



Economic Impact of OTTs

Technical Report
2017

Summary

This technical paper seeks to provide technical and policy background to the international community in both developed and developing countries as to the nature and implications of Over-the-Top (OTT) and related online services.

Keywords

OTTs, online services, economic impact, policy, infrastructure cost, infrastructure investment, benefits, societal welfare, vertical integration, horizontal integration, policy challenges, policy approaches

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This document contains the ITU-T Technical Paper “Economic impact of OTTs” approved at the ITU-T Study Group 3 meeting held in Geneva, 5-13 April 2017.

Editor

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ITU Study Group 3 (SG-3) has committed to a work item on the economic impact of over-the-top (OTT) services.

This report (which results from that decision) seeks to provide technical and policy background to the international community in both developed and developing countries as to the nature and implications of Over-the-Top (OTT) and related online services.

The report seeks to be *descriptive* rather than *normative*. It seeks to provide clear statements on the current state of play, and to identify suitable *findings* where appropriate; nonetheless, in many cases, it refrains from expressing findings – even in instances where there is little dispute over the relevant facts, there may be multiple conflicting interpretations and narratives based on those facts. In any event, *recommendations* are clearly beyond the scope of this report.

In order to take the study to its current level, it was necessary to resolve a number of inter-related scoping and definitional questions, at least on a tentative basis (but with the recognition that our tentative definitional conclusions for this study are without prejudice to any future regulatory definitions). Among the issues that had to be addressed:

- What is the proper *scope* for the study?
- Given that there is a very wide range of services that might possibly be classified as online services, what services should be viewed as being OTT services for purposes of this study? How do these OTT services differ from other online services?
- How relevant is the economic concept of *substitution* for traditional telecommunications and broadcasting services to this classification?

Network neutrality is a separate topic in its own right. Since it is extensively covered elsewhere, this report treats the topic as being largely out of scope; however, it is addressed where necessary.

Surveillance, whether for purposes of national security or for law enforcement, is treated as being generally out of scope for this report; however, it was necessary to mention it in passing at several points.

Specific aspects that are explored or provided include:

- what OTT services are (and are not) (Chapter 2);
- the benefits and impacts associated with OTT services (Chapter 3);
- a range of challenges to global public policy (Chapter 4);
- examples of interesting approaches that have been attempted or implemented in various parts of the world (Chapter 5); and
- concluding remarks (Chapter 6).

What are OTT services, and how do they differ from other online services?

Key Findings

For purposes of this report, an over-the-top (OTT) service is an online service that can be regarded as potentially substituting for traditional telecommunications and audiovisual services such as voice telephony, SMS, video on demand and television. (This working definition for purposes of this report is without prejudice to any regulatory definition that might conceivably be adopted in the future.)

With this working definition in hand, it is possible to characterise OTT services based on the traditional services with which they compete. OTT services compete with voice services (typically by offering VoIP services), with SMS (typically by offering chat and messaging services), with voice and video conferencing, and with television and video on demand (typically by offering streaming services such as Netflix and a range of online video content).

Online services that do not substitute to a significant degree for traditional telecommunications or audiovisual services are, for purposes of this report, not OTT services. In practice, however, the distinction sometimes blurs.

This section offers a working definition of OTT services for purposes of this report, and provide examples of what OTT services are (and are not). In order to have a clear scope for this report, it is necessary to establish clear boundaries, as much possible, as to what services should be viewed as being OTT.

If policy or regulatory measures were to be enacted for OTT services, it would presumably be necessary to establish a regulatory definition for OTT services. Consistent with our approach to recommendations in general, this report does not put forward suggested or recommended regulatory definitions. The working definitions that are used in order to establish the scope of this report are thus without prejudice to whatever regulatory definitions, if any, might eventually be formulated by the ITU or any other body.

2.1 Working definitions for purposes of this report

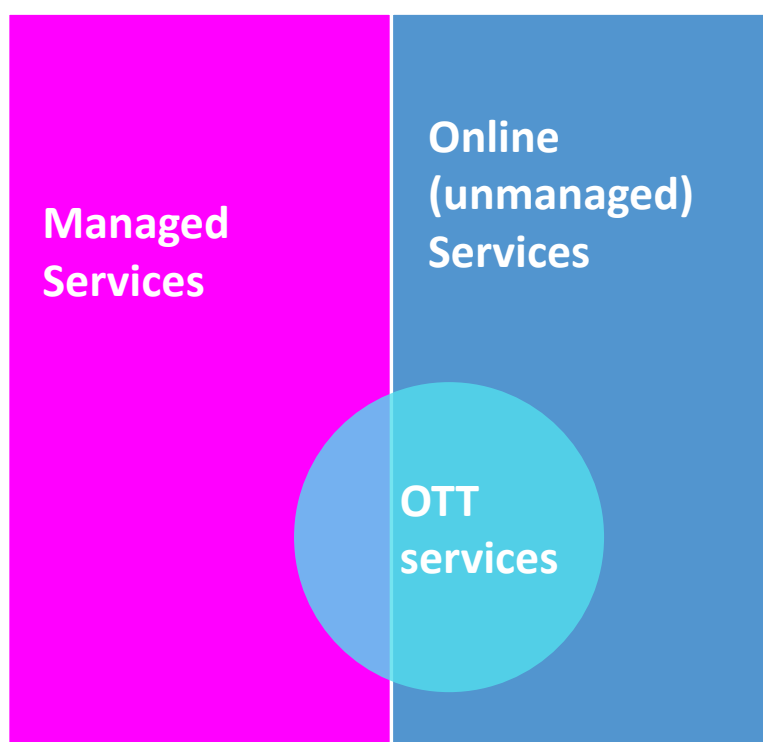
There is no single, universally accepted definition of OTT services or of online services in general. Much of the discussion, however, has tended to focus on establishing a *level playing field*, however defined, between OTT services based on the *Internet Protocol (IP)* and the traditional telecommunications and broadcasting services with which they are presumed to compete. This seems to suggest that competitive neutrality between traditional services and new IP-based OTT services is perceived as an important consideration. With that in mind, the following working definitions will be used for purposes of this report:

- **OTT service:** an over-the-top (OTT) service is an online service that can be regarded as potentially substituting for traditional telecommunications and audiovisual services such as voice telephony, SMS, video on demand and television.¹

¹ Ilsa Godlovitch, J. Scott Marcus, Bas Kotterink, Pieter Nooren et al. (2015), "Over-the-Top (OTT) players: Market dynamics and policy challenges", study for the IMCO Committee of the European Parliament.

- **Managed service:** a service where the provider offering the service has substantial control over the fixed or mobile access network used for its distribution. The provider may be able to use this control to size its network, or to reserve network capacity to guarantee the quality of the service.²
- **Online service:** a service that depends on the public Internet for its delivery, at least in part; consequently, no single network operator can guarantee the quality of the service delivered.³

Schematically, the relations among managed services, online services, and OTT services that are assumed for purposes of this report can be viewed as depicted in the Venn diagramme in Figure 1. OTT services are often, but not always, unmanaged.



Source: Marcus

Figure 1. Managed services, online services, and OTT services: a set theoretic view.

Our focus in this report is on OTT services, and on online services that are closely related to them. In other words, it is on services that substitute in some degree for traditional telecommunications and, to a lesser degree, for broadcasting services.⁴ Other online services are, as much as possible, out of scope.

² Ibid.

³ Ibid.

⁴ This definition is roughly equivalent in practice to a definition in Shirley Baldry, Markus Steingröver, and Markus A. Hessler (2013), "The rise of OTT players – what is the appropriate regulatory response?" They write: "OTT

2.2 Examples of OTT services for purposes of this report

With these definitions in hand, it is possible to create an organised view of OTT services based on the traditional services with which they compete.⁵

- **Voice services:** Firms include Skype, Viber, the South Korea-based KakaoTalk, and various capabilities that are integrated into social networking and other applications of firms such as Google and Facebook. Some of these services provide voice communications solely or primarily to traditional phones that have phone numbers (e.g. Vonage); some complete calls only to users who have the same application (e.g. KakaoTalk); and many provide both (e.g. Skype). Some offer the ability not only to place calls, but also to receive calls that have been placed to a particular phone number (a service that is sometimes sold separately).
- **SMS services:** A range of chat services are prominent, most notably Whatsapp and Viber.
- **Teleconferencing:** Skype is prominent in this sector, as is Google Hangout. In the traditional telecommunications world, teleconferencing has been primarily a service for large enterprises because it is fairly expensive. OTT services enable inexpensive or free videoconferencing with a range of value-added features, but at a level of transmission quality that can be fairly low.
- **Broadcast (linear) video:** A range of IPTV offerings compete with traditional broadcasting.
- **Video on demand:** Online services can offer a more flexible alternative to traditional video on demand services as well. YouTube is a conspicuous example, but there are many more.

The degree to which these OTT services substitute for the services with which they compete can vary greatly from one service to the next.

- Many would argue (see Figure 2) that chat services have collectively reversed the previous growth trend of SMS, and that it can be presumed to be taking substantial business away from traditional network operators.⁶
- Substitution effects can however be more complex, as appears to be the case with VoIP services such as Skype (see Figure 3). Skype appears to be very successful in taking *international* calling business away from traditional network operators (presumably because it is inexpensive and simple), but it appears to have been less successful in gaining market share among *domestic* calls made (presumably due to factors such as relatively low voice quality).⁷

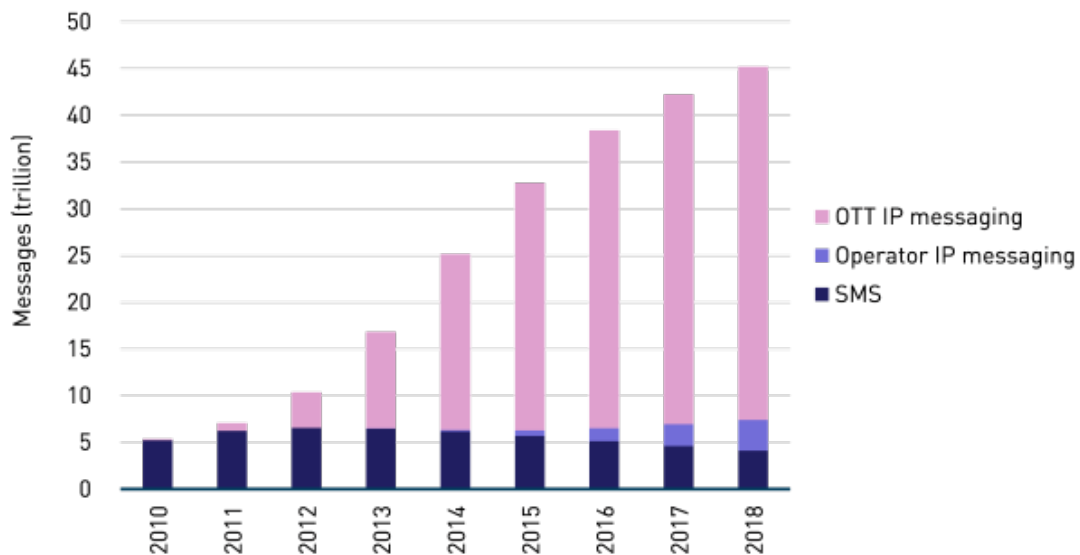
Communication refers to services whose primary applications lie in communications but use the internet as the transport medium. This is especially relevant to telecom operators since these services operate in a similar space as traditional voice and messaging services."

⁵ The taxonomy here is a bit more detailed than that provided by the Indian TRAI, but broadly consistent with it. They note that "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." See TRAI (2015), "Consultation Paper on Regulatory Framework for Over-the-top (OTT) services".

⁶ Caution is given, here and throughout, that the accuracy of analyst estimates such as these cannot be guaranteed; moreover, forward-looking projections are subject to numerous uncertainties.

