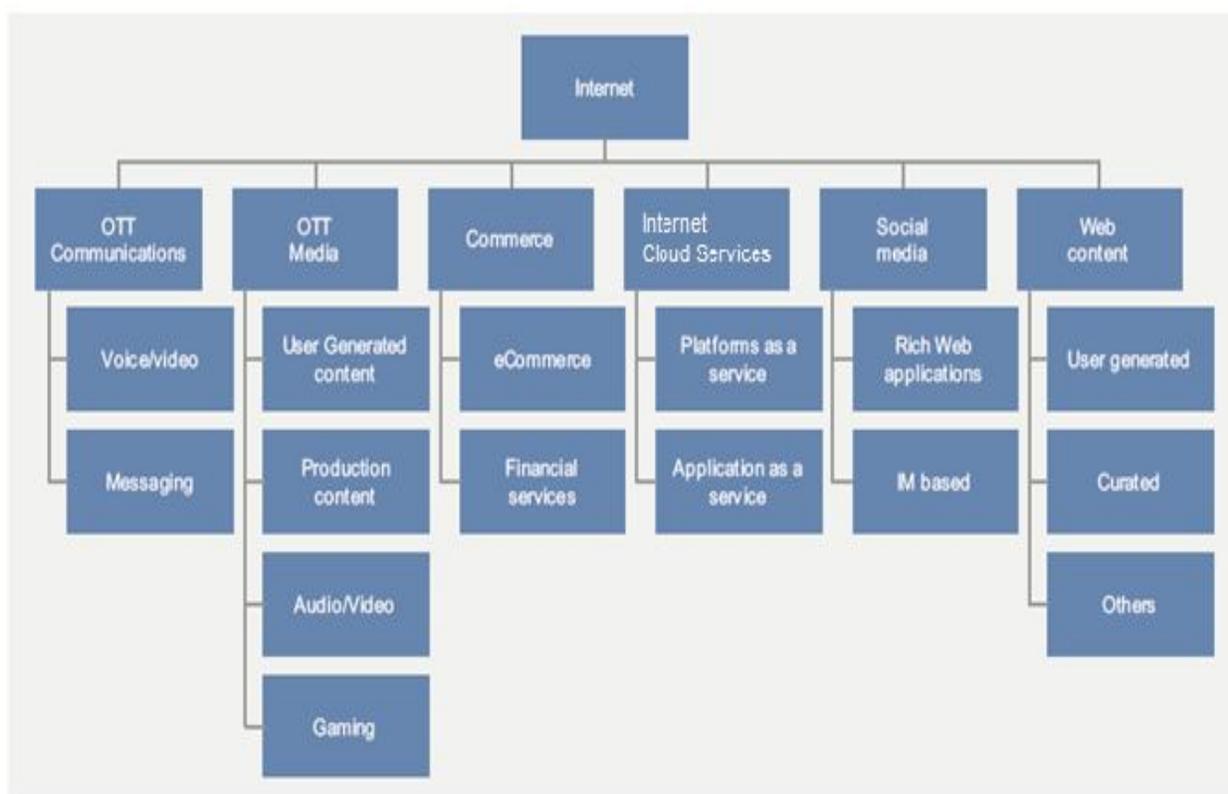
3. Carriage is separated from content in internet networks, enabling OTT content and application service providers to deal directly with end users. TSPs are excluded from the said transactions, with no control over the content or the application. The move to Long Term Evolution (LTE) technology's all-IP architecture will further facilitate this delinking of delivery of services from the underlying network.
4. The characteristics of OTT services are such that TSPs realise revenues solely from the increased data usage of the internet-connected customers for various applications (henceforth, apps). The TSPs do not realise any other revenues, be it for carriage or bandwidth. They are also not involved in planning, selling, or enabling OTT apps. On the other hand, OTT providers make use of the TSPs' infrastructure to reach their customers and offer products/services that not only make money for them but also compete with the traditional services offered by TSPs. Leave aside TSPs, these apps also compete with brick and mortar rivals e.g. e-commerce sites, banking etc.
5. Currently, the major sources³ of internet traffic are Google, Yahoo, MySpace, YouTube, Facebook, Windows Live, eBay, Wikipedia.org, msn.com and Craigslist, in that order. These portals are not owned by the networks and most of the portals host OTT services which provide

³According to Alexa Global Traffic Rankings

various applications to end users. Social networks like Facebook, MySpace, Bebo, Friendster, Tagged, and Linked-In are capturing millions of user connectivity hours.

- The services available on the internet⁴ can be broadly categorised as in Figure 1.1 below. Apart from web content and social media, OTT communications and OTT media are now increasingly playing a major role in the internet domain.

Figure 1.1: Internet Classification



- The affordability of smartphones (because of declining price) and the up-gradation of access networks by the TSPs are among the important factors contributing to OTT growth. Digitalization of content has reduced conservation, reproduction and distribution costs, which, in turn, has promoted the explosive growth in the supply of online content.

⁴Policy and Regulatory Framework for Governing Internet Applications by Detecon Consulting

Paradoxically, the broadband networks provided by incumbent TSPs are used as a platform by the OTT players for the development of new businesses. The growth of traffic apart, the OTT applications have created an increasing demand for faster broadband speed, which translates into a need for huge investments in network up-gradation by the TSPs.

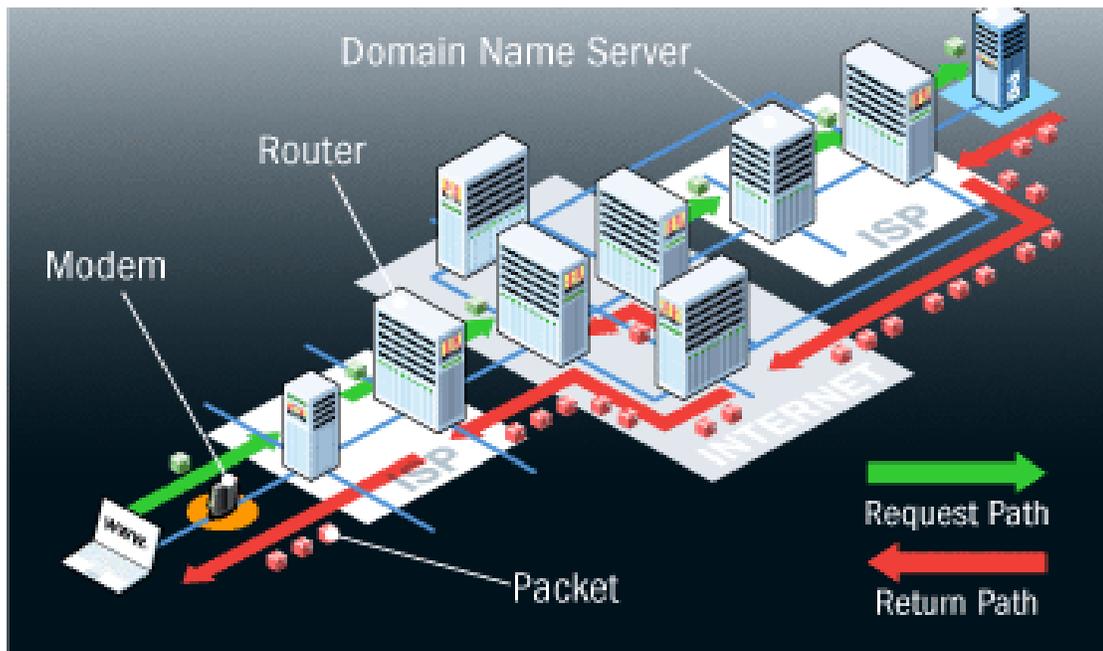
8. It is thus becoming clear that, in future, the provision of services by OTT players will impact revenues of network operators insofar as their current business models are concerned. This has already started happening in some developed countries. And, these developments have implications for the Operations Support System and Business Support System (OSS/BSS) of the communication systems used by the TSPs to support end-to-end telecom services.
9. The objective of this Consultation Paper (CP) is to analyse the implications of the growth of OTTs and consider whether or not changes are required in the current regulatory framework. To understand the underlying issues, a seminar was conducted by the Authority on “Regulatory Framework for OTT services” on 05 August 2014, in which representatives of TSPs, OTT providers and legal experts presented their views. Those views are reflected in the CP. The CP is structured in seven chapters. Besides the introductory Chapter I, the rest of the paper is organized as follows. Chapter II focuses on OTT applications, their characteristics and the impact on the telecom industry. Chapters III and IV deliberate on the challenges posed by the OTTs to TSPs and the responses of regulators in different geographical jurisdictions viz. adjustments, if any, to the regulatory framework. Chapter V discusses net neutrality and Chapter VI considers the options available to the TSPs and OTT players. Chapter VII summarises the issues for consultation.

Chapter 2

OTT: Characteristics, Trends and Growth

2.1 An OTT provider can be defined as a service provider offering ICT (Information Communication Technology) services, but neither operates a network nor leases network capacity from a network operator. Instead, OTT providers rely on the global internet and access network speeds (ranging from 256 Kilobits for messaging to speeds in the range of Megabits (0.5 to 3) for video streaming) to reach the user, hence going “over-the-top” of a telecom service provider’s (TSP’s) network. Services provided under the OTT umbrella typically relate to media and communications and are, generally, free or lower in cost as compared to traditional methods of delivery. Figure 2.1 explains the working of the internet and shows how data flows between end users or between servers and users over the top of the Internet Service Provider’s (or TSP’s) network.

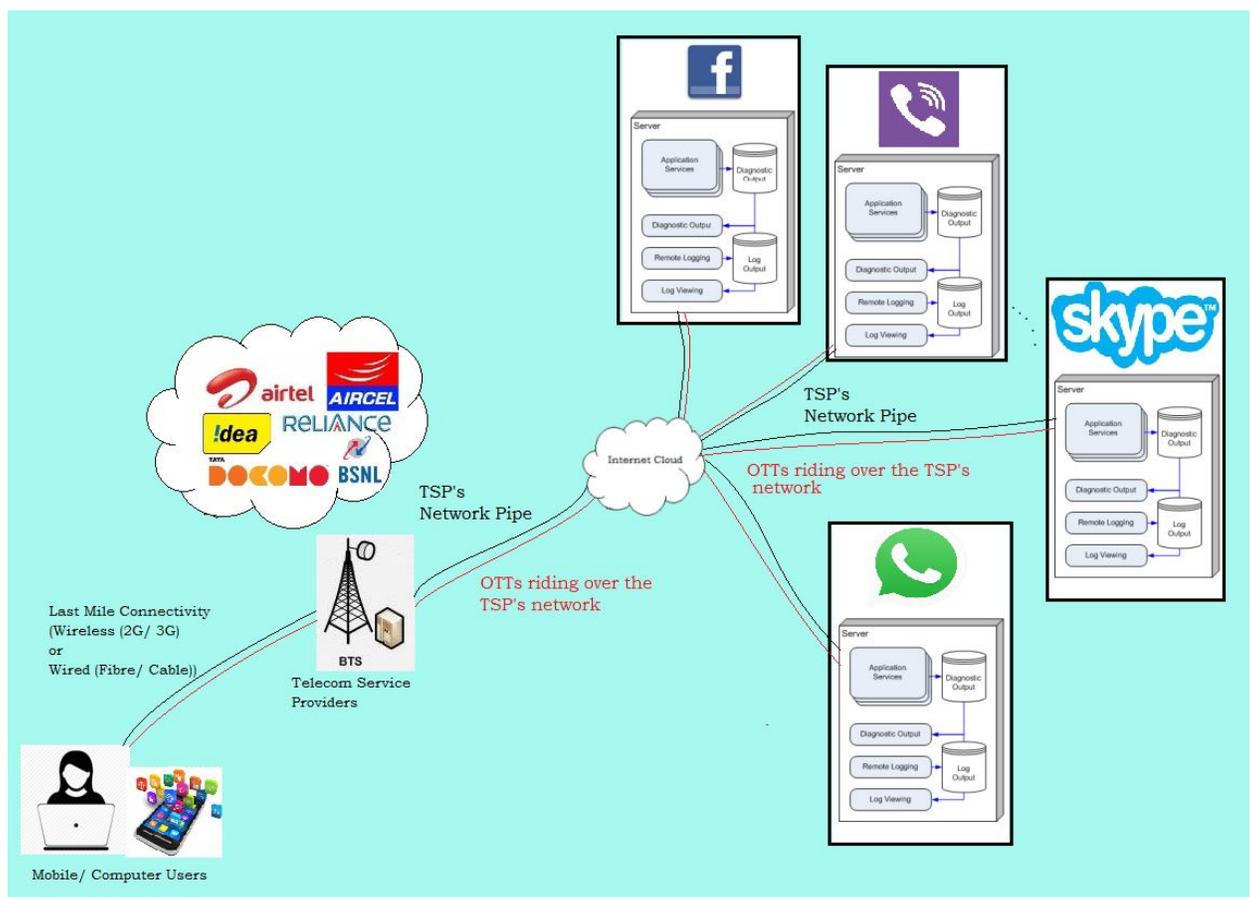
Figure 2.1: Working of Internet



2.2 OTT players can access customers or end-users in two different ways.

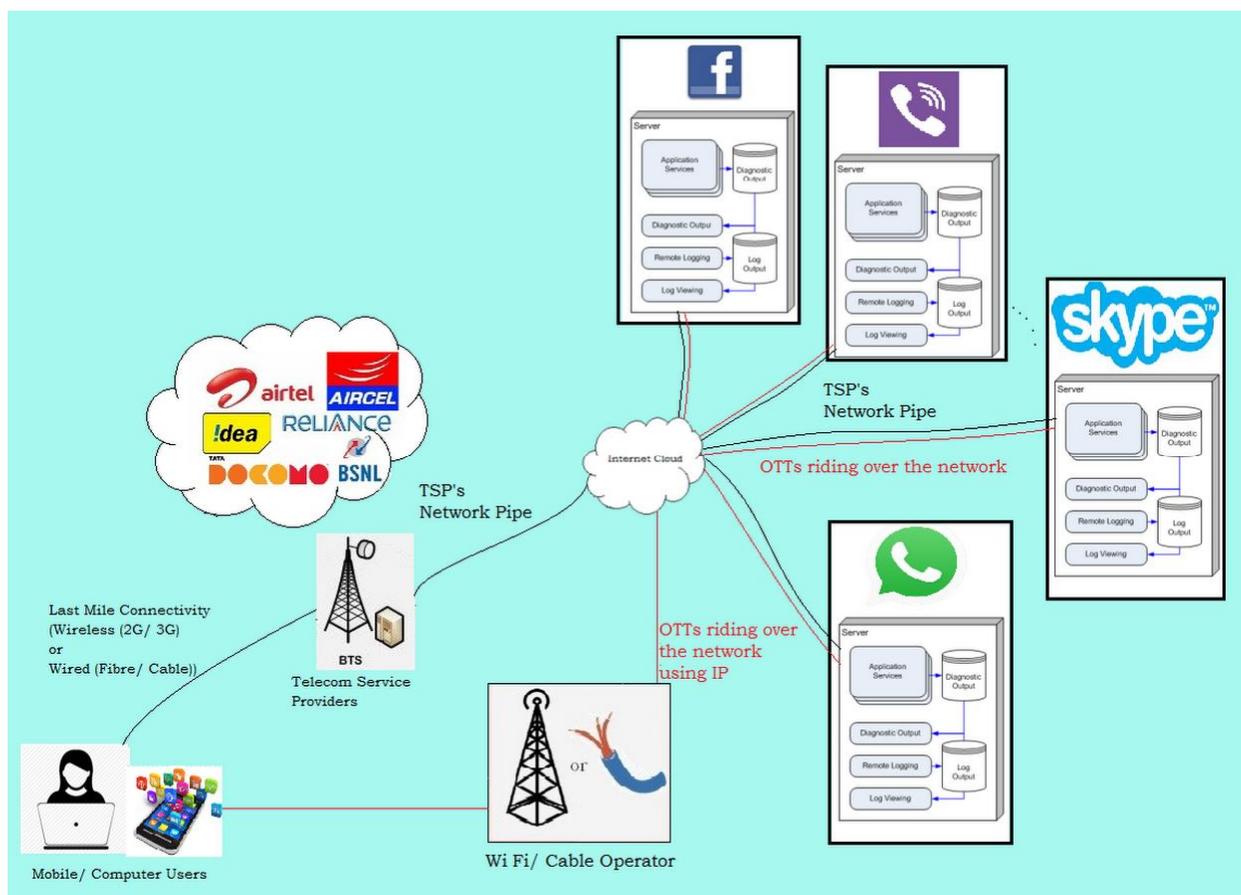
(a) As shown in Figure 2.2 below, these OTT services ride over the top of the telecom pipe which is connected to the user device through mobile networks or fixed line. In this case, the TSP also acts as an Internet Service Provider (ISP) providing last mile connectivity and bandwidth.

Figure 2.2: OTT riding over TSPs (TSP acting as ISP also)



(b) As shown in Figure 2.3 below, the OTT service could also ride over the bandwidth provided by the Wi-Fi operator or a cable operator. The last mile connectivity in this case will be that of Wi-Fi hot spots or a cable TV connected to the customer. This Wi-Fi operator could also be a bandwidth provider connected to the internet via an ISP or through different technologies like TV white spaces.

Figure 2.3: OTT riding over Other Service Providers



Characteristics of OTT:

- 2.3 There has been a rapid proliferation of voice, video and OTT application services being delivered over wireless networks. The TSP whose network is utilized for delivering the OTT service has no control, no rights and no responsibilities for content on these apps and no claim on the latter. The TSP network simply carries the IP packets from source to destination.
- 2.4 The arrival of smartphones with multimedia and advanced communication functions has revolutionized the OTT services market. The greater processing power, easy customisable interface and support of high data rate connectivity make innovation and adoption of OTT apps easier. The link between the penetration of smartphones and growth of OTT services marks an inflection point in the complex strategic

relationship between TSPs and OTT providers. This is because it determines market prices, rewards and incentivises investment for the OTT players and the TSPs.

- 2.5 Another reason for the growth of OTT services and their independence from the TSPs is because of the rapid computerisation of the banking system and the growth in the number of internet banking transactions. Earlier, if a consumer bought an app/ content, the TSPs did the billing and the content provider had to depend on the TSP for its revenue share from the amount collected by the TSP. However, with the availability of internet banking, the content/ app provider can independently bill the consumer and get the money directly.
- 2.6 The traditional income model of the operators, based on subscriptions and metered services, mainly voice and messaging, is showing signs of running its course. At the same time, growing OTT communication services use the TSPs' networks and compete with the very same TSPs' own proprietary services. Without a doubt, the increased use of OTT applications increases the growth of data usage and, thereby, increases the flow of revenue to TSPs. However, companies emerging as part of the new industry (like Google and Yahoo) take advantage of advancement in network technologies to expand their reach and diversify through new opportunities that earn them ever-growing new income inflows. In many cases, they base their sales primarily on advertising and offer services free or at rates far cheaper than traditional models.
- 2.7 Based on the kind of service they provide, there are basically three types of OTT apps:
- (i) Messaging and voice services, (Communication services);
 - (ii) Application eco-systems (mainly non-real time), linked to social networks, e-commerce; and

(iii) Video / audio content.

OTTs can impact revenue of all the three real time application verticals – video, voice and messaging. The various other non-real time applications include e-payments, e-banking, entertainment apps, mobile location based services and digital advertising.

2.8 Table 2.1 provides a bird’s eye view of how OTTs can potentially have an adverse impact on incumbent TSPs or other business entities.

Table 2.1: Types of OTT services

OTT	Examples	Minimum Speed Req. for good quality service	Challenge for the network operator	Implication for the network operator
Messaging and Voice Services (Communication Services)	VoIP, Skype, Chat with and without video, Gmail, WhatsApp, Wechat, Line, Viber	<1MBps	Fixed and Mobile telephony substitute, SMS substitute	Competition, Loss of value of traditional services offered
Application eco-systems	Social networks, Facebook, LinkedIn, Twitter, Instagram, WeChat, various e-commerce apps including m-payments, m-wallets- Amazon, Flipcart, Snapdeal Alibaba	<1MBps	Another medium for communications . (In case of e-commerce apps, it is another market place)	Competition, Loss of revenue of traditional services offered. (In case of e-commerce apps , loss of revenue to existing brick and mortar establishments)
Content	OTT-TV, OTT Video, streaming and video on demand(VoD), Netflix, Netmovies, Hulu, Cuevana TV, Youtube	4-10 MBps	Substituting TV	Not in direct competition/ Loss of audience (hence advertising) for traditional TV services

What is driving OTT growth?

- 2.9 OTT is the future service model for communications and media, as well as for a whole range of other apps like e-commerce, m-commerce, e-health, e-education, smart grids and the digital economy in general. While the rise of OTT services has created serious concerns for the traditional telecoms operators, it has also created an environment for innovation and alternative services to grow.
- 2.10 At one extreme, some argue that TSPs should focus exclusively on their role as "bit pipes" (carriers of data through the pipes) rather than remain integrated companies that provide services and infrastructure. However, there is another side to the story. Building such networks will require substantial investments by the TSPs. With more users connecting to the internet, the network of the TSP is under constant strain and there is the risk that the back-end server will reach its capacity very fast, thus compelling constant upgrades, the costs of which are to be borne exclusively or for the large part by the TSPs which build such networks.
- 2.11 The availability of high speed internet has opened up new avenues for OTT applications. OTT TV/Video involves distributing video or television content over the internet directly to users connected through any electronic device. Such video services are provided free online, for instance from YouTube, as also from other sites which are offering streaming video content. This is different from IPTV (Internet Protocol Television), which also provides TV over internet but is a "managed" type access to online content. The provision of OTT video content has led to disintermediation, i.e. once internet access and its use is widespread and high speeds are available, certain content owners and operators which up until now had to negotiate with telecom operators (or television operators) to reach consumers will have the option of no longer doing so and can directly interact with the consumer through a web page.

- 2.12 In voice services, however, a different situation arises where unmanaged IP voice services, such as Skype or WeChat or Gmail video chat, can be exploited with lower access speeds. This obviously and adversely impacts the revenue of TSPs. For example, every Skype call that bypasses the TSP is foregone revenue. Similarly the use of SMS services, traditionally a lucrative business for mobile operators, is declining. One of the main reasons is the growth of OTT applications like WeChat and WhatsApp. While network quality can be a major constraint to some OTT voice applications, SMS applications are less reliant on network capacity and capability because of their low data usage and higher tolerance for latency. For example, as penetration of smartphones increases, apps like Whatsapp pose a clear challenge to the TSPs in respect of text messages and even voice messages.
- 2.13 The other major driver of OTT application services are Cloud Services. The general idea of the 'Cloud' is to store content on a server that can be reached through the internet so that the content can be accessed from any device anywhere, as against leaving it on a hard drive. Apple, Google, Amazon, Microsoft and Dropbox offer various kinds of Cloud services.
- 2.14 With the emergence of Cloud Services, users are now able to upload all their data on the Cloud at a central location which is then accessed frequently using any device. This 'service portability' feature between devices allows a user to upload any data, say a photo to the Cloud, which can then be viewed from anywhere, on any device. These services also place huge demands (pressure) on the network due to downloading of large amounts of data. Syncing one's data⁵ with the Cloud every time an

⁵Data synchronization (Syncing) means synchronizing a single set of data between two or more devices, automatically copying changes back and forth. For example, a user's contact list on one mobile device can be synchronized with other mobile devices or computers.

application is used consumes much more bandwidth than the traditional back-up or selective uploading and downloading technologies.

