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Notes

Introduction

- 1 MP3 from 8 June 2006. Note the 44th President is not opposed to QoS, just to differential contracts for that QoS. He continues: 'Allowing the Bells and cable companies to act as gatekeepers with control over Internet access would make the Internet like cable. A producer-driven market with barriers to entry for website creators and preferential treatment for specific sites based not on merit, the number of hits, but on relationships with the corporate gatekeeper. If there were four or more competitive providers of broadband service to every home, then cable and telephone companies would not be able to create a bidding war for access to the high-speed lanes. But here's the problem. More than 99 percent of households get their broadband services from either cable or a telephone company.'

He went on: 'There is widespread support among consumer groups, leading academics and the most innovative Internet companies, including Google and Yahoo, in favor of net neutrality. And part of the reason for that is companies like Google and Yahoo might never have gotten started had they not been in a position to easily access the Internet and do so on the same terms as the big corporate companies that were interested in making money on the Internet...'

- 2 The Internet is a 'networks of networks' that connects users by sending packets of bits (digital data) from any point on that network of networks to any other point. Kahn and Serf adopt the broad Federal Networking Council definition of the Internet: 'Of particular note is that it defines the Internet as a global information system, and included in the definition, is not only the underlying communications technology, but also higher-level protocols and end-user applications, the associated data structures and the means by which the information may be processed, manifested, or otherwise used.' It is defined by its inventors, Cerf et al. at <http://www.isoc.org/Internet/history/brief.shtml>. See further Kahn and Cerf (1999).

From the October 24, 1995, Resolution of the US Federal Networking Council in Kahn and Cerf, op cit: 'The Federal Networking Council (FNC) agrees that the following language reflects our definition of the term "Internet". "Internet" refers to the global information system that – (i) is logically linked together by a globally unique address space based on the IP (IP) or its subsequent extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/IP (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein.'

For most domestic, consumer users, it is a combination of the World Wide Web, a graphical interface that permits hyperlink surfing ('clicking' from one webpage to another) and electronic mail. However, it is actually the most prevalent and fastest growing information sharing network ever devised. It grew from a small scientific network into a network accessed by almost a billion people in less than 10 years (1994–2003), only exceeded in rate of diffusion by mobile telephones. Numbers of Internet users have consistently been under-estimated in official statistics, and there is no accurate estimate for the global total. There are no definitive totals of Internet users worldwide, unsurprising given the numbers of email accounts, use of cybercafes, numbers online through a third party subscription (e.g. work, school, library). See Global Internet Statistics <http://www.glreach.com/globstats/index.php3> and GSM Association <http://www.gsmworld.com/news/statistics/index.shtml>. However, it is meaningless to give specific numbers for a book – there are well over a billion Internet users by mid-2009 and well over 2 billion mobile phone users.

- 3 I am Senior Lecturer at the University of Essex Law School (since 2008), and formerly Lecturer (2007–8) and Fellow (2005–7), having also been a Research Manager/Associate at Oxford's Internet Institute and Programme in Comparative Media Law and Policy (2003–5), and previously Lecturer in European Law at the University of Warwick (1997–2000).
- 4 I consulted for the Chief Executive of the Independent Television Commission, a forerunner of UK regulator Ofcom, in 2000, lobbied Ofcom, another forerunner in 2001–2, as Director of Regulatory and Government Policy for MCI WorldCom UK Ltd (yes, WorldCom), was General Counsel of Shortmedia Ltd, a video-on-demand start-up in 2000–1, consultant for telecoms strategy boutique boutique Re:Think! In 2001, and for RAND Corporation's Cambridge and Brussels offices, I worked for Ofcom as well as British Telecom and content providers such as Google Inc. in 2005–7. I have seen UK communications policy from most sides.

- 5 I have consulted for the European Commission as well as the Netherlands and Irish governments in 2005–7, and for the Council of Europe in 1999.
- 6 I was Research Fellow at Harvard's Information Infrastructure Project (1999–2000), participated in the Harvard/Swiss Re conferences (2002–7), and Wharton Media Law Colloquiums (2006–8) and have given many papers since 1997 at the Telecoms Policy Research Conference, serving on the Programme Committee for the 2007 and 2008 conferences. I was also a very active member of the Cambridge-MIT Institute Communications Research Network 2004–7. I also have long-standing links with both USC and Columbia University researchers in the field.
- 7 I am a Research Fellow at both GLOCOM and Keio Universities and a frequent visitor to Japan, including several visits sponsored by the British Academy, Japanese Society for the Promotion of Science and Keidanren 21st Century Institute.
- 8 Berners Lee (2006) at <http://dig.csail.mit.edu/breadcrumbs/node/144>.
- 9 The comparison is carefully drawn, as congestion modelling for IP networks and roads has been carried out with great policy effect by Kelly (2003).
- 10 Still the only option for the vast majority to the developing world, where mobile subscribers and WiFi users outnumber fixed broadband subscribers exponentially – for instance by at least 20 to 1 in India.
- 11 There are 8 bits in a byte.
- 12 See Lessig (1999b); Lemley and McGowan (1998); Lemley (1999, 2000) in Marsden (ed.).
- 13 Warwick University had only a theoretical capacity to deliver real-time video conferencing all those years ago. The first article I give to my LL.M. introduction class is Samuelson (2000), asking them which of the five challenges remains most relevant. (It's a trick, they all do!).
- 14 Lemley and Lessig (1999) at Paragraph 4.
- 15 Lemley and Lessig (1999) at Paragraph 22. Though note that end-to-end has prevented many Internet architectural innovations including QoS. Dave Clark, one of the originators of the end-to-end principle, has pleaded for less zealotry on the part of lawyers interpreting his work as though it were a 'law': see Clark and Blumenthal (2001) in a very thoughtful restatement of the ideas.
Clark more recently expressed his views that end-to-end anonymity was actually a bad mistake, particularly in the spam context. See: <http://www.cambridge-mit.org/cgi-bin/default.pl?SID=5&CALEVID=192>.
- 16 For a more free-market empirical observation, see Hazlett and Bittlingmayer (2001), Marsden (2000b) and most recently Hazlett and Caliskan (2008).
- 17 Lessig (1999a).
- 18 Marsden (2004a: 5).
- 19 The great man did concern himself with both vertical integration and moreover the UK public service broadcaster, in his LSE days. See Coase (1937, 1950) at <http://coase.org/coasepublications.htm>.
- 20 To understand the nature of the relationship between regulation and competition law in the late 1990s, see Sauter (1997); Larouche (2000); Marsden ed. (2000) (especially chapters by Cave, Collins and Barnes); Cowie and Marsden (1999).
- 21 Generally, see Walden (2009). Early case law is covered in Ungerer (1996a); Jauk (1999).
- 22 On US policy generally, see Lichtman, Shelanski and Weiser (2006) at www.law.duke.edu/fac/benjamin/telecom/.
- 23 IP/99/413 (1999).
- 24 See IP/00/373 (2000), resolving Case No COMP/M.1795.
- 25 This issue arose in Europe in three mergers: AOL and Time Warner, WorldCom and MCI, and WorldCom and Sprint. See Case No COMP/ M. 1845 AOL/Time-Warner; IP/98/213 (1998); IP/98/639 (1998); Case IV/M.1069 - WorldCom/MCI 99/287/EC; Case COMP/M.1741; MCI WorldCom/Sprint, D.Comm. June 28, 2000, 2003 OJL 300/1; Case T-310/00 *MCI, Inc. v. Commission*.
- 26 Directive 96/19/EEC.
- 27 See LeGates (2000); Hurley and Keller (eds.) (1999).
- 28 See the case law: *Sealink v. B&I Holyhead*: Interim Measures [1992] 5 CMLR 255; *Sea Containers v. Stena Sealink Commission* Decision 94/19 [1994] OJ No L 15/8; Commission Decision 89/205/EEC in

- Case IV/31.851 - Magill TV Guide/ITP, BBC and RTEOJ L 78, 21.3.1989, p. 43; C-241-242/91; *Magill v. RTE and Commission* (1995) 4 CMLR 718 C-7/97; C-241 / 91P & C-242/91P, *Radio Telefis Eireann v. Commission* ('Magill'), [1995] ECR, I-743; *Oscar Bronner GmbH & Co. KG v. Mediaprint Zeitungs- und Zeitschriftenverlag GmbH & Co KG* [1999] 4 CMLR 112; C-418/01 *IMS Health v. NDC Health* 29th of April 2004, ECR 2004. Analysis provided in Cowie and Marsden (1999); Treacy (1998); Bergman (2000); Schmidt (2002).
- 29 On economic issues in telecoms generally, see Laffont and Tirole (2001); Majumdar, Vogelsang, Cave eds. (Vol. 1 2002; Vol. 2 2005); Buiges and Rey (2004); Cave (2004).
- 30 C(2000)1059.
- 31 On the chequered progress of NRAs in implementing the 1998 and 2002 frameworks, see British Institute of International and Comparative Law (2004); Geradin and O'Donoghue (2005); Andersen (2005).
- 32 *United States v. Microsoft Corporation* (2000); in re *United States of America v. Microsoft Corporation*, Civil Action No. 98-1233 (CKK).
- 33 COMP/C-3/37.792 Microsoft (24.03.2004); C(2004)900.
- 34 On Trans-Atlantic differences, see Naftel and Spiwak (2001); Marcus (2005).
- 35 Ungerer (2000: 24).
- 36 IP/98/707 (1998); IP/99/298 (1999).
- 37 See Ungerer (2000) at footnote 93: See also[the] recent FCC (Federal Communications Commission) decision on the AT&T/MediaOne merger where the FCC insisted on divestitures, in order to decrease the effect of the merger on the cable TV market, and noted that it expected 'AT&T to fulfil its voluntary commitments to give unaffiliated ISPs (ISPs) access to its cable systems to provide broadband services to consumers'. It also noted 'that AT&T has entered a proposed consent decree with the U.S. Department of Justice, which requires the merged firm to divest its interest in the cable broadband ISP Road Runner and to obtain Justice Department approval prior to entering certain types of broadband arrangements with Time Warner and America Online'.
- 38 European Parliament legislative resolution of 6 May 2009: 16498/1/2008 – C6-0067/2009 – 2007/0249(COD).
- 39 SPEECH/08/561.
- 40 Reding continued SPEECH/08/561: 'Professor Martin Cave has recently calculated that the present lack of a single telecoms market comes at a very high price for Europe's economy. According to him, the additional cost of regulatory fragmentation in telecoms is €20 billion per year for Europe's businesses. Commission experts believe this figure to be still a very conservative estimate ... But it is clear that at present, it remains difficult for, say, a French operator to invest in Spain if regulatory decisions on next generation access differ substantially in both countries. And I compare with interest your comments on regulatory issues with that of your subsidiaries in those Member States where they are in the position of a new market entrant ... This [type of regulatory inconsistency] is exactly the kind of problematic situation Professor Cave refers to when he talks about the cost of poor and inconsistent regulation.'
- 41 Lessig's further work may be more well known, but his former student, the now masterful Tim Wu also has an excellent record of scholarship investigating control of content and freedom of expression on the Internet in the United States, Europe and China. See Goldsmith and Wu (2006).
- 42 Sandvig (2007).
- 43 It is often forgotten that Enron's troubles were highlighted by the Enron Broadband non-business whose revenues were wildly overstated in 2000. After WorldCom's \$11b fraud was later uncovered, in June 2002, global stock markets fell 25%, as Arthur Andersen collapsed and many of the world's largest companies had to restate earnings. It was a forewarning of the 2008 implosion of banks. Not only those companies and Global Crossing, but also competitors such as Level3 went into Chapter 11 bankruptcy protection, from where they aggressively – almost suicidally – cut prices to customers, thus playing 'beggar thy neighbour' tactics against their competitors such as the UK's Cable & Wireless and Energis. For the US fall-out see Goldstein (2005), also see <http://telefrieden.blogspot.com/2009/02/non-lesson-from-telecom-frauds.html> for a comparison with the present day.
- 44 I exclude the United Kingdom, as its cable provider was deep in financial trouble, and the pace of broadband rollout was funereal.