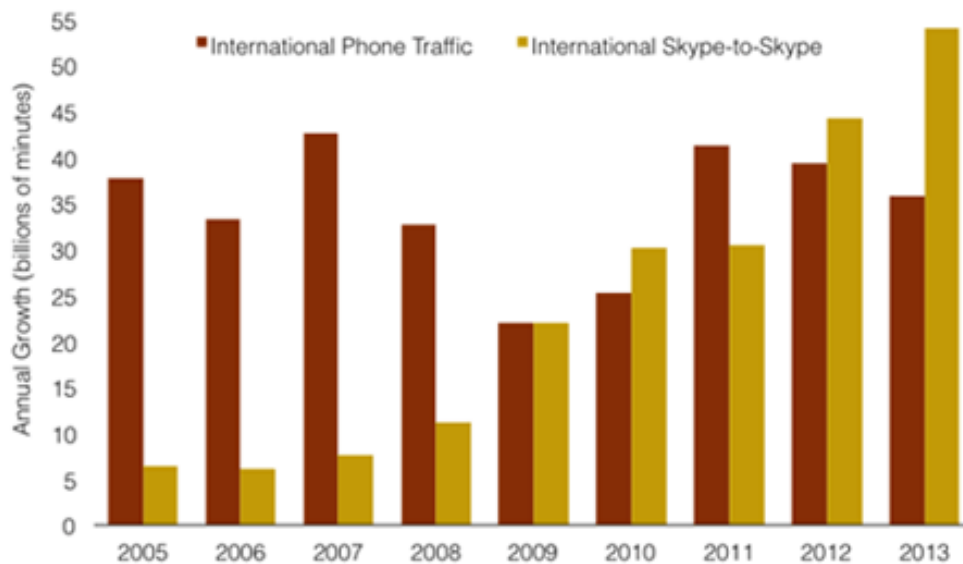
⁷ As networks gain in speed and capability, this might perhaps reverse. Voice quality of VoIP might well improve over time. Indeed, VoIP is not forced to "clip" high frequency response as is the case with traditional telephony; consequently, it is quite possible in the long term that VoIP will offer audio quality of higher fidelity than that of the traditional voice telecommunications network.

There are often gaps in the ability of OTT services to substitute for a traditional telecommunications or broadcasting service. Often, OTT services function as *imperfect substitutes*. In principle, these apparent substitution effects can be measured and assessed using econometric techniques. In practice, however, data quality may pose challenges, and it is often difficult to establish a clear causal relationship. That usage of a traditional service declined while that of a new IP-based OTT service increased may be *suggestive* of a causal relationship, but the two tendencies may be unrelated to one another, or may both result from some unobserved third phenomenon.



Source: Analysys Mason⁸, 2014

Figure 2. Volume of messages from mobile handsets.



Source: Telegeography⁹, 2014

Figure 3. Year over year increase in international telephone traffic and Skype traffic (billions of minutes).

⁸ See <http://www.analysysmason.com/About-Us/News/Insight/OTT-messaging-volumes-Jan2014-RDMV0/>.

⁹ Telegeography (2014), "Skype Traffic Continues to Thrive", 15 January 2014, viewed 26 December 2015, at <https://www.telegeography.com/press/marketing-emails/2014/01/15/skype-traffic-continues-to-thrive/>.

On the other hand, OTT services often offer capabilities that are either unavailable with traditional services, or else available only at significant cost. Skype, for instance, functions not only as a voice communications substitute (and to some extent as a chat medium), but also offers voice conferencing and videoconferencing, both to and among users of the Skype application and to traditional phones (but only for voice in the latter case). Videoconferencing over the traditional telecommunications is available, but only at a cost that makes it inaccessible to most consumers.

In other words, the competition that OTT services offer to traditional services is complex. In some areas, OTT services may fall short in comparison with traditional services with which they compete, while in other aspects, they may greatly exceed what traditional services typically deliver.

2.3 Examples of online services that are not OTT services for purposes of this report

In creating a working definition for purposes of this report, understanding what is *out of scope* is just as important as understanding what is *in scope*.

Some definitions treat *all services delivered over the Internet* as being over-the-top. For instance, the *Board of European Regulators of Electronic Communications (BEREC)*, whose members include the *national regulatory authorities (NRAs)* of all Member States of the European Union, recently defined OTT services in terms of “content, a service or an application that is provided to the end user over the open Internet.”¹⁰ For purposes of this report, such a broad definition seems to be unhelpful.

Similarly, according to a recent consultation document on the part of the Indian TRAI,¹¹ “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.” This paper notes that 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).” The consultation document speaks of three kinds of OTT services:

- Messaging and voice services (communication services);
- Application eco-systems (mainly non-real time) linked to social networks, e-commerce; and
- Video / audio content.

A somewhat narrower approach has been used for this report. Messaging and voice services clearly fall within the definition employed in this report, as do visual and audio content; however, application ecosystems would be out of scope, except to the extent that they compete with traditional telecommunications and audiovisual services.

¹⁰ BEREC (2015), “Draft Report on OTT services”, BoR (15) 142. They go on to provide a “taxonomy of OTT services that consists of (a) OTT-0 services, which are OTT services that qualify as ECS, (b) OTT-1 services, which are OTT services that do not qualify as [Electronic Communications Services (ECS)] but do potentially compete with ECSs and (c) OTT-2 services, which are the remaining category consisting of OTT services that are not an ECS and do not potentially compete with ECSs.” Their OTT-1 and OTT-2 services collectively correspond to OTT services as used in this report, while the three sub-categories together correspond roughly to online services as used in this report.

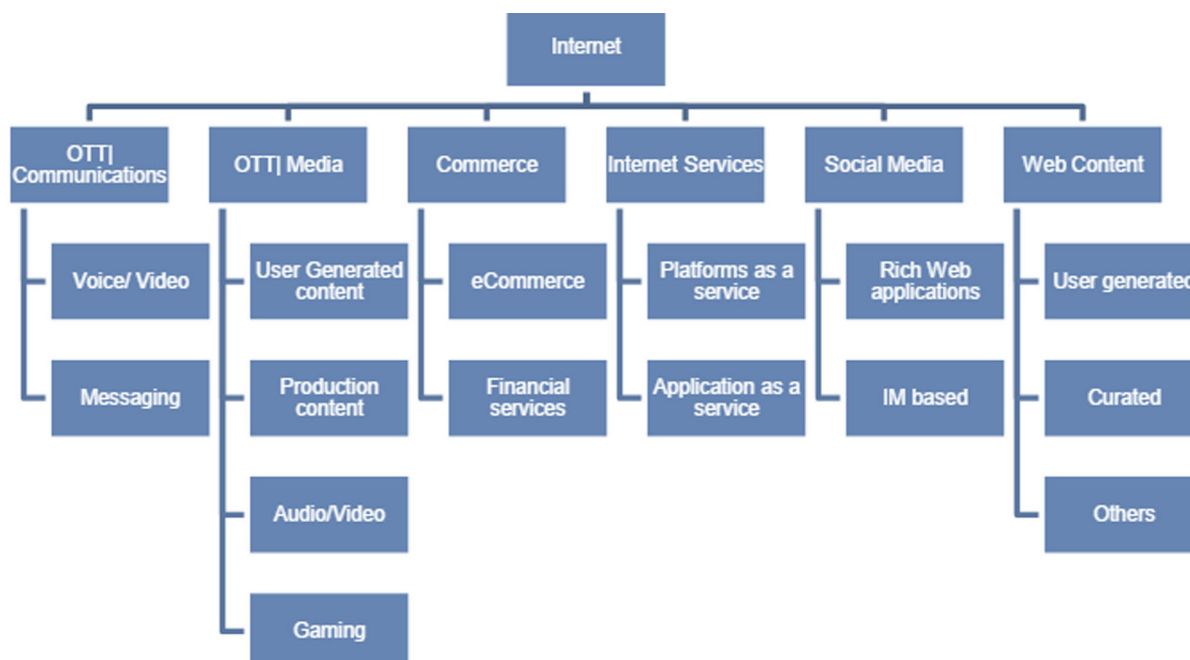
¹¹ Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

Online travel services such as Expedia and Orbitz, together with online ticketing capabilities offered by airlines and railroads, clearly compete with traditional “brick and mortar” travel agencies; however, they do not appear to compete with network or broadcasting services. For purposes of this report, they are considered to be online services, but not OTT services.

There is a tendency in the press to refer to search engines such as Google, Bing, Yahoo, and Alibaba as OTT services; however, in their role as search engines, they do not obviously compete with any existing telecommunications or broadcasting service. (As explained in Section 3.6, however, it is increasingly common for such services to incorporate complementary capabilities such as messaging or VoIP that clearly constitute OTT services.) For purposes of this report, search engines services are treated as being an online service that is not an OTT service.

Social networking is, for purposes of this report, likewise not an OTT service *per se*; however, this distinction can blur in practice as services become increasingly integrated. Social networking services often offer services that are clearly OTT. Facebook, for instance, acquired the WhatsApp online instant messaging service in 2014, and has had its own offerings for years that provide forms of chat, voice and video calls. Google Hangout offers chat, voice and video services, as well as integration with the Google+ social networking service.

A recent study by Baldry, Steingröver, and Hessler (2013) provides a categorisation of online services. It seems clear that there is a great variety of online services. It is instructive to note that only the first two columns of Figure 4 (“OTT communications” and “OTT media”) represent OTT services in the Baldry, Steingröver, and Hessler taxonomy – the rest are online services, but not necessarily OTT services.



Source: Baldry, Steingröver, and Hessler (2013), “The rise of OTT players – what is the appropriate regulatory response?”

Figure 4. A categorisation of online services.

Opportunities and impacts associated with OTT services

Key Findings

Online and OTT services have transformed the economies of both developed and developing countries; moreover, this effect has clearly trickled down to small businesses and to individuals.

Historically, these benefits have tended to be concentrated in developed countries; however, as the process of digitisation accelerates, and as more and more people worldwide are connected to the Internet, these benefits accrue to developed and developing countries alike.

This tendency is closely linked to the growth in the availability and affordability of mobile broadband (and smart phones), which has deepened network coverage and opened it up to the masses, not only in the developed world (where fixed networks were long since fully deployed).

Rigorous proof that OTT services substitute for traditional telecommunications services to a significant degree, but the trends that are visible strongly suggest substitution effects.

Concerns are widespread that OTTs may be impacting the revenues and profits of traditional network operators. This could in turn depress investments that are needed in fibre-based infrastructure, and in new mobile access technologies such as LTE. Different interpretations are possible as to the relevance and severity of this threat.

Online service providers – especially the largest ones – are increasingly vertically integrating networking and content delivery options into their offerings. In most cases, this probably benefits both the online service provider and the network operators that carry their data to end-users.

The best prediction that one can make about the future of OTT and online services, based on previous experience, is that no prediction is safe. Beyond extrapolating the points already made, the following predictions are cautiously made:

- Network traffic associated with audiovisual content will continue to grow, and at a more rapid rate than traffic in general. As a result, the great majority of Internet traffic going forward will be comprised of audiovisual content; nonetheless, linear television is unlikely to disappear for quite some time.
- User-generated content (for instance, YouTube video) can be expected to play an increasingly important role going forward; however, professionally generated content will continue to be important.
- OTT services are likely to be increasingly integrated with related services (for instance, social networking capabilities), and also with real networks that carry the services.

The increasing adoption of OTT services poses various threats to established arrangements, but also entails numerous promising opportunities.

This chapter considers a range of issues, opportunities, and impacts associated with OTT services, and also the drivers of increased deployment, adoption, and use of OTT services; the benefits that

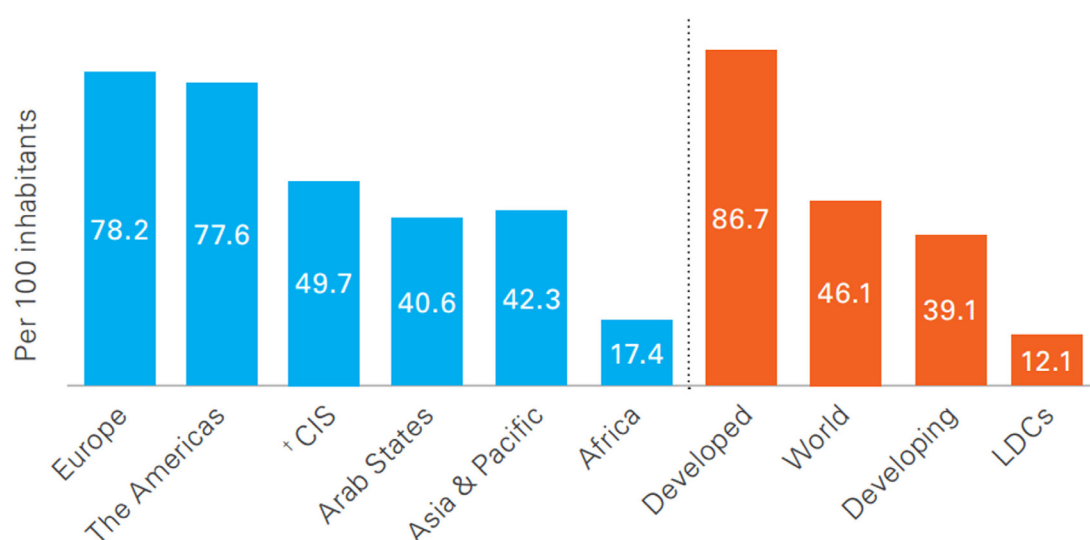
can flow from them; the impacts on traditional providers, and the potential consequences for investment.