- 2.15 Over-The-Top(OTT) is the service model not only for future communications and media services, but also for emerging services, such as e-commerce, m-commerce, e-health, e-education, smart grids and the digital economy in general.
- 2.16 Mobile commerce is also one of the sunrise sectors today and the industry is finally coming into its own due to the rise in OTT services and app stores offering more digital channels for e-retailers to reach varied audiences. The growth of smartphones, along with improvements in mobile infrastructure, has also assisted the growth of m-commerce in many parts of the world. What is more, the cost of regulatory compliance is comparatively less when compared to the existing models. New players are entering the mobile commerce market because of the huge revenue opportunities. It also has the potential for enduring customer acquisition. The development of m-wallets and m-payment systems is seen as a key development for the m-commerce sector and beyond.
- 2.17 Omni-channel retailing is another emerging trend. New communication and software developments are making it increasingly possible for retailers to offer a seamless shopping experience using the available retail channels such as mobile internet devices, computers, bricks-and-mortar, television, radio, direct mail, catalogues and so on. As in many other markets, well-functioning omni-channel systems can easily operate internationally, so national boundaries are becoming less of a barrier for those who want to explore overseas markets. There are several taxation laws (and consequential obligations) for doing business within national boundaries; these tend to get blurred when business is conducted internationally through the web.

OTT usage patterns

2.18 Some common OTT usage patterns are shown in Table 2.2 below:

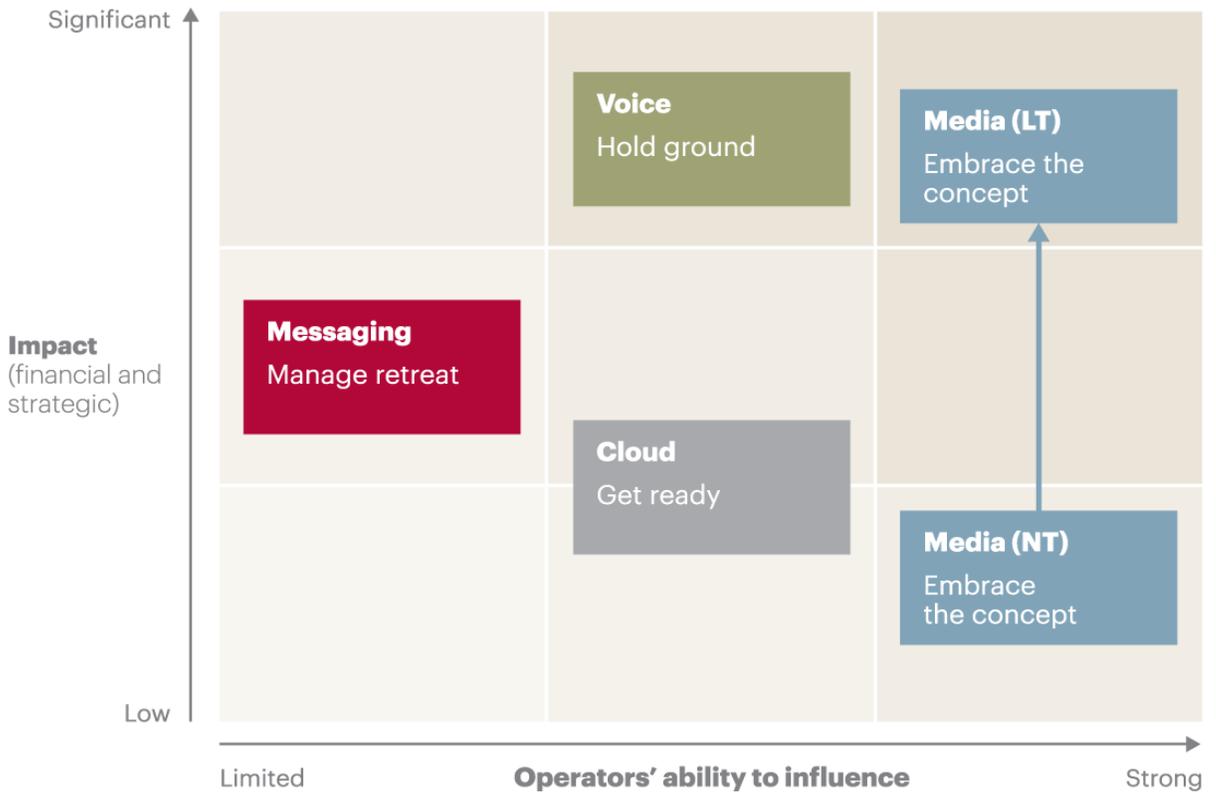
Table 2.2: OTT Usage Pattern

Category	OTT Usage	OTT Usage Frequency	Barriers to OTT Usage
Communication	Messaging	High	Poor network
	VoIP	High	Poor network
Entertainment	Social Networking	High	Lack of Local Content, Poor Network Services
	Downloading Content from Web	High	
	Gaming Applications	High	
	Instant Messaging	High	
	Playing Music from the internet	Medium	
	Watching Videos	Medium	
	Live Broadcast	Low	
Online market place	e-commerce sites	Medium	Safety and Privacy ,Lack of Trust, low penetration of plastic money
Finance	Booking Tickets	High	Safety and Privacy, Poor Network Services, low penetration of plastic money
	Banking Transactions	High	
	Stock quotes and Trading	Low	
Education	Distance Learning and Collaborative Services	Medium	Lack of customisation, Poor Network Services
Health	Health Information	High	Lack of Trust, Poor Network Services
	Remote Monitoring and diagnostic services	Low	
Other	Email	High	Lack of Apps in local languages, Poor Network Services
	App Downloads	High	
	Job Sites	Medium	
	Maps and Directions	Medium	

2.19 From a telecom regulatory perspective, there are two broad categories of OTTs: OTT communication services in direct competition with the licensed communication services (real-time services) offered by the TSPs and other services that do not fall under the telecom licensing framework, but are offered competitively to users /non-real time services

as OTT apps and content e.g. booking tickets, stock trades, gaming etc. Figure 2.4 depicts the three main areas where OTT communication services have entered the market- voice, messaging and video-, the impact thereof and the strategic response thereto as brought out by an analysis.

Figure 2.4: The OTT Communication services Battleground⁶



Note: LT is long term; NT is near term.
Source: A.T. Kearney analysis

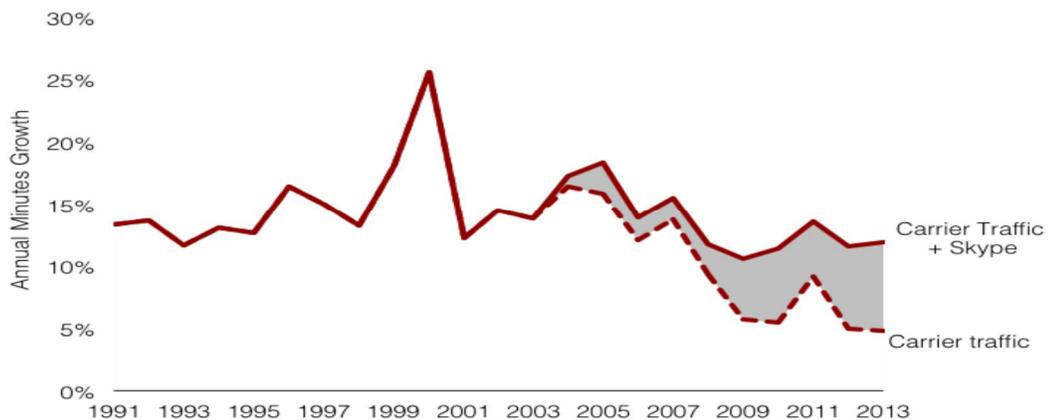
⁶A.T. Kearney Analysis

Voice Services

International experience:

2.20 In 2013, Skype carried an estimated 214 billion⁷ minutes of international “on-net” calls (i.e. from one Skype app to another, rather than calls made from Skype to a regular phone). Skype’s traffic was almost 40% the size of the entire conventional international telecom market and in growth terms, it now far outpaces the combined growth in the voice minutes of the global telecom industry. Figure 2.5 below shows the growth in the annual minutes for Skype traffic-on-net⁸ (Skype-to-Skype)

Figure 2.5: Increasing Skype Traffic



2.21 With innovations in OTT services, Full-HD voice is slowly becoming a reality for customers all over the world. The call quality of Skype and Google Voice is improving rapidly and, in some markets, nearly matches that of a circuit switched call.

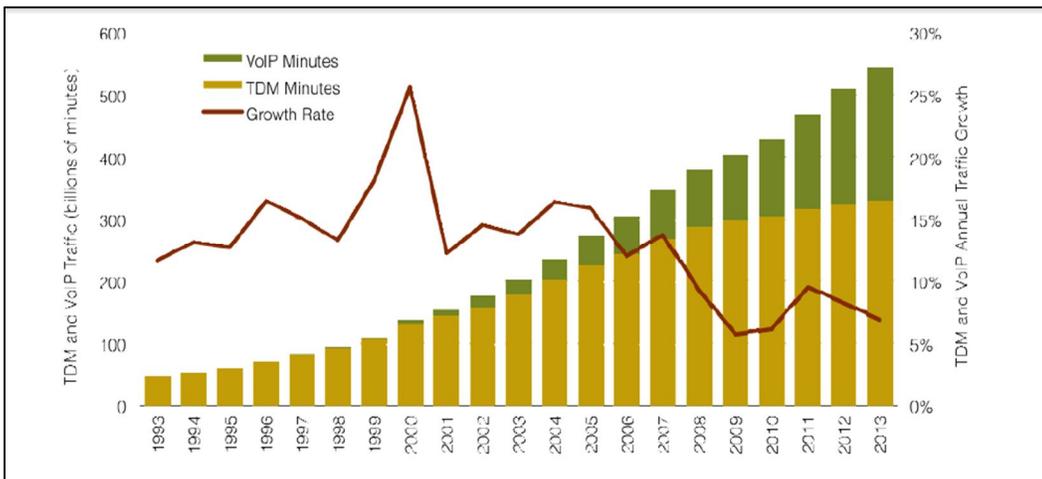
2.22 VoIP providers are expected to offer multiple communication services aligned to market needs. Skype and Viber are already providing both voice call and messaging facilities. The voice minutes currently carried by incumbent service providers basically rely on circuit-switched

⁷TeleGeography report executive summary

⁸TeleGeography 2013, PriMetrica, Inc

telephony. It has been argued that voice telephony may migrate⁹ completely from circuit-switched telephony to VoIP, in future, as can be seen from Figure 2.6 below (VoIP traffic reflects international traffic transported as VoIP by carriers, and excludes PC to-PC traffic).

Figure 2.6: International Call Volumes and Growth Rates, 1993-2013¹⁰



2.23 Till voice telephony migrates fully to VoIP, OTT players will need to interconnect with incumbent TSPs. This is apart from the fact that even in VoIP the underlying data connectivity is through the telecom pipe provided by the TSPs. This phenomenon, namely, the growth of OTT apps, providing voice services has started to impact revenues of TSPs from voice services, which constitutes a major portion of their revenues. Therefore, the question that arises is whether there is a need for regulation to be put in place. Is a regulatory response warranted to this outcome of the technological evolution of the telecom sector?

Indian Experience

2.24 In India however, the situation is slightly different. The impact on voice services is not considerable because of three reasons. Firstly, India has one of the lowest voice calling rates (at the rate of Rs.0.40 to 0.60

⁹www.iis.fraunhofer.de/audio

¹⁰Source: TeleGeography 2013, PriMetrica, Inc

realised rates) in the world. Secondly, the mobile internet penetration is only around 20%, that too predominantly on 2G. Thirdly, the Quality of Service (QoS) of such OTT apps is not as good as traditional voice services offered by TSPs. The quality of service for delivery of such voice calls (offered by OTT apps) is further inhibited because of low broadband penetration in the country. Also because of low call tariffs, 80% of the customers prefer using the TSPs voice services. There is, however, some amount of cannibalisation on international calling, where rates are substantially higher. The revenue from international calls is less than 10% of an Indian operator's total revenue¹¹. Bharti Airtel recorded 2.89 billion international outgoing minutes in the quarter ended June 2013, down from 3.79 billion minutes in the previous quarter while Idea's outgoing minutes fell 7% sequentially in April-June 2013. Reliance Communications' international outgoing minutes also dropped nearly 10% in a quarter in the same period. The drop could be directly attributed to the growth of free calling services such as Skype or Viber.

Messaging Services

Impact of messaging apps: International Experience

2.25 In 2013, the worldwide annual SMS traffic was around 8.16 trillion¹² messages, when compared to 18.3 trillion messages by OTT players. The OTT messaging traffic was expected to double in 2014. OTT messaging includes "one to many" broadcast messages, in addition to private or direct messaging unlike traditional SMS messaging which is largely private or direct messaging. The OTT messaging apps possesses a wide range of capabilities such as voice and video messages as in Facetime, messages using geo-location information (Ola, Uber etc.) or photo sharing, as in Instagram, Snapchat etc.

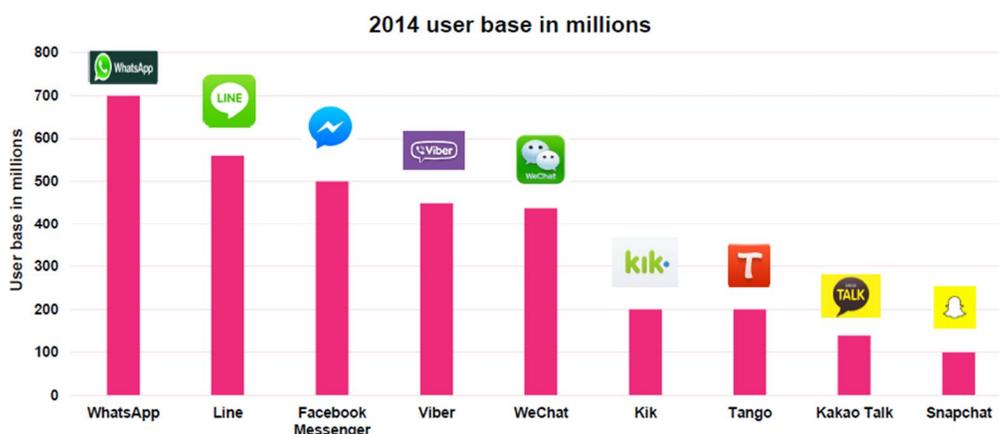
¹¹Price Waterhouse Coopers

¹²The State of Global Mobile Consumer, Deloitte 2013

2.26 The growth of OTT messaging services, and their overtaking conventional SMS messaging, is reflective of a general global trend. As on January 2015, WhatsApp had 700 million¹³ monthly active users across the globe. WhatsApp alone is delivering on an average about 30 billion messages each day and this had grown to around 64 billion during April 2014. In addition, RIM claimed to have over 50 million users in May 2011 of its BlackBerry Messenger service, who sent 100 billion messages each month. Whilst Apple's iMessage is integrated tightly between approximately 800 million iOS devices, Apple claims that 40 billion iMessages were sent each day during January 2014.

2.27 The user base of OTT messaging services has grown to more than one billion in less than five years, as shown in Figure 2.7. This has impacted TSPs and other service providers all over the world. This impact has also been felt in India.

Figure 2.7: Global OTT Messaging Services¹⁴



¹³<http://www.cnet.com/news/facebooks-whatsapp-messaging-service-tallies-700-million-monthly-active-users/>

¹⁴ Fetch, Compiled from Statista, Expanded Ramblings, ibnlive, Techinasia, Times of India, ctv news, adweek

2.28 The options for text-based OTT services are growing for consumers and a number of low cost or even free alternatives to traditional SMS are currently in use. Two different OTT alternatives have emerged:

- Operating System (OS) specific communication systems such as iMessage and Blackberry Messenger. These are closed captive systems with communication possible only between users of the same OS. These closed captive systems secure the Wireless data through an intricate encryption process. Each system has an assigned encryption key stored in the server and the phone. As information is transmitted back and forth, it is encrypted and decrypted using the access code stored in the server and the phone. This allows all wireless transmissions to remain secure and confidential.
- Third-party applications such as WhatsApp, Viber etc. are open systems, often cross-platform, OS-agnostic and open to all devices.

2.29 Both sets of applications promise a richer user experience when compared to traditional SMS offered by TSPs. The apps contain options to attach photos, video or files in real time as messages. Moreover, these services are available at a price significantly lower than traditional SMS messaging. However, there is a fundamental difference in applications offering messaging and voice services. The messaging apps require the same application installed on smart devices of both the communicating parties, while no such restrictions exist for SMS services. According to the Australian Competition and Consumer Commission¹⁵, it is due to this characteristic that these OTT apps are not considered effective substitutes to communication services offered by TSPs.

2.30 These messaging OTT apps have gained the most in countries where the SMS market is the weakest, i.e. the cost of messaging is relatively high

¹⁵Domestic Mobile Terminating Access Service Declaration Inquiry by ACCC in June 2014

rendering these apps attractive to users. According to a study¹⁶ in Spain in 2012, 63% of smartphone users were using OTT apps for messaging primarily because the SMS was too highly priced. The OTT apps are popular due to the additional value they add to traditional messaging. Sending videos and images through such messaging platforms has become easier and cheaper when compared with traditional messaging or MMS messaging messages. It is estimated that the worldwide amount of messaging revenue loss¹⁷ to TSPs because of OTT apps will be around \$ 50 billion in 2016.

Impact of messaging apps: Indian experience

2.31 The impact of messaging in India is also in line with international trends. In India, as on December 2014¹⁸, WhatsApp topped the messaging application market with 52% of all the users using OTT messaging services, followed by Facebook Messenger with 42%, Skype with 37% and WeChat with 26% share. Viber stood at fifth spot with 18% share and Line stood at sixth position with a 12%. WhatsApp's subscriber base in India has risen to 70 million¹⁹ and it has a free subscription model (unlike in developed markets where the annual fee is \$1). Similarly, the home-grown Hike messenger in India claims to have a subscriber base of around 35 million as of August 2014 sending 0.5 billion messages per day. Interestingly, 83% of Indian internet users access the net through a mobile phone.

2.32 The SMS traffic for the TSPs have shown declining trends in the recent past. Figure 2.8 depicts the case of an Indian TSP's decreasing SMS traffic over the past year. The messaging traffic fell from 5346 million in

¹⁶Quantifying the impact of OTT communications services in Western Europe by Analysys Mason, 2013

¹⁷Cartesian (2013); Ovum (2012)

¹⁸According to the Global Web Index (GWI) study

¹⁹<http://timesofindia.indiatimes.com/tech/tech-news/WhatsApps-India-user-base-crosses-70-million/articleshow/45018845.cms> (November 2014)

June 2013 to 4367 million in June 2014, a decline of 18.3%. This decrease can be attributed almost entirely to an increase in traffic of OTT messaging apps. In the fourth quarter of 2014, Bharti Airtel and Idea Cellular, both Indian TSPs, have shown a significant drop in their messaging and Value Added Service (VAS) revenues as a percentage of total revenues, as shown in Table 2.3 below.

Figure 2.8: SMS traffic for an India Operator

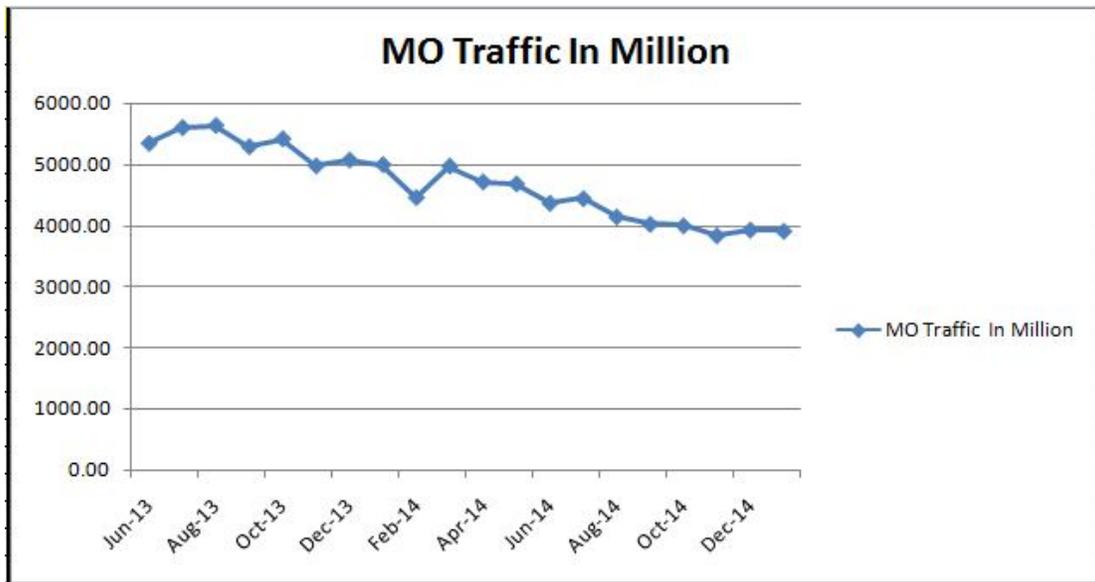


Table 2.3: Declining Non Data Revenue of TSPs²⁰

TSP	VAS revenue/ Non Data revenue component (Q4 FY 2013)	VAS revenue/ Non Data revenue component (Q3 FY 2014)	VAS revenue/ Non Data revenue component (Q4 FY 2014)
Bharti Airtel	8.1% of the total revenue	6.1% of the total revenue	5.6% of the total revenue
Idea	8.6% of the total revenue	6.6% of the total revenue	6.4% of the total revenue

²⁰<http://www.telecomlead.com/news/ott-impact-reflects-in-idea-cellular-airtel-fourth-fiscal-quarter-2014-revenues-83272-50461>

2.33 According to the rating agency CARE, the share of SMS revenue in the total revenue of TSPs in the country in the case of GSM operators has decreased from 5.84% in October-December 2012 to 3.39% in October-December 2013 and from 1.80% to 1.66% for CDMA operators. This decline in SMS revenue has an implication of approximately Rs.3700-4000 crores per annum.

Data usage, revenues and pricing:

2.34 The business and pricing models of TSPs have been affected by the advent of various OTT apps including messaging apps. Earlier, TSPs had an incentive to invest in the network as content and carriage went together and they could generate revenues through the provision of content. Traditionally, Indian TSPs kept the bulk of the VAS revenues from their subscribers, retaining on average 60-70% revenue from VAS, while the remaining revenues accrued to VAS companies. Proliferation of internet through mobile networks has blurred the contours of the VAS industry and the OTT players; now, consumers can access various application services through the internet. With the emergence of OTT services, the trends have changed; now, a TSP earns revenue only from wholesale data usage.

2.35 The wholesale data usage also increased in recent times for the TSPs. For example, in India, the mobile data revenues of one of the TSPs, Airtel, rose from 6.5 percent of the mobile revenues in Q4 FY 2013 to 16.2 percent in Q3 FY 2015 with the mobile data revenue growing 74.3%, Year-on-Year in Q3 2015. The trends in increased data usage show that mobile operators are also benefitting from the popularity of OTT services. Typically, once customers start using data plans – often due to the viral nature of OTT communication services – they begin using increasing

amounts of data as they get familiar with the various OTT smartphone application environments. Data usage increases primarily due to the value addition these OTT services offer to the customers: in case of voice, they tend to offer free services, for non-voice, there is increased usage of messaging due to advanced features in OTT messaging (para 2.29) and increased data usage due to cloud services (para 2.14). Data is consumed in large quantities on account of the proliferation of video services, improved broadband and availability of smart devices.

2.36 In India, data usage has increased from 49645 TB in Oct 2013 to 90267 TB in December 2014, showing a cumulative annual growth of 65.2%. The data revenue has nearly doubled, from Rs. 3057.83 Crores in June 2013 to Rs. 5910.28 Crores in September 2014. It is estimated that data revenue as a percentage of overall mobile revenue²¹ will reach 32% by 2015 as compared to 14% in 2010.

2.37 The revenue earned by the TSPs for one Minute of Usage (MoU) in traditional voice is 50p on an average, as compared to data revenue earned for one minute of VoIP usage which is around 4p. (On average, revenue earned through data by TSPs is around 25p /MB of data and the average size of a one minute VoIP call²² is around 150 KB). It is this difference between prices of traditional telecom calls and VoIP calls that has prompted the proliferation and success of communication OTT apps. But the low cost of usage incentivises the user to have longer conversations in VoIP calls as compared to traditional telecom calls. While the average holding time in a traditional voice call is around 2 minutes, in VoIP calls it is more than 12 minutes. However, with new coding techniques, the amount of data consumed for one minute of data will further come down drastically.

