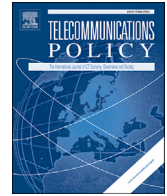


Contents lists available at [ScienceDirect](#)

Telecommunications Policy

journal homepage: www.elsevier.com/locate/telpol

Speed isn't everything: A multi-criteria analysis of the broadband consumer experience in the UK

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ARTICLE INFO

Keywords:

Internet access
Broadband
QoS
QoE
Consumer experience
Ofcom

ABSTRACT

In this paper, we demonstrate that there is more to consumer experience than just broadband access speed. We identify and describe a complex and dynamic set of interactions that occur between different factors that collectively determine consumer experience. We suggest that the relationship between broadband speed and consumer experience follows an inverted U-shape. Access speed is necessary to provide consumers with a good experience, but it is not sufficient. Based on our findings, a more nuanced understanding of the market for broadband Internet access products is outlined and a foundation for deriving valuable policy implications is developed.

1. Introduction

For some time now, Usain Bolt, the 100 m world record holder and regularly referred to as the world's fastest man, has advertised the broadband products of Virgin Media in the UK. His prominent role is a not so subtle attempt to emphasise how fast the company's broadband products are compared to those offered by their rivals like PlusNet, TalkTalk or Sky.¹ Indeed, the speed of Virgin's broadband network plays a key role in the company's advertisement strategy. Virgin Media is, perhaps surprisingly, not alone when promoting their products on the basis of speed. Its rivals also emphasise speed, often comparing how fast their new products are relative to their older (existing) ones.

Although average broadband speeds have increased significantly over time (Ofcom, 2015a, 2016d), most consumers are familiar with problems such as distorted audio signals or frozen video screens during Skype calls. Even though most consumers now enjoy broadband access speeds that are considerably faster than the minimum mandated by Skype, the consumer experience is not what it should be. Similarly, many consumers watch movies through Netflix or Amazon Prime, and although average access speeds should be sufficient, buffering delays and varying resolution qualities are relatively common. As the average broadband download speed in the UK is 37 Mbps (Ofcom, 2016e, p. 4), why does buffering or poor audio quality on Skype continue to occur?

The answer to this question is both simple and complex. It is simple in the sense that there is a gap between the download speed that the consumer subscribes to and what the Internet Service Provider (ISP) is able to deliver. It is complex because even if the ISP can deliver the speed that the customer pays for, it cannot guarantee a good consumer experience. Consumer experience reflects the perceived quality of products and services (Bouch, Kuchinsky, & Bhatti, 2000; Raake & Egger, 2014), and is a multi-dimensional concept

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¹ In November 2016, according to speedtest.net, the top 10% download speed (that is, the 90th percentile) for Virgin Media was 161.33 Mbps whereas the comparable figure for BT was 63.23 Mbps. The figures for Plusnet, TalkTalk and Sky were 59.53 Mbps, 37.57 Mbps and 36.27 Mbps respectively (Ookla, 2016).

<http://dx.doi.org/10.1016/j.telpol.2017.06.001>

Received 12 November 2016; Received in revised form 29 May 2017; Accepted 3 June 2017

Available online xxxx

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that makes evaluations complex and involves several inter-related trade-offs. It is also shaped by the actions of, and the interactions between, the various players that collectively constitute the value chain that delivers a product or service to the final end user. The weakest link in the value chain, as determined by speed or service quality, shapes the perceived consumer experience. If, for example, content is delivered by a content provider with low resolution, the consumer experience is impinged upon irrespective of the quality of the other elements of the value chain. Furthermore, the ISP does not necessarily own or control the whole underlying infrastructure. The various parts of the infrastructure used to deliver services to consumers may be owned by different companies, and vary in terms of the bandwidth available and how they treat products and services such as voice-over-IP (VoIP) or over-the-top (OTT) services. Additionally, the consumer experience may also vary depending on the devices that are used to access the Internet, the configuration of home networks and the digital literacy of the user.