The chapter then notes a few likely forward-looking trends, and concludes with a discussion of strengths, weaknesses, opportunities and threats from the perspective of national governments and regulatory authorities.

3.1 Improved (mobile) broadband, handsets and tablets as a driver of demand

Chapter 3 spoke of the transformative power of online applications in general, and of OTT services in particular. This tendency appears to be closely linked to the growth in the availability and affordability of *mobile broadband*, which has deepened network coverage and opened it up to the masses, not only in the developed world (where fixed networks were long since fully deployed).¹² ITU has estimated ¹³ that the coverage of 3G mobile services has expanded from 45% of a global population of 7 billion in 2011, to 69% of a global population of 7.4 billion in 2015, a staggering growth for just four years!

Gaps in coverage remain for now, despite rapid progress. ITU estimates global 3G urban coverage to have reached 89%, but 3G rural coverage to represent a mere 29%.¹⁴ Meanwhile, developed countries can be presumed to benefit from having far more mobile subscriptions per capita than developing countries. The least developed countries (LDCs) have in general the lowest mobile penetration, and thus lowest ability for consumers to access online services in general and OTT services in particular (see Figure 5).



Source: ITU (2015)¹⁵

Figure 5. Mobile broadband subscriptions (2015).

¹² See also Telecommunications Regulatory Authority of India (2015), "Regulatory Framework for Over-the-top (OTT) services". "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 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; and d) Growth of bandwidth consumption."

¹³ ITU (2015), "ICT Facts & Figures: The world in 2015".

¹⁴ Ibid.

¹⁵ Ibid.

3.2 Benefits of OTT services

When people speak of the transformative power of the Internet, they often forget that those benefits flow not from the Internet's ubiquitous ability to carry data, but rather from the applications that it enables and the content that it carries.

There is little doubt that online and OTT services have transformed the economies of both developed and developing countries; moreover, this effect has clearly trickled down to small businesses and to individuals. Individual craftsmen have access to wider markets, or even to global markets. Economic distortions within countries are reduced, thus raising the economic welfare of all at the same time that it reduces the ability of those "in the know" to exploit individual producers (such as farmers).

Whole economic sectors have been profoundly transformed in complicated ways. A travel industry where travel agents once played a large role is now largely online. Sales of books, music and video content has become a largely online activity. For many, the need to deal face to face with bank personnel is largely a thing of the past. Taxi services are under threat from amateur drivers organised by services such as Uber.

As a related point, the difference between online services versus traditional services may seem less relevant in the years to come, because it will increasingly be the case that all *services are online*.

OTT applications substitute to some degree for traditional telephony and broadcasting, but they also offer many capabilities that go well beyond traditional services. A VoIP service such as Skype, for instance, arguably serves not only as a telephony substitute, but also as a means of enjoying rich videoconferencing. Instant messaging services can provide far richer services than the traditional SMS services that they are to some extent supplanting. OTT video services such as YouTube provide not only access to professionally produced content, but also to user-generated content, thus simplifying and enriching interactions for end-users.

As set out in Section 3.6, integration of OTT networking functions with search functions and with social networking offers additional benefits. The use of search and of social networking enables end-users to locate individuals and companies in ways that never would have been possible with traditional printed telephone directories.¹⁶ This enriches and also simplifies the end user experience.

3.3 Impact on traditional service revenues

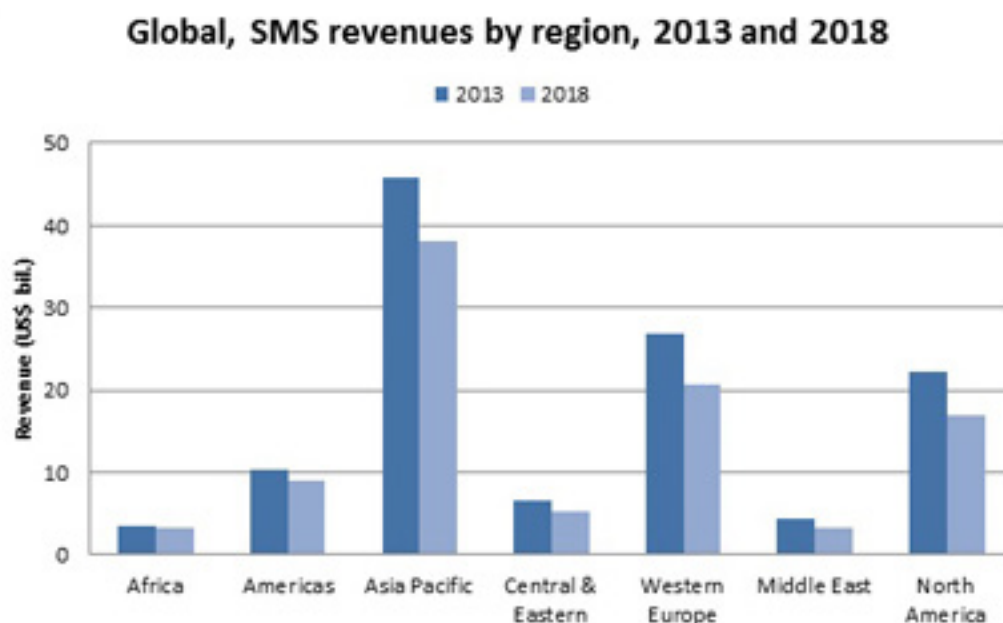
Concerns over the impact of OTT services on the revenues of network operators have been noted in both developed and developing countries. The Indian TRAI, for instance, expresses the concern in this way: "[U]nmanaged IP voice services, such as Skype or WeChat or Gmail video chat, can be exploited with lower access speeds. This obviously and adversely impacts the revenue of [network operators]. For example, every Skype call that bypasses the [network operator] is foregone revenue.

¹⁶ One could conceivably argue that social networks and search engines are themselves OTT services to the extent that they compete with printed telephone books, but that seems to be quite a "stretch".

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 [network operators] in respect of text messages and even voice messages.”¹⁷

The usage trends that were previously noted in Figure 2 and Figure 3 are strongly suggestive of substitution that is consistent with the concerns over revenue expressed here.

That seems to be little doubt that revenue is declining for a number of traditional services, especially for SMS. The cause is not proven, but the observed trends are suggestive of substitution effects.



Source: Informa Telecoms & Media¹⁸

Figure 6. Global SMS revenues by region of the world (2013 and 2018).

Substitution effects are arguably also important for international voice calls. Analyst firm Telegeography notes: “Hundreds of millions of people now use “over-the-top” (OTT) voice, video, and text communications on their computers and mobile devices for a growing share of their calls. Telegeography estimates that the on-net international traffic of Skype, the best-known OTT provider, grew 35 billion minutes in 2014, to 248 billion minutes. While international telephone traffic remains far larger than international Skype traffic, Skype’s volumes are enormous. Skype’s 2013 international traffic was four times greater than that of the largest telco in the world, and Skype’s 2014 traffic growth was nearly 30 percent greater than the volume growth of every carrier in the world, combined.

¹⁷ Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

¹⁸ Informa (2013), “Global annual SMS revenues will be US\$23 billion less by 2018”, at <http://www.informa.com/media/press-releases-news/latest-news/global-annual-sms-revenues-will-be-us23-billion-less-by-2018/#>.

Given these immense traffic volumes, it is difficult not to conclude that at least some of Skype's growth is coming at the expense of traditional carriers.

[emphasis added] If Skype's traffic were added to the volume of international phone calls, international voice traffic would have grown at a compounded annual rate of 13 percent between 2008 and 2013, much closer to historical growth trends. This finding suggests that demand for cross-border communications has not declined, but that an ever-growing number of callers have chosen to take telcos out of the equation.”¹⁹

As in so many aspects of OTT services, these facts are subject to multiple interpretations. One can argue that technological progress inevitably implies the existence, not only of winners, but also of losers. Firms that operated steamship lines did not necessarily benefit from the introduction of steam-based locomotives;²⁰ firms dependent on horse-drawn transportation did not necessarily benefit from the introduction of automobiles powered by internal combustion engines. The value of this kind of creative destruction is core to the views of the economist Joseph A. Schumpeter.²¹ Under this interpretation, the short-term negative impact on network operators is part of a normal long-term business process that ultimately benefits all.

An alternative narrative argues that OTT services are effectively pumping money out of the network operators at the very moment when substantial investments in fibre-based infrastructure are required. This narrative draws on multiple theoretical sources, including Aghion's “inverted U” which argues that investment is maximised when competition is neither too low (implying a lack of competitive incentive to invest) nor too high (implying a lack of funds to invest).²²

It is also worth noting that the loss in traditional voice and SMS revenues needs to be understood in the context of compensating increased revenues for (mobile) data services. The Indian TRAI reports, for instance, that “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 revenue will reach 32% by 2015 as compared to 14% in 2010.”²³ The data consumption of a WhatsApp message does not generate sufficient network operator revenue to offset what an SMS would have generated, but when one factors in the increased number of messages, increased volume of content per message (and for voice, longer duration for voice calls), and all of the other data hungry applications, the effects of online and OTT services on revenues are complex overall (see also Section 3.5).²⁴

19 Telegeography (2013), Telegeography Report, Executive Summary, at https://www.telegeography.com/page_attachments/products/web-site/research-services/telegeography-report-database/0005/5686/TG_executive_summary.pdf.

20 Occasionally, a visionary leader can make the disruptive leap. Cornelius Vanderbilt managed to build a railroad empire on top of his earlier steamship empire.

21 See especially Chapters VII and VIII of Schumpeter's *Capitalism, Socialism and Democracy*, Second Edition, 1942.

22 Philippe Aghion et al. (2005), *Competition and Innovation: An Inverted U Relationship*, *Quarterly Journal of Economics*, 120(2), S. 701-728.

23 Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

24 Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”. “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.”

3.4 Impact on infrastructure cost and investment

Numerous governments and regulatory authorities worry that OTT services are having an impact on the investments of network operators, and that this impact may impact their ability to make investments going forward in new fibre-based technologies (impacting both fixed and mobile deployment), and in new mobile access technologies such as LTE.²⁵

Analyst firm Telegeography, for instance, expressed the concern in this way: “While the share of international carrier traffic routed as VoIP grew from 11 percent in 2002 to 38 percent in 2013, many established service providers still rely on their legacy TDM networks. The capital outlay required to transition to new generation IP networks is a small fraction of what most of these companies spent to deploy their TDM networks, but many carriers have been operating their international voice business with a view to maximizing cash flow. Such operators could find it difficult to justify CAPEX in a market segment that is now in decline, ...”²⁶

A few years ago, claims were widespread that Internet traffic growth was driving unbounded costs, that flat rate prices prevented network operators from charging to recover their costs, and that regulatory intervention was therefore required to address the claimed market failure.²⁷ Concerns along these lines are visible both in developed and developing countries.²⁸

This is a persuasive narrative, but alternative interpretations are also possible. These alternative views generally are based on claims that growth in traffic does not necessarily equate to an equivalent growth in cost.

Factors in this alternative assessment include:

- Internet traffic growth is indeed healthy, but no longer seems to reflect explosive growth. The percentage growth in both fixed and mobile traffic volumes appears to decline year over year (see Figure 7). This trend is visible in multiple forecasts, and has been visible (for fixed broadband) since the nineties.
- Relevant unit costs also decline year over year (an effect known as Moore’s Law), and offset any increase in traffic volume, as is visible in Figure 8. It has been claimed²⁹ that this decline slightly exceeds the rate of increase in traffic for the fixed network at present. If so, this would suggest that fixed network prices are stable or declining because the corresponding costs are stable or declining.
- Prices for both fixed and mobile broadband services do not appear to be “stuck” at any particular level, but rather appear to respond to normal forces of supply and demand.³⁰

²⁵ See for instance Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

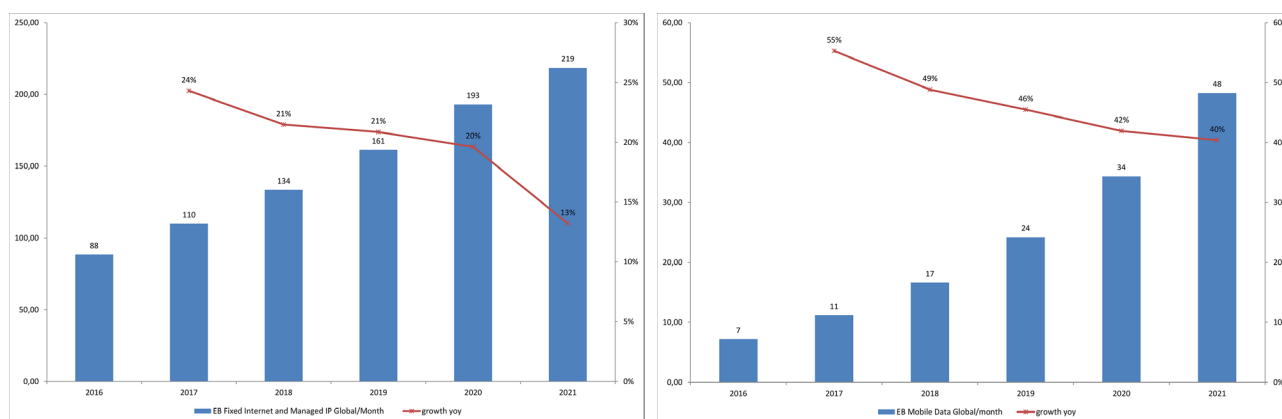
²⁶ Telegeography (2013), Telegeography Report, Executive Summary, at https://www.telegeography.com/page_attachments/products/web-site/research-services/telegeography-report-database/0005/5686/TG_executive_summary.pdf.