²¹Informa, Company filings

²²Deloitte analysis

2.38 The average revenue earned by a TSP for an SMS is around 16p, when compared to 1p of data usage charges (On average, revenue earned through data by TSPs is around 25p /MB of data and the average size of one message is 30 KB) for messaging services through various OTT Apps like WhatsApp and Viber. But, the ease of rich user experiences in OTT messaging like attachment of photos, videos, (even real time), profile uploads, file attachments, voice recording, etc. increases the size and number of messages being sent when compared to the traditional messages.

2.39 Table 2.4 below shows the comparison of various apps with respect to the data usage.

Table 2.4: Top Apps for sampled users²³

S. No.	Application	Data used (in %age)	Average data usage (MB/month)
1	Facebook	90	9
2	WhatsApp	38	1.2
3	Twitter	27	3.7
4	Skype	21	14
5	Shazam	18	0.6
6	eBay	12	4.3
7	Instagram	10	9.4
8	Dropbox	9	2
9	LinkedIn	8	0.5
10	Foursquare	8	1.2

²³ http://articles.courant.com/2011-12-24/business/hc-ls-iphone-apps-data-20111224_1_iphone-apps-android-wireless-data-plans

Indian Telecom Licensing Regime

- 2.40 Under the current telecom licensing regime, voice and messaging services can be offered only after obtaining a license. Apart from traditional voice and messaging, IP based voice and messaging services can also be offered by TSPs as unrestricted Internet Telephony Services, which are permitted under the scope of the Unified Access Service (UAS) license in terms of the UAS Guidelines dated 14th December 2005. Similar provisions exist for Cellular Mobile Telephone Service (CMTS) and Basic Service Licences. However, the scope of the Internet Services Licence²⁴ was restricted to Internet Telephony Services without connectivity to Public Switch Telephone Network (PSTN) / Public Land Mobile Network (PLMN) in India.
- 2.41 According to the Cellular Operators Association of India (COAI), voice services provided by OTT players substitute the PSTN/ Internet Telephony Services offered by licensed TSPs. In the present licensing regime, Internet Telephony is a licensed service permitted only under the UAS/ISP or Unified License granted under Section 4 of the Indian Telegraph Act 1885. Hence, according to COAI, companies offering OTT voice services, without holding a telecom license in India, circumvent Indian telecom licensing provisions and provide services that are otherwise permitted only under a telecom license.
- 2.42 COAI further opines that the licensed TSPs in India are subject to many licensing provisions, including but not limited to regulatory fees such as Entry Fee, License Fee and Spectrum Usage Charges. They are also subjected to various statutory regulations such as Quality of Service Regulations, Tariff Regulations and, Consumer Protection Regulations. They also need to ensure emergency services, confidentiality of customer

²⁴ In terms of internet Service guidelines dated 1st April 2002 and 24th August 2007

information, privacy of communication, undergo regular audits and ensure proper lawful monitoring and interception. However, 'unlicensed' OTT providers are not bound by any such conditions. This opportunity for arbitrage enables OTT players to offer Internet Telephony either free or at very low tariffs and that too by riding on the TSPs' networks. Such OTTs can and will unfairly garner a substantial chunk of voice service usage, as they have done in the case of messages, because they directly compete with voice services provided by TSPs. And, the OTT business model, with low or zero tariffs, results in usage shifting from PSTN/Internet Telephony Voice to OTT Voice (Internet Telephony). As a result, both licensed operators and the Government are deprived of their legitimate revenues.

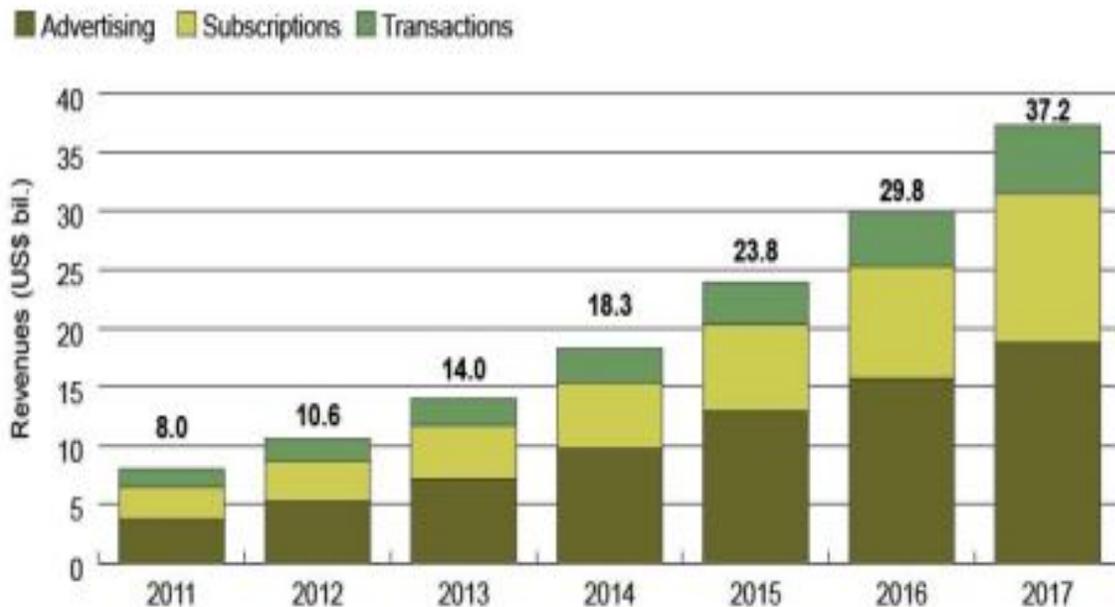
- 2.43 The TSPs also argue that allowing the use of VoIP/Internet Telephony on such a massive scale, without a licensing regime, would result in a significant disruption to the existing business of TSPs and could substantially derail their investment capability. Such a situation would jeopardize the national objective of affordable and ubiquitous telephone and broadband access across the country. Further, the proliferation of OTT communication services would lead to a significant loss of revenue for the exchequer.
- 2.44 On the other hand, OTT players offering communication services argue that such services (voice call, chat, messaging) are offered to users through the internet services provided by Licensed Telecom Operators and the TSPs levy applicable usage charges. Therefore, OTT providers argue that they are offering communication services over the internet but the TSP is paid for the internet services consumed by an end-user.
- 2.45 The OTTs are quick to point out that increased data usage augments revenue flows of the TSPs. This is indeed true. However, whether this

revenue sufficiently compensates the TSPs needs further examination. Further, there is a technological caveat to the general proposition that increased OTT app usage augments revenue flows of TSPs. With the evolution of new coding techniques (I2S for audio and HVEC for video) apps are being designed to consume minimal bandwidth and improved call/ video quality. If so, will there be any revenue increase and would it still sufficiently compensate the TSPs?

Media services

2.46 The delivery of video, audio and other media content over the internet can be termed as OTT media. It refers to third party content delivered to an end-user device over the TSP's network. The rise in OTT media traffic has been subsumed in the rise of internet traffic. However, these media apps clearly seem to be one of the few services that are earning large revenues for the providers. Figure 2.9 depicts the forecasted increase in OTT video revenues, the majority of it coming from advertisements.

Figure 2.9: OTT media revenue forecast²⁵



²⁵ Informa Telecoms and Media

2.47 Websites like YouTube are becoming increasingly popular. It is estimated that around 100 hours of user-generated video is uploaded on YouTube every minute and accounts for 17.1% of all US peak downstream fixed access traffic. Similarly, Netflix, Spotify and even videos transferred through Facebook are increasingly loading the network. However, in India, on account of poor broadband penetration of around 4% at present, notwithstanding the availability of OTT media apps, the challenges to be faced by the broadcasting industry are yet to materialise. The India's active OTT video subscribers²⁶ in 2014 were 12 million and expected to grow to 15 million by 2015.

Business Models of OTT players:

2.48 Hundreds of thousands of OTT apps have emerged due to the low cost base required to provide a service in the internet environment. For example, WhatsApp Messenger can run at an operating cost of a meagre ten cents per subscriber per year. The business becomes viable even with a nominal charge of less than a dollar²⁷ per year. But the WhatsApp service is presently free in India, largely due to the low credit card penetration. Some of the business models²⁸ common in the OTT environment are shown in Table 2.5 below:

Table 2.5: Business Models of OTT

Advertising	Services funded by viewing advertisements or the collection of data to sell to advertisers	Google, Facebook, Line, Pinger, Apps like Spider Man, Angry Birds etc.
Hardware	Services add value to the device and promote market presence within a segment defined by device ownership	Apple, Blackberry, Nokia, Samsung
In-app purchases/content	Users can purchase extra features such as stickers or download content such as games	Kakao, Line, Tencent (WeChat), Apps like Bad Land, Device 6

²⁶ 'Media Route 26 India' Issue 6 March 2015 by Media Partners Asia (MPA)

²⁷Analysys Mason, 2013

²⁸Policy and Regulatory Framework for Governing Internet Applications by Detecon Consulting

Software Licensing	Services can be bundled with hardware or offered on a white-label basis	Microsoft/ Skype, Apps like Minecraft, Heads Up etc.
Subscription	Recurring charge either for basic service or additional features	Microsoft/ Skype, Viber, WhatsApp, payTV services, Game Apps like Lumosity
Unit pricing	Revenue derived from off-net calls and messages or terminating incoming calls	Microsoft/ Skype, Viber

2.49 The business models of most OTT apps are predominantly advertisement driven. Worldwide, their net digital advertisement revenues increased from \$ 121.47 billion in 2013 to \$ 146.42 billion in 2014. In India the digital advertisement revenue grew from ₹28.3 billion in 2013 to ₹41.2 billion in 2014. But new models like in-app purchases of selling virtual goods like stickers, mobile games, apps are rising exponentially. For example²⁹, 85% of the \$1.1 billion revenue of WeChat in 2014 was from online gaming, and the rest was from stickers, services like sponsored accounts, and from m-commerce. Today, merchants are selling goods as diverse as fruits, smartphones, movie tickets, taxi rides and insurance using WeChat. Similarly, Line's gaming revenue accounted for 60% of its \$338 million revenue in 2013, while sticker purchases accounted for 20% and the rest were from business services like official accounts and branded stickers. In India also, because of the growing popularity of smartphones, mobile gaming revenue³⁰ is expected to jump to ₹18,000 crore by 2017 from barely ₹5,700 crore in 2013.

²⁹<http://www.economist.com/news/china/21594312-can-wechat-become-world-beating-app-nice-little-earner> dated Jan 18th 2014 |

³⁰ <http://businesstoday.intoday.in/story/mobile-gaming-companies-look-beyond-india/1/194963.html>

(A) Impact of OTT

2.50 Rapid growth in the telecom sector will continue and, possibly, accelerate in the future. According to Ericsson, globally the number of smartphone subscriptions is expected to exceed 4 billion by 2018, while mobile broadband subscriptions are projected to reach 7 billion in 2018³¹. The growth of the smartphone market has fuelled the surge in OTT services. An analyst, Pyramid Research, projects that 4G subscriptions will grow tenfold over five years, from 88 million in 2012 to 864 million in 2017³².

2.51 The future of OTT services and their impact will hinge on:

- a) Growth in penetration of Smartphones (and other smart devices)
- b) Growth in overall revenues driven by new technologies.
- c) Growth of IP traffic
- d) Growth of bandwidth consumption

Growth in penetration of smartphones

2.52 According to Cisco VNI report³³, there were about 140 million smartphone users in India with a growth rate of 54% in 2014. In 2016, the smartphone market is expected to cross 200 million users, overtaking USA, as shown in the figure 2.10 below. Amongst the developing countries, India is second only to China in terms of the growth in smartphone users. According to the latest report³⁴, India has around 173 million internet users as of December 2014, with a penetration of 17% and a growth rate of 23% during 2014.

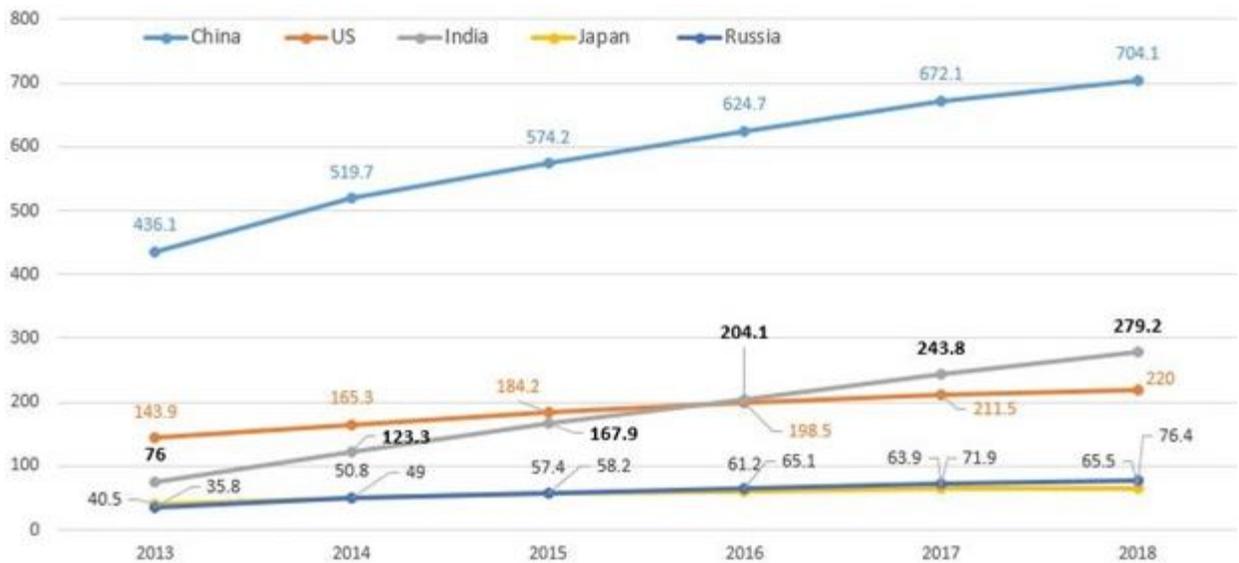
³¹Ericsson Traffic Mobility Report 2014

³²Pyramid Research quarterly mobile data forecast, February 2013

³³Cisco VNI global mobile data report 3rd February 2015.

³⁴ ' Mobile Internet in India 2014 report' dated 13th January 2105, jointly published by the Internet and Mobile Association of India (IAMAI) and IMRB International

Figure 2.10: Smartphone user growth [2013-2018] –Top 5 countries



2.53 Smartphones are expected to penetrate rural Indian markets as the price of smartphones drops and availability of apps for the use of rural population increases. The use of mobile data, which has already seen exponential growth, will further increase with the uptake of tablets and smartphones that give users mobile access to popular web 2.0 applications³⁵.

Growth in overall revenues driven by new technologies

2.54 Globally, the overall revenues in the telecom/ICT sector are expected to continue rising because of growth in users, traffic and applications. Even though there may be a loss of up to 6.9 per cent in cumulative voice revenues (representing \$479 billion) because of OTT services, the total revenue for TSPs is likely to grow to \$2.4 trillion in 2019 from \$2.1 trillion in 2014³⁶. Despite these modest gains, some sectors, such as Ethernet, Cloud, and mobility solutions, are projected to have double-digit annual revenue growth, while data traffic in these sectors is also expected to double every two years. The Cloud computing market which

³⁵Web 2.0 describes World Wide Web that uses technology beyond the static pages of earlier Web sites.

³⁶EmekaObiodu and Jeremy Green (2012): The Future of Voice, OVUM

was worth \$37 billion in 2010 is estimated to reach \$121 billion by 2015³⁷, driven by big data stored in the Cloud now accounting for two-thirds (as internet traffic) of data-centre traffic worldwide³⁸. The resultant increase in data use will result in additional data revenue streams for the TSPs.

- 2.55 In India, the overall revenue of TSPs is expected to reach \$46-49 billion by 2020³⁹ up from \$28 billion in 2013. Data revenues will form a substantial portion of the total revenues and is expected to rise from 10-12 percent in 2013 to 35-40 percent by 2020. Other revenues from SMS, traditional value added services and new services are expected to remain at \$2 billion over the period 2013-2020. The cloud services market in India especially the public cloud stood at \$632 million in 2014, which is expected to touch \$838 million by 2015 end and \$1.9 billion in 2018. (growing at about 33%)

Growth of IP traffic

- 2.56 Annual global IP traffic is expected to surpass the zettabyte threshold (1.4 zettabytes) by the end of 2017, driven by the diversification of pay-TV and video streaming services, and other media-rich content⁴⁰. The annual global mobile data traffic is expected to increase by 873% from 30 Exabytes in 2014 to 292 Exabytes by 2019⁴¹. More than 4 billion hours of videos are watched on YouTube each month, 30 billion pieces of content are shared on Facebook every month, and some 400 million tweets per day are sent by about 200 million monthly active users⁴².

³⁷Markets and Markets Research Report, March 2014

³⁸ITU and CISCO Visual networking index (VNI)

³⁹ http://articles.economictimes.indiatimes.com/2014-10-09/news/54827653_1_digital-india-spectrum-subscribers

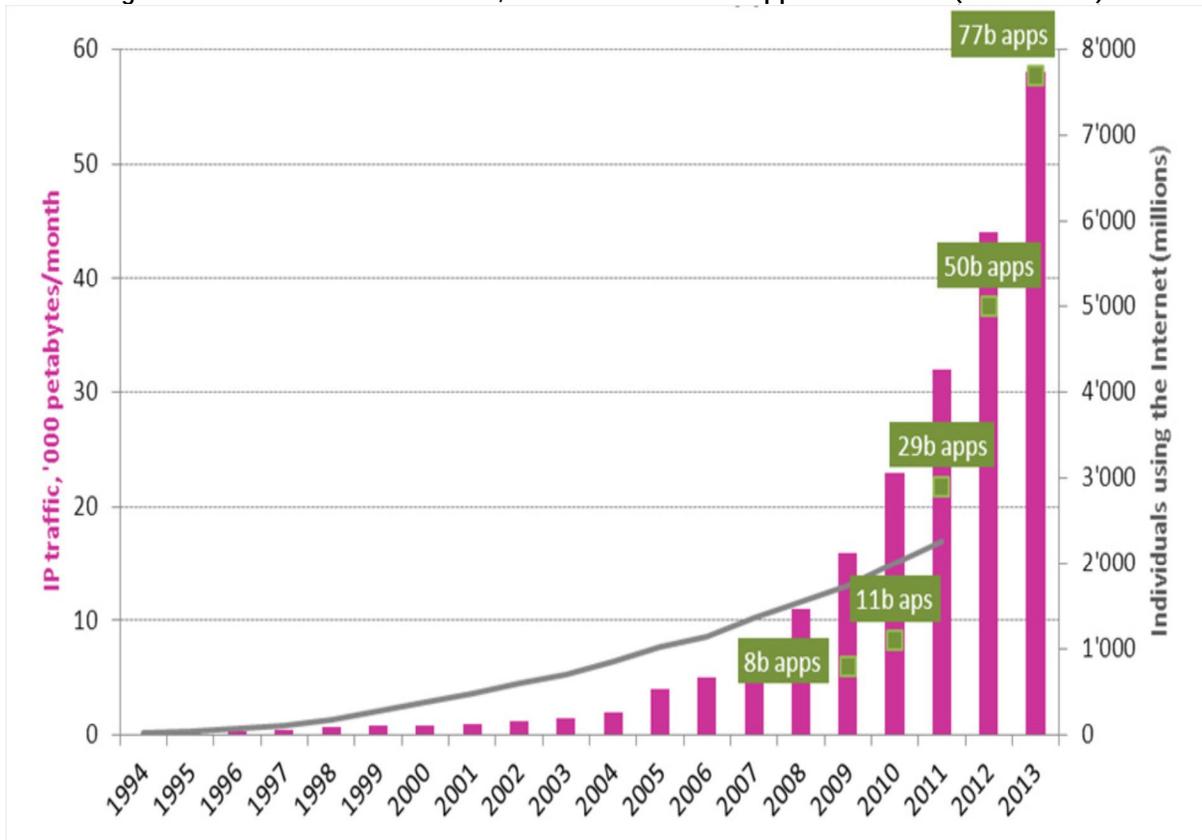
⁴⁰Cisco Visual Networking Index: Forecast and Methodology, 2011-2016

⁴¹ Cisco's Visual Networking Index (VNI), 2014

⁴²Sources: McKinsey Global Institute, Twitter, Cisco, Gartner, EMC, SAS, IBM, MEPTec, QAS

Figure 2.11 depicts the growth in internet users, IP traffic and Apps downloads.

Figure 2.11: Growth in IP traffic, Internet users and apps downloads (1994-2013)⁴³



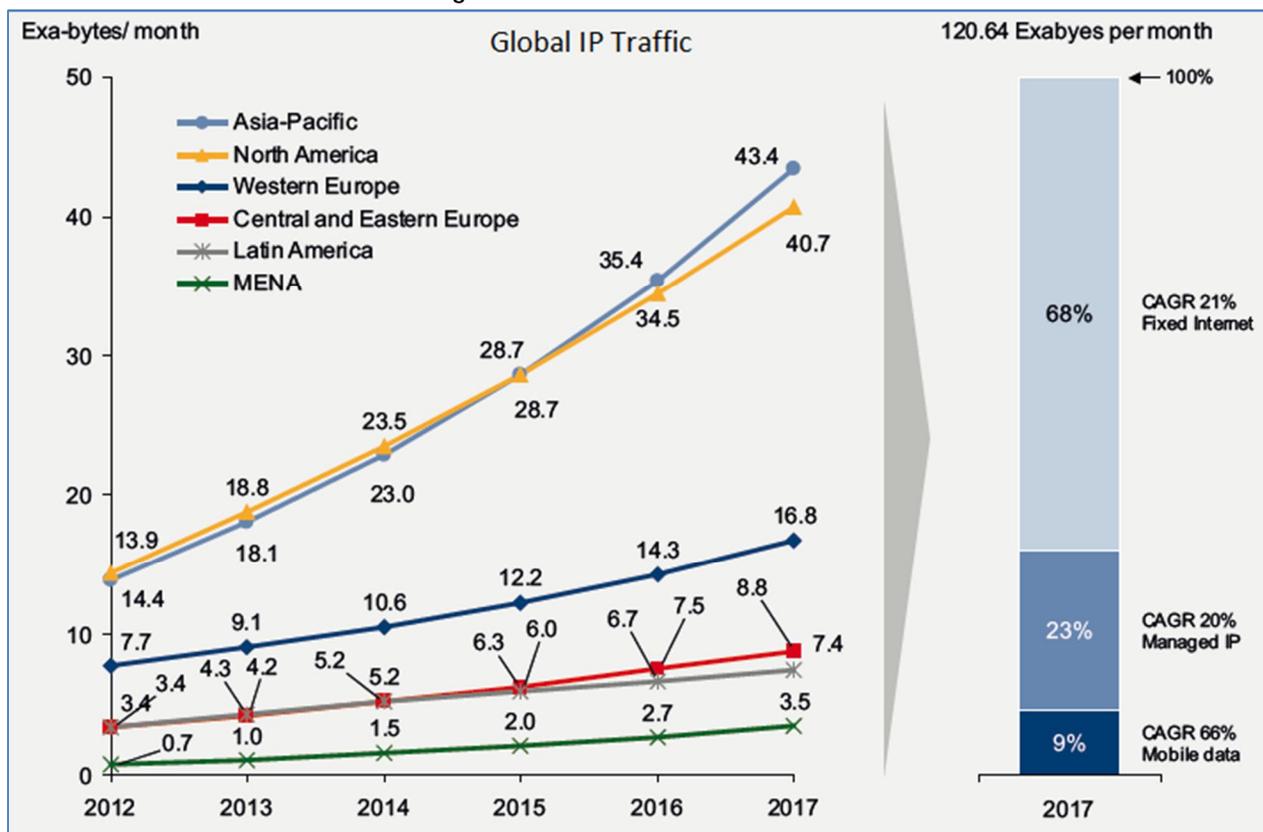
2.57 In India, Internet traffic is expected to grow more than 5 fold from 2013 to 2018, with a compounded annual growth rate (CAGR) of approximately 40 per cent. The total IP traffic was 538 Petabytes (PB) in 2013 and is expected to reach 2246 PB in 2017⁴⁴. The traffic will reach an annual run rate of 13.7 Exabytes by 2019, up from 1.1 Exabytes in 2014. The report also reveals in 2014, the mobile data traffic generated by both 2G and 3G mobile broadband services increased by 74 per cent, primarily driven by strong 3G growth of 114 per cent.