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- 45 Cairncross (1997), stating that policy must adapt to the loss of local voice telephone monopolies, while dealing with the 'Five P's' of the Internet: policing, pornography, privacy, protection and property. She also feared the monopolistic tendencies of the industry, as revealed by the anti-trust charges against Microsoft: 'Competition clearly does not come naturally in communications.'
- 46 Even if many consumers only wanted their wireless phone and broadband, what is termed 'naked DSL' which rival ISPs can sell on to customers without the twentieth century phone line paraphernalia. As I write, this is available in France and other EU countries, but not the United Kingdom and the majority of the 27 Member States.
- 47 Riley and Scott (2009: 3).
- 48 *Recording Industry Association of America v. Verizon Internet Services* 2003 U.S. Dist. Lexis 681, 240 F. Supp. 2d 24 (D.D.C., Jan. 21, 2003), reversed, 351 F.3d 1229, Case No. 03-7015 (D.C. Cir., December 19, 2003) cert denied 125 S.Ct. 309 (2004).
- 49 See Croxford and Marsden (2001) for contemporary details.
- 50 Wu (2003).
- 51 Hulme-Jones (2009).
- 52 Ridley and Scott (2009: 3) add: 'The first DPI devices were used for manual troubleshooting of network problems and to block viruses, worms and Denial of Service attacks. Initially, DPI was not powerful enough to monitor users' Internet communications in real time. But today, DPI is capable of far more than security – it enables new revenue-generating capabilities through discrimination. Historically, Internet communications were processed using only information in the header, because only that information is needed to transfer packets from their source to their destination. By contrast, DPI technology opens and reads the data field in real time, allowing network operators to identify and control, at a precise level, everyday uses of the Internet...'
- 53 See Marsden et al. (2006) at Appendix A: A Simple Game for ISP Choice, modelled by Jonathan Cave – showing that early adopters with a propensity to act as servers for P2P networks are exactly the kind of customer that no ISP wants, and that therefore all ISPs logically choose to throttle such uses.
- 54 Crowcroft (2007).
- 55 Public remarks of discussion between UK and French regulators at ENST conference 29 May 2007 in Paris.
- 56 With walls sufficiently high that one might term them 'Forbidden Cities'. The reference is to the Chinese Emperor's official residence in Peking until 1924, and I acknowledge fully the analogy to the 'Great Firewall of China' – on which see Zittrain and Edelman (2003) and Goldsmith and Wu (2006).
- 57 Van Schewick (2005).
- 58 Kocsis and De Bijl (2006) have proposed a game theoretical perspective to analyze such incentives similar to Appendix A in Marsden et al. (2006).
- 59 P2P networks carry malware, spyware, spam and other unsolicited and potentially harmful content, but so does SMTP email, in fact the latter is generally considered a more ubiquitous danger.
- 60 See Greenberg and Veytsel (2006) and Greenstein (2006).
- 61 Examples abound, for recent examples see <http://chrismarsden.blogspot.com/>.
- 62 See Clayton (2005); Brown (2008); Pfleeger and Pfleeger (2006).
- 63 As there is usually only a telephone line, and sometimes a cable line (depending on cable industry development), into each domestic household, there are only two possible competitors unless one or both lines are shared with other rivals.
- 64 Williams (2007).
- 65 Meyer (2007).
- 66 A common ITU term for all-IP networks, which are replacing the current telephony networks.
- 67 Frieden cites Code Monkey (2006): 'What the ISPs don't tell the public is that there are no free-riders among the content companies. They pay handsomely for their bandwidth. In fact, they are the true bread and butter for the major telecoms and ISPs. The reason that this "Network Neutrality" controversy exists today is that ISPs don't want to admit that their whole business model is flawed.'
- 68 Davies and Banks (eds.) (2003).

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- 69 See <http://arstechnica.com/articles/culture/Deep-packet-inspection-meets-net-neutrality.ars/2>.
- 70 See Frydman, Hennebel and Lewkowicz (2008) at <http://ssrn.com/abstract=1282826>. Also note the work of the OpenNetInitiative, the Chilling Effects clearing house and other academic-NGO initiatives to track censorship on the Internet: <http://opennet.net/> <http://www.chillingeffects.org/> <http://www.eff.org/> and in Europe organizations affiliated to the European Digital Rights Initiative: <http://www.edri.org/about/members>.
- 71 Mayer-Schonberger (2008). Also more generally on law and economics' place, see Mackaay (2006).
- 72 Berners Lee, with Fischetti (1999).
- 73 Saltzer, Reed and Clark (1984).
- 74 Lessig (1999d).
- 75 Gillett and Kapor (1996) in Kahin and Keller (eds).
- 76 Lemley (1999) and Lessig (1999c).
- 77 Business Week International Online Extra (2005).
- 78 See generally Pflieger and Pflieger (2006).
- 79 Odlyzko and Levinson (2007: 3).
- 80 Wallsten (2007) at SSRN: <http://ssrn.com/abstract=976749>.
- 81 This debate was current even a decade ago at the beginning of the open access debate: see Woroch (2002); Weiser (2000); Speta (2000).
- 82 Lemley and Lessig (1999: 1).
- 83 De Beer, Jeremy (2009: 24.3) states: 'Both supporters and opponents of regulated network neutrality have discussed the principle as a First Amendment issue for its connection to freedom of online expression (Yemini 2008, May 2007). Its egalitarian and participatory underpinnings have even been connected to fundamental theories of distributive justice (Schejter and Yemini 2007).' De Beer's work alongside that of his colleague Michael Geist at the University of Ottawa is doing much to shape the arguments around network neutrality as both an economic and a human rights issue. De Beer, Jeremy (2009: 24.3) states: 'Both supporters and opponents of regulated network neutrality have discussed the principle as a First Amendment issue for its connection to freedom of online expression (Yemini 2008, May 2007). Its egalitarian and participatory underpinnings have even been connected to fundamental theories of distributive justice (Schejter and Yemini 2007).'
- 84 Reding (2009 undated).
- 85 It is reminiscent of European attempts to resist the Netscape and Explorer browsers' decision to set a default of accepting cookies for e-commerce in the 1990s.
- 86 See Sandvig (2007); Crowcroft (2006); Clark and Blumenthal (2007).
- 87 See Palfrey and Gasser (2008); Tapscott (1999, 2008). On the specifics of file-sharing, see Danay (2005).

Chapter One

- 1 Business Week International Online Extra (2005).
- 2 See Trope (2005) for definitions.
- 3 See OECD Foresight Forum (2006).
- 4 International Telecommunication Union (2006).
- 5 See Sandvig (2007), Felten (2006) and Mueller (2008).
- 6 Werbach (1999).
- 7 Lemley and Lessig (2001).
- 8 Wu (2003).
- 9 See Woroch (2004) and Thierer (2004).
- 10 Hahn and Wallsten (2006).

- 11 Frieden (2006).
- 12 Atkinson and Weiser (2006).
- 13 See FCC (2002, 2005a,b,c); *National Cable & Telecommunications Ass'n v. Brand X Internet Services* (2005) 545 U.S. 967; *Time Warner Telecom, Inc. v. FCC* (2007) 507 F.3d 205 (3d Cir.).
- 14 See AT&T Inc. and BellSouth Corp. (2007); SBC Communications Inc. and AT&T Corp. (2005); Verizon Communications Inc. and MCI, Inc. (2005); Quinn (2006).
- 15 See FCC (2005a).
- 16 A famously provocative study is Kushnick (2006) at <http://www.newnetworks.com/BroadbandScandalIntro.htm>.
- 17 Communications Act of 1934 as amended by Communications (Deregulatory) Act of 1996, 47 U.S.C. §§ 153(20) (definition of 'information service'), 153(10) (definition of 'common carrier'), 153(43) (definition of 'telecommunications') and 153(46)(definition of 'telecommunications service').
- 18 See Longley (1967); Ridley, Jasper and Whitehead (1982); Encyclopædia Britannica (2009).
- 19 In the wonderfully descriptive language of the common law: 'Fault of the shipper as an excepted cause is any negligent act or omission that has caused damage or loss—for example, faulty packing. Inherent vice is some default or defect latent in the thing itself, which, by its development, tends to the injury or destruction of the thing carried. Fraud of the shipper is an untrue statement as to the nature or value of the goods. And jettison in maritime transport is an intentional sacrifice of goods to preserve the safety of the ship and cargo'.
- 20 Cherry (2006).
- 21 Carriers Act 1830 Chapter 68 11_Geo_4_and_1_Will_4 at http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1830/cukpga_18300068_en_1.
- 22 *Lane v. Cotton* (1701) 1Ld.Raym. 646, 654 (per C.J. Holt) 'If a man takes upon him a public employment, he is bound to serve the public as far as the employment extends; and for refusal an action lies, as against a farrier refusing to shoe a horse ... Against an innkeeper refusing a guest when he has room ... Against a carrier refusing to carry goods when he has convenience, his wagon not being full'.
- 23 Noam (1994: 435), explaining that: 'When historically they [infrastructure services] were provided in the past by private firms, English common law courts often imposed some quasi-public obligations, one of which one was common carriage. It mandated the provision of service to willing customers, bringing common carriage close to a service obligation to all once it was offered to some'.
- 24 *National Association of Regulatory Utility Commissioners v. FCC*, 525 F.2d 630, 642 (D.C.Cir. 1976).
- 25 See *Western Union Telegraph Co. v. Call Publishing Co.*, 181 U.S. 92, 98 (1901).
- 26 Powell (2004) at <http://hraunfoss.fcc.gov/edocspublic/attachmatch/DOC-24356A1.pdf>.
- 27 In 2004, Phil Weiser and Jim Speta wrote duelling papers about the FCC's authority under the Communications Act. Weiser concluded that the FCC had authority to institute a common-law, adjudication-based regime of regulating. Speta concluded that the FCC's statutory authority was inadequate. These papers were before the Supreme Court's decision in the Brand X case, 545 U.S. 967 (2005). In that case, the Court said that the FCC has authority to address competition problems on the Internet. Speta (2004); Weiser (2004).
- 28 FCC 05-151, adopted 5 August 2005.
- 29 Madison River Communications, LLC (2005).
- 30 See Frieden (2007a), citing AT&T/Bell South (2006) and the dissent of the Chair of the FCC: 'Importantly, however, while the Democrat Commissioners may have extracted concessions from AT&T, they in no way bind future Commission action. Specifically, a minority of Commissioners cannot alter Commission precedent or bind future Commission decisions, policies, actions, or rules ... To the extent Commission action is required to effectuate these [concessions] as a policy going forward, we specifically do not support those aspects of the conditions and will oppose such policies going forward.'
- 31 See Clark (2006) and Sirbu (2007) for technical possibilities in network architecture.
- 32 The debate in regard to the subtleties of service degradation is beyond this paper and experts at the Paris conference of 29 May 2007 were divided as to whether degradation that is deliberate could be well enough disguised to suggest off-net discrimination.