²⁷ See for instance Mark Page, Luca Rossi and Colin Rand (2010): “A Viable Future Model for the Internet”, A.T. Kearney, available at: <http://www.atkearney.com/index.php/Publications/a-viable-future-model-for-the-internet.html>. “Those who have to build and operate the networks required to carry these traffic volumes earn almost no revenue from [content sites] and are often locked into flat rate pricing schemes with [end users] ...”

²⁸ See, for instance, Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”. “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. 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.”

²⁹ J. Scott Marcus (2014), “The economic impact of Internet traffic growth on network operators”, available on SSRN at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2531782.

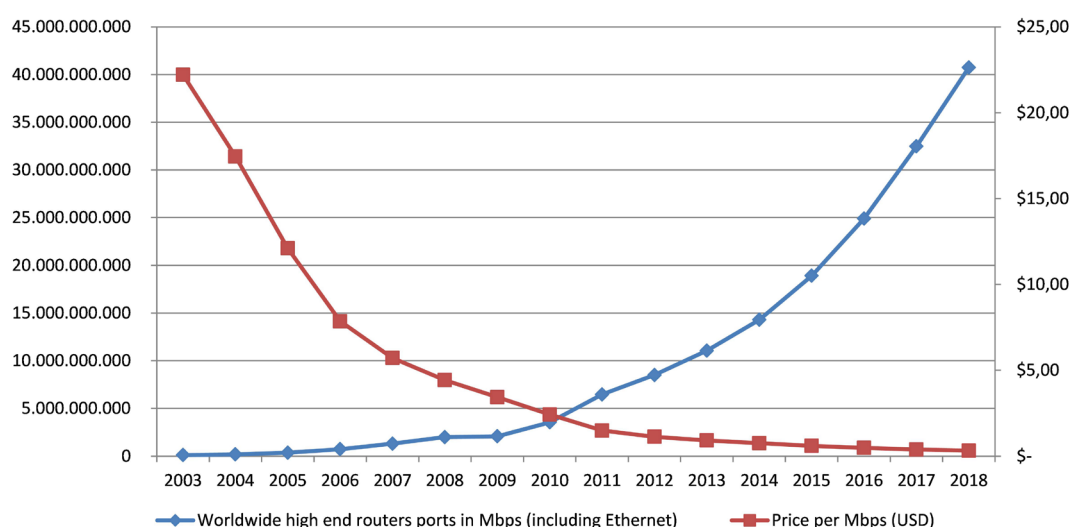
³⁰ Ibid.



Source: Cisco VNI online database (2017), Marcus calculations.³¹

Figure 7. Fixed versus mobile Internet and managed service traffic volume (exabytes, 2014-2018).

The decline in unit costs for key traffic-dependent items of equipment (for instance, large routers and long haul DWDM equipment used by network operators) appear to more than offset the increase in the amount of equipment required to carry fixed network traffic. For the mobile network, the combined effect of increased traffic-dependent equipment volumes and declining unit cost appears to be in line with the increase in the monthly price paid by consumers (ARPU). In neither case are there indications of market failure.



Source: Cisco VNI (2014), WIK / Marcus calculations.³²

Figure 8. Shipment volumes and unit prices for high end carrier grade routers (2003 - 2018).

³¹ J. Scott Marcus (2014), "The economic impact of Internet traffic growth on network operators", available on SSRN at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2531782. See also ITU (2016, forthcoming), OM 5 - Regulatory Aspects of QoS, in the ITU Quality of Service Training Programme.

³² J. Scott Marcus (2014), "The economic impact of Internet traffic growth on network operators", available on SSRN at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2531782. See also ITU (2015, forthcoming), OM 5 - Regulatory Aspects of QoS, in the ITU Quality of Service Training Programme.

3.5 The overall impact of OTT services on societal welfare

Much of the discussion on OTT services to date (and on online services in general) has been on the negative impact on traditional service providers. That discussion tends to focus on (1) lost revenues to service providers, (2) increased costs to service providers, (3) lost tax revenues to national governments, and (4) transfers of welfare ³³ between different countries.

The risks for traditional service providers are real. As the Indian TRAI succinctly notes, “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.”

Nonetheless, most analyses of the societal welfare impacts of OTT services tend to be incomplete. Societal welfare is the sum of *producer welfare and consumer welfare*. Consumers presumably view OTT services as offering better price/performance than the services for which they substitute (otherwise, they would not be purchased). The OTT service is either less expensive than an equivalent service, or else offers better value overall.

Most analyses of the economic impact of OTT services tend to be incomplete to the extent that

- they consider only costs to producers, ignoring benefits to consumers;
- they often ignore real benefits that flow to producers of the services;
- they may not be clear as to the assumptions that they are making;
- they may not be clear as to the comparison they are making, and in particular as to the counterfactual scenario ³⁴ that they are assuming. Exactly *what* is compared is being compared to *what*?

Online services tend to intensify competition, and thus to reduce the spread between cost and price (i.e. the profit margin). They reduce market inefficiencies caused by imperfectly informed consumers. The increase in market efficiency has two distinct effects on societal welfare.

- First, the reduced retail prices transfer societal welfare from producers to consumers. This transfer is, in a static economic analysis, *neutral in principle to societal welfare*, even though it is harmful to producers. What producers lose, consumers gain.
- Second, the reduced retail prices lead to *increased consumption due to the price elasticity of demand*. More of the product or service is consumed. This effect (formally referred to as a reduction in deadweight loss) represents a real and unambiguous gain in societal efficiency, benefitting both suppliers and consumers.

³³ For a discussion of welfare effects, producer welfare, consumer welfare, welfare transfer, deadweight loss, and Harberger’s Triangle, see for instance Chapter 5 of J. Scott Marcus, Ilsa Godlovitch, Pieter Nooren, Bram van den Ende, Jonathan Cave and Werner Neu: “How to Build a Ubiquitous EU Digital Society”, November 2013, available at: [http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET\(2013\)518736_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET(2013)518736_EN.pdf).

³⁴ When one speaks of lost revenues or taxes, what assumptions are being made as to what the world would be like in the absence of OTT services?

For OTT services, the relevant benefits to producers can be assumed to flow primarily from increased overall consumption of network services; and secondarily (but relatedly) from an increased number of subscribers to the network due to the enhanced desirability of the service. OTT services have presumably eroded profit margins for telecommunications market segments that previously had been highly profitable, namely SMS and international voice calls; nonetheless, data revenues are growing substantially, presumably due both to an increase in the number of subscribers and an increase in traffic volume per subscriber, both of which benefit from online services usage in general and OTT service usage in particular. Overall consumer willingness to pay (WTP) presumably also benefits from the use of online services.

In some countries, the net effect is an increase in network operator revenues rather than a decrease. Circumstances could however vary greatly from one country to the next.

A detailed analysis of these effects is well beyond the scope of the current analysis, and would in any event depend on far more detailed data in multiple countries than is likely to be available.

3.6 Vertical and horizontal integration of OTT and related online services

As noted in Section 1.3, social networks such as Facebook and Google+ should not considered to be, strictly speaking, OTT services in and of themselves (because they do not directly compete with traditional network operators); however, these are to an increasing extent integrated with OTT services. This tendency is likely to continue, and possibly to accelerate.

Social networks represent a means for end-users to find one another, thus supplanting to a significant degree the role that telephone directories historically played. There is a natural synergy between these directory-like functions and those of OTT voice and messaging services – when one is viewing information about a company or an individual, one may wish to establish contact.

Similarly, there can be synergies between search and content, noting that audiovisual content can be viewed as an OTT service to the extent that it substitutes for traditional video on demand.

These tendencies are already visible in many of the largest content and application providers (many of which are US-based), such as Google, Facebook, and Apple. The offerings of all three incorporate OTT services such as messaging / chat, VoIP voice telephony and video conferencing, and video streaming. Facebook's 2014 acquisition of WhatsApp is an especially prominent example.

One often thinks of integration as a means of gaining *economies of scale* (i.e. gains in cost-effectiveness due to the size of the organization). Integration in this case seeks instead *economies of scope* (i.e. gains in the desirability of the service due to the great breadth of the offering, together with gains in cost-effectiveness due to being able to deliver multiple services that have some commonalities).

A distinct but somewhat related tendency is for online and OTT service providers to vertically

integrate network transmission functions and content delivery capabilities into their respective offerings.³⁵ Different online service providers make different choices, but the general tendency is to invest more as the online service provider's service traffic, customer base and revenue stream grow.³⁶ Today, the largest content and application providers often operate international IP-based data networks and Content Delivery Networks (CDNs) that rank among the largest in the world. Typically, however, they serve few if any end-user customers with their own networks – their networks concentrate on international distribution, not on end-user connectivity.

3.7 Cautious predictions for the future

The best prediction that one can make about the future of OTT and online services, based on previous experience, is that no prediction is safe.

- Before Amazon entered the market, none of the pundits would have predicted that the first online mega-success would be a firm to sell books – the pundits assumed that the migration to electronic publication would happen first.
- The success of Uber as an alternative to taxis may seem obvious in hindsight, but it was not predicted in advance.
- Similarly, the evolution of the sharing economy and the online services that enable it was for the most part not anticipated.

Having said this, one might venture the following predictions:

- The role that online services will play daily life can be expected to progressively grow, both in developed and developing countries; moreover, the impact in the coming years may be especially visible in developing countries, to the extent that they have not yet experienced the full impact of online services.
- The growth of broadband coverage, and progressive gains in the price/performance of broadband (especially mobile broadband), are an important driver.
- General gains in price/performance of all ICTs components (including for example storage and processing power for servers)³⁷ are another key driver.
- Network traffic associated with audiovisual content will continue to grow, and at a more rapid rate than traffic in general.³⁸ As a result, the great majority of Internet traffic going forward will be comprised of audiovisual content; nonetheless, linear television is unlikely to disappear for quite some time.
- User-generated content (for instance, YouTube video) can be expected to play an increasingly important role going forward; however, professionally generated content will continue to be important.
- OTT services are likely to be increasingly integrated with related services (for instance, social networking capabilities), and also with real networks that carry the services (see Section 3.6).

³⁵ This discussion draws on previous work. See J. Scott Marcus (2014), "The economic impact of Internet traffic growth on network operators", available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2531782.

³⁶ This is different in its details from the broadband ladder of investment propounded in a series of papers by Martin Cave (see for instance CAVE (2004)), but it is similar in its effects. As an organisation grows, it is motivated to climb the ladder.

³⁷ Again, this tendency for semiconductor-based price/performance to double roughly every eighteen months is often referred to as *Moore's Law*.

³⁸ See for instance the Cisco VNI (2015).

3.8 Opportunities and challenges for national economies

Based on the foregoing, it should be clear that growing deployment, adoption and use of OTT services poses both threats and opportunities for national economies; the relative magnitude will, however, tend to vary from country to country. The *SWOT analysis* that appears in Table 1 seeks to identify the most significant overall *strengths, weaknesses, opportunities and threats* that ITU member states confront. The strengths and opportunities are positive, while the weaknesses and threats are negative. The strengths and weaknesses are inputs that relate to the past and present, while the opportunities and threats are forward-looking potential outputs. This SWOT analysis is, in its nature, a somewhat subjective analysis.