⁴³Trends in Telecommunication reforms by ITU

⁴⁴ According to Cisco's 'VNI Global Mobile Data Traffic Forecast' report, 4th February 2015.

2.58 The traffic in the **Asia-Pacific region** is registering the maximum growth and also holds the maximum share, depicting the growing importance of IP in the region (Figure 2.12 below).

Figure 2.12 Global IP Traffic⁴⁵



Growth of bandwidth consumption

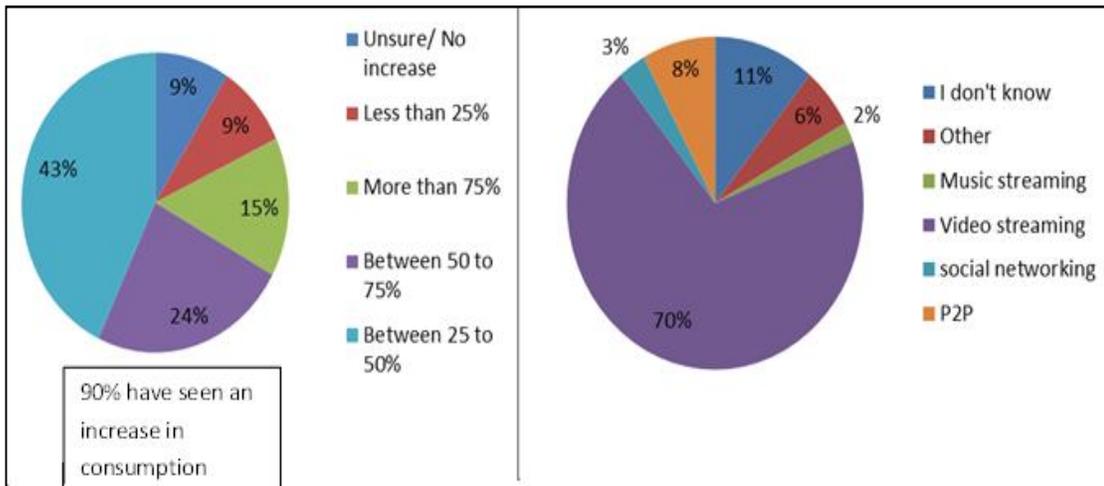
2.59 In recent years, there has been a spike in bandwidth consumption because of OTT services, mostly streaming video websites. A survey by Incognito Software in its 2013 report revealed that 90% of TSPs worldwide have seen an increase in bandwidth consumption as shown in Figure 2.13. The report also mentions that 70% of the bandwidth is consumed for video streaming. However in India, mobile video traffic⁴⁶ constituted 36% of the total data traffic and is poised to reach 66% by

⁴⁵ Policy and Regulatory Framework for Governing Internet Applications by Detecon Consulting

⁴⁶ <http://www.vserv.com/mobile-video-india-fast-furious-growth-spree/>

2019. Mobile data study by Opera’s Skyfire finds that 83% of video users in India experience stalling, primarily because of the network infrastructure.

Figure 2.13: Increase in Bandwidth consumption experienced by TSPs and Sources of Bandwidth



Responses to the impact of OTT services

2.60 TSPs are using various strategies to meet the challenges posed by the OTTs. These can include fair usage policies, bandwidth caps, toll booting, Zero-rating and traffic management. Zero-rating ("toll-free data" or "Sponsored data") is the practice of TSPs to not charge the users for restricted internet access through prior agreements with specific content providers. The zero-rating strategy is one where operators offer unlimited access to certain online services - typically social media sites, music streaming or online television. Traffic management may include network discrimination techniques to earn more revenues, either from the content providers or the users. The OTT players could position themselves (in cooperation) along with the TSPs in offering adequate quality of service to customers through various traffic management techniques like deep packet inspection, layered segmentation, and traffic differentiation.

2.61 According to the survey report by Incognito Software⁴⁷, at the global level, the most popular strategies employed by TSPs to manage OTTs, are fair usage policies, bandwidth caps, followed by proprietary OTT services. According to the report, fair usage policies are being used as a measure by around 40 percent of the TSPs surveyed. Fair Usage policy means reviewing the data usage of each subscriber and limiting the plan speed of specific customers who are using excessive network bandwidth. However, this percentage varies from region to region. For example, in Latin America, the fair usage policy is used by 53%, as compared to 33% in Europe, Middle East and Africa regions. In India, most of the TSPs have a fair usage policy in place.

2.62 The next popular strategy (33.85% of the TSPs surveyed) deployed for combating OTT service usage, worldwide, is introduction of bandwidth caps (also called as data caps). Bandwidth caps require monitoring traffic volume and throttling data or charging for extra volume for a customer once a pre-defined data cap is reached. In such data packs the user gets a particular speed up to a particular data limit say, 5 or 10GB and thereon, the speed reduces. Proprietary OTT services (22%) and service add-ons- such as unlimited video streaming or speed boosts or toll-boothing- are expected to see the most growth in adoption rates over the next 12 months. In Toll boothing, different services offered to the users are priced differently. The recent introduction of differential pricing for VoIP calls and normal internet usage by Airtel in India is one such example of toll boothing. The vast majority of TSPs employ more than one strategy, or plan to employ more than one strategy in the future (70 percent).

2.63 However, in today's India, we have low access speeds and/or low coverage of high-speed broadband service. This imposes limits on the use

⁴⁷Incognito Software survey report, 2013

of OTTs amongst the population at large. Access to or use of OTTs is restricted to only those groups with high-speed access and possession of smart devices, at least in the near term.

- 2.64 The counter to the above argument is that with the advent of new coding technologies, use of OTT even in areas of low access speeds will increase. For example, the recent Facebook Lite app is designed to operate on 2G networks and in areas with limited network connectivity.

Question 1: Is it too early to establish a regulatory framework for OTT services, since internet penetration is still evolving, access speeds are generally low and there is limited coverage of high-speed broadband in the country? Or, should some beginning be made now with a regulatory framework that could be adapted to changes in the future? Please comment with justifications.

Question 2: Should the OTT players offering communication services (voice, messaging and video call services) through applications (resident either in the country or outside) be brought under the licensing regime? Please comment with justifications.

Question 3: Is the growth of OTT impacting the traditional revenue stream of TSPs? If so, is the increase in data revenues of the TSPs sufficient to compensate for this impact? Please comment with reasons.

Question 4: Should the OTT players pay for use of the TSPs network over and above data charges paid by consumers? If yes, what pricing options can be adopted? Could such options include prices based on bandwidth consumption? Can prices be used as a means of product/service differentiation? Please comment with justifications.

Chapter 3

Challenges in the OTT Environment

OTT Challenges

3.1. The growing popularity of OTT services worldwide is posing a major challenge to the TSPs. Yet, this growth largely depends on the availability of existing telecom infrastructure in a particular area and market dynamics, i.e. if infrastructure (access to bandwidth) improves, there will be a further growth of OTT apps. The rapid pick-up in OTT growth can be attributed to the following five sets of drivers⁴⁸:

- i. **Technology readiness:** Countries with high speed broadband networks and high levels of smartphone penetration are most suited to OTT services.
- ii. **Cost incentive:** Compared to SMS, OTT alternatives are often very low priced or free. Usually, OTT players provide free services to consumers and use advertisements to realise revenue.
- iii. **Social propensity to adopt OTT:** OTT apps are usually utilised not by a single consumer, but by a social group. Teenagers and youth are using these services in large numbers.
- iv. **Strength of OTT platform:** The presence of a single OS platform with a large share of the population (e.g. Android) will strengthen the OTTs specific to that OS.
- v. **Scalability of the services:** OTT players are at an advantage when it comes to scaling up any incremental/ new services. The OTT players could build new services without investing in or developing the infrastructure, since they will be riding over service providers' network.

In India, the network infrastructure is still at an early stage of development.

⁴⁸The future of Mobile Messaging by McKinsey, 2011

Challenges posed by OTT services

- 3.2. In the Seminar on OTT conducted by TRAI, OTT communication services came under severe criticism by the TSPs. This was because they provide voice and messaging services, traditionally provided only by telecom companies, thus competing with them without any investments in building networks. The contention of the TSPs is that they have invested in building the infrastructure (capital costs) and incurred other costs associated with operation of the network (cost of spectrum, License Fee, Spectrum Usage Charge etc.) and the OTT players are freely riding on their networks. The counter to this argument is that the use of OTT apps results in increased data usage leading to additional revenue for the TSPs as explained in the previous chapter. Notwithstanding the above, both categories of OTT services- communication and non-communication raise a number of public policy issues.
- 3.3. From the national perspective, the public policy issues can be broadly classified into the following three categories:
- Regulatory Imbalances
 - Impact on the economy
 - Security Issues

Regulatory Imbalances

- 3.4. The technological differences between OTTs and TSPs have led to a situation where both TSPs and OTT service providers become capable of providing similar services to customers. The communication OTT players are actually competing with traditional TSPs. The TSPs bear the costs for the infrastructure, spectrum management and also pay license fees for use of spectrum. At the same time, they need to meet Universal Services Obligations and roll-out obligations and comply with other regulations. The counterpart OTT service providers, however, are not

obliged to adhere to any regulatory obligations and do not have to bear any such costs. The TSPs fall under a regulatory regime whilst OTT players are simply bypassing such a regime. Table 3.1 describes the differences between TSPs and OTT service providers across various dimensions:

Table 3.1: Regulatory Imbalances

Area of Regulation	Telecom Service Providers	OTTs
Spectrum allotment and use	Need to bear costs and adhere to rules	No such costs
Licensing	Yes, different licenses and their associated costs including licensing fee	No such licenses or costs
Spectrum related charges	Need to bear the costs	No such costs
Space related charges	Need to bear the costs	No such costs
Bank Guarantees to the government	Yes	No
Proper record keeping including methodology	Required	Required through other acts
Interconnection	Yes, required as part of regulatory regime. Requirement to interconnect entails costs.	No such interconnection required as they are 'Over the Top' networks
Quality of Service Parameters	Required as part of regulatory regime	No such requirement
Obligations under various Telegraph Acts	Need to adhere to rules	No such requirement
Infrastructure sharing	Need to bear the costs	No Infrastructure sharing
Security conditions	Need to adhere to rules	No such requirement
Emergency and Public utility services	Need to adhere to rules	No such requirement
Monitoring services i.e. Lawful interception and monitoring	Required as a license condition	No such requirement

- 3.5. Apart from communication services, there are other areas where OTTs are, in effect, bypassing local regulations e.g. taxi regulation for Uber is a case in point. While companies providing various applications-based services such as Uber Taxi, Ola taxi, e-commerce apps, etc. are an easy solution for customers, there can be attendant risks. For example in the case of conventional (non-OTT) taxi services, the regulatory framework has a licensing regime for taxis in India- local (the black and yellow) taxis, radio taxis and tourist permit taxis. But, OTT apps for taxi services entirely bypass this licensing regime. Acting as a platform, these taxi services connect private taxi players directly with users. This may be beneficial to both users and taxi owners; but, it could also pose certain unanticipated risks. The major challenge remains: in a non-level playing field, how can such OTT app providers be brought within the ambit of the prevailing regulatory regime of the country to ensure public safety and security of users.
- 3.6. Some other areas where such regulatory imbalances exist are as given under:

Table 3.2: Regulatory Imbalances

SECTOR	Regulatory Issues	Measures
Media Like OTT Video etc.	Copyright issues; Legacy laws ⁴⁹ regarding ownership.	Implementation of digital watermarks and limited distribution options. In France there is a legislation to deal with online transgressions concerning IPR
E-Commerce like Flipkart, Snapdeal, Amazon etc.	The number and methods of illegally accessing user data ⁵⁰ are growing rapidly, and the protection of consumer information is an important regulatory issue. Availability ⁵¹ is another important factor. These issues can, also become issues of national security ⁵² . The convergence of communications and financial services has led to the question of how to ensure that the requirements of the different regulatory authorities are combined	Surveillance (legal intercept). Where law enforcement agencies previously had warrants to examine bank accounts of suspects, now access to online financial transactions is vital.
Cloud services	The outsourcing of data storage and/or the use of Software/Infrastructure ⁵³ as a Service exposes users to risks as they no longer have physical control of these (software or data storage) assets. Data protection is another issue.	Access to the cloud by third parties must be prevented, and the regulator needs to assess whether this is an issue for them or for more general consumer protection legislation. Cloud services are often offered by providers which are located in another country. This may raise sovereignty questions which require adaptations in commercial law. Coordination between different authorities may also be an issue.
Social Media	Social media is playing a significant role in defining social interactions.	Social media sites have also been the target of sophisticated hacking

⁴⁹Where content (e.g. DVD, CD) was bought once and then owned (and could be resold), are inappropriate for digital content.

⁵⁰To participate in online commerce, individuals have to submit personal data online, which can be of great value to criminal elements.

⁵¹Interruptions in commercial transactions, or delays in time-relevant transactions can be disastrous

⁵²If hackers access the database of large enterprises, or the availability of the net for commerce is prevented for a significant length of time by a denial of service attack, the very stability of the economy may be endangered

⁵³Where software or infrastructure is purchased as a cloud service this means that network down time is equivalent to down time for the entire company. Loss of access to data, or its deletion, can endanger the survival of an enterprise.

	Users are voluntarily disclosing personal data ⁵⁴ (photographs, preferences etc.) which are then mined to serve targeted advertisements. This presents opportunities for new enterprises but at the same time raises concerns about privacy, ownership of data and longevity of data among others.. This issue of data portability clearly needs regulatory attention.	attacks where personal details including credit-card numbers have been stolen. Although hacking is a phenomenon not exclusive to social media, the large amount of personal data stored makes the trend an especially worrying phenomenon.
Others	The proliferation of internet services is part of a larger trend towards an online world. Many of these services are used for entertainment, information and commerce and have been subject to little or no regulation. Where regulatory concerns abound the service providers simply host the site in "friendly" nations ⁵⁵ . Due to the absence of any consistent worldwide standards, anyone with access to a VPN tunnel and an international credit card is able to access the website of his/ her choice – irrespective of the laws prevailing in their country of residence.	Needs proper regulation.

3.7. OTT applications are not mandated to adhere to any service or QoS standards or regulations, but they still make profits through delivery of these services because of the different business models they use. There may not be any guarantee of quality; but the OTT player's position is that end-users are aware of this before they start using the app. Moreover, it is in the OTTs' interest to upgrade and deliver quality for fear of loss of

⁵⁴Google with its latest notification indicates that it would have the right to use an individual's photograph to endorse a product in advertising to others if the user has recommended a product elsewhere in their search

⁵⁵E.g. most gambling websites are hosted in small European and Asian countries with less stringent regulations. The same is applicable to adult content.

customers, notwithstanding the absence of a quality of service guarantee.

- 3.8. As per TSPs, the OTT players are thus able to circumvent the regulatory requirements associated with businesses in the brick and mortar world. They also additionally save on regulatory costs and on costs for regulatory compliance. This regulatory imbalance or arbitrage opportunity allows them to offer services or goods that are cheaper or free or at competitive rates when compared to the existing model.

Impact on the economy

- 3.9. Due to the universality of the internet, it is becoming increasingly difficult for traditional firms as well as localized entities to compete with the new global market players. The brick-and-mortar shops are slowly losing their space to such players. The phenomenal growth of various e-commerce applications is an example of how such OTT players directly compete with and take over the market share of local entities. Another example from the media industry is that of an OTT media player which, because of its global presence, benefits from lower costs per MB for storage and hosting. Because of this, they are able to negotiate better content deals with providers in comparison to small specialized local players⁵⁶, thereby rendering the domestic players irrelevant.
- 3.10. The impact of OTT on business creation, employment and output is expected to increase dramatically, contributing to the annual growth rate. It is estimated that these services will improve the efficiency of an average employee by nearly 2.1%. It also helps in reduction of carbon emissions by 30% for large establishments and as much as 90% for smaller and the least efficient business establishments. This will also

⁵⁶http://tra.org.bh/media/document/Study_Policy_Regulatory_Framework.pdf

help business establishments, save billions of dollars in energy bills; create new jobs through development of a number of new small and medium size enterprises.

- 3.11. The growth of OTT services can also help the economy recover from a severe downturn. Specialized manufacturing or cottage industries could expand their footprint throughout the country and also globally through online sites. Weavers from Varanasi or Kanchipuram can, for example, sell their goods online, which could change their traditional business models completely. E-commerce has the power to radically alter the traditional construct in which these craftsmen function by providing them access to global demand, market intelligence, data analytics and new marketing tactics.
- 3.12. The economic impact of OTT innovation in various sectors is going to have a profound effect on the market structure of these sectors and also on their global macro-economic performance. The most visible benefit is the reduction in fixed costs, cost of entry as well as production costs. This results from shifting of fixed capital expenditure to only operative costs as firms are no longer required to invest in physical establishments (showrooms, displays etc). The consequences of this endogenous structure of the market with huge cost savings will help in the entry of new SMEs and an increase in production will reduce the cost of the product or service.
- 3.13. However, the counter to this argument is that the OTT services, especially in the retail sector, displace the brick and mortar establishments. This can be disruptive. Moreover, many OTTs can also capitalise on savings in tax revenues of millions of rupees. Being location-agnostic, they are in a position to take advantage of the variable tax rates across states in the country.

- 3.14. Further, the servers of these internet apps or service providers can be located anywhere in the world. For example, most of the Cloud based apps servers are located only on foreign shores. OTTs are not located in the country that they service. Therefore, real macroeconomic benefits accrue only to the country in which they are located. National governments stand to lose tax revenues since users purchase goods and services from global players rather than local entities. Moreover, there are limited employment benefits in the country where the services are delivered; and, there are no knock-on (spillover) effects from the business.
- 3.15. The counter argument will be to facilitate local app service providers to develop India-specific OTT apps. For instance, the emergence of an Indian version of Facebook, like renren.com of China, will facilitate content to be located in servers within the country. Only 30% of the data centers in the country are currently utilised. Encouraging such India-specific OTTs will augment the supply of apps having localised content in various Indian languages, thereby removing the language barriers for the use of such apps.
- 3.16. The challenge for businesses in the face of growth of OTT services is, in particular, loss of control over customer relationships, increased competition, the threat of commoditization and the need to engage digitally with suppliers, partners and employees in addition to customers. To deal with this challenge, companies need to adapt to the changing scenario or perish.

- 3.17. Many OTT players work on freemium⁵⁷ models to monetize their user base and advertisements become their main source of revenue. The global exposure of such services provides them with a global user base for their advertisements. These models are generally successful as evident by applications like Skype, WhatsApp, Viber etc. That apart, some OTT players are part of, or are supported by, MNCs who are making huge investments for building a stronghold in the market, even though they may not be making any profits at present.
- 3.18. For communication services, these OTT apps directly impact the existing business models of the TSPs. Their traditional billing models from voice, messaging and data are seriously threatened by offer of similar services by OTT players at far cheaper rates or free of cost. Subscription revenues of the TSPs from such services are impacted by the growth in voice, messaging and media apps that rely on other business models to earn their revenues (advertising, in-app purchases, subscription based services, stickers, per unit pricing etc.) as mentioned in Table 2.5.
- 3.19. The revenue losses of the TSPs will also lower various Government revenues. It will also result in lower accumulation of Universal Service Obligation Fund (USOF) for the government, which is a percentage of the revenues earned by the TSPs. The loss in revenue for the TSPs will also lead to less return on their network investments which could substantially derail their investment capability. This will lead to less investment in the infrastructure.

⁵⁷Freemium is a pricing strategy by which a version of product or service (typically a digital offering or application such as software, media, games or web services) is provided free of charge, but money (premium) is charged for proprietary features, capacity, functionality, or virtual goods etc.

Security Issues

- 3.20. Communication services that use internet for transmission like VoIP and instant messaging have security implications primarily because they bypass the regulatory regime enforced on conventional voice and messaging services provided by TSPs. The differences between regulations for VoIP and conventional voice service have implications for telephone number management, public safety, emergency number access and national security. Without secure connections through TSPs, they present various cyber security threats.
- 3.21. Lawful Intercept (LI) is the legally approved surveillance of a telecom network. It is an important tool for investigating and prosecuting criminal (cyber) activities and terrorism. In terms of regulation, LI reposes an obligation on TSPs to grant Law Enforcement Agencies (LEAs) access to their network/services. However, no such provision exists for OTTs.⁵⁸ For instance, Indian LEAs had a protracted negotiation with Blackberry to be able to access Blackberry Messenger Services. This in spite of Blackberry having both physical presence and economic interests in India.
- 3.22. Internet telephony does not follow standard protocol, as is essential in the traditional voice services through GSM. This is a cause of concern for security agencies since it is extremely difficult to trace the source of internet calls. For instance, during a terrorist attack, it becomes extremely complex to intercept such calls which appear to have originated from other countries from virtual numbers. In case of messaging, certain players indulge in special encryption, which becomes extremely difficult to intercept as these encryption keys are not made available easily to law enforcing agencies. It was only after prolonged

⁵⁸ http://tra.org.bh/media/document/Study_Policy_Regulatory_Framework.pdf

persuasion by the Government of India that BlackBerry agreed to monitor, track and intercept its services including mails, chats and browsing history on BlackBerry devices .

- 3.23. Also, service models in which data is made available only for a limited time-span such as Snapchat pose a new security challenge. All Messages (text, audio/ video or graphics) for Snapchat are automatically deleted from the server after delivery. This is a new challenge in the context of content regulation because of the real-time nature of the messages transmitted.⁵⁹
- 3.24. Another important challenge derives from cultural sensitivity and diversity. The OTT players mostly located outside the country may not be sensitive to the diverse cultural spread of India. It is very important to recognise the sensitivity of different cultures. These differences are reflected in ways that different groups communicate and relate to one another. Communication OTTs can entirely unintentionally cause disturbance and affect the social fabric. Of course, there is also the possibility of deliberate misuse of communication OTTs, to sow disharmony and discord. The recent inflammatory text messages and depictions through videos/ photos circulated in Bangalore using various apps/ SMS, targeting students from the North East is but one such example.
- 3.25. This resulted in the Government asking relevant agencies to scan social media platforms to check for inflammatory and offensive content. In a multi-ethnic society there is a vital need to ensure that the social equilibrium is not impacted adversely by communications that inflame passions, disturb law and order and lead to sectarian disputes. This will

⁵⁹ Policy and Regulatory Framework for Governing Internet Applications by Detecon Consulting

clearly be a new age challenge for the law enforcing agencies. Most of the content for such OTT apps are however not housed within the country, which poses a further challenge. Another major challenge is the wide circulation of obscene or pornographic videos through these apps which is very divisive in a society with strongly divergent views on moral standards and obscenity. Yet another potentially problematic area is that users of the social media websites express opinions freely without the usual social restraint.