- 33 Werbach (2002); Lehr, Gillett, Sirbu and Peha (2006).
- 34 Communications, Consumer's Choice, and Broadband Deployment Act of 2006, at <http://thomas.loc.gov/cgi-bin/bdquery/z?d109:SNo2686:@@L&summ2=m&>
- 35 Network Neutrality Act of 2006 HR 5273 at <http://thomas.loc.gov/cgi-bin/query/z?c109:H.R.5273>: followed in Internet Freedom and Nondiscrimination Act of 2008, HR 5994 at <http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.5994>:
- 36 See Perry Barlow et al. (2009).
- 37 See Marcus (2002), and for current European reform proposals, see http://ec.europa.eu/information_society/policy/ecom/tomorrow/roadmap/index_en.htm.
- 38 See Sidak (2007); Sidak (2006); Thierer (2004); Thierer (2005); Woroch (2004).
- 39 The lines are bought wholesale from the incumbent and resold to ISP customers. The incumbent's ISP competes for end-customers, theoretically at the same wholesale price. Independent ISPs continue to allege that incumbent wholesale prices to their retail ISP allow illegal subsidy to be recovered. See www.ectaportal.com for latest developments in competitor's regulatory strategy.
- 40 For more recent literature continuing to analyze the problem, see Yoo and Wu (2007); Peha, Lehr and Wilkie (2007); Peha (2007); Sidak (2007); Weitzner (2006); Chirico, van der Haar and Larouche (2007); Kocsis and d. Bijl (2007).
- 41 FCC (2008).
- 42 http://www.theregister.co.uk/2008/02/19/bittorrent_developers_hit_back_at_comcast/.
- 43 See FCC (2008).
- 44 <http://www.washingtonpost.com/wp-dyn/content/article/2008/09/04/AR2008090403282.html>.
- 45 <http://werblog.com/2008/08/further-thoughts-on-the-comcast-decision/>.
- 46 <http://blog.wired.com/27bstroke6/files/comcastic.pdf>.
- 47 Karpinski (2009) and http://downloads.comcast.net/docs/Attachment_B_Future_Practices.pdf.
- 48 Williams (2007).
- 49 American Recovery and Reinvestment Act 2009, at Division B, Title VII, Section 6001(k)2, A, D, E.
- 50 See FCC (2009: 15–17) especially footnotes 62 and 63 at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf.
- 51 <http://www.law.com/jsp/legaltechnology/pubArticleLT.jsp?id=1202428160722>.
- 52 See Commerce and Energy Committee (2008) describing 'the climate of fear that currently pervade[s]' the FCC.
- 53 See http://telefrieden.blogspot.com/2009/01/top-ten-list-of-fcc-regulatory_29.html.
- 54 See Marsden (2000a).
- 55 On LLU and the potential for structural or functional separation, see Sandbach (2001); Cave (2002); Cadman and Dineen (2005); Ofcom (2006a); OECD (2006a).
- 56 See BIICL (2003) *supra*.
- 57 DB Research (2005).
- 58 Enck (2006).
- 59 Bouwman et al. (2006).
- 60 See Cave et al. (2009).
- 61 See European Commission (2006b).
- 62 i2010 High Level Group (2006).
- 63 OECD (2006a: 4).
- 64 See British Institute of International and Comparative Law (2004).
- 65 Ibid. See further <http://www.itu.int/osg/spu/ngn/ngn-policy-regulatory-resources.html>.
- 66 Levy and Spiller (1994).
- 67 Marcus (2005).

- 68 See British Institute of International and Comparative Law (2004), and ECTA (2005), various recent Commission studies by consultants at http://europa.eu.int/information_society/topics/ecommerce/useful_information/library/studies_ext_consult/index_en.htm#2003;
- 69 Ovum (2005).
- 70 Although markets such as France and Sweden have caught up, Denmark stands out in the initial 2001–2 period, see Andersen (2005).
- 71 Named after then Dixons plc-owned subsidiary Freeserve.com (acquired and renamed Wanadoo by France Telecom).
- 72 The economic model was transitory because it depended on per-minute charging, and of the early 1999 successes, Freeserve was purchased by France Telecom and WorldOnline/LibertySurf were bought by Tiscali, all in 2000–1. The model had lasted less than eighteen months. See Marsden (2005b).
- 73 For instance, AOL and UUNet/MCI/WorldCom. Both grew through acquisitions (AOL merging with Compuserve 1998 and Netscape 1999, Time Warner 2000 at the peak of the dot-com bubble).
- 74 See Oftel (2000).
- 75 The lines are bought wholesale from the incumbent and resold to ISP customers.
- 76 See http://www.ofcom.org.uk/static/archive/oftel/publications/internet/internet_brief/broad1003.pdf at p. 22.
- 77 See <http://www.ofcom.org.uk/consultations/current/wbam/wbam.pdf>.
- 78 For the German market, see DB Research (2003).
- 79 See Municipal Wireless (2006).
- 80 This despite Cave and other's arguments that this leaves too little incentive for the NetCo to innovate and maintains incentives for opaqueness in determining responsibility for service-level failures. See Cave (2002) and Sandbach (2001).
- 81 See European Telecommunications Platform (2006): ETP was formed in 1998 and combines 'Open Network Provision Co-ordination and Consultation Platform (ONP-CCP), founded in 1991, and the European Interconnect Forum (EIF)' see http://www.etp-online.org/html/masterset_public.asp.
- 82 See Buiges and Rey (2004); Crandall, and Flamm (1989). A broader interdisciplinary treatment is Einhorn (2004).
- 83 Laffont and Tirole (2000).
- 84 Marsden (2003a,b).
- 85 Cowie and Marsden (1999).
- 86 Geradin and O'Donoghue (2005).
- 87 See *U.S. v. Microsoft Corp.*, No. 98-1233 (U.S. District Court for the District of Columbia), Findings of Fact, ¶¶39–41. Available at www.usdoj.gov/atr/cases/f3800/msjudgex.htm.
- 88 For evidence from the early modern period of telecoms regulation, see Noam (1989); Robinson (2004).
- 89 For discussion of the theory, legislation and practice, see Ungerer (2002).
- 90 Shelanski (1999).
- 91 Shinoda (2004).
- 92 Cadman and Dineen (2005).
- 93 Brunel for Department of Trade and Industry (2002). The Brunel University study of South Korea claimed six reasons for its success: Geography and demographics with most population in densely populated urban areas. Government vision, strategy and commitment, which has proved to be a key factor. Strong competition, with a number of competitors providing broadband infrastructure. The 'PC bang' phenomenon where large numbers of people use an Internet gaming café. Providing service at an affordable price. Clear user benefits resulting from broadband access. Within the education sector all schools have a broadband connection and there is a strong support within Korean society for providing high quality education.
- 94 ITU (2005) demonstrates this in a chart in the statistical Appendix at <http://www.itu.int/osg/spu/newslog/Broadband+Bargains+2005.aspx>.
- 95 Speech/08/561.

- 96 Speech/08/561 supra: 'It is clear that in the US, AT&T still plays quite an important political role up to now. But I would say that in Europe, there is certainly no policy maker who can afford to ignore the incumbents ... Given their history, there is still a vast majority of Europe's incumbents who are at least partially owned by the State. For instance, Deutsche Telekom is 31.3% owned by the German state, France Telecom at 33.1%, TeliaSonera at 45%, Belgacom at 50%, and P&T Luxemburg even at 100%. Only a minority of telecoms incumbents are no longer owned by the State: BT, KPN, Telefónica and Telecom Italia are certainly the most notable examples for this, even though you will probably agree that the lack of a formal ownership link in these cases does not mean that the government would view you as companies like any other'.
- 97 See generally, for current infringement proceedings, http://ec.europa.eu/information_society/policy/ecomm/implementation_enforcement/infringement/index_en.htm; for summaries of national regulation by year since 1997 (14 reports to 2009, 15th Report expected March 2010); http://europa.eu.int/information_society/policy/ecomm/implementation_enforcement/annualreports/ and for an up-to-date guide to case law http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/infringements/Case_law_summary_2008_10.pdf.
- 98 See Chirico et al. (2007) – and my thanks for further discussion in 2007 Istanbul and 2009 Tilburg with the authors of the paper.
- 99 Cowie and Marsden (1999), previously and more extensively by Lemley and McGowan (1998).
- 100 See *The Economist* (2009) citing Vickers (2009).
- 101 Your network of choice will make calls to and from other users of your same network cheaper than those between other networks, fixed or mobile, and your own. Therefore you will have probably made your choice of network based on using the same as the majority of your friends. In addition, your choice will have been motivated by their choice at a time of almost certainly different tariffs. Recognising these effects, the EC has made switching networks and 'porting' (carrying) your number to that new network legally necessary within a single day, with no service loss. However, that has been accompanied by new proposed termination controls to further ensure no abuse of monopoly. In addition, NRAs are required to ensure that information can be provided for independent third party price comparison sites, which may be audited for quality and given 'trust marks'. The idea behind that is to provide greater information on the price variations in monthly mobile tariffs. See further Chapter 7.
- 102 Some readers may recall the discussion and practice of calling back to a received call from a payphone, in order to save on the exorbitant cost of calling from such a facility. In response, public houses often banned incoming calls on such phones! So much for common carriage.
- 103 Economides (2007).
- 104 See the European Commission guidelines, http://ec.europa.eu/comm/competition/liberalization/others/io2_1016_en.pdf.
- 105 See Marsden (2008, 2005a).
- 106 Note that of Europe's 450 million population, only a small proportion are in reach of an unbundled local telephone exchange or an alternative high-speed infrastructure provider to the duopoly of cable and telecoms incumbents. See the EC Implementation Twelfth report of 29 March 2007 at http://ec.europa.eu/information_society/policy/ecomm/implementation_enforcement/annualreports/12threport/index_en.htm or the ECTA Regulatory Scorecard at <http://www.ectportal.com/en/upload/File/Broadband%20Scorecards/Q306/FINALBBSQ306.xls>.
- 107 Van Der Berg (2007).
- 108 Lemley and Lessig (1999) at Paragraph 4.
- 109 Kahn and Cerf (1999).
- 110 Naughton (2000). See further Hafner and Lyon (1996: 52–66).
- 111 Sieradski and Maxwell (2008: 87).

Chapter Two

- 1 See OECD (2006).
- 2 See Cave, Prosperetti and Doyle (2006).

- 3 Yoo (2005a: 8).
- 4 Frieden (2008b).
- 5 Clark and Blumenthal (2007). They note that their design principle has been elevated by law and economics scholars, notably van Schewick (2005), on whose thesis analysis of end-to-end they drily comment: 'Its almost Talmudic character begs the question of how important is the exact wording used by technologists' at their footnote 36.
- 6 See Crowcroft (2007).
- 7 See Hass (2008).
- 8 See Waclawsky (2005).
- 9 IPSphere (2006).
- 10 See IETF (2006) 'MPLS Charter' at <http://www.ietf.org/html.charters/mpls-charter.html>.
- 11 Waclawsky (2005).
- 12 Clayton, Murdoch and Watson (2006) and more generally Pfleeger and Pfleeger (2006).
- 13 Odlyzko and Levinson (2007).
- 14 Horlings, Botterman, Cave, Ligtvoet and de Vries (2002).
- 15 Botterman, Anderson, van Binst, Cave, Libicki, Ligtvoet, te Velde and de Vries (2003).
- 16 See Bohlin et al. (2006).
- 17 Van Oranje, Simmons, Kahan, Botterman and Lundin (2005).
- 18 Talbot (2006) explains that 400 gbps was the expected throughput of Internet2 in 2007.
- 19 See Clarke (2005).
- 20 In the United States, the FCC 'generally defines broadband service as data transmission speeds exceeding 200 kbps' (see <http://www.fcc.gov/cgb/consumerfacts/highspeedinternet.html>). See CNET BB meter for lists of speeds in the United States (http://reviews.cnet.com/7020-7973_7-0.html?tag=bbw) which show a range of 1.8–3.0 Mbps (downstream) as of October 2006.
- 21 Government of the Kingdom of the Netherlands: Ministry of Economic Affairs (2003: 5).
- 22 Latest OECD numbers are found at http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html.
- 23 20:1 for businesses, 50:1 for home, but delivered speeds that reflect/punish increasing uptake.
- 24 See Karagiannis, Rodriguez and Papagiannaki (2005).
- 25 With productivity implications: see Brynjolfsson and Hitt (2003), Brynjolfsson (2003).
- 26 Bohlin et al. (2006: 53).
- 27 Neither appears a particularly promising technology beyond existing uses including broadcasting and Global Positioning System uses. See Bohlin et al. (2006: 75) for satellite and (2005: 106) for powerline.
- 28 Utilization of last-mile links, which include more investment dedicated to single users/households, is lower than what is achievable on 'core' links, resulting in a cost-recovery challenge that helps explain why bandwidth is more limited in edge networks.
- 29 The usage model has important (and hard to change) implications for networks deployed (e.g. what is average/peak usage? how symmetric? open access?). The marketing challenge will remain for any new 'experience' good – we will not know what usage is until it is available and then changing it may be expensive. Policy may therefore favour flexible architectures.
- 30 Paltridge (2006).
- 31 See <http://www.fastnetnews.com/dslprimelist/46-dsl-equipment/514-dsm-on-14m-lines>.
- 32 See, for instance, Analysys (2006).
- 33 A comprehensive exercise was undertaken by the Institute of Electrical and Electronic Engineers (IEEE) – see Camp, J. (ed.) (2000) Special Issue, Info, Vol. 2, Issue 2. The purpose was to construct scenarios for complete fibre coverage of the United States by 2005. All scenarios have proven wildly optimistic.
- 34 See Labbe (2005) which looks at the US case.
- 35 See official government statistics at <http://www.stat.go.jp/data/getujidb/zuhyou/002.xls>.