Inputs	Strengths	Weaknesses
	<ul style="list-style-type: none"> Increasing speed, price- performance, and adoption of broadband services, enhanced price performance (Moore's Law). Increasing speed and capability of devices and services, enhanced price performance (Moore's Law). Increased capability of online platforms. Growing network effects due to increased adoption. 	<ul style="list-style-type: none"> Remaining limitations in fixed and mobile broadband coverage, adoption, and speed. Inconsistent global approaches to the scope of regulation, to jurisdiction, to specific regulatory rules, to privacy, to network security, and to taxation. Limited capacity to create or operate OTT services in many countries.
Outputs	Opportunities	Threats
	<ul style="list-style-type: none"> Gains in market efficiency. Consequent gains in GDP and in (skilled) employment. Economies of scale and scope. Lower unit costs. Lower transaction costs. Overall acceleration of business. Enhanced innovation. 	<ul style="list-style-type: none"> Possible negative impact on network operator revenues and profits, with corresponding adverse impact on taxes and on ability to invest. Increased risk of privacy and security breaches. Risk of access and service monopolisation. Risk that the "digital divide" between developed and developing countries worsens.

Source: Marcus ³⁹

Table 1. Opportunities and threats in the growth of OTT services for national economies.

³⁹ See also Ilsa Godlovitch, J. Scott Marcus, Bas Kotterink, Pieter Nooren et al. (2015), "Over-the-Top (OTT) players: Market dynamics and policy challenges", study for the IMCO Committee of the European Parliament.

Key Findings

There are numerous questions that confront policymakers. Different views and different interpretations, even where facts are not in dispute, are possible.

- To the extent that these new OTT services compete with traditional services, what regulatory obligations (if any) are needed?
- Is it appropriate, necessary, or even possible to regulate these services in such a way as to maintain competitive neutrality (i.e. a level playing field) with traditional services with which they compete?

Questions of authorisation and licensing are fundamental. The underlying question is, which online services should be subject to regulation?

Determining which country has jurisdiction is not always straightforward. For online service providers, a country of origin principle is probably best; however, this is not always appropriate or practical.

Competition law and economics faces many new challenges in dealing with online services.

With VoIP, “spoofing” of the Caller Line ID (CLI) for malicious and/or fraudulent purposes represents a serious and growing threat.

Online services pose many new threats to privacy. In some instances, technology also offers solutions.

With the growing importance of online and OTT services, security takes on increasing importance. This has many aspects, including not only the security of the network or service itself, but also access to emergency services. Surveillance clearly must be mentioned, as it also plays a role here; however, it is generally out of scope for this report.

There may be a tendency to focus only on the threat to the established order posed by OTT applications, but it also provides opportunities for societal benefits, not only through creating and providing OTT applications, but also through their use. Measures to enhance creation, provision and use thus also appear to merit consideration in any balanced programme.

This chapter introduces a number of the regulatory debates that have emerged with respect to OTT services.

With the growth of OTT and related online services, numerous challenges to public policy have emerged. Among them:

- To the extent that these new OTT services compete with traditional services, what regulatory obligations (if any) are needed? Is it appropriate, necessary, or even possible to regulate these services in such a way as to maintain competitive neutrality (i.e. a level playing field) with traditional services with which they compete?
- In the specific case of OTT services that compete with conventional network services (for instance, voice over IP (VoIP)), what are the implications for regulation of the Over-the-Top service as distinct from regulation of the underlying network?

- Are traditional approaches to market definition (and to competition policy) suitable in this rapidly evolving and complex markets? Have specific online platforms amassed too much market power, to the detriment of competitors and consumers?

This chapter reflects on (1) issues of competitive neutrality in general (i.e. the “level playing field”); (2) the possible need to authorise or license OTT services; (3) the challenges faced in determining the country of jurisdiction; (4) the implications of OTT services for competition law and economics; (5) threats to network operator revenues and profits; (6) corresponding implications for investment in infrastructure; (7) implications for Quality of Service; (6) implications for consumer privacy; (8) obligations for security and reliability of OTT services; and (9) possible measures to promote the use of OTT services.

4.1 Competitive neutrality (the level playing field)

There is at present an active debate concerning the level playing field for OTT services. The level playing field is often used, however, to express very different policy dimensions, with significantly different implications. Do online services compete fairly with traditional businesses (such as travel agents, book sellers, or taxi firms) that they may eventually replace? Do OTT services (including messaging services, VoIP services, and streaming video) compete fairly with the SMS, voice telephony, and conventional broadcast services with which they compete? Do the developed countries where most of these services are based benefit unduly at the expense of developing countries?

There are few who would disagree with the general proposition that similar services that are similarly situated, and that compete with one another, should be subject to obligations that are similar (to the extent that doing so is practical). Specifically, one could argue that it is important to maintain competitive neutrality between OTT services and the underlying networks with which they compete. Doing so would serve to maintain competitive neutrality. Philosophically, one can argue that the choice between traditional versus OTT services should be made by the market, with as little interference as possible by regulatory authorities.⁴⁰

This seemingly straightforward principle is difficult to apply in practice. Are the new services really effective substitutes, are they imperfect substitutes, are they economic complements, or are they something else? Is the original rationale for the original regulatory obligation really relevant to the online service that competes with it? How practical and proportionate is it to impose the traditional obligation on a new service – does it impose unreasonably high costs?

The Board of European Regulators of Electronic Communications (BEREC), representing the National Regulatory Authorities (NRAs) of the European Union, expressed the challenge as follows: “A central theme in the discussion about OTT services are the differences in the regulatory treatment of [Electronic Communication Services (ECS), which clearly fall within the scope of the regulatory framework,] and OTT services. BEREC notes that although there is general appreciation of the idea that services of the same type should preferably be subject to broadly the same regulatory treatment there can also be reasons for different regulatory treatment of services.

⁴⁰ See Ilsa Goldlovitch, Bas Kotterink, J. Scott Marcus, Pieter Nooren, Jop Esmeijer, Arnold Roosendaal (2015, forthcoming), *Over-the-Top (OTT) players: Market dynamics and policy challenges, a study for the IMCO Committee of the European Parliament*.

The range of services to which any specific obligation should apply, must be considered in light of the goals of the obligation and the proportionality of that obligation being applied to any specific service or service type. This implies that the social benefits of the obligation and its scope need to be proportionate to the economic costs entailed for each regulated provider, and the static and dynamic competition effects of partial or universal application of the obligations. A preference for a level playing field can be part of the assessment of proportionality, but it is only one of the many elements.”⁴¹

These concerns over competitive neutrality have been perhaps most visible within the European Union, but they would seem to be just as relevant to developing countries as to developed countries. The Indian TRAI notes the mobile operators have complained that “...the licensed [network operators] 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 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.”⁴²

The answers to these questions would appear to be crucial; however, the most appropriate answers might well vary from one service to the next, and also from one country to the next. A single, straightforward answer is unlikely to emerge. These questions are likely to be with us for years to come. This might suggest the need for cautious case by case analysis.

4.2 Licensing and authorisation

Licensing and authorisation appear to be linked closely with the competitive neutrality and level playing field aspects addressed in Section 4.1, both as a cause and as an effect.

A key underlying question is, which services should be subject to regulation at all?

Most countries require firms that wish to provide telecommunications services to obtain some kind of licence or permission from the national regulatory authority; however, approaches to licensing can vary substantially from one country to the next. The obligations imposed on licensed entities are considerable in some jurisdictions; by contrast, the Authorisation Directive of the European Union (EU) serves primarily to limit the obligations that national regulatory authorities are permitted to impose.⁴³

In many countries, licensed entities fund the regulatory authority itself. In some countries, licensed entities fund the provision of universal service.

⁴¹ BEREC (2015), “Draft Report on OTT services”, BoR (15) 142.

⁴² Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

⁴³ In the UK and in Denmark, for instance, firms that wish to become providers of Electronic Communication Services (ECS), and thus subject to EU regulation, are not even obliged to formally notify the national regulatory authority in advance.

The approach to the licensing of OTT services is very diverse at the moment. This is especially visible in regard to VoIP services.

A few examples:

- **India:** “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 [licensed network operators] as unrestricted Internet Telephony Services ... However, the scope of the Internet Services Licence was restricted to Internet Telephony Services without connectivity to Public Switch Telephone Network (PSTN) / Public Land Mobile Network (PLMN) in India.”⁴⁴
- **European Union (EU):** Practices among EU Member States are not fully harmonised. “[I]n the case of VoIP Telephony services that permit inward and/or outward connections to the PSTN, [...] most NRAs take the view that the VoIP service provider [...] provides an [Electronic Communication Service (ECS)] since it has the contract with the end user, collects payment for the service and negotiates network access to allow the service to be offered, manages directory data base and the servers for call set-up signalling. [...] The VoIP Service Provider is therefore, in these cases, providing the service to the end user, even if some aspects of it are sub-contracted to various agents.” An ECS is in principle subject to regulation, including authorisation (licensing) obligations.
- **United States:** In principle, traditional telecommunications services are subject to the licensing obligations of Section 214 of the Communications Act of 1934 as amended, while IP-based information services are not.⁴⁵

4.3 Country of jurisdiction

Many aspects of commerce (including e-commerce) that seem to be fairly clearly defined at national level start to break down when looking at cross-border OTT services. These challenges are, of course, potentially of interest to the ITU, which is among the very few organisations that could potentially deal with them.

A key question, and a starting point for discussion, is: “*Who has jurisdiction?*”

From the perspective of the provider of online or OTT services provider, the ideal answer would be that the *country of origin* should have jurisdiction. The service provider then would have to familiarise itself with only a single set of laws and regulations.

A comprehensive approach along these lines at global level, however, would run into any number of challenges. First, it would motivate service providers to establish their operations (on paper, at least) in whichever country had the least restrictive regulations and/or the lowest taxes.

⁴⁴ Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

⁴⁵ For licensing purposes, it is important to distinguish among international, interstate, and intrastate communications. The US FCC must affirmatively grant international section 214 authorisation, but it has forborne from the requirements of Section 214 for broadband Internet access service, and has granted blanket domestic 214 authorization for interstate telecommunications services. For intrastate communications, states play a significant role in telecommunications licensure.

This would likely trigger a “race to the bottom” among countries seeking the advantage of being home to these service providers. The second problem is that the diversity of laws among the countries of the world is considerable – one could imagine country of origin among clusters of countries that coordinate their laws closely, but it is hard to imagine comprehensive application of country of origin jurisdiction at global level.

The primary alternative would be for the laws or regulations of the *country of destination* or *country of consumption* to govern. This is closer to the situation that pertains today. It of course raises the complexity for online and OTT service providers, since they must be prepared to deal with the divergent laws and regulations of every country in which they operate.

A country of consumption rule inevitably raises questions as well as to which country is the country of consumption, since electronic communications services generally consist of at least two ends, and sometimes more. It also raises the risk that a service provider is obliged to comply with not fully compatible laws in two or more countries.

These challenges show up in many contexts, ranging from taxation to privacy.

Concerns have also been raised relating to the acceptability of content – content that is prohibited on the basis of being inflammatory, societally dangerous, or pornographic in one jurisdiction might be acceptable in another (and perhaps protected under the right of free expression).⁴⁶ These issues would however appear to be relevant to online content whether delivered over traditional or OTT services.

4.4 Competition law and economics

In principle, competition law and economics are relevant to online and OTT services, just as they are to traditional services.

In practice, a number of additional factors must be taken into consideration.⁴⁷

First, the potential benefits of these services to society at large, and to consumers in particular, appear to be considerable (see Section 3.2). The benefits are often claimed to be even greater to those who use online tools than to those who produce and provide them.⁴⁸

For this reason, there is an argument to be made that policymakers should be careful to avoid putting needless roadblocks in the way of online and OTT services. This would suggest in turn that dynamic economic effects (i.e. the benefits over time that derive from investment in the creation and use of online tools and OTT services) require serious consideration. Competition policy tends to place greater emphasis today on static economic effects, in part because they are easier to analyse.

These OTT and online services markets could be said to be volatile, and rapidly changing. There have been many examples in recent years where market power that seemed impregnable evaporated rapidly once a new, disruptive player entered the market.

⁴⁶ See also Telecommunications Regulatory Authority of India (2015), “Regulatory Framework for Over-the-top (OTT) services”.

⁴⁷ See Ilsa Goldlovitch, Bas Kotterink, J. Scott Marcus, Pieter Nooren et al. (2015, forthcoming), *Over-the-Top (OTT) players: Market dynamics and policy challenges*, op. cit.; Nicolai VAN GORP and Olga Batura, (2015), “Challenges for Competition Policy in a Digitalised Economy”; and Paul DE BIJL, Andrea RENDA, and Massimo MOTTA et al. (2015), “Cross-Competition among Information (Digital) Platforms: Proceedings of the Workshop”, all studies for the European Parliament.

⁴⁸ See for instance Ben Miller and Robert Atkinson (2014), “Raising European Productivity Growth Through ICT”.