3.26. Besides security challenges at the national level, OTT communications and OTT media can pose a threat to privacy. The transfer of personal information on the internet is fraught with risk precisely because of the “open” architecture of the internet. It can result in loss of content privacy, compromised cyber security and lead to cybercrime. The ‘always online’ state of mobile phones exposes users to cybercrime. Most applications can trace the user’s location for underlying processes (such as GPS apps finding the nearest restaurants etc.). This information may be used to commit a crime, or the location itself may be the target of a crime. Such threats can impact the nation’s security and financial health. New age cybercrimes such as cracking⁶⁰, phishing, piracy, identity theft⁶¹ and child pornography and cyber-extortion⁶² have been gaining ground in recent years. There are related problems of loss of privacy when confidential information is lost or intercepted, lawfully or otherwise. However, use of these OTT apps for crowdsourcing of information that may impact the security of the country, could be of advantage to the LEAs in curbing and monitoring anti-national elements.

⁶⁰A crack is a methodology for breaking into a secured computer system.

⁶¹ Identity theft is a form of stealing someone's identity in which someone pretends to be someone else by assuming that person's identity, usually as a method to gain access to resources or obtain credit and other benefits in that person's name

⁶²Cyber extortion is a crime involving an attack or threat of attack against an enterprise, coupled with a demand for money to avert or stop the attack.

A Summing up:

3.27. To sum up, national policy issues arising from the rapid growth of OTT services need to be addressed. The various regulatory imbalances need examination at different levels and by different agencies of Government, at the Central and State level. The security issues (including law and order dimensions) that have surfaced because of the growing popularity of the OTT services need to be addressed. Public safety and privacy issues can no longer be left unattended. Lastly, whether the growth of OTT actually impacts the economy (positively or negatively) in the short-term or will consolidate and facilitate the growth of economy in the long-term needs careful examination.

Other challenges posed by OTT services: A user's perspective

3.28. Other OTT services – application and content- pose a different kind of challenge for users. According to MetaIntell⁶³, today more than 92% of such OTT apps use non-secure communication protocols. Apart from this, these OTT apps suffer from developer reputation⁶⁴, content vulnerabilities⁶⁵ and 20% of the apps have the ability to load external applications without the explicit consent or knowledge of the user.

3.29. In general, users are not informed or educated on the risks associated with OTT apps downloaded from various stores. Most of the time users believe that OTT apps downloaded from an official app site can be trusted even though these stores do not guarantee trustworthiness of the products or items on sale or offer. This is primarily because the apps

⁶³A vendor that specializes in cloud-based mobile risk management (MRM), set about testing the top apps in a range of stores, including Amazon, CNET, GETJAR and the official Google Play store

⁶⁴The use of the applications is based on developed software with appropriate codes and entirely depends on the developer. The reputation of the developer plays a major role as he plays a crucial role in the process of use of personal data.

⁶⁵Improper authentication techniques can allow attackers to gather valid usernames or potentially gain access to the website. Strong authentication mechanisms can also protect against phishing attacks, in which hackers may trick users into providing their personal credentials, and pharming, in which traffic to a legitimate website may be redirected to an illegitimate one

are developed and hosted in such app markets without any risk assessment. These apps can adversely impact not only the individual device but also the Intranet i.e. a company's internal network.

- 3.30. Users also rarely understand that the so-called free apps actually share their personal information with various third party developers, and that this can pose serious threats. In most cases during the installation of such OTT apps, agreement to certain terms and conditions are usually obtained; but, these normally run into many pages and are rarely read by a user during installation of such apps. The question that arises is whether such OTT apps should take the explicit consent of the user every time information is shared with different third party developers.
- 3.31. Apart from these issues faced by OTT apps, all sub-categories of these apps—medical-centric, e-commerce-centric or payment-centric - have their own set of problems. Because of the constant 'always on' connection, it is difficult to determine what the mobile apps are doing in the background and what information is being collected. Today organizations are carrying out Big Data analytics; information so extracted is used for carrying out marketing activities amongst other things. It is said that Big Data can even predict an individual's future actions. Although Big Data provides immense opportunity for organizations, individuals, governments and society to mine information for several uses, along with these opportunities emerge additional risks. Several concerns are being raised; most important among them is the privacy of an individual. Big Data (not Big Brother) is watching.
- 3.32. In short, there could be continuous monitoring of user activity and the data could be exploited to gain access to privileged information on the system which includes geo-location details, authentication, personal information, banking information etc. and data analytics can lead to a

user's private information being harnessed for commercial gains, e.g. advertisement targeted to a user. This compromises the user's free will. There are also other problems associated with this. A perfectly legitimate OTT app if poorly implemented exposes sensitive data to third parties. These apps also store sensitive data pertaining to banking and payment systems-PIN numbers, credit card numbers, or online service passwords, which should be in an encrypted format, but are usually kept unencrypted. Further, the implementation of certain security solutions like Secure Sockets Layer (SSL) and other forms of cryptography, if not correctly done could expose all sensitive information to malicious third parties. Lastly, some OTT apps may enable sensitive information to be hard-coded into them because of oversight on the part of the programmer. This exposes another attack vector allowing exploitation of an app for the purpose of theft of data.

- 3.33. Various mobile applications relating to health and fitness are not subject to any regulatory framework to protect users. These apps record details of diet, daily exercise, glucose readings, pregnancy, etc. which could be shared with various unregulated healthcare sites and unregulated medical advice could be provided to users.
- 3.34. Finally, companies operating OTT in the virtual world might not meet the expectations of customers in the real world. Often there are companies which do not disclose their work places, contact addresses etc. The quality of goods and services being purveyed is usually gauged only by the site's or application's face value and/or presentation of the goods on the website. When consumer protection laws and rules apply to all Brick-and-Mortar sellers, should not such OTT services also be properly registered to secure customer interests and held accountable in case of poor product quality or any compromise to public safety/ hazard to an individual user?

3.35. Apart from the above issues, there are a number of other issues that generally impact customers and devices using the internet to connect and communicate. Some of these are :

a. Security/ cyber safety issues/ Malicious Software

Internet applications bring with them all manners of nuisance that are carried by the internet. These include viruses, worms, malware, spyware or trojan horses etc. which can play havoc on a user's computer system or smartphone. Hacking and theft are common occurrences. Recently even unreleased films from Sony were leaked by hackers.

b. Reconnaissance

This is an act of scouting or exploring to gain information about an enemy or potential enemy. This enables the attacker to discover vulnerabilities or weaknesses on the network. It could be likened to a thief surveying through a car parking lot for vulnerable – unlocked - cars to break into and steal. This has serious implications for the users of the applications.

c. Denial of Service

OTT providers do not have any obligation to ensure availability of service at all times. Using a Denial of Service (DoS) attack, services of OTT providers can be shut down by exhausting processing resources or network bandwidth. Each computer under their control directs thousands of messages to a single server, which disables the victim's computer due to resource exhaustion.

d. Social engineering

This involves psychological manipulation of people into performing actions or divulging confidential information. Recently, Facebook manipulated information posted on 689,000 users' home pages and found it could make people feel more positive or negative through a process of "emotional contagion". Improper use of control by a single private company over populations worldwide can have a tremendous

negative impact not just on the psychology but even in some cases on economic markets worldwide.

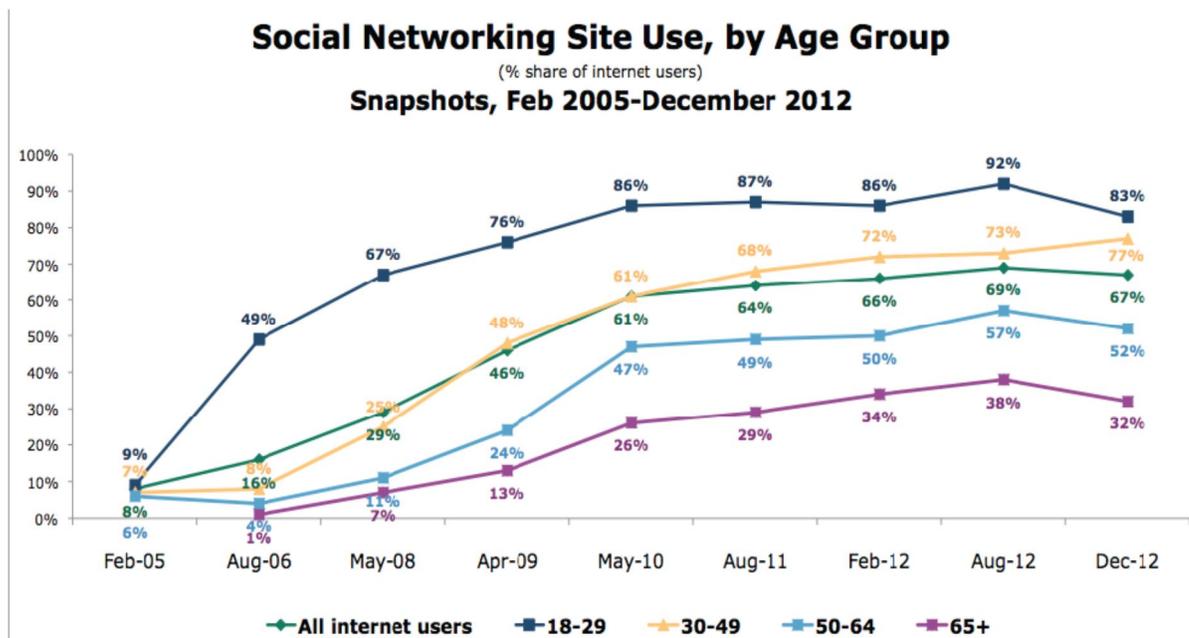
e. Safety:

The internet is a place that is full of resources for both adults and children. It also provides a platform to stay in touch with friends and family. But, the internet can also be a very dangerous place. Cyber predators, bullies, stalkers and con artists are all online waiting to find their next victim. Children using the internet often don't realize the risks they face online. It is therefore important for parents and teachers to learn about the dangers that young adults face on the internet, and talk to them regarding how to stay safe and smart. Also children need to be advised to avoid File-Sharing / Peer-to-Peer (P2P) Sites, Chat rooms and online gaming. During the last 5 years, the number of preadolescents and adolescents using such sites has increased dramatically. According to a recent poll, 25% of teenagers log on to their favourite social media site more than 10 times a day, and more than half of these adolescents log on to a social media site more than once a day. Seventy-five percent of teenagers now own cell phones, and 25% use them for OTT based social media, 54% use them for texting, and 24% use them for instant messaging. Some social media statistics on children:

- The average age when a child begins regularly consuming online media is 8.
- Though Facebook's minimum age requirement is 13, there are about 5 million users under the age of 10.
- About 10 hours and 45 minutes per day are spent online (for 8-18 years old)
- 25% of teens log into to social media 10+ times per day
- 51% of children say they've been bullied online, and 49% say they have been the online bully

Because of their limited capability for self-regulation and susceptibility to peer pressure, children and adolescents are at great risk as they navigate and experiment with social media. Recent research indicates that they are frequently disclosing their offline behaviour through online expression, such as bullying, clique-forming, Facebook depression and sexual experimentation, that has given rise to problems such as cyberbullying, privacy issues, and “sexting.” Other problems that merit awareness include internet addiction and concurrent sleep deprivation. Figure 3.1 depicts the use of social networking by different age groups.

Figure 3.1: Social networking site use.



Other challenges

- 3.36. Another problem encountered in the internet environment is the increased infringement of Intellectual Property Rights (IPRs). The availability of pirated content, usually books, movies and videos is ubiquitous. According to the Alexa⁶⁶ December 2014 ranking, the most popular websites visited by Indian users are pirated websites, when compared to legitimate content websites. For example, it lists the torrent

⁶⁶ A web-site traffic monitoring site

website (torrentz.eu) as 50th in its ranking for web sites frequented by Indian users when compared to a legitimate Indian site 'zeetv.com' which was ranked 2263rd. In UK, a Police Intellectual Property Control Unit (PIPCU) has been set up for monitoring content and content distribution to keep a check on such activities. There have been suggestions to throttle speeds of such websites or OTTs that provide pirated content or have a history of doing so. The intention is to make sure that content providers become increasingly conscious of their errors.

Question 5: Do you agree that imbalances exist in the regulatory environment in the operation of OTT players? If so, what should be the framework to address these issues? How can the prevailing laws and regulations be applied to OTT players (who operate in the virtual world) and compliance enforced? What could be the impact on the economy? Please comment with justifications.

Question 6: How should the security concerns be addressed with regard to OTT players providing communication services? What security conditions such as maintaining data records, logs etc. need to be mandated for such OTT players? And, how can compliance with these conditions be ensured if the applications of such OTT players reside outside the country? Please comment with justifications.

Question 7: How should the OTT players offering app services ensure security, safety and privacy of the consumer? How should they ensure protection of consumer interest? Please comment with justifications.

Chapter 4

Regulatory intervention for OTT in other countries

- 4.1. OTTs present a unique problem to regulators worldwide. Regulators in different countries are dealing with the OTTs in a variety of ways. There are logically two separate regulatory issues involved. The first is the treatment of communication OTT players vis-a-vis TSPs offering similar licensed services. The second is the treatment of non-communication OTTs vis-a-vis existing service providers of their respective trades. The regulatory framework of countries largely depends on the stage of development that OTTs have reached in that country. In most countries, the regulatory framework for the treatment of communication OTT players is being debated. The way to deal with other OTTs is being analysed on a case-to-case basis. For communication OTT services, developed countries such as US, EU and Japan are tending towards net-neutrality to promote openness and non-discrimination. But, even in their cases, there is no unanimity or policy announcement on net neutrality just yet. And, in the EU there are variations on the theme. On the other hand, some countries have altogether prohibited OTT services (or insisted on regulatory compliance). For example, some governments in the Middle East have blocked Skype. In China, VoIP (PC-to-phone) is classified as a basic voice call service; hence, only major operators with basic telecom service licenses are allowed to provide VoIP services. (See Box 4.1 on China's stance on websites and OTT apps).
- 4.2. The regulatory framework in the **United States of America** attempts to enforce some variant of net neutrality. However, this is an issue of regulatory and judicial contention amongst network users and access providers. In USA, telecom companies (to the extent that they are not common carriers) have no legal restrictions against practices impeding net neutrality. But they rarely resort to offer different rates to broadband

and dial-up internet consumers based on content or type of service. The US Congress has made five attempts to pass Bills containing some net neutrality provisions; and, it has failed every time. Each Bill was conceived with the intention to prohibit service providers from using different variable pricing models (price discrimination) based upon the user's Quality of Service level (tiered service).

- 4.3. The internet community is required to adhere to any Net Neutrality rules set by the Federal Communications Commission (FCC). However, decisions related to net neutrality should be taken with a long-term perspective and not in response to pressure from stakeholders or short-term objectives. In April 2010 and June 2010, the US Court of Appeals ruled against the FCC 'cease and desist' order against Comcast and it ruled that the FCC cannot force the ISPs to keep their network open. Because of the overturned order in the Comcast case, FCC set the regulations for net neutrality through its Open Internet Order of 2010⁶⁷, which stipulates three broad principles: Transparency, No blocking and No unreasonable discrimination. Critics argue that while broadband providers may have economic incentives to block or degrade certain content or application providers, both competitive pressure and antitrust law can help police such misbehaviour. The FCC has not defined

⁶⁷The Federal Communications Commission's Open Internet Order, 2010 is a set of regulations for ensuring net neutrality in USA. It also differentiates the implementation of net neutrality for fixed line providers and wireless net providers. The rules take a rigorous net neutrality stand towards fixed line broadband providers but are lenient towards the wireless net providers. However, net neutrality towards all legal content is assured for both the service providers.

The following main three principles can be seen:

- Transparency- Both the fixed and mobile broadband providers are required to disclose the network management practices, performance characteristics, and terms and conditions of their broadband services
- No blocking- Fixed broadband providers are not allowed to block lawful content, applications, services, or non-harmful devices; mobile broadband providers may not block lawful websites, or applications that compete with their voice or video telephony services subject to reasonable network management
- No unreasonable discrimination- Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic. Reasonable network management shall not constitute unreasonable discrimination.

unreasonable discrimination, though it has offered a few guideposts for consideration such as, differential treatment of traffic is more likely to be reasonable if it is clearly disclosed to customers, if it places the decision making largely in the hands of end-users rather than providers, and if it does not discriminate among specific uses of the network or classes of uses.

- 4.4. However, in 2014, the U.S. Court of Appeals for the D.C. Circuit vacated certain portions of the FCC Open Internet Order 2010. The court ruled that FCC did not have the authority to impose the order in its entirety. Because FCC had previously classified broadband providers (as information services) under Title I of the Communications Act of 1934, the court ruled that the FCC had relinquished its right to regulate them like common carriers. The case was largely viewed as a loss for network neutrality supporters and a victory for the cable broadband industry. Out of the three orders of the FCC Open Internet Order 2010, two were vacated (no blocking and no unreasonable discrimination) and one was upheld (transparency).
- 4.5. The FCC stated that they will not appeal the decision, but will establish new rules for transparency, no blocking, and non-discrimination, based on the decision. The FCC stated it will keep "Title II authority on the table" and work "on a case by case basis" to evaluate whether standards of network neutrality are met by carriers. On April 23, 2014, FCC while reversing its earlier stand on net neutrality is consulting stakeholders, contemplating a rule that will permit ISP to offer content providers a faster track to send content. On November 10, 2014, US President Obama recommended that FCC should make efforts to preserve net neutrality. Finally, on January 16, 2015, a U.S. Congress 'H. R. discussion draft Bill' came up for discussion. This Bill seeks to make concessions to net neutrality while prohibiting FCC from enacting any

further regulation affecting ISPs. In February, 2015, the FCC voted in favour of new net neutrality rules on broadband providers reclassifying broadband as a utility. As of today the Open Internet Order has only one element of ensuring transparency by the service providers. The FCC has also reclassified broadband as a telecom service and permitted fast and slow broadband lanes. That is to say, it is legitimate to have tiers of service, price-determined or otherwise.

- 4.6. Recently, FCC released the new internet rules on March 12, 2015⁶⁸ which further strengthens the network neutrality concept in US. These new rules apply to both fixed and mobile broadband service recognising advances in technology and the growing significance of mobile broadband internet access.

These rules, called as bright-line rules are:

- a) No Blocking: broadband providers may not block access to legal content, applications, services, or non-harmful devices.
- b) No Throttling: broadband providers may not impair or degrade lawful internet traffic on the basis of content, applications, services, or non-harmful devices.
- c) No Paid Prioritization: broadband providers may not favor some lawful internet traffic over other lawful traffic in exchange for consideration of any kind—in other words, no "fast lanes." This rule also bans ISPs from prioritizing content and services of their affiliates.

However, all these proposed regulatory rules are at draft stage. Going by past experience it may take a few years before they are formulated. And, in any case, the issue of the draft rules has opened the doors to litigation which is bound to ensue.

⁶⁸ http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0312/FCC-15-24A1.pdf

- 4.7. According to FCC, these rules will set a standard for future conduct, and ensure greater transparency. Reasonable Network Management has been allowed by the agency. However, the network practice must be primarily used for and tailored to achieving a legitimate network management—and not business-purpose. For example, a provider can't cite reasonable network management to justify renegeing on its promise to supply a customer with "unlimited" data. The FCC will enforce the Open internet rules through investigation and processing of formal and informal complaints. Some⁶⁹ argue that this is only a start and the FCC will have to fight harder to maintain net neutrality in the US considering the limitations put by US Congress laws that regulate FCC's domain. Also, certain regulations are complex and may end up in lengthy court proceedings. The open-ended regulatory schemes also make it harder for broadband providers to predict which business models will be considered legal.
- 4.8. **French Telecom regulator ARCEP** has demanded that Skype register as a Telecom Operator in the country. ARCEP's view is that by providing French users with services that allow them to make phone calls to or from a device connected to the internet, (a computer or a smartphone) as well as to the traditional telecoms network (e.g. landlines), Skype is in fact providing electronic communications services. The regulator has said that whilst Skype is not required to obtain administrative approval to become an electronic communications operator in France, it is however obliged to declare itself compliant with the French Postal and Electronic Communications Code (CPCE). ARCEP also says that the operator must meet certain obligations as they are in the business of providing electronic communications; this includes routing of emergency calls and implementing measures required to perform legally ordered interceptions. However there are a number of unclear regulatory

⁶⁹ <http://www.vox.com/2015/3/16/8223785/net-neutrality-400-pages>

classifications. There is no clear classification for VoIP, Instant Messaging, Cloud and Content Delivery Network. But, Skype has refused to register as a telecoms operator in France. It insists that Skype is largely free VOIP telephony service and nothing more than an IT application. French prosecutors have launched a fact-finding investigation into Microsoft's Skype operations in France, based on a complaint from ARCEP.

- 4.9. The European Parliament had voted for protection of Net Neutrality in April 2014. The inclusion of the same in French law was fiercely debated. The "Digital Bill" is scheduled for the first quarter of 2015, which would contain a section on Net Neutrality. Interestingly, the French Council of State's recent report on rights in the digital environment backs the claims of operators that real Net Neutrality protection would undermine investment in faster networks.
- 4.10. **South Korea** is a strong market in OTT services because of its broadband penetration. As far back as 2008, 3G mobile networks had reached 99 percent of its population. Because of the rapid uptake of smartphones and mobile devices, growth of various services like free-to-use mobile Voice over Internet Protocol (mVoIP) services, mobile instant messaging (MIM) services and OTT SMS services have increased. This raised serious concerns about the sustainability of business models of telecom operators and prompted action by the regulator.
- 4.11. Korea Communications Commission (KCC), the telecom regulator announced "Net Neutrality (NN) and Internet Traffic management Guidelines" in 2011. Its objective was to foster an open and fair internet usage environment, and create a healthy and sustainable ICT ecosystem through basic principles for net neutrality and internet traffic management. The four requirements included in the Guidelines were:

- Transparency;
- No blocking;
- No unreasonable discrimination⁷⁰; and
- Reasonable traffic management.

4.12. The transparency requirement made network operators responsible for disclosing traffic management objectives, practices and methods to end users. The No Blocking requirement prohibited the blocking of any lawful content, apps or services, with allowances to prevent harm to devices and for reasonable traffic management practices. The No Unreasonable Discrimination requirement prohibited discrimination between lawful content application and services, again allowing for reasonable traffic management practices. Finally, the Reasonable Traffic Management requirement states that network operators may adopt traffic management practices for network security and stability, to avoid network congestion and for protecting end users.

4.13. The NN Guidelines were, however, conspicuously silent on the rights of network operators to VoIP providers for the termination of their traffic charge and, instead, a “traffic usage based cost share” has been allowed to be charged from the VoIP providers. The KCC has reportedly made it legal for telecom operators to charge their customers extra fees to use VoIP apps – or block their use entirely. Korean TSPs were planning to develop their own Mobile Instant Messaging Services (MIMS) services which would benefit more by making them interconnected and interoperable services rather than standalone products. This has been done so that services can be delivered to end-users according to their bandwidth requirements so as to improve user experience.

⁷⁰That ISPs may not act in a commercially unreasonable manner to harm the internet, including favoring the traffic from an affiliated entity.

- 4.14. However, other nations, notably the **United Kingdom**, have taken a different approach founded on the premise that allowing ISPs to develop additional revenue streams from preferential traffic would be the best means of incentivizing investments in the broadband infrastructure. They can provide preferential treatment in the form of tiered services or toll-boothing, for example, by giving online companies who are willing to pay for faster flow of data packets than other internet traffic. The incremental revenue from such services could be used to pay for the building of increased broadband access to more consumers. Hence, in the UK, price discrimination (service differentiation) is perfectly in order.
- 4.15. In **Germany**, VoIP is subject to the same regulatory framework which applies to all other telecom services due to the technology-neutral approach of the Telecommunications Act. Regulatory obligations include, inter-alia, the provision of free emergency calls, availability of telecom surveillance, and retention of traffic data. However, the Federal Network Agency has announced its intention to exercise its discretion, in the medium-term, giving sufficient way for the development of evolutionary services like VoIP. Also, Deutsche Telekom (DTAG) lost a court case covering their intention to throttle data speeds above a certain volume. The basis of the decision lay in the contention about calling the tariff as a “flat rate”. But it is to be expected that the name will be dropped and DTAG will still implement the throttling tactics.
- 4.16. One of the simplest approaches for the regulatory framework⁷¹, within Europe, might be to extend the definition of “electronic communications service” to cover OTT services. Currently, general authorisations apply on a per-market basis; for example, a provider in the UK needs to comply with the regime as set out by Ofcom, whilst, in Germany, it is the principles established by the Bundesnetzagentur which are relevant.