With this in mind, the remainder of the paper explores the complexity of the broadband consumer experience. We do so by illustrating this complexity through reference to a series of products and services that are commonly accessed via broadband. Such an approach allows us to demonstrate how the various components of the value chain interact with one another to shape consumer experience. We explore the relationship between Quality of Service (QoS) and Quality of Experience (QoE), demonstrating how customer experience and speed display an inverted U-shaped relationship. In the following section, a brief overview of the advantages associated with broadband is provided while our attention turns to broadband speeds in the UK in Section 3. In Section 4 we discuss consumer experience on the Internet before arguing that this is broader than speed in Section 5. Illustrations that demonstrate the complexity of the consumer experience on the Internet are provided in Section 6, before the issues that arise are discussed in Section 7. Conclusions are drawn in Section 8, the final section of this paper.

2. Why broadband is important

2.1. Socio-economic benefits

Over the last decade or so, an extensive literature has emerged that highlights the positive socio-economic benefits of broadband. Broadband increases economic output. One study of OECD member countries found that an increase in broadband penetration of 1% increased economic growth by 0.025% (Koutroumopis, 2009), while another, geographically broader analysis of 120 countries, found that a 10% increase in broadband penetration resulted in additional GDP per capita growth of 1.21% in developed and 1.38% in developing countries (Qiang, Rossotto, & Kimura, 2009). In some countries the Internet has significantly contributed to economic growth; for example, the Internet contributed a third of Sweden's GDP growth between 2004 and 2009 and a fifth of the UK's over the same period (Economist Intelligence Unit, 2012b). It is, therefore, perhaps unsurprising that better broadband availability has also been found to be associated with higher levels of employment (Singer, Caves, & Koyfman, 2015). Additionally, it has been associated with improvements in healthcare as well as the management of natural resources and resiliency to climate change (Broadband Commission for Sustainable Development, 2016; Mölleryd, 2015).

Furthermore, individuals may also benefit directly from broadband. Not only can individuals become better informed through accessing online new sources, but they can also benefit financially through, for example, purchasing and selling goods and services via the Internet. Time can also be saved, through purchasing electronic goods and services as well as reduced commuting time. Of course, for individuals to be able to enjoy these benefits they require access to the Internet as well as the means – device and IT skills – to go online. There are, all things considered, wide-ranging socio-economic benefits to be derived from broadband adoption.

2.2. Speed

An increasingly prominent strand of the literature on broadband focuses on speed. At one end of this debate, governments have set broadband speed targets. These targets vary considerably, reflecting the specific circumstances and existing infrastructural endowment of the country (see, for example, Economist Intelligence Unit, 2012a; OECD, 2011). Focusing on peak downstream data rates, Australia aims for 50 Mbps Internet access to be available to 90% of fixed line premises, and 25 Mbps to all premises as soon as possible (Government of Australia, 2016). New Zealand follows a more differentiated, multi-tiered, approach. By the end of 2024, the Ultra-Fast Broadband Initiative (UFB) aims to provide fibre-based Internet access with peak speeds typically ranging from 100 Mbps to 1 Gbps to 84% of New Zealanders (Ministry of Business, Innovation & Employment, 2017). In addition, the Rural Broadband Initiative (RBI) aims at ensuring the availability of 50 Mbps Internet access to 99% of New Zealanders, and 10 Mbps to the remaining 1%, by 2025 (Adams, 2015). More ambitious goals are being pursued by Luxembourg, which is aiming for every household to have access to broadband speeds of 1 Gbps by 2020 (OECD, 2011). Luxembourg's target stands in stark contrast with those of the European Union (EU) more generally. The EU has set a target of everyone having access to broadband at speeds of at least 100 Mbps (upgradable to Gbps speeds) by 2025 (European Commission, 2016).

There are economic benefits associated with faster broadband speeds. Analysing 33 OECD countries, Rohman and Bohlin (2014) found that doubling broadband speeds added an additional 0.3% to GDP growth between 2008 and 2010. Ericsson, Arthur D. Little and Chalmers University of Technology (2013) found that increases of 4 Mbps in OECD countries increased household incomes by \$1200 a year, whereas increasing speeds by just 0.5 Mbps in Brazil, India and China resulted in household incomes rising by \$800 a year.

Ezell, Atkinson, Castro, and Ou (2009) emphasize the role of faster Internet access in facilitating innovation in the Internet ecosystem. Innovators are expected to draw on high-capacity next-generation broadband access to develop new services and products. Innovations related to services as diverse as HD video-conferencing, cloud computing, virtual reality, and the Internet of

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