Barriers to entry appear to be lower than in many traditional telecommunications markets.⁴⁹ This suggests, once again, that the threshold of competitive harm that should trigger intervention may perhaps need to be higher than that which has historically been employed.

Finally, many of the online platforms are in reality two-sided (or multi-sided) platforms. The economics of two-sided platforms is still a relatively new discipline. A two-sided platform brings the sides of the market together.

The platform may subsidise one side of the market in order to ensure that there is sufficient participation over – for instance, viewers of over-the-air broadcast television typically pay little or nothing for the service, because advertisers are willing to pay for their presence.

Pricing arrangements to the different sides of the market do not follow the same rules as in conventional markets. Application of conventional competition economics tests can lead to grave errors if applied to two-sided markets.⁵⁰

Overall, this is an area where economic and policy theory continues to rapidly evolve.⁵¹

All of this suggests that, while competition policy is still highly relevant to online and OTT services, competition authorities may perhaps need to operate with great care and caution in this space.

4.5 Quality of Service standards

In many countries, traditional network operators are subject to explicit Quality of Service (QoS) standards. Providers of OTT services are rarely subject to equivalent obligations. For that matter, if they do not control the networks over which their traffic flows, they may not be in a position to assure QoS.

The question of whether the regulatory authority should impose QoS standards has been a longstanding debate among policymakers. A key question is whether market forces alone sufficient to ensure appropriate QoS.⁵² Views on this differ.

The answer to this question obviously has a great deal to do with the degree of competition in the market in question. Largely for this reason, the approach in developed countries is often different from that taken in developing countries where competition is less well established. This section discusses both of the most widely applied approaches.

Historically, in countries where voice telecommunications was a regulated monopoly or government monopoly, both quality and prices for voice services tended to be high. Compensation was typically rate of return based, which meant that the incumbent provider was permitted to charge so as to recover its costs and achieve a percentage profit above them. This creates perverse incentives – the incumbent is motivated to maximise its costs in order to maximise its profits. It can result in “gold plating” of services, i.e. delivery of services in excess of what many consumers strictly require.

⁴⁹ Notably, arguments relating to last mile market power as a barrier to entry would appear to be irrelevant to an OTT market player that has no need for its own network.

⁵⁰ See for instance Rochet and Tirole (2004), “Two-Sided Markets : A Progress Report”.

⁵¹ See for instance Nicolai van Gorp and Olga Batura (2015), “Challenges for Competition Policy in a Digitalised Economy”; and Paul de Bijl, Andrea Renda, and Massimo Motta et al. (2015), “Cross-Competition among Information (Digital) Platforms: Proceedings of the Workshop”, both studies for the European Parliament.

⁵² The discussion in this section draws on the ITU’s soon-to-be released QoS Training Programme. J. Scott Marcus and Geoff Huston (2015), OM 5 - Regulatory Aspects of QoS, in the ITU Quality of Service Training Programme.

Not all customers require (or are willing to pay for) toll quality voice. The success of mobile telephony makes clear that consumers can tolerate voice quality well below what the fixed network historically delivered.

“Gold plating” of services can crowd out less expensive, lower quality services that some consumers may desire. Inflated prices result in reduced usage due to the *price elasticity of demand*. The consumption that should have occurred but did not represents a *deadweight loss*, and thus a reduction in societal welfare. One can argue that this has negative impact on the economy as a whole.

In countries where competition is weak or non-existent, this may not be a concern, since there would have been no low price lower quality offerings in any case. Thus, in countries with little or no competition, regulatory imposition of QoS standards and tolerance of high prices may be preferable to low quality and nonetheless high prices.

In countries with competition, however, it is often the incumbent that promotes QoS standards, since they limit the ability of other network operators to compete aggressively on price. In countries with greater competition, or at least with strong prospects of competitive entry, it is often preferable to leave QoS to market forces. One would expect that different levels of quality will emerge in the market in such countries, with correspondingly different prices. Different consumers have different willingness to pay (WTP) for different level of quality, or even different WTP for QoS for different conversations.

Price and quality differentiation benefit the network operators overall, since they can capitalise on these differences and extract more revenue. This is not necessarily to the detriment of consumers. Consumers also benefit from differentiated services that on balance better accord with their preferences.

Aggregate consumption with differentiated quality and pricing tends to be higher, benefiting the broader society.

Based on reasoning along these lines, many developed countries with effective competition do little or nothing to impose QoS standards. Some developed countries (including all of those in the European Union) require network operators to publish statistics on the QoS that they offer and/or the QoS that they achieve. In these countries, persistent failure to achieve the committed levels of QoS might then be actionable, not as a matter of telecommunications regulation, but rather as a matter of truth in advertising.⁵³

A key advantage of this “light touch” approach to QoS regulation, in countries where it is feasible, is that it encourages network operators to tailor the QoS of their offerings to meet the requirements, and the corresponding willingness to pay (WTP), of their prospective and actual customers.

⁵³ Consistent failure to meet QoS standards can also be actionable under a new Regulation of the European Union, Regulation 2015/2120

4.6 “Spoofing” of the caller ID under Voice over IP (VoIP) and other forms of abuse of VoIP

The core problem of caller ID “spoofing” is the ability of a (possibly malicious) caller to either impersonate someone else, or to anonymise a call in such a way that fraud and abuse can occur. The network operator, the regulator, and law enforcement typically are unable to track and trace the source of the abusive call.

This is essentially a problem of *authentication* of the identity of the caller. Is the caller really who he claims to be?

Under the traditional public switched telephone network (both fixed and mobile), this was less of an issue.

The number of network operators was limited, they had agreed procedures with one another, and the technology was designed to minimise the risk of misrepresentation of the caller ID. Under VoIP, however, the technical ease of misrepresentation is far greater (some argue that there can be legitimate reasons to do so), and the number of network operators is potentially far greater (thus expanding the “circle of trust”).

This has been a general concern worldwide, and an intense concern in the United States (see Section 5.7), the UK, and Canada.

Some countries have explicitly introduced regulatory provisions to require providers of VoIP services to accurately report the Caller Line ID (see for instance the discussion of Oman in Section 5.3 and of the United States in Section 5.7).

Although various technical solutions have been discussed, no comprehensive technical solution is generally available today.⁵⁴

Various other forms of abuse capitalising on VoIP, especially mobile VoIP, have raised concerns. In some cases, for instance, an incoming call while roaming is redirected so as to be received, not using the traditional mobile service, but rather using a VoIP service (which may impose high data costs on the unsuspecting user).

4.7 Commercial privacy, transfers of personal data

Three different discussions tend to be conflated in the press and in the public discussion of privacy in connection with OTTs:

- commercial privacy,
- government surveillance for purposes of law enforcement, and
- government surveillance for purposes of national security.

All three are legitimate under suitable preconditions, but all three entail risks – albeit different risks – for consumer privacy.

⁵⁴ See J. Scott Marcus and Richard Shockey (2015), «Review of Resource Public Key Infrastructure (RPKI) to verify ownership and authenticity of telephone caller ID over Voice over Internet Protocol», a study for Ofcom, the UK NRA, at: <http://stakeholders.ofcom.org.uk/market-data-research/other/technology-research/2015-reports/rpki/>.

Our focus in this section is on commercial privacy, since government surveillance is generally out of scope for this report.

The ability of online service providers to sell or re-purpose information about consumers has become increasingly important commercially, but also increasingly contentious. As regards commercial privacy, there have been, and continue to be, substantial differences in implementation and to a lesser degree in objectives from one country to the next.⁵⁵ Some common threads are however visible in many national laws that support commercial privacy. At the risk of over-simplifying, these include:

- Firms that collect personally identifiable data of end users bear a special responsibility to maintain the confidentiality of the data, and to protect it both from inadvertent disclosure and from malicious attacks.
- The user should know and provide informed consent to the use of his or her personally identifiable information.⁵⁶
- Personally identifiable data should not be re-purposed (used for purposes other than that which the customer has authorised) without the informed consent of the end user.

The value of personally identifiable data for purposes of targeted advertising over the Internet has grown enormously over the years.

With it, the temptation for online service providers (including not only OTT service providers, but also traditional network operators) to re-purpose personally identifiable data for purposes of targeted advertising are now large.

A substantial challenge has to do with the enforceability of commercial privacy at international level. Whose laws govern (see Section 4.2)? To what extent are relevant laws enforceable in practice?

As previously noted, data surveillance on the part of the government raises its own complex issues regarding the protection of personally identifiable data. In principle, government surveillance is well outside the scope of a study like this one; however, an active discussion in Europe just now makes it necessary to touch on the topic.

Transfers of personally identifiable data from the European Union (EU) to third countries are generally permitted under European law only to the extent that the receiving country provides a roughly comparable level of protection to that afforded by the EU. A recent court case of the European Court of Justice⁵⁷ made it clear that these protections must also be adequate against inappropriate use or disclosure of personally identifiable data on the part of the government of the country to which the data was shipped. The court ruled that this is not the case in the United States. As a result, transfers of personally identifiable data between the EU and the United States were at risk of grinding to a halt, with likely negative consequences for businesses (including online and OTT services) in both the EU and the US.

⁵⁵ See for instance J. Scott Marcus, Neil Robinson, Joel Reidenberg, Yves Poullet, Adam Peake, Chris Marsden, Florence De Villenfagne, Franck Dumortier, Keisuke Kamimura et al. (2007), "Comparison of Privacy and Trust Policies in the Area of Electronic Communications", a study prepared for the European Commission.

⁵⁶ If the end user has purchased a service for which the data is obviously required, this condition might be considered to have been fulfilled.

⁵⁷ Court of Justice of the European Union (2015), Judgment in Case C-362/14, Maximilian Schrems v Data Protection Commissioner. Press release No 117/15, Luxembourg. Available at: <http://curia.europa.eu/jcms/upload/docs/application/pdf/2015-10/cp150117en.pdf>.

It is not clear how these issues will ultimately be resolved, but most experts agree that a firm and suitable agreement between the US and the EU is needed.⁵⁸ The EU and the US subsequently reached an agreement, named *Privacy Shield*;⁵⁹ however, Privacy Shield is unlikely to be the last word on the matter. First, as an agreement between the European Commission and the U.S. Department of Commerce, there is no force of U.S. law nor of a ratified treaty to oblige future U.S. governments to comply. Second, *the Article 29 Working Party*,⁶⁰ while recognising the very considerable progress that Privacy Shield represents, has expressed serious concerns over the lack of clarity and specificity in Privacy Shield overall. They also have raised specific concerns that (1) the assurances provided by the U.S. do not preclude massive and indiscriminate surveillance; and that (2) the redress procedure offered in the form of an Ombudsman, while representing major step forward, "is not sufficiently independent and is not vested with adequate powers to effectively exercise its duty and does not guarantee a satisfactory remedy in case of disagreement."⁶¹

4.8 Security and reliability

This is once again a large and complex area in its own right.

It is clear that the security of all electronic services is important. This is true for electronic communication networks, and not less true for the services (e-commerce, for instance) that run over them.

In many countries (not all), network operators are subject to explicit obligations regarding network security; in most countries, governments or regulators monitor the reliability and security of major networks.

OTT and related online service providers tend to be subject to fewer security obligations. They may however be subject to obligations to report significant security breaches, especially if those breaches exposed significant amounts of personally identifiable end-user data. Surveillance for purposes of law enforcement or for purposes of national surveillance is generally out of scope for this report; however, it is to be noted in passing that some regulatory authorities have expressed concerns over lack of clarity as regards the applicability of these obligations to OTT services.⁶²

As OTT services increasingly substitute for network services (at the same time that they depend on the underlying networks), there is a natural but currently unresolved question as to what obligations are required in the longer term, and whether the same obligations are appropriate.

58 See J. Scott Marcus and Georgios Petropolous (2015), Data transfers under the threat of terrorist attacks, at: <http://bruegel.org/2015/12/data-transfers-under-the-threat-of-terrorist-attacks/>.

59 European Commission (2016), European Commission - Fact Sheet: EU-U.S. Privacy Shield: Frequently Asked Questions, at

60 The Article 29 Working Party is an independent European advisory body on data protection and privacy, with formal statutory responsibilities identified in various European Directives.

61 ARTICLE 29 DATA PROTECTION WORKING PARTY (2016), Opinion 01/2016 on the EU – U.S. Privacy Shield draft adequacy decision, 16/EN WP 238, at http://ec.europa.eu/justice/data-protection/article-29/documentation/opinion-recommendation/files/2016/wp238_en.pdf. They express concerns that "the representations of the U.S. Office of the Director of National Intelligence (ODNI) do not exclude massive and indiscriminate collection of personal data originating from the EU. The WP29 recalls its long-standing position that massive and indiscriminate surveillance of individuals can never be considered as proportionate and strictly necessary in a democratic society, as is required under the protection offered by the applicable fundamental rights. Additionally, comprehensive oversight of all surveillance programmes is crucial."