⁷¹ Thesis report of “Regulation of over the top services” by Neil Brown

- 4.17. The National Communication Commission (NCC) of **Taiwan** is planning to regulate mobile apps. Following this change, certain mobile app developers will be required to obtain an operating license from the NCC.
- 4.18. In **China**, the emergence of services such as WeChat threatened established mobile telecom providers, such as China Mobile, causing the carrier to lose SMS and voice revenues. In addition, China Mobile and other carriers argued that the constant signaling of WeChat applications loaded on hand-held devices with base stations to communicate online status and position has imposed traffic costs on the mobile networks. China's unique social media landscape is presented in the box 4.1 below. An added factor complicating a potential regulatory framework for OTT services in China is the desire of the Chinese government to regulate the information access of its citizens.

Box 4.1 China's unique internet space

The People's Republic of China (PRC) hosts a unique online system, a national "inverse intranet" that was developed as a distinct unit within the global internet. The Chinese Communist Party (CCP) achieved this "intranet" using a double-pronged strategy: control and growth. Government exerts strong control over access, online content, and ownership of online companies. Meanwhile, it blocks access to key foreign websites, thus creating a huge market for domestic online services.

As a result, successful Chinese companies now dominate the domestic online market and collaborate with state agencies to censor content. China's "intranet" policies have enabled the CCP to exert strict political control, minimize public discontent, and encourage a booming online economy. Since China's first internet connection in 1994, a self-sufficient, gated digital universe has emerged within the global internet. The country boasts the world's largest online population—618 million at the end of 2013. China's web footprint is also growing. The country hosted 3.23 million websites in 2013, a dramatic increase from 694,000 in 2005.

*China's "intranet" has also become an economic juggernaut. Online advertising revenue in China jumped from RMB 6.07 billion (\$988 million) to RMB 51.19 billion (\$8.34 billion) between 2006 and 2011. Leading domestic players such as Tencent, Baidu, and Sina are among the world's fastest growing, most profitable internet companies. China's "intranet" is defined by the nation-state within the World Wide Web. The so-called "Great Firewall" blocks access to undesirable foreign websites and services, allowing domestic websites and services to dominate the Chinese market. For example:- the Chinese censorship authorities have DNS poisoned *edgecastcdn.net, which means all subdomains of edgecastcdn.net are blocked in China. (Cloud services)*

Of all page views within China, 96% go to Chinese-hosted websites. Domestic entrepreneurs have aggressively adapted the principles and technological solutions of leading global online services. The social media landscape is dominated by the local Chinese sites. To encourage the local players and stimulate innovation within China, there is no access to Western fixtures like Twitter, Facebook etc. Chinese equivalents (or near-equivalents) have been developed for Facebook (Renren; formerly Xiaonei), Twitter (Sina Weibo), YouTube (Tudou; Youku), Amazon (Dangdang), e-Bay (Taobao.com), Groupon (Meituan), and many other global services. Top Chinese ad sellers, search company Baidu and e-commerce firm Alibaba, have overtaken most of their American counterparts and are catching up to Google and Facebook.

In the e-commerce sphere, Baidu is expected to take in 4.68% of the \$146 billion marketers will spend on digital advertising this year. The research firm projected that Alibaba will trail close behind at 4.66% of the money advertisers around the world will put toward desktop and mobile ads in 2014. This year Baidu and Alibaba ranked third and fourth, respectively behind Google and Facebook.

Source: Policy and Marketing Strategies for Digital Media by Yu-li Liu, Robert G. Picard

- 4.19. In 2013, China Mobile, with the approval of the Ministry of Information Industry (MII), announced plans to begin charging OTT communication services for termination of traffic to their customers. Though the China Mobile proposal was short on specifics and did not identify a price point for its charges, the move was immediately criticized by users on social media. On its part, Tencent immediately announced that it had no plans

to pass on the charges to users⁷². Critics alleged that imposing a charge only on one OTT service will not solve the network operators' problems, since the low barriers to entry into the OTT services market would enable other "free" OTT service to replace WeChat. Eventually, under public criticism, the proposed charges were withdrawn. In July 2014, the Chinese Ministry of Science, ICT and Future Planning (MSIP) blocked two Korean owned OTT services, Naver's free messaging application Line and Kakao Talk, alleging that the services were being used to coordinate acts of terrorism. But domestic OTT services such as WeChat, and some foreign applications like WhatsApp and others, continued to work.

4.20. In **Europe**, OTT services for video programming have diffused much faster and achieved greater penetration than telecom based services. A number of operators have offered cloud-based pay TV or streaming video services, including Deutsche Telekom with its Livestream Perform service, BSkyB's NOW TV, and HBO's Go. Pay TV over OTT, which had about 400,000 subscribers in Europe as of late 2013, was expected to grow to 5.2 million by 2016, according to analysts. The growth in OTT services over mobile networks has also been significant. A research report⁷³ identifies key trends in the OTT sector with a focus on mVoIP. The mobile voice OTT market size is expected to range between \$14-100 billion in 2016, accounting for between 2-20 percent of total voice revenues. The report also states that the traditional telcos are still complacent that voice OTT is unlikely to cause any major upset because of poor monetization, inferior QoS and challenged business models.

4.21. There are various other proposals regulators are contemplating the world over, from an outright ban on OTT services in **Vietnam**, to the **European Telecommunications Network Operators' (ETNO)** proposal of 2012 to

⁷²BMI, 2014

⁷³ "Disruptive Threat or Innovative Opportunity?", by Research firm, Arthur D. Little

request payment for termination of OTT traffic, to the largely unrestricted markets currently operating in most countries.

- 4.22. Alarmed by the growth of OTT services, ETNO has demanded changes in the regulatory and interconnection pricing regime that enable OTT services to use their infrastructure with no return for them.⁷⁴
- 4.23. It is in this context that ETNO has put forward a pricing proposal that would enable them to negotiate pricing schemes with OTT providers. Specifically, ETNO put forward three interrelated demands:
- a) Sending networks, such as content providers, OTT services and other application providers, must be required to pay “fair compensation for carried traffic” to interconnect with network operators (the “sending party network pays,” or SPNP principle);
 - b) New interconnection models should be allowed providing for end-to-end Quality of Service (QoS) delivery for sending parties willing to pay a premium; and
 - c) Governments should allow these interconnection and carriage arrangements to be negotiated between network operators and information services without regulatory interference (Article 19, 2012).
- 4.24. The proposal has been strongly opposed by other stakeholders, such as the Body of European Regulators of Electronic Communications (BEREC). On the question of SPNP, the BEREC argue that requiring senders to pay for end-to-end connectivity is “totally antagonistic to the decentralized efficient routing approach to data transmission of the internet” and termed the end-to-end QoS proposal “neither commercially nor technically realistic”.

⁷⁴European Telecommunications Network Operators [ETNO], 2012).

- 4.25. The proposal has also run counter to regulatory initiatives in many European countries to promote network neutrality, manifested in regulations on information transparency and minimum QoS standards. In 2009, the EU announced the guidelines for telecom regulations regarding network neutrality. Subsequently, countries such as the Netherlands and Slovenia adopted net neutrality legislation prohibiting traffic discrimination between content providers.⁷⁵ However, other members of EU have not yet adopted any such legislation. And, some countries are currently unlikely to do so.
- 4.26. In the absence of a unified regulatory framework for mVoIP or other OTT services, individual network operators have sought to implement traffic management arrangements advantageous to them, sometimes drawing negative scrutiny from regulators. In the Netherlands for example, the incumbent network operator KPN, in cooperation with the local affiliates of Vodafone and T-Mobile, sought to block, or charge for OTT services such as Skype and WhatsApp. Dutch lawmakers reacted strongly passing a net neutrality law in 2011 prohibiting 10 discriminatory practices, making the Netherlands the first European country to do so. Similarly, a German court blocked Deutsche Telekom in 2013 when the telecom provider attempted to reduce consumers' broadband speeds if they exceeded certain data caps. The court ruled that Deutsche Telekom's practice was discriminatory since the data caps did not apply to the company's own customers. In other words, the data caps (price based or otherwise) are perfectly legitimate; there is no legal bar to the use of such caps. However, favouring one's own app over others is a discriminatory practice and, hence, not legally sustainable.

⁷⁵Renda 2013

4.27. In April 2014, the European Union (EU) 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 of firms and individuals to online services such as video on demand, streaming audio and cloud computing; and second, to harmonize rules across national borders to create a unified European market. But, interestingly, as a reversal to its proposal, the EU member states are not going to support an EU-wide ban on telecoms companies offering online services such as Facebook for free. The so-called "zero-rating", where operators offer unlimited access to certain online services - typically Facebook, music streaming or online television - is seen as good for competition and innovation as well as more choice for consumers, even though some perceive it as a breach of net-neutrality. In effect, this implies no pan-EU legal bar to zero-rating. The constituent member Governments will be free to decide on their own. However, leaving the choice to individual governments runs the risk of a patchwork of approaches across the EU, contrary to the EU's aim of developing a single market in the telecoms sector.

4.28. OTT services are viewed differently by different nations. Some countries view Voice over Internet Protocol (VoIP) as a voice service while others view it as data- a 'value-added' or 'information' service, basically a data-driver. For example, Dominica views VoIP as voice, while Bolivia, Czech Republic, Egypt, Jordan and the United States view it as data. In the European Union, VoIP can be classified as either an Electronic Communication Service or as a Publicly Available Telephone Service i.e. both are classified as communication services.

4.29. Though interconnection and pricing issues for OTT services on mobile networks have not been satisfactorily resolved in any jurisdiction, comparative analysis identifies the contours of emerging "best practices"

in terms of access, interconnection and pricing for OTT services. Other key practices include :

- a) Separate regulatory practices for communication services and non – communication services. (e.g., Germany, France.)
- b) Use of price discrimination on traffic to ensure development of broadband infrastructure. (e.g. United Kingdom. Korea)
- c) Use of a FRAND approach⁷⁶ in dealing with regulatory issues concerning OTT players.(e.g. Korea, ETNO)

Question 8: In what manner can the proposals for a regulatory framework for OTTs in India draw from those of ETNO, referred to in para 4.23 or the best practices summarised in para 4.29? And, what practices should be proscribed by regulatory fiat? Please comment with justifications.

⁷⁶FRAND -fair, reasonable, and non-discriminatory terms

Chapter: 5

Network Neutrality

- 5.1 The exponential increase in data traffic of TSPs, has given rise to a new set of issues in accessing the internet. Earlier, across the globe, there were demands to keep the internet open and free for all without any restrictions. This was primarily advocated by various Application Service Providers (ASPs) driving the internet. They advocated regulatory measures to ensure open internet access. But, over the years, the situation has changed and the TSPs are employing various strategies to deal with the challenge posed by OTTs. They too are requesting intervention in regulating certain services. The ASPs are not in favour of regulation that could tilt the balance in favour of TSPs. However, they are advocating suitable legislation to keep the internet open.
- 5.2 TSPs are concerned primarily because of the excessive use of internet leading to congestion and bandwidth difficulties. It is worth noting that 10% of mobile users actually consume 90% of operators' bandwidth. Watching videos online is indeed becoming an increasingly popular activity and generating a huge traffic on the networks (Globally, 70% of the bandwidth is consumed for video streaming⁷⁷ and in India it has already reached 36%). This skewed condition has compelled the TSPs to devise business models and strategies to address network related capacity and capability issues.

What is Net Neutrality (NN)?

- 5.3 Net neutrality (NN) is generally construed to mean that TSPs must treat all internet traffic on an equal basis, no matter its type or origin of content or means used to transmit packets. All points in a network should be able to connect to all other points in the network and service

⁷⁷Incognito Software, 2013 report

providers should be able to deliver traffic from one point to another seamlessly, without any differentiation on speed, access or price. The principle simply means that all internet traffic should be treated equally.

- 5.4 In USA, FCC has defined Network, or "net" neutrality as another way to refer to open internet principles. The open internet is the internet where consumers can make their own choices about what applications and services to use, and where consumers are free to decide what content they want to access, create, or share with others. However, according to some economists, NN has no widely accepted definition, but usually means that TSPs charge consumers only once for internet access without discriminating between content providers and content over the network. In other words, NN implies that there cannot be any price discrimination between suppliers of content and also among the customers that access such content. Yet other economists, and a majority, argue that price-discrimination is legitimate especially in view of externalities i.e if a video service hogs bandwidth it ought to pay more.
- 5.5 Currently, NN is a topic of great debate across the world. At one level, it is being linked to the right to freedom of expression and the right to information. The underlying idea of an open internet is that all internet resources and the means to operate on it are easily accessible to all. It effectively renders the network carrier a dumb pipe i.e. intelligence of management and operation of communication must lie at the end points of the network and not in the network.
- 5.6 The 'end to end' principle says that communication protocol operations should be defined to occur only at the end points of a communication system or as close as possible to the resource being controlled. It is this principle, that in effect, implies that a network is a 'dumb pipe'. And this is the argument used by advocates of NN.

5.7 There are several definitions of NN.⁷⁸

Strict NN: NN prohibits TSPs from speeding up, slowing down or blocking internet traffic based on its source, ownership or destination.

According to Hahn & Wallsten, "NN usually means that broadband service providers charge consumers only once for internet access, do not favour one content provider over another, and do not charge content providers for sending information over broadband lines to end users."

The Debate around NN

5.8 Openness has been the guiding principle for the growth of the internet. This has been vital for innovation on the internet. NN ensures that new entrants in a business running on the internet are able to compete fairly with incumbent giants. Proponents of NN contend that when a service provider breaches neutrality of a network, new entrants become vulnerable to unfair competition as their access to the internet infrastructure is restricted. They argue that any preferential treatment of internet traffic would put newer online companies at a disadvantage and slow down innovation in online services.

5.9 It has been suggested that to ensure a thriving and neutral Internet, the following issues need to be addressed:

- i. The Internet must be kept open and neutral. Reachability between all endpoints connected to the Internet, without any form of restriction, must be maintained.
- ii. All data traffic should be treated on an equitable basis no matter its sender, recipient, type, or content. All forms of discriminatory traffic management, such as blocking or throttling should be prohibited.

⁷⁸NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt (October 24, 2013)

- iii. Network service providers should refrain from any interference with internet users' freedom to access content (including applications of their choice)
- iv. There should be restricted use of **packet inspection software** (including storage and re-use of associated data) to control traffic.
- v. Complete information on reasonable traffic management practices and justifications for the same must be **accessible and available to the public**. TSPs should be transparent and accountable to any changes in practices.
- vi. **Non-neutral treatment of traffic** for "voluntary" law enforcement purposes must be prohibited unless there is a legal basis for it.

Concerns regarding departure from NN

- 5.10 A policy decision to outright depart from "NN" raises⁷⁹ various antitrust and public interest issues. There are concerns that TSPs will discriminate against certain types of content and political opinions. Such practices may hurt consumers and diminish innovation in complementary sectors such as computer applications and content dissemination. Discriminatory pricing proposals, if implemented, could raise a variety of significant anti-competitive concerns.
- 5.11 Access networks, if left unrestrained by non-discrimination rules, have incentives to favour their own services, applications, and content and to kill competing services. In the absence of non-discrimination rules, last mile carriers can leverage their market power to control/support their voice telecom services.
- 5.12 One of the concerns is the possibility that TSPs will degrade and/or restrict capacity in traditional internet access to force applications and

⁷⁹ "Net Neutrality," Non-Discrimination and Digital Distribution of Content Through the Internet, By Nicholas Economides

content providers to use the TSPs new “premium” service. The possibility exists that this degradation and restriction of capacity will happen in a coordinated way, in a cartel-like fashion.

- 5.13 Besides concerns over incentives for creativity, there is another concern regarding allowing TSPs to charge fees from content producers: it can result in TSPs “competing” for content⁸⁰, as seen in other platform industries, by charging different fees and bargaining on exclusive arrangements with content providers. In turn, such bilateral agreements could inevitably lead to fragmentation—where certain content would only be available on certain TSPs—and hence multiple “internets.”
- 5.14 The ability of smaller and start-up Content and Application Providers (CAPs) to compete with the more established CAPs⁸¹ may be affected if they are unable to secure access to specific TSPs or afford access-tiering charges, particularly if a TSP with market power reaches an exclusive arrangement with an established CAP or where smaller CAPs are unable to secure affordable access. These potential barriers to entry may deter new start-ups from joining the market, which threatens to hinder innovation and diversity in the long run.
- 5.15 The fact of the CAPs being charged instead of subscribers will likely mask⁸² the true cost of internet service to subscribers. This will further create price distortion and surplus loss; because the generally more competitive market for large business customers will not shield them from the levies imposed by the access carriers.

⁸⁰Subsidizing Creativity through Network Design: Zero-Pricing and NN, By Robin S. Lee and Tim Wu

⁸¹GSR 2012 Discussion paper: NN: A regulatory perspective

⁸² “NN,” Non-Discrimination and Digital Distribution of Content Through the Internet, By Nicholas Economides

5.16 Also, there is no simple index or measure of capacity or bandwidth use of an application that is closely correlated to the willingness to pay for that application. For example, bandwidth use is high for some highly valued services, like video on demand, but bandwidth use is very low for information services, such as search or bidding in auctions in real time, which are also highly valuable. In the absence of legally mandated non-discrimination, TSPs may attempt to capture the consumer surplus that remains after uniform pricing.

Arguments put forward that counter NN principle

5.17 Some experts⁸³ believe that mandating NN would be inconsistent with sound economic management of the internet. Innovations in application services can be better achieved if innovators can respond to price signals from platform providers, such as broadband producers. So, for example, innovators might take into account potential congestion costs of bandwidth-intensive applications.

5.18 There is a demand for “fast lane” internet in certain sectors; this enables content providers to ensure priority delivery of their content. Telemedicine is one such example. A Japanese study⁸⁴ noted that poor quality images limited the medical use of the internet, but that a very high-speed dedicated link can make real-time surgical collaboration possible.

5.19 According to some experts⁸⁵, if NN is imposed, due to rise in data traffic, TSPs will be forced to increase the cost of access for consumers and consumers would be worse off. Instead, CAPs that earn by advertising and other business models should be charged by the TSPs. CAPs are the

⁸³The Economics of NN, By Robert Hahn and Scott Wallsten

⁸⁴ Shimizu, et al. 2005

⁸⁵ NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt (October 2013)

strongest advocates for NN⁸⁶. If a particular TSP were to threaten to charge a Google or Amazon, they could withdraw the service from that TSP. The loss of this service could result in possible loss of clients for the TSP to other TSPs that have access to these services. While the CAP may lose access to the TSP's subscriber base, however, the largest CAPs are now so big and have such a diverse set of users internationally that such a move would have little impact on their overall revenue. This argument is strongest when there is a vibrantly competitive retail broadband market.

5.20 Globally, the market is already dealing with the issue by virtue of a range of new mechanisms, including:

1. Tiered pricing structures, so that data hungry users are charged additional sums for the data used; and
2. The use of certain delivery networks by CAPs to reduce their access costs and improve the quality of service for their customers.

5.21 An over-application of NN rules will actually reduce the ability of providers to offer properly tiered services to third parties. For example, NN rules should not prevent TSPs from providing higher QoS to business customers (or home workers). However, where the incumbent has market power, then they will need to be applied in such a way that prevents incumbents from acting anti-competitively and discriminating in favor of their own content and applications business in the provision of such services. Therefore, the issue is actually about the effectiveness of any over-arching telecom regulatory regime and its ability to effectively target discriminatory conduct, drive competition in retail markets where there is wholesale market power and do so in a timely and effective manner.

⁸⁶ GSR 2012 Discussion paper: NN: A regulatory perspective

Global practices on Internet traffic management and pricing:

5.22 Traffic management⁸⁷ is at the heart of the NN debate. There are two broad forms of internet traffic management:

- 'Best-efforts' internet access, under which TSPs attempt to convey all traffic on more or less equal terms. This results in an 'open internet' with no specific services being hindered or blocked, although some may need to be managed during times of congestion.
- Managed Services, under which TSPs prioritise certain traffic according to the value they ascribe to it. An example may be the prioritisation of a high quality IPTV service over other traffic. This amounts to a form of discrimination, but one that is normally efficiency enhancing.

5.23 Many critics of NN⁸⁸ refer to the argument that the current 'Best Efforts' (BE) internet cannot be considered as 'neutral' since different types of data and applications have different requirements for network quality. Historically the ISPs were blocking port 25 or port 80⁸⁹ disallowing certain types of services that were riding on the network. Internet on a BE basis generally favours real time communications traffic over other non-time sensitive traffic (non-neutral tiered Internet).

5.24 The NN debate is, first and foremost, a technical and economic one, with the following core issues at stake⁹⁰:

⁸⁷GSR 2012 Discussion Paper: Net neutrality: A regulatory perspective, published by International Telecommunication Union

⁸⁸ NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt

⁸⁹For two computers or devices on the internet to communicate they have to follow a set of communication rules called protocol. Most things on the internet use the TCP/IP set or stack of protocols. Each of these protocols is assigned a unique port number to enable proper communication. Some commonly used protocols are:

HTTP - used for websites and uses port 80 (if blocked has to use web server on a non-standard port)

DNS - used for resolving internet domain names to IP addresses and uses port 53

FTP - used for transferring files across the internet and uses port 21

POP3 - used for collecting email and uses port 110

IMAP - also used for collecting email and uses port 143

| SMTP protocol - used to transport or communicates email or messages & uses port 25.

⁹⁰Report to Parliament and the Government on NN, ARCEP (French Regulatory Agency)

- Traffic management
- Managing scarcity of bandwidth by differentiating the traffic streams conveyed over the network, e.g. by giving priority to certain services or throttling others;
- Investment and increasing capacity;
- The quality of service provided to end users.
- Unrestricted access of internet.
- No premium charges for riding over the network.

Traffic Management⁹¹

5.25 Traffic management can be broadly defined as a collection of techniques that may be used by a TSP to plan and allocate available resources to attain optimum performance for diverse classes of users across a network. These techniques will often include the use of performance measures to define optional service levels tailored to different user needs, and to assure appropriate quality of service. Traffic management **may be** critical for proper functioning of the internet.

5.26 The primary reason advanced by TSPs for traffic management is to prevent a small number of their customers from using the available bandwidth and clogging access to the internet for others. Proponents of traffic management contend that TSPs are justified in controlling the flow of data because it is necessary to maintain the quality of service to ensure that all users have a reasonable internet experience. Traffic management is essential to protect the consumer experience, especially in times of potential extreme network congestion. A rigid adherence to NN would preclude such traffic management practices, notwithstanding the compelling need for such traffic management.