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- 36 Van de Woude (2006).
- 37 See European Foundation for the Improvement of Living and Working Conditions (2005).
- 38 See Yardley (2006).
- 39 He explains that nanophotonics offers lower cost and lower power, with integration of optics and electronics and silicon optics (e.g. SiGe modulators). Further developments include optical packet switching, integrated optical processing, switching and wavelength conversion, and integrated optical packet buffers. McKeown (2005).
- 40 See further Forfás (2005).
- 41 See Bohlin et al. (2006: 89).
- 42 '250 down, 125 up' – 250 Mbp to the end-user, 125 Mbps from the end-user. This is typically shared bandwidth in the local area.
- 43 Burstein (2006).
- 44 There is very little non-technical academic literature on this subject due to its novelty.
- 45 A key feature here is whether future will entail locally owned last-mile shared infrastructure that could be shared with multiple providers so competition is not at last mile but from first point of electronics and beyond.
- 46 OECD Foresight Forum (2006).
- 47 See Katagiri (2006).
- 48 Wright (2006).
- 49 See 12 June 2009 consultation by the European Commission, at http://www.pcworld.com/businesscenter/article/166595/rules_for_new_eu_telecom_networks_a_political_football.html.
- 50 See, for instance, http://www-g.eng.cam.ac.uk/photonic_comms/pages/News/Light_reading.html.
- 51 For an excellent primer, see Felten (2006).
- 52 Afergan (2005).
- 53 So, for instance, some trivial activities may be illegal: Is passive DNS collection lawful, or the systems that scan user traffic to determine the most visited websites? If ISPs deployed monitoring equipment to detect malware infection, keyloggers, etc., by identification of traffic patterns, is it legal that they do this and tell their own customers what they saw (with a view to getting the problem fixed)? If they saw another ISP's customer had a problem, could they inform them? All of these activities are ubiquitous but strictly speaking interception. I am grateful to Richard Clayton for these examples.
- 54 The Chinese government requires this of its network providers, although using much simpler technologies. See Clayton, Murdoch and Watson (2006).
- 55 See generally Bendrath (2009) 'Deep Packet Inspection Reading List', at <http://bendrath.blogspot.com/2009/03/deep-packet-inspection-reading-list-and.html>.
- 56 See Deibert, Palfrey, Rohozinski and Zittrain (eds) (2008).
- 57 ITU Internet Reports (2005).
- 58 See Brown, Edwards and Marsden (2006).
- 59 EC/2006/24.
- 60 http://europa.eu.int/comm/secretariat_general/impact/docs/ia_2005_3/COMM_PDF_SEC_2005_1131_1_EN_DOCUMENTDETAVAIL.pdf.
- 61 See <http://www.europarl.eu.int/omk/sipade3?PUBREF=-//EP//NONSGML+WQ+E-2006-1131+O+DOC+WORD+Vo//EN&L=EN&LEVEL=2&NAV=S&LSTDOC=Y>.
- 62 Audiovisual Media Services Directive (EC/2007/65).
- 63 In Directorate General Information Society and Media (DG INFSO), the unit that covers information security is at least in the same DG as the enforcement and policy units.
- 64 See Brown, Edwards and Marsden (2006).
- 65 See Williams (2007).
- 66 See Brown (2006).
- 67 Doctorow (2009).

- 68 Buchanan's theory of club goods holds that flat-rate pricing will induce 'freetards' to maximize personal consumption, since the marginal cost of another Terabyte is zero. See Buchanan (1965).
- 69 Cerf estimates 140 million at <http://arstechnica.com/news.ars/post/20070125-8707.html>.
- 70 <http://www.freedom-to-tinker.com/blog/felten/comcast-and-bittorrent-why-you-cant-negotiate-protocol>.
- 71 Kulawiec (2007) Date: 13 February 2007, 2:06:47 PM. EST Subject: Re: [IP] Re: The Great Firewall of Norway? Interesting People discussion list.
- 72 Sieradski and Maxwell (2008: 88).
- 73 Privacy Commissioner of Canada (2009) at para 13.
- 74 Privacy Commissioner of Canada (2009) at para 32.
- 75 Dornseif (2003).
- 76 See Brown (2006, 2008).
- 77 Reidenberg (2005).
- 78 See Clayton (2005), Brown (2006) and Sandvig (2007).
- 79 Anti-censorship activists have also developed proxies that individual users can run on their home and office PCs anywhere in the world, making it extremely difficult for governments to block access to every last proxy (Feamster et al., 2002).
- 80 See Zittrain and Edelman (2004).
- 81 Clayton, Murdoch and Watson (2006).
- 82 Goldsmith and Wu (2006).
- 83 Clayton, Murdoch and Watson (2006).
- 84 Clayton (2005).
- 85 See most recently http://www.theregister.co.uk/2009/06/16/pirate_bay_vpn/.
- 86 For a legal perspective on private packet sniffing, see Frieden (2008b); draft available at http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=102928.
- 87 See European Parliament (2001).
- 88 http://www.publications.parliament.uk/pa/ld200708/ldhansrd/text/80708w0001.htm#80708w0001.htm_spm12.
- 89 Williams (2009).
- 90 http://www.theregister.co.uk/2009/04/22/virgin_media_phorm_nma/.
- 91 http://www.theregister.co.uk/2009/06/03/phorm_webwise_discover/ announcing a new product for websites, Webwise Discover.
- 92 http://energycommerce.house.gov/cmte_mtgs/110-ti-hrg.071708.DeepPacket.html.
- 93 Matwyshyn (2009).
- 94 See Google (2009) http://investor.google.com/fin_data.html.
- 95 CDT (2008).
- 96 <http://www.guardian.co.uk/media/pda/2009/mar/11/phorm-timbernerslee>.
- 97 See http://www.theregister.co.uk/2009/04/24/deep_packet_inspection/ on the US investigation, and <http://www.apcomms.org.uk/category/Activities/> announcing 'Can we keep our hands off the net?' apComms to investigate the role for Government over Internet traffic.
- 98 Directive 2000/31/EC.
- 99 Directive 95/46/EC.
- 100 Directive 2002/21/EC.
- 101 Directive 2002/58/EC.
- 102 Communications from the Commission, and Resolutions of the Council are not European legislation and therefore non-binding on Member States but have important 'signaling' effects on Member States and companies, and therefore are termed 'soft law'.
- 103 COM/2004/0028.

- 104 Dubious value is given to such permission in BT internal documents, see http://wikileaks.org/wiki/British_Telecom_Phorm_PageSense_External_Validation_report.
- 105 BBC (2009) Home Office 'colluded with Phorm', 28 April at <http://news.bbc.co.uk/2/hi/technology/8021661.stm>.
- 106 Waters (2009).
- 107 See FIPR (2008); also FIPR (2008) Continuing concerns about Phorm, 6 April at <http://www.fipr.org/press/080406phorm.html>.
- 108 Clayton (2008).
- 109 Bohm (2008).
- 110 Bohm and Harrison (2008).
- 111 http://www.theregister.co.uk/2009/02/11/phorm_eu_action_threat/.
- 112 http://www.theregister.co.uk/2009/04/14/eu_phorm_formal/page2.html citing EC infringement action opened on 14 April 2009; see IP/09/570 (2009).
- 113 http://www.theregister.co.uk/2009/06/18/phorm_results/.
- 114 Buchanan (1965).

Chapter Three

- 1 Marsden (2001b) at http://findarticles.com/p/articles/mi_m0UKG/is_2001_May_7/ai_74991270/.
- 2 Even more confusingly, the first three are members of the European Broadcasting Union, the 'club' of PSBs, and therefore are recognized as exempt from parts of European cartel law for their joint purchasing of sports and cultural events rights – notably the Olympic Games and major national team sports championships. The fourth, Channel 5, is not. There are also minority Welsh and Gaelic language PSBs. See further Levy (1999) and http://www.ebu.ch/en/ebu_members/actives/index.php.
- 3 Its origins are recent, but the debate is of course ancient political philosophy. An 'early modern' use is Orlowski (2007). See also the less than perfect definitions in http://www.doubletongued.org/index.php/citations/freetard_1/ and <http://www.urbandictionary.com/define.php?term=Freetard>.
- 4 11 Megabits divided by 8 (8 bits in a Byte) × 60 seconds × 60 minutes × 24 hours × 31 days.
- 5 Freiden (2006) cites Code Monkey Ramblings Blog (2006): 'What the ISPs don't tell the public is that there are no free-riders among the content companies. They pay handsomely for their bandwidth. In fact, they are the true bread and butter for the major telecoms and ISPs. The reason that this "Network Neutrality" controversy exists today is that ISPs don't want to admit that their whole business model is flawed.'
- 6 See Crowcroft (2007).
- 7 Public remarks of discussion between UK and French regulators at ENST conference 29 May 2007 in Paris (Sirbu 2007).
- 8 See Felten (2006: 3).
- 9 Swanson (2007) also Gilder and Swanson (2008). They use Cisco projections to 2011, and then using their own assumptions: 'We estimate that in the US by 2015: movie downloads and P2P file sharing could be 100 exabytes; video calling and virtual windows could generate 400 exabytes; "cloud" computing and remote backup could total 50 exabytes; Internet video, gaming, and virtual worlds could produce 200 exabytes; non-Internet "IPTV" could reach 100 exabytes, and possibly much more; business IP traffic will generate some 100 exabytes; other applications (phone, Web, email, photos, music) could be 50 exabytes. The U.S. Internet of 2015 will be at least 50 times larger than it was in 2006.'
- 10 Banerjee and Sirbu (2005). See also Frigo et al. (2004); McAdams (2000).
- 11 This is a well-developed distinction discussed at length in Marsden et al. (2006) a previous report for Ofcom. By commons, I refer to an open space with interoperable and publicly available standards of which the World Wide Web is the archetype.
- 12 See Wu (2007).