62 See for instance Sections 3.20 through 3.27 of Telecommunications Regulatory Authority of India (2015), "Regulatory Framework for Over-the-top (OTT) services".

The issues that appeared in the discussion of competitive neutrality (Section 4.1) are highly relevant here. To what extent are the services in question really equivalent, or substitutes for one another? To what extent are network security obligations at all relevant to a service provider that may not operate a network at all? For a particular obligation that already applies to a traditional network operator, would it be feasible, practical, and cost-effective to apply it to an OTT provider that provides a somewhat equivalent service?

4.9 Promoting the creation, operation and use of OTT and related online services

Online services potentially provide enormous benefits to those who use them. Removing any unnecessary impediments to the provision and use of OTT services is therefore a legitimate public policy concern.

Indeed, many have argued that ICT use is far more important than ICT creation and operation.⁶³ Atkinson claims, for instance, that “the large gains are to be realized not so much from production of ICT ... as in its adoption.”

This would appear to suggest a need for continued attention to many of the issues with which policymakers have already concerned themselves, for instance:

- For online services to be optimally useful, consumers should have ubiquitous access to broadband of good quality.
- In the developing world, the mobile network is often more widespread than the fixed.
- This implies in turn that spectrum management must be effective.
- Consumers must be willing and able to use new online services. This likely implies a need for measures in support of digital literacy, and not just during the initial school years.

⁶³ Ben Miller and Robert Atkinson (2014), “Raising European Productivity Growth Through ICT”.

Policy approaches attempted or taken in various parts of the world

Key Findings

Policy approaches as regards OTT services can differ greatly from one country, and among many different dimensions.

To what degree is it appropriate to regulate OTT services at all?

Are there obligations such as access to emergency services, or surveillance for purposes of law enforcement, that are indispensable irrespective of how a service is delivered?

This chapter reviews noteworthy emerging practice on four continents. It is perhaps too early to identify best practice.

Policy approaches taken or proposed vary widely, and among multiple dimensions, from one country to the next, even among countries in the same region. This chapter considers noteworthy approaches taken on multiple continents, representing large countries and small, and including some countries that are developed and others that are arguably still developing.

It is perhaps too early to say what represents best practice as regards regulatory and policy approaches for OTT services.

5.1 Brazil

On 23 April 2014, Brazil enacted the *Marco Civil*, Law Number 12.965, which “establishes the principles, guarantees, rights and obligations for the use of Internet in Brazil”. The Marco Civil is an ambitious and far-reaching legislative act; however, large portions have not yet been fully implemented pending decisions by the responsible ministries.

The goals of the Marco Civil are to promote “... the right of all to access the internet; the access to information, to knowledge and participation in the cultural life and in the handling of public affairs; the innovation and the stimulus to the broad diffusion of new technologies and models of use and access; and the adoption of open technology standards that allows communication, accessibility and interoperability between applications and databases.”⁶⁴

Topics covered in the Marco Civil⁶⁵ include:

- guarantee of freedom of speech, communication and expression of thought, in accordance to the Federal Constitution;
- protection of privacy;
- protection of personal data, pursuant to law;

⁶⁴ The text here is based on the English translation provided by Public Knowledge at <https://www.publicknowledge.org/assets/uploads/documents/APPROVED-MARCO-CIVIL-MAY-2014.pdf>

⁶⁵ Ibid.

- preservation and guarantee of network neutrality;
- preservation of stability, security and functionality of the network, via technical measures consistent with international standards and by encouraging the use of best practices;
- the liability of the agents according to their activities, pursuant to the law;
- preservation of the participative nature of the network; and
- freedom of business models promoted on the internet, provided they do not conflict with the other principles set out in this Law.

The Marco Civil establishes strong consumer privacy rights, including the inviolability and secrecy of the user's communications whether over the Internet or stored, except where a court order holds otherwise. The user's data may not be provided to third parties without the user's express, free and informed consent. Use of personal data is restricted to legitimate and lawful purposes.

Network neutrality is expressed in broad and sweeping terms, but with limited detail. "The party responsible for the transmission, switching or routing has the duty to process, on an isonomic basis, any data packages, regardless of content, origin and destination, service, terminal or application." The exact meaning of "isonomic"⁶⁶ here is not altogether clear. At a meeting sponsored by CGI.br and consumer advocate Proteste in Sao Paulo in February 2015, for instance, a ministry spokesperson opined that different treatment for the traffic of different applications that have different requirements was not necessarily incompatible with isonomic treatment.

The Marco Civil also deals extensively with surveillance for purposes of law enforcement, and seeks to limit surveillance based in third countries. This is noted in passing, as regard surveillance as being generally out of scope for this report.

Finally, the Marco Civil exempts a provider of Internet access from liability for the content that it is posted, except in instances where the Internet access provider is notified by court order of the specific infringing content and fails to remove it within the time frame specified in the court order.

5.2 India

India is in the process of reassessing its rules on online services, including OTT services.

A public consultation was published on 27 March 2015, with responses due by 24 April 2015.

A final ruling has not yet been issued.

As noted in Section 4.2, voice and messaging services are permitted to be offered only by firms that hold a licence. Internet Protocol (IP) based voice and messaging services can also be offered by licensed network operators as unrestricted Internet Telephony Services; however, these services may not interconnect with traditional switched services. The dichotomy between regulated traditional services and largely unregulated OTT services leads to numerous anomalies.

⁶⁶ In the Portuguese text, *isonômica*.

In terms of concrete proposals, the consultation document appears to implicitly propose:

- that OTT services either be explicitly licensed as are traditional communication services, either as Communication Service Providers (CSPs) or else under a separate category as application Service Providers (ASPs);
- alternatively, TSPs could treat firms that offer OTT services as Bulk Users of Telecom Services (BuTS);
- enactment of explicit network neutrality rules; and
- whether OTT service providers are treated as CSPs, ASPs, or BuTS, the consultation considers what level of payments between content providers and network operators might be appropriate.

The consultation document appears to provide only limited indications as to how regulatory differences between regulated voice and SMS services versus unregulated OTT VoIP or messaging services might be addressed. If OTT services were treated as CSPs, they would be subject to all of the same obligations, which however would raise numerous issues and therefore “needs careful deliberation”. If classified as ASPs, the national regulatory authority would be empowered to impose obligations in regard to emergency services or lawful interception, but the consultation document does not specify what those obligations would specifically entail, or to which OTT applications they might apply. If classified as BuTS but not as CSPs or ASPs, the consultation document does not indicate how regulatory asymmetries might be addressed (if at all).

This process is still ongoing. The TRAI issued an order a second consultation late in 2015, and issued a ruling prohibiting discriminatory tariffs early in 2016.⁶⁷

5.3 Oman

In 2012, the Telecommunications Regulatory Authority (TRA) of Oman implemented “Decision No (34/2012): On Issuing the Regulation on the Provision of Public Voice Telecommunications Service via Voice over Internet Protocol (VOIP)”.⁶⁸

The text is concise and clear. The Regulation:

- Provides a working definition of VoIP;
- Establishes that licensees of “public voice telecommunications service Licensees are permitted to provide VOIP voice telecommunications service in accordance with the Telecom Act and the licenses awarded to them.”
- Reserves for the TRA the prerogative to “exempt specific VOIP applications via computers or similar devices if they are for personal purposes only.” This could, for instance, be used to exempt online games from various obligations.⁶⁹
- Providers must verify the identity of the subscriber and record relevant information.
- Providers of VoIP as a Basic voice service are obliged to observe the quality of service requirements issued by the TRA.

⁶⁷ TRAI India (2016), “Prohibition of Discriminatory Tariffs for Data Services Regulations, 2016”, 8 February 2016. ⁶⁸ An unofficial English language translation is available at <https://www.tra.gov.om/pdf/551decisionno34-2012.pdf>.

⁶⁹ The Omani TRA informs us that no explicit exemptions have been granted to date.

- Providers of VoIP as a value added service must notify subscribers that they are not subject to the same quality of service requirements that are applied to the Public Basic Voice Service, and that the service will not necessarily be available if power fails.
- Licensee must also:
 - provide access to emergency services;
 - send the Calling Line Identification (CLI) number for all calls (note the Caller ID spoofing has been an issue in Oman, as in many countries, as explained in Section 4.6);
 - consider confidentiality and protection of beneficiary's data and calls; and
 - maintain and store the beneficiary's personal data within Oman's geographical boundaries.

5.4 The United Arab Emirates

In the United Arab Emirates, Voice over IP services such as Skype, Viber and appear to be effectively blocked, although it is not altogether clear whether they are being blocked by the network operator or by the government.⁷⁰

VoIP services are not included in the licence terms of the two fixed network operators, Etisalat and Du. According to a statement of the national regulatory authority issued in September of 2014, "We have recently seen local newspapers and social networks publishing news with regards to the Viber service being blocked in the UAE. We would like to clarify that the service was never licensed in the UAE. Moreover, the VoIP regulatory policy has only licensed Etisalat and Du, The Licensees, to provide telecommunication services in the UAE, including VoIP services. This policy still exists and has not been amended."⁷¹

5.5 South Korea

In South Korea, Internet access service providers must obtain a service license from the Ministry of Science, ICT and Future Planning (MSIP) and are subject to the Telecommunications Business Act.

As in many parts of the world, the basic legislation relating to telecommunications regulation was created for the switched telephony network. The Telecommunications Business Act was subsequently amended, however, to include providers of Internet access services within the definition of common carriers. Today, a common carrier that provides Internet access service is subject to the same duties as those that apply to traditional providers of telephony services.

South Korea has been subject to various disputes as regards OTT services, notably in the context of blocking, throttling, or charging for OTT VoIP services such as Voice Talk, Line, Skype and Viber. The Citizens' Coalition for Economic Justice and Korean Progressive Network Jinbonet reported telecommunications carriers to the KCC on November 23, 2011 for allegedly charging users more for VoIP applications or blocking their use entirely.⁷²

⁷⁰ See for instance Joey Bui (2015), "Skype ban tightens in the UAE", in The Gazelle, 7 February 2015, at <http://www.thegazelle.org/issue/55/news/skype/>.

⁷¹ As quoted in Joey Bui (2015), "Skype ban Tightens In the UAE", op. cit.

⁷² See Borami Kim and Byoungil Oh (2014), "Network Neutrality in S. Korea", at <http://act.jinbo.net/drupal/node/8351>.

There have also been allegations that Korea Telecom (KT) blocked its high-speed Internet service subscribers from using Smart TV starting on 10 February 2012 so as to identify and discard data that was being sent to a Samsung Smart TV server. Thanks to the arbitration of KCC, KT withdrew the restriction on 14 February 2012.

Partly as a result of concerns such as these, the Korea Communications Commission (KCC) issued a guideline on network neutrality and Internet traffic management in December 2011. The guideline established the user's right to access to lawful content, applications and services of his or her choice, using devices which are not harmful to network, and the user's right to be informed of traffic management practices.

It also mandated transparency of traffic management, no blocking, and no unreasonable discrimination.⁷³

Building on the KCC's earlier work, the MSIP subsequently issued revised "Guidelines on the Net Neutrality and Internet Traffic Management" on 5 December 2013.⁷⁴

Network operators in South Korea are not prohibited from charging their customers extra fees to use VoIP, or blocking the use of VoIP altogether. Network operators are permitted to charge VoIP providers a "traffic usage based cost share".⁷⁵

5.6 Europe

It is important to recall that relevant regulation within the European Union (EU) takes place within a common Regulatory Framework for Electronic Communications (RFEC). In areas that are not rigorously specified, there are differences among the 28 Member States,⁷⁶ but they can be viewed as representing variations on a common theme.

The question of how to deal with Over-the-Top services has emerged as a new concern for EU regulatory policy in recent years; however, the underlying concern with the de-coupling of the service from the network is by no means new. These same issues were visible from the time that it was first recognised that packet-switched protocols in general, and the Internet Protocol (IP) in particular, de-coupled electronic communication services (ECSs) from the underlying electronic communications network (ECN).

The European RFEC that was enacted in 2002 already attempted to address these challenges (1) by distinguishing between the ECS and the ECN, and (2) by embracing an over-arching principle of *technological neutrality*. Technological neutrality did not fully resolve the underlying challenges. Notably, the boundary between voice telephony services and e-mail as electronic communication services (ECSs which in general fall within the regulatory framework),⁷⁷

⁷³ Ibid. These provisions are similar to those of the US FCC's Open Internet Order of 2010. The article includes a brief and informal translation of the guidelines.