⁹¹GSR 2012 Discussion Paper, NN: A regulatory perspective, ITU, 2012

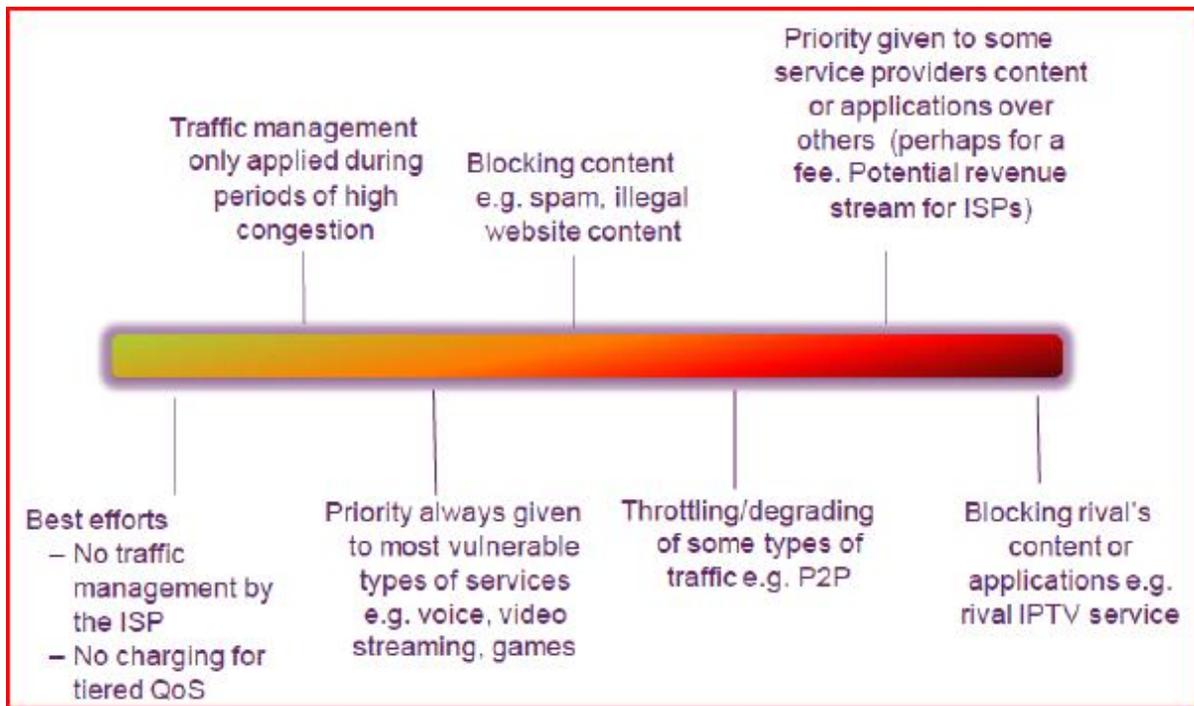
5.27 Other techniques like data caps, application-agnostic congestion management, prioritization, differentiated throttling, access-tiering and blocking are used by TSPs for data management, using techniques like Deep packet inspection, Deep flow inspection and Policy control and management.

Traffic Management Concerns

5.28 All data management technologies are, in a sense, “non-neutral”: they mean that different traffic passing through a network is treated differently. Some of these measures are widely acceptable, while others have been criticized or subject to sanctions. Therefore, the concerns over these technologies derive not so much from their departures from a truly neutral network, but from something broader, such as their departures from the principles of non-discrimination and fair competition (including the abuse of market power). There is a fine line between correctly applying traffic management to ensure a high quality of service and wrongly interfering with internet traffic to limit applications that threaten the TSP’s own lines of business. The use of traffic management by an operator for anti-competitive purposes by using its control over internet access to discriminate against any competitors that rely on its network has been the subject of greatest concern.

5.29 The following Figure 5.1 by Ofcom, categorises different data management techniques in terms of increasing non-neutral behaviours.

Figure 5.1: Traffic Management Conduct



Network Discrimination⁹²

5.30 Network discrimination is the tendency of TSPs to intentionally and, in some cases, arbitrarily apply restrictions to users' access to the open and neutral internet. Generally speaking, network discrimination can take place in the following ways:

- Blocking of applications and services: In order to maximise profits, some TSPs that offer their own services and applications similar to online services can exclude certain services and applications of competing market players. This can include for example blocking or restricting the use of VoIP services for their customers.
- Slowing or "throttling" internet speeds: Some TSPs can slow down specific services and applications, or ask users to pay an extra fee to have access to these internet services. Given the sensitivity to high latency (delay) of many applications, TSPs are able to compromise the

⁹²NN- Ending Network Discrimination In Europe, By Giusy Cannella, Raegan MacDonald & Jochai Ben-Avie

correct functioning of these services by slowing them down, thus preventing the services from running properly. For example Verizon is throttling the speeds for Netflix streaming. Earlier Comcast was throttling Netflix before Netflix agreed to pay for a "fast lane" access.

- Blocking websites: TSPs can block websites for a number of reasons – to secure their network, or to avoid competition, and sometimes for social, public relations or political reasons.

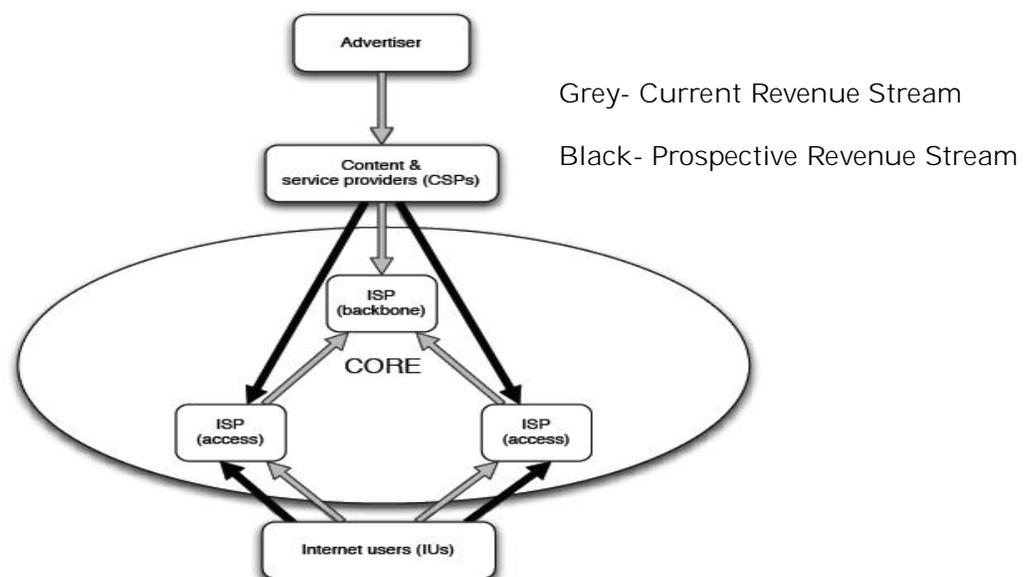
- Preferential treatment of services and platforms: TSPs can also impose data caps on internet access while granting data allowance exceptions to certain services say company's own proprietary streaming.

Investment, pricing and increasing capacity

- 5.31 Historically worldwide, there exists a de facto bar on termination fees, also referred to as a "zero-price" rule. This prevents a TSP from charging an additional fee from a content provider to reach the TSP's customers. The absence of such additional payments from content creators to TSPs facilitates the entry of content creators. The rule also helps avoid the problems of internet fragmentation, in which content providers who do not reach agreements with TSPs cannot access all customers.
- 5.32 Internet, as a network, can be seen as a market or intermediary that facilitates the interaction of two main groups: users and content providers- a two sided market. Some examples of two-sided markets include payment systems, such as credit cards or online services; hardware-software markets like videogames or operating systems; retail marketplaces such as bazaars, shopping malls, job sites; and advertising exchanges, such as online advertising platforms.
- 5.33 In the absence of additional profit prospects on the user side, TSPs could generate extra revenue from Content and Service Providers (CASPs), who are in part causing the necessity for infrastructure investments, by

exercising their market power on the installed subscriber base⁹³. CASPs have a high valuation for customers, consequently, the terminating TSP can demand an extra fee (over and beyond the access fee to the backbone TSP they are connected to) from the CASP for delivering its data to the end users. Proponents of NN aver that such new revenue streams would clearly be considered as breaches of NN. Figure 5.2 depicts the current revenue streams and prospective revenue opportunities that can be available to the TSPs.

Figure 5.2: Revenue Streams in the Internet Ecosystem



5.34 The pricing structure of the internet can be viewed as a means of subsidizing creativity and promoting innovation. Economic analysis suggests that ruling out certain types of fees for content providers encourages creation of content or new inventions that would not otherwise occur. Experts claim⁹⁴, “more than 60 percent of Web content is created by regular people, not corporations,” and over 100 million blogs have so far been documented. The internet, as a platform, has spawned thousands of new firms and millions of sites, from mass

⁹³NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt (October 2013)

⁹⁴Lessig and McChesney (2006)

content projects such as Wikipedia to search indexers and content aggregators such as Google and Yahoo.

- 5.35 If charging CASPs was to be widespread, it would be unlikely to provide sufficient sums to drive network up-grades given the scale of the revenues for these providers versus the cost of the network upgrades required. Increasing demand for capacity driven by new data-intensive applications combined with a shortage in spectrum has put TSPs under pressure to make investments that are necessary for growth. The outlook for the mobile industry suggests that wireless networks will continually need to be upgraded in order to keep pace with capacity required. And NN seems to be having a more immediate effect on the mobile industry.

The fault with the All-or-Nothing Approach

- 5.36 The adoption of the strict NN rule would require TSPs to treat each packet the same. And this, by definition, would make it impossible to offer and deliver Quality of Service. Proponents of this approach are concerned that TSPs may use QoS as a tool to distort competition among competing applications by offering QoS selectively to one of several competing applications. In addition, they fear⁹⁵ that allowing TSPs to offer QoS and charge for it may reduce the quality of the baseline service and reduce TSPs' incentives to increase the capacity of their networks.
- 5.37 Allowing all forms of discrimination raises concerns of "Internet fragmentation". TSPs might slow-down the "normal lane" traffic so that content providers will be forced to pay for "fast lane" access and this will significantly affect innovators and small content providers.
- 5.38 Therefore, the two extremes- strict NN and no regulation- are inherently flawed. Banning all discrimination is over-inclusive and restricts the

⁹⁵Network Neutrality and Quality of Service What a Non-Discrimination Rule Should Look Like, By Barbara van Schewick

evolution of the network. Allowing all discrimination can lead to exclusion and, effectively, make the rule against blocking meaningless. Hence, a few standards or principles such as 'No Blocking' and fixed QoS standards ought to be specified to respond to concerns.

Emerging Business Models

5.39 Under the current prevailing internet business model⁹⁶:

- TSPs charge end users for internet access. TSPs pay for transit from international operators, or they peer; and
- CAPs charge end users for their services, or provide it for free (normally supported by advertising). CAPs pay for hosting and connectivity from TSPs that provide this particular service.

5.40 New business models are being suggested to deal with the investment required due to the growing data consumption and also for new bandwidth-hungry content and applications provided by CAPs. These include prioritization for higher prices (including of a TSP's own services, like IPTV), charging CAPs for prioritization for delay-sensitive services and providing guaranteed network capacity for end users. Figure 5.3 categorises these emerging business models.

Figure 5.3: Non- NN Framework⁹⁷

		Pricing regime	
		One-sided	Two-sided
Network regime	Quality of service	User tiering (IUs choose priority class.)	Content and service provider tiering (CSPs and/or IUs choose priority class.)
	Managed network	Status quo (Best effort network with traffic engineering and/or managed services.)	Termination fee (Additional fee for CSPs to terminate traffic at access ISP.)
	Capacity only	Strict net neutrality (No discrimination based on source, destination or content.)	

⁹⁶GSR 2012 Discussion Paper, NN: A regulatory perspective, ITU, 2012

⁹⁷NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt (October 2013)

- 5.41 TSPs can use partnerships with CAPs to establish themselves as innovators and gain market share through cost-efficient customer acquisition. These partnerships would also provide opportunities for TSPs to increase revenues by reclaiming their footprint in the value chain. Greater collaboration with TSPs could also increase a CAP's end-user exposure by allowing it to gain access to an operator's user base and high quality network services and also present a chance to monetize the existing user base.
- 5.42 When CAPs are charged extra, just to be able to transmit their data to the access TSP's customers, but without any additional benefits in return, then these payments are simply termination fees, which are common practice in the fixed and mobile market for voice communications. However, instead of blocking the traffic of those CAPs that do not pay the termination fee, TSPs may also offer CAPs faster access lanes to its customers in return for an additional fee. Such pay for priority arrangements seem less obtrusive, yet, given a fixed amount of bandwidth, speeding up some CAPs' traffic will inevitably lead to a slowing down of those CAPs that do not pay the priority fee.
- 5.43 QoS techniques may also be employed to provide tiered internet access to end users, or to manage the traffic of certain end users (as opposed to certain protocols). Light users could be offered limited access to the internet in return for a discount to the current flat rate price for unlimited access. This means that access to websites or services that are not included in the selected internet access package would be denied, or will cost extra. At the same time, the cost for an unlimited internet access is likely to increase, because it is no longer cross subsidized by the light users. However, with respect to fixed-line internet access, proponents of NN fear that such practice may lead to a fragmentation of the internet.

- 5.44 Although not occurring on any widespread basis at the moment, TSPs could require that CAPs pay a TSP for prioritization –faster or higher quality service relating to the TSP’s network. This might not be happening because TSPs and CAPs typically don’t have any physical or contractual relationship –they interface with the myriad of internet intermediaries. However, the absence of this physical or contractual relationship may not prevent a TSP from charging a CAP. The risk for the CAP is their services are degraded relative to other competing services and they are prepared to pay for that not to happen. Large CAPs have significant power to demand reasonable commercial terms in this sort of negotiation. Smaller CAPs may be more vulnerable, but can be represented in negotiations by large hosting and connectivity providers that can have equivalent bargaining power.
- 5.45 Through new applications, and especially specialised services that capitalise on the deployment of new access networks, such as TV and video on demand services on fixed networks, operators can hope to generate additional income from end users and the content providers involved⁹⁸.
- 5.46 Operators can also try to have players located higher up the value chain help cover their costs: especially other operators and CAPs. Interconnection relationships that are at the heart of the internet’s operation are undergoing tremendous changes, in some instances creating tension between undertakings who disagree over the terms of their mutual connection.

⁹⁸Report to Parliament and the Government on NN, ARCEP (French Regulatory Agency)

Box 5.1: NET NEUTRALITY

Net neutrality is a slippery concept. The term, coined by Tim Wu underlies the basic principle that has led to the success of internet- businesses that operate the network may not discriminate between different data packets. This ensures that innovators or content developers do not need to ask permission for new projects, making internet a collection of a large amount of information, analysis, opinions and services with no sole content provider or regulator.

However, with the internet becoming more crowded and improvement in traffic management tools, net neutrality is difficult to sustain. These new technologies allow the network operator to identify the traffic they are transmitting and scrutinizing, stopping or slowing down spam and other such traffic. Network operators can now create lanes of different speeds to not only manage their traffic, but make more profits. The question that needs to be answered is that who will pay these profits- the consumers or the content providers owning majority traffic? Why should capacity-hungry services like those sites that stream videos not pay when they take up majority of the traffic capacity, especially when they are earning from it? On the other hand, many argue that without net neutrality laws, toll booths and check points will spring up all across the network, making it less attractive to new content providers and developers. They fret that network operators will abuse their market power for maximizing profits. This might, in the long run, impinge upon the freedom to impart and receive information without any interference. The operators on the other hand argue that the increasing internet traffic can be sustained by investments in upgradation of networks which will be possible by increase in profits. The recent Latvian proposal allows paid fast lanes, "provided that sufficient network capacity is available so that the availability and general quality of internet access services are not impaired in a material manner".

The next network neutrality debate is over 'zero-rating', i.e. customer access to certain websites without charging them for data usage. This will, some argue is a great way to allow customers to access these services. However, who will choose these sites and on what basis- learning basis or on popularity? This will make it difficult for competitors to compete and benefits a particular company by creating its monopoly in the service. Regulators in Slovenia and Netherlands recently banned certain forms of zero-rating.

Micro-regulation can lead to adverse impact in the industry, and detailed rules and utility- type regulations might not be the correct approach. Broader rules, such as insisting that a provider's basic services must not be very slow can be a better option. Competition between network providers will also lead to better services and reduce exploitation of market power.

Source: *"THE ECONOMIST", January 31, 2015*

5.47 User choice, innovation without permission, and low costs of application innovation⁹⁹ are essential to maintain and preserve the factors that have allowed the internet to serve as a platform for application innovation, free speech and decentralized economic, social, cultural and political interaction. Therefore, the following principles need to be ensured under any regime¹⁰⁰:

⁹⁹Network Neutrality and Quality of Service What a Non-Discrimination Rule Should Look Like, By Barbara van Schewick

¹⁰⁰Ofcom's Approach to NN

1. Effective competition amongst TSPs and user choice which can be ensured by:
 - Sufficient information available to enable consumers to make the right purchasing decisions; and
 - Consumers should be able to act on this information by switching TSPs where appropriate.

2. Transparency: Network Providers need to declare all their practices on traffic management. Ofcom has published six principles for the publication of consumer information on traffic management. It suggests that consumer information should be:
 - Appropriate: TSPs should disclose all information, and only such information, that a consumer needs to make an informed decision.
 - Accessible: basic information should be available at the point of purchase, and more detailed technical information should be readily available online or on request.
 - Understandable: information should be simple enough for consumers to be able to understand the practical impact of traffic management policies on the way they may use the internet service.
 - Verifiable: consumers or third parties should be able to verify any information provided.
 - Comparable: consumers should be able to compare information provided by different providers.
 - Current: the information available to consumers should be up-to-date, both at the point of sale and subsequently.

3. Switching costs: For competition to affect the traffic management practices used by TSPs, consumers need to be able to act on their experiences and information by switching providers. If two TSPs differ only in their traffic management techniques, in a competitive market,

consumers should be able to switch the TSP without undue costs or other barriers.

4. Quality of service assurances: There is a concern that if prioritization by TSPs becomes widespread, then the un-prioritized traffic will be so degraded that the CAPs that do not participate in prioritization will suffer competitively. This “dirt track” argument gives rise to the question of whether to introduce measures that ensure a certain base level of quality of service. There may be a more general need for these measures where degradation, hindering or slowing down warrants the introduction of a minimum quality of service requirement.

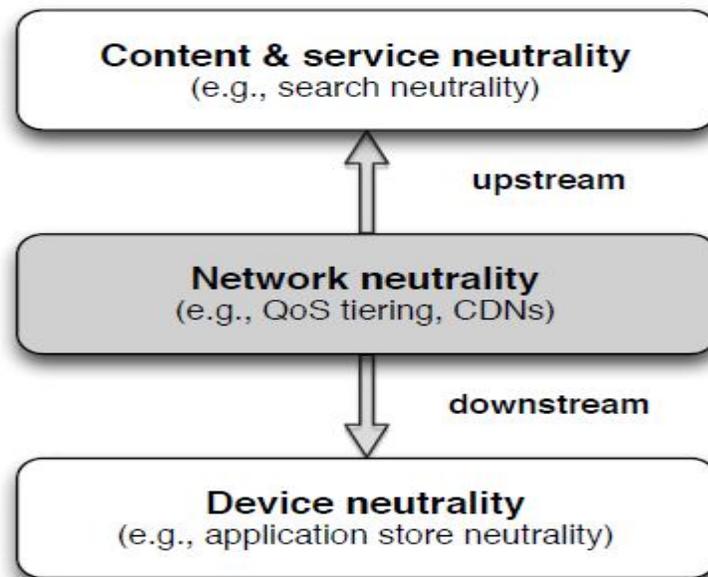
Device and Search Neutrality¹⁰¹

- 5.48 There are other stakeholders involved when a user accesses the internet. The mobile device manufacturers (such as Apple) and owners of mobile operating systems (such as Google) and search engines also form intermediaries. With the iPhone, Apple essentially took over full control over the end-user experience and software, including all wireless functionalities. Apple decides which software is allowed on their devices, both indirectly (e.g., no support of flash media) as well as directly through its centralized approval process for the AppStore. Thereby, Apple as well as other mobile operating systems providers (such as Google or Microsoft) are in the position of a gatekeeper that controls the content and functionality of end-user devices. The similarity to breaching NN is immediate and thus, it is not surprising that this development is also of concern to some NN activists. Advertisement funded search engines like Google have an incentive to bias search results in favor of their paying advertisers. Social network providers (e.g., Facebook), for instance, own the information about the so-called social graph (the aggregate information about all links of each participant of the social network with

¹⁰¹NN: A progress report, By Jan Krämer, Lukas Wiewiorra, Christof Weinhardt

other participants of the network and the related personal information). With this information search engines can personalize search results even more, based on personal preferences, social affiliation and browsing history. Figure 5.4 shows how network neutrality in the internet ecosystem is dependent not only on TSPs, but device owners and search engines as well.

Figure 5.4: Neutrality in the Internet ecosystem



5.49 In particular, it is likely that soon other gatekeepers up and down the information value chain may be pushed to center stage when the debate concentrates on issues like device neutrality or search neutrality.

Question 9: What are your views on net-neutrality in the Indian context? How should the various principles discussed in para 5.47 be dealt with? Please comment with justifications.

Question 10: What forms of discrimination or traffic management practices are reasonable and consistent with a pragmatic approach?

What should or can be permitted? Please comment with justifications.

Question 11: Should the TSPs be mandated to publish various traffic management techniques used for different OTT applications? Is this a sufficient condition to ensure transparency and a fair regulatory regime?

Question 12: How should the conducive and balanced environment be created such that TSPs are able to invest in network infrastructure and CAPs are able to innovate and grow? Who should bear the network upgradation costs? Please comment with justifications.

Chapter 6

The Way Forward: Options Available

- 6.1 There have been instances in the recent past where Indian TSPs have used techniques that may be referred to as breach of strict NN principles. TSPs have been using techniques such as blocking some sites or differential pricing of OTT apps. There have been other instances where the TSPs have co-opted the OTT players. Examples include Reliance Communications coming together with Facebook to provide free access to 38 websites including Facebook, Wikipedia, Reliance Astrology, AajTak etc. Airtel has recently launched its 'One Touch Internet' through which uninitiated Internet users are allowed to see-try-buy a host of popular services (including social networking, videos, online shopping and travel bookings) through free tutorial videos and trial packs. Airtel's intended differential pricing for VoIP is an example of price discrimination. TSPs are offering data packs for specific apps like WhatsApp. Some of the TSPs in India have started proprietary OTT services like Hike and WYNK.
- 6.2 As has been discussed in this paper, OTTs riding on TSP's networks are not subject to any regulatory framework. Experience across countries vary and TSPs are grappling with coming to terms with communication OTTs affecting their business models. Even non-communication OTTs such as videos, gaming and e-commerce are consuming scarce bandwidth raising issues about network investment. TSPs are subject to regulatory and licensing regimes in most jurisdictions. However, in the absence of a consensus on NN, with no public policy or statute yet in place, there is no defined delimitation of what the TSP can do and cannot do.
- 6.3 In the absence of an overarching framework and legislation on NN across jurisdictions, TSPs, as stated above, are taking action within the limits of

the law as it prevails today. They are adopting network management practises to either protect their turf or co-opting OTT players to augment revenues or increase their customer base. Some of these traffic management practices to prevent congestion externalities may be legitimate in one jurisdiction but may not be so in another. This chapter lists out some such practices being adopted by TSPs in dealing with OTTs. Some of these practices may be generally acceptable in many jurisdictions even though a stated NN policy or legislation may not be in place.

- 6.4 And, this brings in the essential question on the powers of the regulator; as to what can be done, what is the existing law and whether the regulator has the jurisdiction to regulate OTTs or take actions to regulate practices being adopted by the TSPs.

Powers of the regulator

- 6.5 OTT players are generally not bound by regulations in many countries. There can be two broad categories of OTTs- OTTs that provide communication services and those providing other services. The communication OTT players are competing with TSPs in the communications sector, and are winning the race, especially in the SMS market due to zero rates and value added features. However, the OTTs are not bound by any regulations; this orients market dynamics in their favour. The lack of regulations also poses a threat to security and safety because of the very nature of the communications sector (See Chapter 3).
- 6.6 The challenges posed by OTT services from a national perspective were discussed earlier. There is a need for the Government to ensure proper regulatory balance to ensure a level playing field in terms of regulatory compliance. There is also a need to address the issues pertaining to security. Though the regulatory imbalances for the non-communication

OTT players are not under the purview of the telecom regulations, the issues have to be addressed suitably by the concerned Ministries/agencies. There may be a need to undertake a comprehensive review of the existing laws/regulations for such non-communication OTT players in all fields which presently fall under the purview of different ministries. It may even become necessary to establish a Nodal Authority which is entrusted with the responsibility of ensuring compliance with the laws of the land e.g. Consumer Protection Laws for e-commerce.