- 13 Odlyzko (2004) states that: 'Lack of quality statistical data was a prime source of the way many investors and decision makers in competing operators misled themselves around 1999 by following the hearsay on growth and focussing on whacky measures of value, while underestimating the real cost drivers'.
- 14 See http://www.pcworld.com/businesscenter/article/166673/the_real_battle_behind_network_neutrality.html.
- 15 This fast becomes really complicated, as for instance there are six types of delay at each router that accumulate. The literature is vast, and in truth it is conversations with Jon Crowcroft, David Clark, Mark Handley and Ian Brown, or rather dialogues between them in which I sit and listen that I have gleaned this extraordinarily basic but functional understanding. Some basic useful literature includes: Zheng Wang and Crowcroft (1996); Baumann(2007).
- 16 See De Beer (2009: 13) *supra*.
- 17 Odlyzko (2003a). Available at <http://www.dtc.umn.edu/~odlyzko/doc/recent.html>.
Odlyzko (2003d) Preliminary version, December 29, at <http://www.dtc.umn.edu/~odlyzko>.
- 18 Odlyzko (2009). Available at SSRN: <http://ssrn.com/abstract=1095350>.
- 19 See further Schwartz and Weiser (2009).
- 20 Horlings et al. (2005); Marsden et al. (2006).
- 21 See Burri-Nenova (2007).
- 22 Analysys Masons (2008: 16).
- 23 Analysys Masons (2008: 10).
- 24 Analysys Masons (2008: 32).
- 25 Bradshaw (2009).
- 26 Quoted in Bradshaw (2009) *supra*.
- 27 Burstein (2009) explaining that 'One answer to the ISPs' problem is to stopping buying overpriced, obsolete STM 155 megabit lines and move to Gig-E[thernet] or dark fiber. Carphone Warehouse is saving 80% that way, according to their financial statement... BT's new pricing provides 60% more bandwidth for the same price if you move ... to Gigabit-Ethernet... The new BT backhaul is "approximately 50 per cent cheaper," Anna Easton of OpenReach writes.'
- 28 See <http://googlepublicpolicy.blogspot.com/2008/12/net-neutrality-and-benefits-of-caching.html>.
- 29 See coverage at <http://chrismarsden.blogspot.com/2008/12/sensible-comment-on-googles-strategy.html>.
- 30 See <http://euotelcoblog.blogspot.com/2008/10/hd-ready.html>.
- 31 http://www.theregister.co.uk/2008/12/16/virgin_bittorrent/.
- 32 See <http://www.dslreports.com/shownews/Verizon-Industry-Comment-On-Time-Warner-Cable-Plans-91172>: 'If customers exceed their bandwidth cap - which covers uploads as well as downloads - they'll be charged an extra \$1 per extra gigabyte. "It's just a like a cell phone plan," Dudley says. And they can track their usage via a "gas gauge" on the company's web site.' Comment and analysis at <http://chrismarsden.blogspot.com/2008/11/time-warner-cable-early-leader-in.html>.
- 33 Burstein (2009) *supra* note 27.
- 34 De Beer (2009: 13).
- 35 Faratin et al. (2008: 54) state 'Other actions, both by industry and academia, could be contemplated. For example, it is clear that the commonly understood, 'old-fashioned' model of peering and transit reduced bargaining costs, which is efficiency enhancing.'
- 36 Maggiore (2008).
- 37 For recent controversies and history, see <http://arstechnica.com/tech-policy/news/2009/06/what-a-non-neutral-net-looks-like.ars>.
- 38 Enck is the leading financial and technical analyst of NGNs in the UK, see for instance: <http://euotelcoblog.blogspot.com/2008/10/hd-ready.html>.
He explains in October 2008 that The iPlayer server farm transcodes content into 'six or seven' codec/bitrate flavours, with the average in the 500–800 kbps range. The BBC is starting a trial of 1.5 Mbps

- H.264 on the iPlayer to Virgin Media's 10,000 50 Mbps trial customers in Ashford, Kent. Among these is a trial of Velocix network caching in three London suburbs.
- 39 http://www.theregister.co.uk/2008/12/23/iplayer_rose_isps/.
- 40 Ofcom's Market Impact Assessment of the BBC's High Definition Television Proposals at http://www.ofcom.org.uk/research/tv/bbcmias/bbc_hdtv/bbc_hdtv.pdf.
- 41 See spectrum issues in part at http://www.ofcom.org.uk/radiocomms/digital/hd_on_dtt/ita/applications/c4.pdf.
- 42 Competition Commission (2008).
- 43 Competition Commission (2009). Responses were due by 8 June 2009.
- 44 See <http://www.guardian.co.uk/media/2009/feb/26/project-canvas-startup-costs>.
- 45 <http://espn.go.com/broadband/espn360/affList>.
- 46 Lasar (2009) quoting American Cable Association (2009).
- 47 For the economics of pay-TV disputes, in particular Sky's dominance and the Ofcom investigation, see Weeds (2009), and for a legal analysis see Ibáñez Colomo (2009).
- 48 As there is usually only a telephone line and sometimes a cable line (depending on cable industry development) into each domestic household, there are only two possible competitors unless one or both lines are shared with other rivals. Wireless alternative technologies are promising but commercial deployment is not common, as discussed in Chapters 2 and 7.

Chapter Four

- 1 De Beer (2009: 15).
- 2 See Zittrain (2003).
- 3 Nas (2003: 165).
- 4 See <http://conventions.coe.int/Treaty/Commun/ListeTraites.asp?CM=8&CL=ENG>.
- 5 See Convention for the Protection of Human Rights and Fundamental Freedoms CETS No.: 005.
- 6 Marsden (1999).
- 7 Council of Europe (2007) Recommendation CM/Rec 11 on Promoting Freedom of Expression and Information in the New Information and Communications Environment.
- 8 See Reidenberg (2005).
- 9 Lessig (1999b).
- 10 See COM (96) 483.
- 11 See Tongue (1999).
- 12 Notably via Recommendation (2006), and the system of self-rating and filtering adopted by software makers.
- 13 The Communications Decency Act, Title 47 U.S.C.A., 223(a) and (d), 1996 was introduced on 30 January 1995, passed by the Congress in December 1995 and signed into law by President Clinton in January 1996, before being substantially but not wholly declared unconstitutional by the Supreme Court in *ACLU v. Reno* Supreme Court Case No. 96-511, 1997.
- 14 Resnick and Miller (1996).
- 15 KPMG (1996).
- 16 COM (1997: 623).
- 17 See COM (1999: 539).
- 18 Bonn Ministerial Declaration (1997).
- 19 See Whitehead (1997), which formed the basis of European Parliament debate.
- 20 Directive 97/36/EC amending Directive 89/552/EEC.
- 21 See further Directive 2000/31/EC; Decision No 276/1999/EC as amended by Decision No 1151/2003/EC.

- 22 See Woods and Scheuer (2004).
- 23 ECTA (2005b).
- 24 Marsden et al. (2008).
- 25 In particular team members Lorna Woods, Ian Brown, Lisa Klautzer and interviewees John Carr, Peter Robbins, Malcolm Hutton, Cormac Callanan, Ola Kristian Hoff and Richard Clayton. Details extracted from Marsden et al. (2008) Phase 2 report.
- 26 President Clinton's 1995 Copyright Taskforce supported such liability: Working Group On intellectual property rights, Information Infrastructure Task Force, Intellectual Property And The National Information Infrastructure (1995: 1-6, 114-24).
- 27 Some legal commentators forcefully argued that strict liability should apply. See Hardy (1994) (advocating strict ISP liability); Tickle (1995) (favoring limited ISP liability).
- 28 See, for example, Elkin-Koren (1995), who argues opposing liability.
- 29 Noam (2003: 2) defines the Internet sector as: 'the core industries that provide instrumentalities and infrastructure components underlying the Internet's basic functioning'.
- 30 Porter (1985).
- 31 Kaplinsky and Morris (2001); mGain (2003) Deliverable D5.2.1, at <http://www.knowledge.hut.fi/projects/mgain/mgain-wp5-d521-delivered.pdf>.
- 32 See for example Wirtz (2001).
- 33 Christensen (1997).
- 34 Examples include PriceWaterhouseCoopers (2004); PriceWaterhouseCoopers (2006).
- 35 See Katz and Shapiro (1986).
- 36 The terms Internet Access Provider and ISP are often used interchangeably, though some people consider IAPs to be a subset of ISPs. Whereas IAPs offer only Internet access, ISPs may provide additional services, such as leased lines and Web development. In contrast to both IAPs and ISPs, Internet Content Providers provide their own proprietary content, often in addition to Internet access. See Yen (2000) at http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID236478_code000726304.pdf?abstractid=236478.
- 37 Child's Internet Protection Act 2003, building on the Communications Decency Act 1996.
- 38 Reuters (2004).
- 39 DMCA Section 512 (b) (2) (E) 'if the person described in paragraph (1) (A) makes that material available online without the authorization of the copyright owner of the material, the service provider response expeditiously to remove, or disable access to, the material that is claimed to be infringing upon notification of claimed infringement...'
- 40 DMCA Section 512 (c)(2)(A), (c)(3)(A).
- 41 Lemley (2003: 613).
- 42 See *Stephanie Lenz v. Universal Music Corp.* (2008), holding, inter alia, that copyright owners must consider fair uses of a work before sending a DMCA take down notice. Contrast with decisions to hold ISPs vicariously liable for their users' content, in *SABAM v. Scarlet*, but the same principle overturned in *Promusicae v. Telefonica*. Generally see Birnhack (2003).
- 43 *Federal Trade Commission v. Pricewert LLC* (2009).
- 44 Large networks of computers that have been compromised and enslaved by the originator of the botnet, known as a 'bot herder'. Botnets can be used for a variety of illicit purposes, including sending spam and launching denial of service attacks. According to the FTC, the defendant recruited bot herders and hosted the command-and-control servers – the computers that relay commands from the bot herders to the compromised computers known as 'zombie drones'. See Federal Trade Commission (2009).
- 45 The court issued a temporary restraining order to prohibit Pricewert's illegal activities and require its upstream Internet providers and data centers to cease providing services to Pricewert, and also froze Pricewert's assets prior to a preliminary injunction hearing on June 15, 2009. FTC praises its collaborators in the action including: NASA's Office of Inspector General, Computer Crime Division; Gary Warner, Director of Research in Computer Forensics, University of Alabama at Birmingham; The National Center for Missing and Exploited Children; The Shadowserver Foundation; Symantec

- Corporation; and The Spamhaus Project. The Commission vote to authorize staff to file the complaint was 4-0.
- 46 Section 30, 47 U.S.C. § 230(c)(1) (Supp. II 1996). This language might shield ISPs from liability for subscriber copyright infringement as well. However, Section 230(e)(2) specifically states, 'Nothing in this section shall be construed to limit or expand any law pertaining to intellectual property.'
- 47 Holznagel (2000).
- 48 Frydman and Rorive (2002: 56).
- 49 Transmission of information provided by a recipient of the service in a communication network or provision of access to a communication network (typically telecom operators).
- 50 Automatic, intermediate and temporary storage of information provided by a recipient of the service performed for the sole purpose of making more efficient the information's onward transmission to other recipients of the service upon their request.
- 51 Storage of information provided by a recipient of the service.
- 52 Frydman and Rorive (2002: 54).
- 53 Alexander and Tambini (2003: 13).
- 54 Ibid.
- 55 Nas (2003: 169).
- 56 Baistrocchi (2002: 130).
- 57 See for background <http://www.managingip.com/Article/1327405/Pilot-online-IP-protection-scheme-to-launch-in-Europe.html> and <http://www.publications.parliament.uk/pa/ld199900/ldselect/lddecom/95/95we09.htm>.
- 58 ISPA (2007) at http://www.ispa.org.uk/about_us/page_16.html.
- 59 ISPA (2007).
- 60 In this regard, the DMCA provides that 'a service provider shall not be liable to any person for any claim based on the service provider's good faith disabling of access to, or removal of, material or activity claimed to be infringing or based on facts or circumstances from which infringing activity is apparent, regardless of whether the material or activity is ultimately determined to be infringed.' DMCA, *supra* note 2, at (g)(1).
- 61 Baistrocchi (2002: 130).
- 62 Nas (2003: 165).
- 63 Loney (2002).
- 64 The Commission's first report on implementation, in 2003, generally concluded that transposition had occurred successfully, in all but three Member States. It found that only Finland and EEA member Iceland had implemented a statutory NTD procedure, for copyright. Given the high levels of Internet penetration and sophisticated user base in these countries, their statutory regimes deserve detailed comparative study as compared with the INHOPE hotline approach in for instance the UK and Ireland. See COM (2003) 702 at p. 14 and footnote 76.
- 65 Directive 2007/65/EC. I assisted the European Commission's Impact Assessment, but cautioned that evidence for impacts on the developing sectors for non-linear delivery was lacking, see Horlings et al. (2006).
- 66 See COM (2004) 0341 which updates Council Recommendation 98/560/EC OJ L 270, 7.10.1998.
- 67 P6_TA-PROV (2005) 0322.
- 68 Directive 89/552/EC as amended in Directive 97/36/EC.
- 69 Formally COM (2005) 646 final, proposing revisions to Directive 89/552/EC as amended in Directive 97/36/EC, with proposals for further revisions, at http://europa.eu.int/information_society/newsroom/cf/itemlongdetail.cfm?item_id=2343.
- 70 Directive 2000/31/EC.
- 71 Perhaps the classic article in this field is Stigler (1971).
- 72 Within the meaning of Article 2(a) of Directive 2002/21/EC.