⁷⁴ An informal translation into English appears in Kim and Oh (2014), op. cit.

⁷⁵ Telecommunications Regulatory Authority of India (2015), "Regulatory Framework for Over-the-top (OTT) services".

⁷⁶ The RFEC also applies for the most part to three countries that are member of the European Economic Area (EEA) but not of the EU, and also to some extent to Switzerland (pursuant in the latter case to bilateral agreements).

⁷⁷ As defined in Article 2(c) of the Framework Directive of 2002, as amended in 2009, an "... 'electronic communications service' means a service normally provided for remuneration which consists wholly or mainly in the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks used for broadcasting, but exclude services providing, or exercising editorial control over, content transmitted using electronic communications networks and services; it does not include information society services, as defined in Article 1 of Directive 98/34/EC, which do not consist wholly or mainly in the conveyance of signals on electronic communications networks ..."

and *information society services* (which are explicitly excluded under Article 2(c) of the Framework Directive)⁷⁸ has always been challenging. Per Recital 11 of the Framework Directive, the “... definition of ‘information society service’ ... spans a wide range of economic activities which take place online. Most of these activities are not covered by the scope of this Directive because they do not consist wholly or mainly in the conveyance of signals on electronic communications networks.

Voice telephony and electronic mail conveyance services are covered by this Directive. The same undertaking, for example an Internet service provider, can offer both an electronic communications service, such as access to the Internet, and services not covered under this Directive, such as the provision of web-based content.”

These issues could be said to have first risen to prominence with the emergence of *Voice over IP (VoIP)* services. Some forms of VoIP function as a classic over-the-top service that competes directly with traditional voice services, thus challenging the business model of traditional providers of ECS while being largely outside of their control.

The European Commission drafted a position paper and conducted a public consultation on VoIP in 2004.⁷⁹ The consultation document explored a number of regulatory issues, including authorisation, universal service, and means to deal with market power. In each of these areas, application of the core elements of the regulatory framework seemed to be reasonably straightforward and unproblematic, which is to say that efforts to craft the regulatory framework in a technologically neutral way appear to have been fairly effective. More complex challenges were identified having to do with access to emergency services; the ability to use geographic or non-geographic numbers (and to exercise number portability); integrity and availability of the network; privacy; and lawful intercept. IP interconnection was identified as posing complex challenges that extended well beyond VoIP.

The findings in subsequent analyses by the European Regulators’ Group (ERG)⁸⁰ in 2005, 2006, and 2007,⁸¹ and also in a subsequent study on behalf of the European Commission,⁸² were largely similar. The problems that were identified had little to do with the core elements of the regulatory framework; rather, they dealt with aspects that were more or less peripheral, including telephone numbering and number portability; network integrity and security; access to emergency services (including the ability to locate the user when emergency services are needed); and lawful intercept. Progress has been made in most of these areas, and some continue to be somewhat problematic to this day. Most recently, EU regulators studied these issues through their joint organisation BEREC.⁸³

Notably, BEREC felt that the definition of an Electronic Communications Service (ECS), i.e. a service subject to the RFEC, was not sufficiently crisp. This risked anomalous treatment among the Member States, and had already led to different interpretations.

⁷⁸ See also recital 5 of the same Directive, which notes that the regulatory framework “...does not ... cover the content of services delivered over electronic communications networks using electronic communications services, such as broadcasting content, financial services and certain information society services, and is therefore without prejudice to measures taken at Community or national level in respect of such services, in compliance with Community law, in order to promote cultural and linguistic diversity and to ensure the defence of media pluralism.”

⁷⁹ European Commission (2004), “The Treatment of Voice over IP (VoIP) under the EU Regulatory Framework”, 14 June 2004, at: http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=3980. The author of this report served as an expert adviser to that project.

⁸⁰ The ERG was the predecessor organisation to BEREC.

⁸¹ ERG (2005), ERG Common Statement for VoIP Regulatory Approaches, ERG (05)12; ERG (2006): Report on “VoIP and Consumer Issues”, ERG (06) 39; and ERG (2007): Common Position on VoIP (Draft) of the ERG – High Level Policy Task Force on VoIP, ERG (07) 56 Rev1.

⁸² Dieter Elixmann, J. Scott Marcus, and Christian Wernick, with the support of Cullen International (2008), “The Regulation of Voice over IP (VoIP) in Europe”, at: http://ec.europa.eu/information_society/policy/ecom/doc/library/ext_studies/voip_f_f_master_19mar08_fin_vers.pdf.

⁸³ BEREC (2016), “Report on OTT services”, BoR (16) 35.

“The general interpretation of NRAs is that some of OTT services qualify as ECS, for example OTT voice services that have the possibility to make outgoing and/or incoming calls to the PATS.”

BEREC explicitly asked that the information gathering powers of EU NRAs be strengthened, including the ability to demand information from firms that are not themselves (currently) subject to the RFEC.

As noted in Section 4.1, BEREC noted the appeal of the “level playing field”, but argued that “... there can also be reasons for different regulatory treatment of services. The range of services to which any specific obligation should apply, must be considered in light of the goals of the obligation and the proportionality of that obligation being applied to any specific service or service type.

This implies that the social benefits of the obligation and its scope need to be proportionate to the economic costs entailed for each regulated provider, and the static and dynamic competition effects of partial or universal application of the obligations.

A preference for a level playing field can be part of the assessment of proportionality, but it is only one of the many elements.”⁸⁴

These questions are still active, and have been the subject of several recent public consultations issued by the European Commission.

5.7 The United States

In the United States, the Communications Act of 1934 as amended imposes scarcely any obligations on *information services*. Providers of *telecommunications services*, by contrast, are subject to a range of regulatory obligations; however, the FCC can forebear⁸⁵ from applying most obligations where certain criteria are met.

The *Federal Communications Commission* (or FCC, the US national regulatory authority) has an open proceeding seeking comment on the appropriate regulatory classification of all IP-based services, including interconnected VoIP, and has declined to explicitly classify interconnected VoIP. Meanwhile, the FCC has found that because customers largely viewed interconnected VoIP service as a substitute for traditional telephone service, certain obligations that applied to telephone service providers should appropriately be applied to interconnected VoIP service (i.e. VoIP that places or receives calls to telephones on the *Public Switched Telephone Network (PSTN)*)⁸⁶ as well, including contributions to the Universal Service Fund, emergency calling obligations (to the emergency number 911), notices of discontinuance of service, compliance with CALEA, and telephone number portability. Most FCC rules that have been extended to VoIP apply specifically to interconnected VoIP.

Online or OTT services may be subject to other obligations as well. Interconnected VoIP, non-interconnected VoIP, and certain online video services are subject to certain FCC regulatory obligations. Most or all online services are subject to privacy obligations.

⁸⁴ BEREC (2016), “Report on OTT services”, BoR (16) 35.

⁸⁵ Under the authority of Section 10 of the Communications Act.

⁸⁶ In the FCC’s rules at 47 CFR 9.3, interconnected VoIP is defined as “a service that (1) Enables real-time, two-way voice communications; (2) Requires a broadband connection from the user’s location; (3) Requires Internet protocol-compatible customer premises equipment (CPE); and (4) Permits users generally to receive calls that originate on the public switched telephone network and to terminate calls to the public switched telephone network.”

Some services, such as online banking and health services, are subject to sector-specific regulation. The history of network neutrality rules in the United States is complex. The US FCC put the current network neutrality (Open Internet) rules in place in 2015.⁸⁷ The FCC's Open Internet Order of 2015 served to re-classify broadband Internet access services; to impose network neutrality rules on providers of broadband Internet access services (BIAS);⁸⁸ but also to exempt BIAS providers from numerous other obligations using the previously mentioned authority to forebear.⁸⁹

In Section 4.6, the Caller ID “spoofing” issue was discussed. The U.S. Congress passed the *Truth in Caller ID Act* in 2011 to prohibit spoofing in the U.S. The FCC adopted rules implementing this act. Since then, several bills to expand the TCIDA have been proposed in the Congress.

Relative to taxation, the United States has long had a Congressional moratorium on taxes on Internet access and on Internet-specific taxes (and on the imposition of multiple taxes on e-commerce), but not specifically on services provided over the Internet, under the *Internet Tax Freedom Act of 1998*.⁹⁰ In principle, purchases made over the Internet are subject to state sales tax whether the purchaser lives in the same U.S. state as the e-commerce provider or not; however, collection of sales tax tends to be unenforceable unless the merchant has a physical presence in the state that seeks to impose the sales tax. A substantial fraction of the sales tax that is nominally due is not in fact collected.⁹¹ The *de facto* moratorium on state sales tax on interstate sales arguably represents a financial benefit to online merchants in comparison to conventional “brick and mortar” merchants (but an advantage that is offset to some extent by shipping costs).⁹² The long-standing moratorium was recently made permanent as part of the Trade Facilitation and Trade Enforcement Act of 2015.

⁸⁷ US FCC (2015), “Protecting and Promoting the Open Internet”, Report and Order on Remand, Declaratory Ruling, and Order, GN Docket No. 14-28, FCC 15-24.

⁸⁸ The obligations were not imposed on providers of OTT or VoIP services.

⁸⁹ J. Scott Marcus (2014), «Network Neutrality Revisited: Challenges and Responses in the EU and in the US», a study on behalf of the European Parliament's IMCO Committee, IP/A/IMCO/2014-02, PE 518.751, available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2014/518751/IPOL_STU%282014%29518751_EN.pdf.

⁹⁰ The Internet Tax Freedom Act of 1998 is not a separate law; rather, it is Title XI (Moratorium on Certain Taxes) of Public Law 105–277. See: <http://www.gpo.gov/fdsys/pkg/PLAW-105publ277/pdf/PLAW-105publ277.pdf>.

⁹¹ See US Congressional Budget Office (2003), “Economic Issues in Taxing Internet and Mail-Order Sales”, at: <http://www.cbo.gov/sites/default/files/10-20-internettax.pdf>.

⁹² Ilsa Godlovitch, J. Scott Marcus, Bas Kotterink, Pieter Nooren et al. (2015), “Over-the-Top (OTT) players: Market dynamics and policy challenges”, study for the IMCO Committee of the European Parliament, at [http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569979/IPOL_STU\(2015\)569979_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569979/IPOL_STU(2015)569979_EN.pdf).

Concluding remarks

This report has sought to explain the opportunities, the threats, and the various regulatory and policy measures that have been taken in order to address these challenges in various regions and countries and around the world that appear to be among the first to confront them.

Online and OTT services have transformed the economies of both developed and developing countries; moreover, this effect has clearly trickled down to small businesses and to individuals. Historically, these benefits have tended to be concentrated in developed countries; however, as the process of digitisation accelerates, and as more and more people worldwide are connected to the Internet, these benefits accrue to developed and developing countries alike.

OTT services are thus associated with significant opportunities for all; however, they are also associated with a number of new threats. Existing regulatory provisions that were developed for the switched telephone network tend to be ill-equipped to deal with today's challenges; moreover, in many cases, a global consensus as to what constitutes best practice has not yet emerged.

Among the challenges to National Regulatory Authorities (NRAs) are:

- Determining which services should be licensed and/or subject to regulation going forward. Assessing the degree to which it is appropriate to impose the same obligations on new IP-based services as on traditional services.
- Determining which country has jurisdiction (with respect to each potential obligation) for a given international or global online service.
- Determining whether Quality of Service (QoS) should be monitored or regulated.
- Addressing risks of fraud, such as falsification of the identity of the calling party.
- Coping with a range of other risks to privacy and security that are associated with these new services.

Many claim that OTTs are impacting the revenues and profits of traditional network operators, with negative impact on investments that are needed in fibre-based infrastructure and in new mobile access technologies such as LTE. Different interpretations are possible as to the relevance and severity of this threat, but there is good reason to believe that substitution effects are present.

Any direct impact of OTT services on the profits and revenues network operators needs to be understood, moreover, in its broader context. Many things are happening at once. Substitution results in lower effective prices to consumers, which not only transfers gain to consumers, but also motivates them to consume more service – thus benefitting not only the consumers, but also generating new revenue for network operators. Globally, the number of networks users continues to increase, due in part to improving price/performance, thus also driving new revenues. At the same time, the steady improvement in the price/performance of network and computing equipment lowers unit costs for network operators. The interactions among these factors are complex, and the relative magnitudes different from case to case.

Network operators have to seriously re-think their businesses in order to capitalise on these factors, but it is by no means the case that the news is all bad for them. For consumers, and

thus for society as a whole, the potential gains from online and OTT services are substantial. Any ultimate consideration as to what constitutes best practice will need to consider the full range of effects of OTT services.