- 6.7 In the case of OTT players offering communication services, to address the various regulatory imbalances and other issues, one available option (as discussed in Chapters 2 and 3) is to bring them within the ambit of licensing framework in some form. In France, while Skype is registered as a telecom operator and meets other obligations, ETNO has not demanded any registration on the part of other OTT applications. Rather, ETNO has proposed to allow TSPs and OTT providers to negotiate prices, while ensuring specific QoS and adhering to other general principles. VoIP in Germany is regulated due to their technology neutral Telecommunications Act.

Regulatory Framework for OTTs

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

(i) Communications Service Provider(CSP)

- 6.9 The fundamental difference between the OTTs and the CSPs remains the ownership of the network. The TSPs contend that unless there is a revenue flow, they do not have an incentive to maintain or upgrade the network. In contrast, the business models of the OTT industry rely on

free riding over the network of the TSPs. The classification of an OTT as a CSP will enable them to have proper interconnection with other service providers and at the same time ensure QoS to the end customer.

- 6.10 All regulatory/ licensing requirements including lawful interception and security of the network will be ensured if OTT players are classified as CSP. Some countries like France have mandated VoIP service providers to be licensed before offering voice services. As a CSP, the OTT players could position themselves along with the TSPs in offering adequate quality of service to customers through various traffic management techniques like deep packet inspection, layered segmentation, and traffic differentiation. Also, classification of OTT players as CSPs will make them liable for payment of license fees and other applicable fees paid by the TSPs. This therefore, needs careful deliberation.

(ii) Application Service Provider (ASP)

- 6.11 The alternative is to categorise OTT communication service providers as ASPs riding over the network of the TSPs. The Authority, in its Recommendations on Application Services of 14th May 2012, had defined application services as enhanced services, in the nature of noncore services, which either add value to the basic telecom services or can be provided as standalone application services through the telecom network. If these OTT players are treated as providers of such Application Services, they could be classified as ASPs. The Authority had recommended that ASPs should be covered under licensing through authorisation. This will enable a proper regulatory framework to consider cases of revenue share, open access to application services and prioritised services being offered to customers. However, such an authorisation system should incorporate certain minimum public service utility add-on concerns like emergency access, Lawful interception etc.

6.12 Presently, there are a number of Application Services centred on entertainment, music and sports (mainly cricket) offered by the ASPs through the TSPs. In the value chain for application services, technology enablers, or aggregators, and content owner/application provider/mobile advertisers are directly connected to the network of TSPs for provision of content/application services. Depending upon the application service offered and the business model, the content/application provider may provide its services directly to the user through the TSPs' networks.

Regulatory Framework for TSPs

6.13 The TSPs are subject to regulatory and licensing regimes. In the absence of a consensus on NN or a public policy statement, there are no legislations in place that clearly define the dos and don'ts of how a TSP can treat the traffic in its network. In the absence of an overarching framework, there are limits imposed on the extent to which the regulator can intervene. And, in any case even the regulator is bound and confined to these areas demarcated in the law establishing the regulatory authority. NN is a much larger policy initiative with wide-ranging ramifications. Until the Government comes up with the rules on NN, the TSPs will be tempted to use practices resorted to in other jurisdictions. Public outcry and regulatory restraint will remain the main instruments to prevent blatant misuse of the vacuum resulting from the absence of a public regulation and associated legislation. Hence, except for regulatory action within the ambit of the law, any other regulatory measure can be called into question as legally non-sustainable.

6.14 Nevertheless, whatever steps the TSPs adopt as strategies vis a vis OTT players should be reasonably within the limits of the law. Also worldwide there is a vast difference in the practices adopted by TSPs, because what

is legitimate in one jurisdiction may not be so in another. Some of the common principles as explained in Chapter 5 include - effective competition, transparency, low switching costs and assured reasonable quality of service.

Traffic management practices adopted by TSPs

- 6.15 In the absence of any legally binding framework, TSPs can and do resort to differential treatment of OTT services on their network. Non-communication OTTs, especially those dealing in video streaming impose large demands on the network in terms of traffic load, bandwidth requirements and congestion. The experience of how TSPs are dealing with the challenges posed by OTT players varies across countries. The most popular strategies employed by TSPs include fair usage policies, toll booting, zero- rating, data caps and traffic management. The question that arises is, should the TSPs be allowed to differentiate between OTT players based on the services they provide? Or, should restraints be imposed on what can and cannot be done?
- 6.16 The differential treatment commonly undertaken by TSPs is implemented through: (i) non-price based mechanisms; or (ii) price based mechanisms.

(i) Non-Price based mechanisms

- 6.17 Non-price based differential treatment may mean providing preferential treatment to certain OTT apps, even as no direct economic benefit is bestowed on the preferentially treated apps. There are different ways in which TSPs can effect differential treatment: degrade the quality of service running on the TSPs' network, delay interconnection requests, require customers to go through additional procedures to decrease the application's brand value, or even outright refusal to interconnect.

6.18 Based on a survey of European regulators, BEREC has identified some categories of non-price based restrictions that have been observed in the telecom industry in Europe. These are:

- Restricting specific types of traffic (for example, P2P or VoIP);
- Differentiating between providers of types of content or applications;
- Technical network protection for congestion management or network security and integrity;
- Implementation of business models (such as data caps or preferentially treated specialized services); and
- Restrictions undertaken in response to legal obligations.

6.19 In cases where TSPs resort to non-price based differentiation, it may become necessary to impose a **transparency** requirement on TSPs, mandating them to make public, the peering and transiting arrangements and traffic management practices they resort to in order to effectuate these arrangements/practices. However, some traffic management practices such as those for avoiding network congestion or for security concerns cannot be strictly construed as non-discriminatory.

6.20 Using techniques for effective data management, TSPs can differentiate between various applications and provide customised services to Application Service Providers (ASPs). Such services could be provided through appropriate revenue sharing agreements between the TSPs and the ASPs. This is akin to a **toll-booth system** whereby different services are priced differently depending on agreements. Also, they can (and do) resort to '**Zero-rating**', where they can provide preferential access to certain defined sites. In both these cases the ASP pays the TSP and not the end-user. For example, access to an e-commerce site could be given

preferential treatment by charging suitable access costs. The following are some of the techniques currently used by TSPs for such traffic management:

- i. **Application-agnostic congestion management:** To respond to network congestion, TSPs can react to daily fluctuations or unexpected network environment changes by implementing “congestion controls” at the edge of the network, where the source of the traffic (e.g. computers) slows down the transmission rate when packet loss is occurring. This ensures adequate Quality of experience for any particular service i.e. under revenue share agreement. For example, after the FCC open Internet Order, 2010, Bretton Woods Telephone Company, Northeast Iowa Telephone Company and a few others firms disclosed that they were using this particular technique for managing congestion.
- ii. **Prioritization:** A TSP might prioritize transmission of certain types of data over others (most often used to prioritize time-sensitive traffic, such as VoIP and IPTV). TSPs may be required to prioritize emergency services through such networks, enable lawful interception and ensure proper security of data. The ASPs will be able to ensure such regulatory requirements through TSPs. For example IPTV services ‘FiOS’ offered by Verizon or the ‘one Uverse’ which is an IPTV service offered by AT&T.
- iii. **Differentiated throttling:** The capacity available for a particular type of content (most often peer-to-peer traffic, particularly in peak times) may be restricted, which preserves capacity for the un-restricted content. Unlike application-agnostic congestion management, this technique is aimed at a specific type of content; generally a type that is bandwidth-hungry and non-time-critical. This can also ensure differentiated delivery of various OTT services depending on various agreements with the ASPs. Verizon Wireless, a wireless provider in USA uses this technique for throttling the speeds of unlimited data users. Also if the users exceed the data cap, the speeds are throttled.

- iv. **Blocking:** End-users may be prevented from using or accessing a particular website or a type of content (e.g. the blocking of VoIP traffic on a mobile data network). Blocking may be implemented to:
 - a. Inhibit competition, particularly if the access provider offers a service that competes with the service being blocked;
 - b. Manage costs, particularly where the cost of carrying a particular service or type of service places a disproportionate burden on the access provider's network; and
 - c. Block unlawful or undesirable content, such as child abuse, viruses or spam. This may be necessary to comply with government or court orders, or done at the request of the end user. The blocking of unlawful and undesirable content generally raises few net neutrality concerns.

- 6.21 Telecom operators have developed and deployed business models based on such practices. Variations across jurisdiction depend on what is legally acceptable in a jurisdiction. Network discrimination can include:
- a. Blocking of application and services
 - b. Blocking websites
 - c. Slowing or "throttling" internet speeds Preferential treatment of services and platforms
 - d. Differential pricing for selective OTT applications.(including differentiation based on Volume of usage, speed and validity)

While all entail some form of network discrimination, some, such as (a) and (b) are more aggressive than others. Price based product/ service differentiation is, in general, preferable (and more acceptable) than outright restrictions.

- 6.22 Another type of non-price discrimination (because the end-user usage is not determined by a price charged by the TSP) is the introduction of

'zero-rating'. For instance, Reliance Communications joining hands with Facebook to provide free internet access as discussed in the earlier part of this chapter. Airtel's 'One Touch Internet' initiative is another similar strategy. The arguments made by Reliance Communications and FB are that they provide free access to the Internet and that the end-user does not pay. However, critics say that this selective access to the Internet will make it difficult for other rivals to cater to this particular market. Some believe that there should be no discrimination whatsoever if the services are delivered at lower rates or, as in this case, for free. While Zero-rating does not limit the customer's options in the short run, prolonged usage will surely condition his/her choices in the long run in matters of preference of sites.

(ii) Price based mechanism

- 6.23 The introduction of pricing for OTT-originated traffic opens up the possibility of price discrimination. Pricing an OTT service too high can effectively lead to prohibition of the service; equally, pricing services too low may result in entry of inefficient apps into the market. OTT services provide a rich experience to consumers, and represent the forefront of innovation in technology and business.
- 6.24 The Telecommunication Tariff Order, 1999 (TTO 1999) laid down the conditions that will regulate the application of rates / tariffs by the various TSPs as per clause 11 (1) (c) of the TRAI Act 1997. As per the provisions of the TTO, 1999 and its amendments, the tariff for data (Internet) is under forbearance. However, all TSPs have to comply with regulatory principles of *inter-alia*, non-discrimination and non-predation. Non-discrimination means that **TSPs shall not, in the matter of applications of tariffs, discriminate between subscribers of the same class and such classification of subscribers shall not be arbitrary.**

6.25 While the TTO, 1999 deals with the issue of discrimination between subscribers of the same class, the introduction of separate tariffs for OTT-originated traffic opens up the possibility of price discrimination between different content across all consumers – not by class of consumer. For example, the TSPs could charge different tariffs for normal internet data access and differently for communication services (such as voice and messaging). They could also charge differential tariffs for access to services from different content/ application providers; for example, access to an e-Commerce site could be given preferential treatment by charging suitable access costs.

6.26 The TSPs claim that with an increase in the OTT services providing voice and messaging applications which are in direct competition with the licensed telecom services, the TSP's voice, and messaging traffic would be displaced by OTT services viz. communication traffic could be diverted to OTT apps. Hence the TSPs would be deprived of the required return on their investments in telecom infrastructure. To protect the return on their investment, the TSPs should be able to resort to price discrimination for such OTT services so as to ensure that voice, video and messaging carried through the traditional telecom channel do not become uncompetitive as compared to voice, video and messaging delivered through OTT services. Pricing for access ought not to be used to garner monopoly rents from the control of bottleneck facilities. Pricing should in no way lead to emergence of discriminatory networks. Some of the common practices the TSPs adopt to effectuate price discrimination are :

- **Data caps:** It is a technical measure that requires monitoring traffic volume and throttling data or charging for extra volume once a pre-defined data cap is reached. Data caps provide a price signal to end users in relation to the cost of their bandwidth consumption. Using

this measure, the volume of data transmitted for any particular application could be determined and the revenue share can be calculated accordingly. This is currently being used in India. In such packs the user gets a particular speed up to a particular data limit say, 5 or 10GB, and the speed reduces upon reaching the limit.

- **Access-tiering:** A TSP may prioritize a specific application or content – for a price to be paid by a customer. By selling access to a “lane”, TSPs can generate greater revenue to fund the network investments necessary to handle increasingly bandwidth-hungry services. This is similar to pricing in the railways where travellers on passenger trains and express trains are priced differentially.

6.27 On the other hand, consumers (supported by OTT service providers) contend that end-users pay for the data usage as per data tariffs offered by the TSPs. Hence, there is no free ride. They contend that TSPs do not have to incur any additional cost when a customer accesses an OTT service. Simply because the TSPs look at some of these OTT services as competing with their main offerings is not sufficient reason for forcing them to pay a higher tariff for consumption of these OTT services.

Pricing model for Bulk User of Telecom Services (BuTS)

6.28 Another option open to the TSPs is to treat an OTT as a bulk user of their telecom services. This requires instituting a sustainable pricing plan for the BuTS by the TSPs while also ensuring competitive pricing for competing OTTs. It also has to be ensured that the TSPs do not incentivise their own vertically integrated services. The pricing mechanism so derived should reflect the mobile networks’ costs of providing access and network services. Further, it cannot “double dip” – that is, collect payments for the same traffic from BuTS and the consumer. Potentially, only a model based on usage-based pricing, in

which there will be two-part tariff, inclusive of a basic access fee to be borne by the OTT players and the usage charge indexed to user's data usage borne by the consumer, might fulfil these requirements. This basic access fee may be charged to the users by the OTT players to pay the TSPs. In this context, the regulatory framework would ensure fair compensation to TSPs while ensuring competitive neutrality between platforms and providers, and thus suggest best practices for OTT regulation.

- 6.29 Treating OTT players as BuTS will also encourage local app service providers to develop India specific OTT apps. This may be similar to what happened in China viz. the emergence of WeChat and Tencent. Encouraging such India-specific OTTs will augment the supply of apps having localised content in various Indian languages, thereby removing the language barriers for the use of such apps. This will also enable home grown OTT services that can be localised and the services would be located within the country.

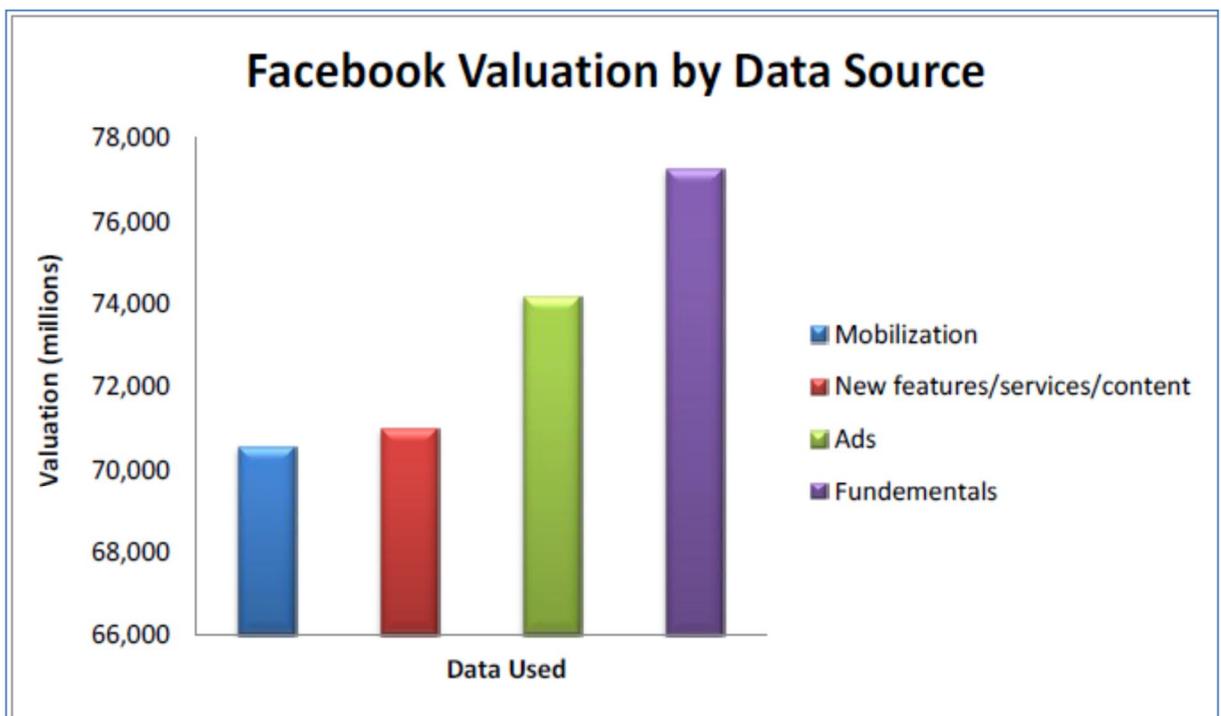
Pricing of OTT services

- 6.30 Today most of the OTT communication apps are offered to customers at near 'no cost' (or entirely free). This is primarily because of revenue streams other than subscription. These apps could generate revenues from advertisements, apps bundled with handsets, in-app purchases, and selling certain features through user license.
- 6.31 Some OTT players like Whatsapp, Skype, Viber also have a subscription model where users are charged a certain amount every month for use of these apps. Their strength lies in the number of subscriptions they have; the large number of users paying even low charges results in a relatively larger revenue stream. The astronomical valuation of some of these OTT players (like the Twitter's \$11 billion or Facebook's \$104 billion) is

forcing these entities to look for alternative business models to generate more revenues, moving to a complete subscription model from the current free or the 'penny gap' model. For example, the Facebook valuation was based on factors as depicted in Figure 6.1 below.

6.32 Under compulsion to perform by their stakeholders, these OTT players may end up having to increase prices from present levels based on their business models. This may be at the cost of customer's interest. The larger question that arises is whether there should be any check and balance to ensure adequate consumer protection. If so, what form should such checks and balances take?

Figure 6.1: Facebook Valuation



Question 13: Should TSPs be allowed to implement non-price based discrimination of services? If so, under what circumstances are such practices acceptable? What restrictions, if any, need to be placed so that such measures are not abused? What measures

should be adopted to ensure transparency to consumers? Please comment with justifications.

Question 14: Is there a justification for allowing differential pricing for data access and OTT communication services? If so, what changes need to be brought about in the present tariff and regulatory framework for telecommunication services in the country? Please comment with justifications.

Question 15: Should OTT communication service players be treated as Bulk User of Telecom Services (BuTS)? How should the framework be structured to prevent any discrimination and protect stakeholder interest? Please comment with justification.

Question 16: What framework should be adopted to encourage India-specific OTT apps? Please comment with justifications.

Question 17: If the OTT communication service players are to be licensed, should they be categorised as ASP or CSP? If so, what should be the framework? Please comment with justifications.

Question 18: Is there a need to regulate subscription charges for OTT communication services? Please comment with justifications.

Question 19: What steps should be taken by the Government for regulation of non-communication OTT players? Please comment with justifications.

Question 20: Are there any other issues that have a bearing on the subject discussed?

Chapter 7

Issues for Consultation

Question 1: Is it too early to establish a regulatory framework for OTT services, since internet penetration is still evolving, access speeds are generally low and there is limited coverage of high-speed broadband in the country? Or, should some beginning be made now with a regulatory framework that could be adapted to changes in the future? Please comment with justifications.

Question 2: Should the OTT players offering communication services (voice, messaging and video call services) through applications (resident either in the country or outside) be brought under the licensing regime? Please comment with justifications.

Question 3: Is the growth of OTT impacting the traditional revenue stream of TSPs? If so, is the increase in data revenues of the TSPs sufficient to compensate for this impact? Please comment with reasons.

Question 4: Should the OTT players pay for use of the TSPs network over and above data charges paid by consumers? If yes, what pricing options can be adopted? Could such options include prices based on bandwidth consumption? Can prices be used as a means of product/service differentiation? Please comment with justifications.

Question 5: Do you agree that imbalances exist in the regulatory environment in the operation of OTT players? If so, what should be the framework to address these issues? How can the prevailing laws and regulations be applied to OTT players (who operate in the

virtual world) and compliance enforced? What could be the impact on the economy? Please comment with justifications.

Question 6: How should the security concerns be addressed with regard to OTT players providing communication services? What security conditions such as maintaining data records, logs etc. need to be mandated for such OTT players? And, how can compliance with these conditions be ensured if the applications of such OTT players reside outside the country? Please comment with justifications.

Question 7: How should the OTT players offering app services ensure security, safety and privacy of the consumer? How should they ensure protection of consumer interest? Please comment with justifications.

Question 8: In what manner can the proposals for a regulatory framework for OTTs in India draw from those of ETNO, referred to in para 4.23 or the best practices summarised in para 4.29? And, what practices should be proscribed by regulatory fiat? Please comment with justifications.

Question 9: What are your views on net-neutrality in the Indian context? How should the various principles discussed in para 5.47 be dealt with? Please comment with justifications.

Question 10: What forms of discrimination or traffic management practices are reasonable and consistent with a pragmatic approach? What should or can be permitted? Please comment with justifications.

Question 11: Should the TSPs be mandated to publish various traffic management techniques used for different OTT applications? Is this a sufficient condition to ensure transparency and a fair regulatory regime?

Question 12: How should the conducive and balanced environment be created such that TSPs are able to invest in network infrastructure and CAPs are able to innovate and grow? Who should bear the network upgradation costs? Please comment with justifications.

Question 13: Should TSPs be allowed to implement non-price based discrimination of services? If so, under what circumstances are such practices acceptable? What restrictions, if any, need to be placed so that such measures are not abused? What measures should be adopted to ensure transparency to consumers? Please comment with justifications.

Question 14: Is there a justification for allowing differential pricing for data access and OTT communication services? If so, what changes need to be brought about in the present tariff and regulatory framework for telecommunication services in the country? Please comment with justifications.

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Question 16: What framework should be adopted to encourage India-specific OTT apps? Please comment with justifications.

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Question 18: Is there a need to regulate subscription charges for OTT communication services? Please comment with justifications.

Question 19: What steps should be taken by the Government for regulation of non-communication OTT players? Please comment with justifications.

Question 20: Are there any other issues that have a bearing on the subject discussed?

List of Acronyms

1	3G	Third Generation
2	4G	Fourth Generation
3	Apps	Applications
4	BEREC	Body of European Regulators of Electronic Communications
5	BSS	Business Support Systems
6	CDN	Content Delivery Network
7	CNNIC	China Internet Network Information Center
8	CPCE	Code des Postes et Communications Électroniques
9	DPI	Deep Packet Inspection
10	EPS	Evolved Packet System
11	ERC	Evolved Packet Core
12	ETNO	European Telecommunications Network Operators
13	eTOM	Enhanced Telecom Operations Map/ Business Process Framework
14	EU	European Union
15	FCC	Federal Communications Commission
16	ICT	Information Communication Technology
17	IMS	IP Multimedia Core Network Subsystem
18	IPTV	Internet Protocol Television
19	ISP	Internet Service Provider
20	ITIL	Information Technology Infrastructure Library
21	KCC	Korea Communications Commission
22	KPCB	Kleiner Perkins Caufield& Byers
23	LTE	Long-Term Evolution
24	M2M	Machine to Machine
25	MIM	Mobile Instant Messaging
26	MNCs	Multi-National Companies
27	NN	Net Neutrality
28	OCS	Offline Charging System
29	OS	Operating System
30	OSS	Operations support system
31	OTT	Over the Top
32	P2P	Peer to Peer
33	PCRF	Policy and Charging Rules Function
34	QoS	Quality of Service
35	RCS	Rich Communication Services
36	RSS	Rich Site Summary
37	SAE	System Architecture Evolution
38	SMS	Short Message Service
39	SPNP	Sending Party Network Pays
40	TOGAF	The Open Group Architecture Framework
41	VoIP	Voice over Internet Protocol
42	VoLTE	Voice over LTE
43	WAC	Wholesale Applications Community
44	XaaS	Anything as a Service
45	YoY	Year on Year