- 73 This is a reference to the legal definition in Article 2(a) of Directive 2002/21/EC: 'electronic communications network' means transmission systems and, where applicable, switching or routing equipment and other resources which permit the conveyance of signals by wire, radio, optical or other electromagnetic means, including satellite networks, fixed (circuit- and packet-switched, including the Internet) and mobile terrestrial networks, electricity cable systems, to the extent that they are used for the purpose of transmitting signals, networks used for radio and television broadcasting, and cable television networks, irrespective of the type of information conveyed.
- 74 Recommendation 98/560/EC.
- 75 Currie (2005).
- 76 Speech 05/532.
- 77 Convention on Cybercrime CETS No.185.
- 78 Examples include broadcast advertising, where a Charter – a Code of Conduct - exists for the European Association of Advertising, and computer games, where a ratings system – PEGI - has been in place for 2 years. The latter is fascinating in its use of comparative regulatory techniques, using rating by NICAM in Holland, the pan-sectoral self-regulatory system, and dispute resolution using UK adjudication, judged as the most time- and cost-efficient as well as procedurally sound.
- 79 Horlings et al. (2006: vi).
- 80 According to a recent Ofcom (2006b) report, three different forms of regulation can be defined as follows: Direct regulation – where a statutory body is empowered by law to develop its own regulations which it maintains, monitors and enforces; Co-regulation – where a body with statutory regulatory authority delegates to the relevant industry responsibility for maintaining and applying a code of practice that the statutory regulator has approved. The statutory regulator is responsible for overseeing the effectiveness of co-regulation, and retains powers to intervene where necessary; Self-regulation – where a group of firms or individuals exert control over their own membership and behaviour. Membership is voluntary and participants draw up their own rules using tools such as codes of conduct to define good or bad practice as well as technological solutions and standards. Members take full responsibility for monitoring and compliance without reference to a statutory regulatory authority.
- 81 Bender (1998).
- 82 Reidenberg (2005).
- 83 For an international assessment of the United Kingdom, see Council of Europe: European Commission Against Racism and Intolerance CRI (2005).
- 84 EU Network of Independent Experts on Fundamental Rights (2005: 5).
- 85 Other statutes include the International Covenant on Civil and Political Rights of 16 December 1966; Rome Statute of the International Criminal Court of 17 July 1998; European Convention on Human Rights and Fundamental Freedoms 1950; Framework Convention for the Protection of National Minorities of 1 February 1995; Council of Europe Convention on Cybercrime of 23 November 2001 and its Additional Protocol of 28 January 2003.
- 86 Williams (2003: 469).
- 87 See Edwards and Brown (2009) at SSRN: <http://ssrn.com/abstract=1148732>.
- 88 See SPEECH/09/46.
- 89 Byron (2008).
- 90 See coverage from 16 June 2009 decision in <http://www.telegraph.co.uk/scienceandtechnology/technology/technologyreviews/videogamereviewsandpreviews/5552574/Digital-Britain-UK-to-implement-PEGI-system-for-video-games-classification.html> and reaction in <http://play.tm/news/25163/bbfc-attacks-pegι-ratings-decision/>.
- 91 Byron (2008) at Paragraph 4.18.
- 92 Byron (2008) at Paragraph 4.75.
- 93 House of Commons (2008) HC 353-iii 18 March 2008 and Report: Harmful Content On The Internet And In Video Games, at Paragraph 95, stating further (Paragraph 96): 'We found the arguments put forward by Google/You Tube against their staff undertaking any kind of proactive screening to be unconvincing. To plead that the volume of traffic prevents screening of content is clearly not correct: indeed, major providers such as MySpace have not been deterred from reviewing material posted on

- their sites. Even if review of every bit of content is not practical, that is not an argument to undertake none at all.'
- 94 Financial Times Tech Blog (2008).
- 95 Guardian (2009).
- 96 Ohm (2008).
- 97 Brown (2008); Brown (2009) at SSRN: <http://ssrn.com/abstract=1261192>.
- 98 I use the adjective 'lazy' not in a pejorative sense, but as an illustration of the actual user's behaviour. That may not apply to you or your circle of friends, but it most certainly applies to me and the families that make up the majority of the Internet user population.
- 99 Again, I do not mean to take sides in the 'pirate'/fair use debate about copyrighted material, or in the 'hacktivist'/unlawful access debates about computer surveillance and security. What I intend is to illustrate that whatever the moral or legal arguments on either side, people will act in the manner that best achieves their own interests. We are bounded rational individuals, as illustrated by Nash's Theorem and the entire canon of game theory before and since. See David (2000).
- 100 Though note Python's embrace of YouTube as a marketing platform in 2008: see <http://www.youtube.com/user/montypython?blend=1&ob=4> They state 'For 3 years you YouTubers have been ripping us off, taking tens of thousands of our videos and putting them on YouTube. Now the tables are turned. It's time for us to take matters into our own hands.'
- 101 COM (2003) 702.
- 102 Lessig (2008).
- 103 Marsden (2004c).
- 104 See <http://chrismarsden.blogspot.com/2009/01/principles-for-internet-content.html> with Bambauer (2008) and Edwards (2008).

Chapter Five

- 1 Harbour (2009), see further <http://www.blackouteurope.eu/act/opennet-coalition-rebukes-claims-of-fantatising-about-the-telecoms-package.html>.
- Note that Malcolm Harbour is a Conservative MEP from the United Kingdom who acted as a rapporteur on the Telecoms package of 2009 for the European Parliament. He is expressing the standard 'net neutrality lite' approach of NRAs, which will be seen to have been overturned by the Second Reading vote of May 2009.
- 2 See SPEECH/06/773.
- 3 See for example Wirtz (2001).
- 4 See Katz and Shapiro (1986).
- 5 See http://ec.europa.eu/avpolicy/other_actions/content_online/index_en.htm.
- 6 Ibid.
- 7 Scott (2007).
- 8 These types of escalation between more sophisticated encryption and more sophisticated detection are of benefit to encryption and decryption software and hardware engineers, but not necessarily the end-user.
- 9 Discussion among a panel of 10 Tier 1 network engineers and policymakers at the Paris 'Workshop on Network Neutrality: American and European Perspectives' 29 May 2007 revealed that while it was quite possible to disguise discrimination at the margins, no incentives appeared to exist for such small-scale and subtle (i.e., also expensive and sophisticated) discrimination: see <http://www.telecom-paristech.fr/chair-innovation-regulation/Agenda.html>.
- 10 See for the current situation Larouche (2000). See further Chirico, van der Haar and Larouche (2007).
- 11 The ERG consulted in 2007 on NGN access, in ERG (2007: 16) at http://www.erg.eu.int/doc/publications/consult_regprinc_nga/erg_cons_doc_on_reg_princ_of_nga.pdf.
- 12 http://erg.eu.int/doc/meeting/erg_06_80_19th_plenary_conclusions.pdf.

- 13 Note Germany has granted a regulatory holiday to its incumbent in rolling out high-speed VDSL lines, which will give it a crucial advantage, given that delays in European litigation mean that the Commission's case preventing the German action will not be heard until 2010 – 3 years after the holiday was given! See Case C-424/07.
- 14 SPEECH/o8/561, which was perhaps the most honest challenge to the telecoms incumbents from any European Commissioner, as discussed in Chapter 2.
- 15 See European Commission (2007).
- 16 Impact Assessment (2007: 90).
- 17 Impact Assessment (2007: 90) in Section 8.1.4.
- 18 OECD (2007).
- 19 SPEECH/o8/473.
- 20 European Parliament (2008) (COM (2007) 0697 – C6-0427/2007 – 2007/0247 (COD)) (Codecision procedure: First Reading), Amendment 138.
- 21 COM (2008) 723 final 2007/0248 (COD) at pp. 4–5.
- 22 IP/o8/1661.
- 23 Reding (2009).
- 24 See further Horten (2009).
- 25 Carter, Marcus and Wernick (2008)
- 26 See Munkhammer (2009) and Renda (2008).
- 27 See EDRI-gram (2008), also 'Illegal downloading: the graduate response reviewed and corrected by the Senate' (only in French, 1 November 2008) <http://www.01net.com/editorial/394828/telechargement-illegal-la-riposte-graduate-revue-et-corrige-par-le-senat/?rss>; "Three strikes" P2P rule inches closer to law in France (2 November 2008) <http://arstechnica.com/news.ars/post/20081102-three-strikes-p2p-rule-inches-closer-to-law-in-france.html>, "Graduated response" – Will France disconnect Europe? (1 November 2008) <http://www.laquadrature.net/en/graduated-response-will-france-disconnect-europe>.
- 28 TA No. 81 (2009) Bill passed on 13 May, Act to promote the dissemination and protection of creation on the Internet ['HADOPI law'] creating the High Authority for the dissemination of works and protection of rights on the Internet (HADOPI).
- 29 Conseil Constitutionnel (2009) Decision No. 2009-580 DC of 10 June 2009, Bill passed on 13 May 2009 (TA No. 81).
- 30 European Parliament (2009).
- 31 La Quadrature du Net (2009).
- 32 See the details of the outstanding Second Reading processes at the European Parliament website: http://www.europarl.europa.eu/code/ongoing_procedures/Second_reading.pdf and specifically on the Working Time Directive Conciliation impasse at <http://www.europarl.europa.eu/oel/FindByProcnum.do?lang=2&procnum=COD/2004/0209>.
- 33 Harbour (2009).
- 34 See Horten (2009) http://www.iptegrity.com/index.php?option=com_content&task=view&id=328&Itemid=9.
- 35 It continues by discussing alternative dispute resolution: 'Article 34(1) shall be replaced by the following: 1. Member States shall ensure that transparent, non-discriminatory, simple and inexpensive out-of-court procedures are available for dealing with unresolved disputes between consumers and undertakings providing electronic communications networks and/or services arising under this Directive and relating to the contractual conditions and/or performance of contracts concerning the supply of those networks and/or services. Member States shall adopt measures to ensure that such procedures enable disputes to be settled fairly and promptly and may, where warranted, adopt a system of reimbursement and/or compensation. Such procedures shall enable disputes to be settled impartially and shall not deprive the consumer of the legal protection afforded by national law. Member States may extend these obligations to cover disputes involving other end-users.'
- 36 2007/0248 (COD).
- 37 Presidency (2009).

Chapter Six

- 1 Wray (2009).
- 2 It is worth referring to these pre-eminent authors for their long-standing and principled views on media regulation, as well as their insights into changes in the communications environment and how these interact with those principles. See Feintuck and Varney (2006); Feintuck (2003); Fenwick and Phillipson (2006); Collins (1998, 2000, 2009); Collins and Murrone (1996).
- 3 See Woods (2009) and Gibbons (2009). This builds on long-standing analysis by both, summed up in Gibbons (1998), Harrison and Woods (2007), as well as Harrison and Woods (2001).
- 4 Woods (2005), Gibbons (2005).
- 5 Currie (2002) at http://ofcom.org.uk/media/speeches/2002/12/currie_20021205.
- 6 Richards (2009b).
- 7 Richards (2009c).
- 8 Richards (2009a).
- 9 Communications Act 2003 Section 3 states:
(8) Where Ofcom resolve a conflict in an important case between their duties under paragraphs (a) and (b) of subsection (1), they must publish a statement setting out — (a) the nature of the conflict; (b) the manner in which they have decided to resolve it; and (c) the reasons for their decision to resolve it in that manner. (9) Where Ofcom are required to publish a statement under subsection (8), they must — (a) publish it as soon as possible after making their decision but not while they would (apart from a statutory requirement to publish) be subject to an obligation not to publish a matter that needs to be included in the statement; and (b) so publish it in such manner as they consider appropriate for bringing it to the attention of the persons who, in Ofcom's opinion, are likely to be affected by the matters to which the decision relates.
- 10 Baldwin et al. (1998: 3) explain that 'At its simplest, regulation refers to the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules.'
- 11 Price and Verhulst (2000), Price (1995).
- 12 See Ofcom (2004).
- 13 See ICSTIS (2005).
- 14 See further on advertising co-regulation, Dacko and Hart (2005).
- 15 See http://www.ofcom.org.uk/consult/condocs/telecoms_p2/.
- 16 See <http://www.ofcom.org.uk/consult/condocs/sec155/>.
- 17 <http://www.ofcom.org.uk/vision.pdf>.
- 18 <http://www.ngnuk.org.uk/>.
- 19 Ofcom (2006a).
- 20 <http://www.ngnuk.org.uk/docs/Workstreamso806.pdf>.
- 21 Also see discussion in Gifford and McGowan (1999), Liebowitz and Margolis (1999), McGowan (2000).
- 22 OECD (2008: 28).
- 23 Burstein (2008).
- 24 Samknows performs the following tests across a 250-person panel with 2000 further volunteers, testing consumer ISP connections for: 1. Latency (ICMP based) 2. Packet loss (ICMP based) 3. DNS query resolution time 4. DNS query failure rate 5. Web page loading time 6. Web page failure rate 7. VoIP call quality (MOS) 8. VoIP call jitter, delay, packet loss 9. SMTP relaying speed 10. Web-based download speed test (HTTP) 11. Web-based upload speed test (HTTP) 12. Non-web-based download speed test 13. Non-web-based upload speed test 14. Single stream download speed test 15. Multi-stream download speed test 16. Single stream upload speed test 17. Multi-stream upload speed test. Tests 1–6 are performed against common UK-based Internet destinations. The speed tests, VoIP tests and SMTP relaying tests are performed against a cluster of Samknows test servers,

- which change periodically and load balance to ensure sufficient capacity. Source: <http://www.samknows.com/broadband/performance.php?page=performance-ofcom-and-samknows>.
- 25 See http://ec.europa.eu/avpolicy/other_actions/content_online/index_en.htm.
- 26 Ofcom (2006c).
- 27 Ofcom (2006) at paragraph 3.69.
- 28 Ingram (2006).
- 29 Ingram (2006) and <http://www.cambridge-mit.org/object/download/1733/doc/Ingram%20P.pdf>.
- 30 Kiedrowski (2007).
- 31 Ofcom (2007).
- 32 http://www.theregister.co.uk/2006/08/17/ofcom_mac_codes/.
- 33 http://www.theregister.co.uk/2005/09/02/bulldog_probe/.
- 34 Ofcom (2007).
- 35 Ofcom (2007).
- 36 Ofcom (2008a).
- 37 Ofcom (2008b).
- 38 Richards (2008).
- 39 Ofcom (2006c) at paragraph 3.72.
- 40 See the announcement of the research project at <http://minimba.eventscope.co.uk/templates/000210/view1.html>.
- 41 See <http://www.npt.no/iKnowBase/Content/109604/Guidelines%20for%20network%20neutrality.pdf>.
- 42 See <http://chrismarsden.blogspot.com/2009/02/nettnytralitet-is-coming-to-norway.html>.
- 43 Internet Platform for Innovation Act, suggested wording (2006) at <http://www.dpsproject.com/legislation.html>.
- 44 See <http://itstheinternetstupid.com/>.
- 45 See <http://www.broadbanduk.org/content/view/66/43/>.
- 46 See <http://www.culture.gov.uk/Convergence/seminars.html>.
- 47 Walker, Taylor and Read (2007, undated).
- 48 Foster (2007: 82) at section 7.4.23.
- 49 Department for Culture Media and Sport (2009) at Chapter 4: Creative Industries in the Digital World at http://www.dcms.gov.uk/images/publications/chpt4_digitalbritain-finalreport-jun09.pdf.
- 50 http://www.culture.gov.uk/what_we_do/broadcasting/5944.aspx.
- 51 http://www.hm-treasury.gov.uk/caio_review_index.htm.
- 52 For contemporary accounts see <http://news.zdnet.co.uk/internet/0,1000000097,2093647,00.htm> as well as Ungerer (1998), Marsden (2001c).
- 53 http://www.theregister.co.uk/2009/01/29/carter_net_neut/.
- 54 It is important to recognize that this is universal coverage, not use. See Ofcom (2009): Those without the Internet are 70% out of work or retired (44% pensioners) and 72% social groups C2DE, 70% over 45, 79% no children in household, 69% no pay-TV, 80% no computer at home – so the UK Digital Divide is almost entirely about poor IT-illiterate older people: a hard nut to crack! 81% do not use a computer, including 45% who have never used one ... and 26% who have never used a mobile phone. Over half (54%) of non-internet users have proxy internet access, usually through their children or grandchildren. About a quarter were hardcore digital refuseniks, anti-technology and strongly agreeing the Internet contained too much immoral material, was dangerous for children to use and stopped people taking face-to-face. There is a small group with CSEs, a computer, children and mobile but no fixed line – this group may choose 3G dongles – leaving the real problem out there. My father has never used a mobile, or the Internet, or a computer and refuses to do so (though my mother does all three and they have broadband at home), he is 76 and retired for twenty years. I assure government that he will never use the Internet.

- 55 <http://chrismarsden.blogspot.com/2009/02/lord-puttnam-bewails-lack-of-ambition.html>.
- 56 Digital Britain (2009) at Paragraphs 24 and 28.
- 57 As Digital Britain (2009) sets out at Paragraph 31: 'The Proportionate Notification Response trigger that we propose, should be focused on measuring the efficacy of the scheme involving a notification procedure, legal action and other measures as set out above in relation to achieving the 70% target for reduction in unlawful sharing. We therefore believe that the trigger should be calculated by (a) taking the number of unique individuals notified and (b) assessing what percentage of those notified have stopped unlawful file sharing, either voluntarily or due to prosecution. If that percentage does not exceed or is not significantly close to 70% the mechanism will be triggered.'
- 58 Department of Business Innovation and Skills (2009) stating at Para 1.3: 'This takes forward Recommendation 39 of the Gowers Review of Intellectual Property, the recent BIS consultation on possible regulatory options and Action 13 of the Digital Britain Interim Report ... ISPs will be required to send notifications to subscribers who have been identified in relation to alleged infringements of copyright. The second obligation is for ISPs to maintain (anonymised) records of the number of times an individual subscriber has been so identified and to maintain lists of those most frequently identified. Both obligations would be underpinned by a code drawn up by industry and approved (or imposed in the absence of agreement) by Ofcom. Following further consideration we are now proposing a change to the way in which we construct these obligations. This document sets out an approach whereby a duty will be placed on Ofcom to take steps aimed at reducing online copyright infringement. Specifically they will be required to impose the two obligations on ISPs set out in the Digital Britain Interim Report. Ofcom will also have the power to impose by Statutory Instrument the additional obligations listed in the legislation if they think it necessary. In addition they will be required to put in place a code to support any obligations that are in place.'
- 59 Bland (2009).
- 60 Carter (2009).
- 61 <http://www.charlesleadbeater.net/cms/xstandard/Digital%20Britain%20Response.pdf>.

Chapter Seven

- 1 SPEECH/08/70 (2008).
- 2 Sadly, it appears to be apocryphal (and misquoted from Dante's translations) as is the location of Traitors gate, and a myth created in the nineteenth century: <http://answers.google.com/answers/threadview?id=702209>.
- 3 It is actually a hopeful sign for some, as Queen Mary condemned her half-sister, Elizabeth, who went on to be Queen of England (and bits of what became the United States). What Queen Anne's reign later gave to copyright monopolies, Elizabeth gave to other commercial monopolies in establishing various guilds with import and/or trade monopolies.
- 4 Generally note Ahlert, Alexander and Tambini (2003) at 2; Ahlert, Marsden and Nash (2005); Alexander and Tambini (2003); Tambini, Leonardi and Marsden (2008).
- 5 See http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/docs_index.htm for a full list of documents submitted by Oftel, or the full Competition Commission report at http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2003/ctm2.pdf. The Report is 15 chapters with 9 appendices and took a year to research and publish.
- 6 See the main (and supporting) documents IP/09/710 and EC(2009) 3359 with Articles 9, 11 and 13 in conjunction with Recital 20 of Directive 2002/19/EC and Commission Recommendation 2005/698/EC.
- 7 Source Croxford and Marsden (2001).
- 8 Grant (2008).
- 9 On mobile standards see generally: Grindley, Salant and Waverman (1999).
- 10 Note the survey of the field in SEC (2002: 1333).
- 11 See Ballon et al. (2006).
- 12 MacInnes et al. (2002).

- 13 mGain (2003).
- 14 MacInnes et al. (2002).
- 15 <http://www.nokia.com/clubnokia>.
- 16 Ahlert, Alexander and Tambini (2003: 2).
- 17 Ahlert, Alexander and Tambini (2003: 2).
- 18 See <http://www.arbitrators.org/cisas/> for ISP and mobile ombudsman; http://www.out-law.com/php/page.php?page_id=ispstandtelcosmust1069270107&area=news for news of CISAS' establishment and parentage, and <http://www.otelo.org.uk/content.php?menuID=2&pageID=23> for details of the OtelO membership board. For legal measures, see Article 34 of 2002/22/EC.
- 19 COM (2003) 776 Final at page 12.
- 20 Reding (2005).
- 21 56% of the 2000 European subscriber market was O2, Vodafone, T-Mobile and Orange – Telecom Italia Mobile and Telefonica (though now having acquired O2), with less significant interest outside their domestic markets, were small in pan-European terms. See Ahlert, Marsden and Yung (2003: 4).
- 22 See Classification Framework at <http://www.imcb.org.uk/assets/documents/ClassificationFramework.pdf>.
- 23 UK Code at p. 2.
- 24 The Code was launched in the UK on 19 January 2005, and worldwide on 15 March 2005; see <http://www.m-e-f.org/news032005.html>.
- 25 See <http://www.imcb.org.uk/>.
- 26 Zittrain (2003).
- 27 This is not the case with all newer devices, and indeed may change in the future if we see increasing convergence between palmtop PC and mobile phone functions. For example, some new PDAs and some smartphones run on Windows CE with voice communication as an additional feature incorporated into this Microsoft operating system.
- 28 Illegal and harmful content can be entirely user-generated and distributed. Legitimate 3G content owners make no money from off-net P2P adult content because the receiver pays (unlike in fixed telephony and ISP access) and networks do profit per bit, mobile operators are perceived by consumers to having a higher duty of care. I am not suggesting that P2P should be regulated by networks on behalf of governments driven by moral outrage at well-publicized child porn cases. However, evidence from Japan suggests that the mobile Internet has played a part in paedophilia and child prostitution and worse. Given the personalization of Internet technology amongst children, that is to be expected. Networks still have the dilemma of acting on the distribution of P2P illegal and harmful content, the distribution of pirated and adult content. Networks have engaged in the debate early to make sure that regulatory action is reasoned, not tabloid-generated. See http://www.out-law.com/php/page.php?page_id=irishpoliceinvesti1074855914&area=news.
- 29 Hallberg (2008).
- 30 Predictions of fixed-mobile convergence are numerous over the years: Minges, Mannisto and Kelly (1999); Van Heesvelde (2000); Curwen (2000); Srivastava (2001); Curwen (2006); Rokkas (2009). Relevant to net neutrality is Meisel (2007) The emergence of the internet to deliver video programming; economic and regulatory issues; 9 info 1 at pp. 52 – 64, who states: 'Public policy makers throughout the world are faced with the need to update, replace, and/or revise existing regulations that govern the relationships between and among traditional video distribution platforms, such as over-the-air and cable/satellite providers, as the internet emerges as a viable video distribution platform.'
- 31 Lewin, Williamson and Cave (2009).
- 32 Cisco (2008).
- 33 Lewin, Williamson and Cave (2009).
- 34 See Kerry (2009):

We ask that you consider the following factors in making this determination: Whether exclusivity agreements are becoming increasingly prevalent between dominant wireless carriers and handset

manufacturers; whether exclusivity agreements are restricting consumer choice with respect to which handsets are available depending on a consumer's geographic region, particularly for consumers living in rural America; whether exclusivity agreements place limitations on a consumer's ability to take full advantage of handset technologies, such as the ability to send multimedia messages or the ability to 'tether' a device to a computer for internet use; whether exclusivity agreements are manipulating the competitive marketplace between commercial wireless carriers. Specifically, whether the ability for a dominant carrier to reach an exclusive agreement with a handset manufacturer is inhibiting the ability of smaller, more regional carriers to compete, and whether exclusivity agreements play a role in encouraging or discouraging innovation within the handset marketplace.

- 35 Wu (2007: 2).
- 36 Miner (2008).
- 37 Auction 73 was started by the FCC on 24 January 2008 for the rights to operate the 700 MHz Block C, with 'open access' requirements set down by the FCC Second Report and Order, at http://fjallfoss.fcc.gov/edocs_public/attachmatch/DA-07-3415A1.pdf.
- 38 For a highly jaundiced and unofficial contemporary view of the lawsuit, see <http://www.wired.com/epicenter/2007/09/verizon-dumps-o/>.
- 39 See <http://www.michaelgeist.ca/content/view/3700/125/> and <http://chrismarsden.blogspot.com/2009/02/canada-analyzes-while-us-republicans.html>.
- 40 Note that these will fluctuate wildly as the months pass, so your guess will by the time of reading be better than mine, for instance, Rogers in Canada in June 2009 charged \$67/month for 3 GB of data on a 'dongle'.
- 41 Forge (2004).
- 42 HSDPA is High Speed Data Packet Access. Estimates from report by SCF Associates (2006) 'Economic Impacts of Spectrum Allocation Methods', mimeo.
- 43 Customers and types of users so far have been early adopters, both male and female and largely below 40 years. Games have been taken up by the 8- to 28-year-old male population in Europe more enthusiastically than other customer segments. Again, music downloads have attracted this age group, especially as mobile multimedia marketing is now concentrated into two major categories: 10–18 years and 18–30 years, with other age groups largely ignored. Some marketing teams for multimedia mobile feel that today's real markets effectively stop at 25 years as far as promotion is concerned, so the product designs are largely oriented to lower age groups.
- 44 Thinkbroadband (2009) performed over 1.4 million tests from over 1,300 testing agents throughout the United Kingdom using its isposure software.
- 45 European Commission (2009: 8).
- 46 Ofcom (2009b).
- 47 Mobile Broadband Group (2009).
- 48 See http://www.theregister.co.uk/2009/05/20/termination_rates/ and <http://www.terminatetheate.org/Pages/MTRs.aspx>.
- 49 A nice simple recent analysis is by Kende (2007).
- 50 See ITU (2009).
- 51 Sutherland (2009: 11) explains that 'The possible reasons for an individual having more than one SIM card, telephone number or cellphone include: overcoming patchy or poor network coverage; avoiding network congestion; saving money by making on-net calls; benefiting from discounted or bundled tariffs; receiving calls or voicemail to an older number; and having separate voice and data network operators.'
- A Jordanian survey discovered that the majority of cases involved cost saving, with some using a second SIM because numbers were not ported when networks were changed (using the old SIM and number, but only to check voicemail). In the United Kingdom, 82% of the population has mobile phones, though networks report over 120 per 100 population.
- 52 Hass (2008: 1602) states that 'mobile and fixed wireless technologies, as well as satellite broadband, overcome many of the physical reach limitations of wired cable and DSL services, meaning that broader coverage of rural zip codes is possible.'
- 53 See Goth (2007) and Bazelon (2009).

- 54 See Cellular News (2009) and <http://uk.reuters.com/article/allBreakingNews/idUKL56132720090205?pageNumber=1&virtualBrandChannel=0>.
- 55 SPEECH/09/222.
- 56 Recall Ungerer's comments in the Introduction about 'solving' the problem and see the latest chapter in the saga: Competition Appeal Tribunal (2008).
- 57 Article 19(1) of Directive 2002/21/EC.
- 58 See the historical reductions in rates achieved in a report recently for the Commission by Teligen (2009).
- 59 Economist (2009).
- 60 It is notable that T-Mobile has also been integrating WiFi with its 3G service in the United States, and its Web'n'Walk plan in the United Kingdom.
- 61 See sources in <http://chrismarsden.blogspot.com/2009/03/more-on-mobile-termination-rates.html> with <http://essextelecoms.blogspot.com/2009/03/european-parliament-caps-roaming.html>.
- 62 I summarized for Ofcom's 2008 conference in <http://www.ofcom.org.uk/event/ConferencePapers/chrismarsden.pdf>.
- 63 See <http://essextelecoms.blogspot.com/2009/02/two-summaries-of-cat-decision-on-mobile.html> and Competition Appeal Tribunal (2008).

Chapter Eight

- 1 Mill (1869).
- 2 See Boyle (2008); Post (2009). The richness of these contributions deserves a book of its own, which is why I restrict myself here to stating that there is a great deal to be said for Internet policymakers to read both books before making any legislation in this area, either to close or to open the commons.
- 3 See House of Commons (2004) at paragraph 129.
- 4 House of Commons (2004).
- 5 MMC (1989).
- 6 The Supply of Beer (Tied Estate) Order 1989, SI 1989/2390 and The Supply of Beer (Loan Ties, Licensed Premises and Wholesale Prices) Order 1989, SI 1989/2258, which prohibited brewers from imposing a prohibition on the use of the premises as licensed premises when they disposed of them, required brewers to publish wholesale price lists for beer and not charge higher prices and prohibited them from withholding wholesale beer supplies without reasonable cause. An amendment was made in 1997: The Supply of Beer (Tied Estate) (Amendment) Order 1997, SI 1997/1740 requiring all brewers who owned more than 2,000 on-licensed premises to dispose of their breweries or release from their ties one half of on-licensed premises above the 2,000 threshold by November 1992. They also allowed for landlords of premises which remained tied to purchase one brand of draught cask-conditioned beer and one brand of bottle-conditioned beer from any supplier, the so-called 'guest beer provision'. They also forbade ties on non-alcoholic beers, low-alcoholic beers and non-beer drinks. As a result, by 2004 only about 11,200 tied pubs remained, mainly owned by regional brewers such as Greene King, with the rest owned by pub companies not brewers, or independent. The number of free houses has increased by about 5% over two decades since to 16,850 – or about 28% of the total.
- 7 OFT, The Supply of Beer, December 2000, and The Supply of Beer (Tied Estate)(Revocation) Order 2002, SI 2002/3204 and The Supply of Beer (Loan Ties, Licensed Premises and Wholesale Prices) (Revocation) Order 2003, SI 2003/52.
- 8 House of Commons (2009) Pub Companies, Business and Enterprise Committee Seventh Report of Session 2008–09, Volume I HC 26-I.
- 9 Horten (2009) at Conclusion, see http://www.iptegrity.com/index.php?option=com_content&task=view&id=332&Itemid=9.
- 10 Cave et al. (2009).
- 11 Zittrain (2008).

- 12 A selection of the literature gives a sense of the scale and ambition required to begin to capture the effect of digital information networks to transform our society. Estimating its effect requires heroic effort in itself. See David (2000) in Brynjolfsson (2000); Bartelsman, Haltiwanger, Jarmin, Scarpetta and Schank (2002); Brynjolfsson, Erik (July 2003); Brynjolfsson and Hitt (2003); European Foundation for the Improvement of Living and Working Conditions (2005); Gordon (2003); Kogut (ed. 2003); Carnoy, Castells, Cohen and Cardoso (1993).
Understanding of the social deployment of innovation and empirical conditions for both Information Society RTD and productivity effects is found in the literature emerging from the Silicon Valley and Boston ICT innovation clusters, for instance, Bower and Christensen (1995); Christensen (1997); Evans and Wuerster (1999); Evans (2006); Shapiro and Varian (1999); Cave, Prosperetti and Doyle (2006); Chandler, Hagström and Sölvell (eds) (1998).
- 13 Seely Brown and Duguid (2000); Schrage (2000).
- 14 Tapscott (1999); Gasser and Palfrey (2008).
- 15 The 'social life of information' was earlier considered by Bijker (1997); Bijker, Hughes and Pinch (eds) (1987).
- 16 Benkler (1998a); Benkler (1998b); De Sola Pool (1983).
- 17 See variously Castells (1996); Cohen, DeLong and Zysman (2000); Drucker (1997); Easton (1965).
- 18 Noam (2008).
- 19 Marsden (2005).
- 20 Even if they do not reach the level of the Swedish 'Pirate Party': see <http://www2.piratpartiet.se/international/english>.
- 21 Mueller (2007).
- 22 Mueller (2007: 7).
- 23 Mueller (2007: 8).
- 24 Internet Governance Forum (2009).
- 25 Internet Governance Forum (2008).
- 26 Baldwin et al. (1998: 3) at p. 3 *supra*.
- 27 Ayres and Braithwaite (1992: 4).
- 28 Teubner (1986: 8).
- 29 See, for instance, Gaines and Kimber (2001).
- 30 Price and Verhulst (2000); Price (1995).
- 31 Braithwaite and Drahos (2000), contextualizing co-regulation within the broader regulatory debate.
- 32 Boddewyn (1988); Bollinger (1976).
- 33 Tambini, Leonardi and Marsden (2008); Marsden et al. (2008); Marsden (2000); Marsden and Verhulst (1999). See also Humphreys (1996); Harcourt (2004).
- 34 Price and Verhulst (2004); Larouche (2001).
- 35 See Schneider (1995).
- 36 Schulz and Held (2001).
- 37 See Hoffman Reim (1996).
- 38 Inter Institutional Agreement (2003) at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2003:321:0001:0005:EN:PDF>.
For those actions that require coordinated or joint implementation by the institutions, the European Parliament, the Council and the Commission adopted in 2003 an inter-institutional agreement to provide a stable context for better regulation. Its objective is to improve the quality of Community legislation, its accessibility and its transposition into national law. The agreement entrenches best practices and sets out new objectives and commitments (at note 30).
- 39 Under co-regulation, following notification of a draft agreement prepared by interested parties, the European Parliament and Council have the right to suggest amendments to the agreement, object to its entry into force and, possibly, ask the Commission to submit a proposal for a legislative act. As

for self-regulation, the Commission will keep the legislators informed by reporting on the practices it regards as effective and satisfactory in terms of representativeness.

- 40 Recommendation 2006.
- 41 Directive 2007/65/EC.
- 42 Many of these derive from Treaty articles relating to the Internal Market (especially Articles 43 and 49) and are further elaborated in SEC (2005) 717.
- 43 See e.g. the Better Regulation Action Plan COM (2002) 278 final. On Impact Assessment, see COM (2002) 276, and the Inter-Institutional Agreement on Better Lawmaking (2003), with the common approach to integrated impact assessment at http://ec.europa.eu/governance/impact/docs/key_docs/ii_common_approach_to_ia_en.pdf.
- 44 Marsden et al. (2008).
- 45 Peers (2009).
- 46 These types of escalation between more sophisticated encryption and more sophisticated detection are of benefit to encryption and decryption software and hardware engineers, but not necessarily the end-user.
- 47 See Brown, Edwards and Marsden (2006).
- 48 Canada is of course particularly interesting because it is the oldest deployer of broadband of any scale, even more so than Korea, but its deployment of faster broadband has been extremely slow in the past ten years, as recorded by the OECD statistical breakdown: http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html.
- 49 OpenNet Initiative (2005).
- 50 See generally de Beers (2009).
- 51 See <http://arstechnica.com/infotech/news/2009/01/how-canadian-isps-throttle-the-internet.ars> and particularly the analysis by Chris Parsons at http://www.christopher-parsons.com/PublicUpload/Summary_of_January_13_2009_ISP_filings_%28for_web%29.pdf.
- 52 ISOC (2009) stating that "These contributions were acknowledged in the OECD Seoul Declaration for the Future of the Internet Economy, which also called for reinforced 'co-operative relationships and mutually beneficial collaboration with the Internet technical community.' The founding members of ITAC are 3rd Generation Partnership Project (3GPP); 3rd Generation Partnership Project 2 (3GPP2); European Committee for Standardization; European Telecommunications Standards Institute; International Electrotechnical Commission; Internet Architecture Board; Internet Corporation for Assigned Names and Numbers; Internet Engineering Task Force; Internet Society; Internet2; Number Resource Organization; Telecommunications Industry Association; World Wide Web Consortium. Details of ITAC's members, mission and inputs are available on its website at <http://www.internetac.org>.
- 53 Much of the discussion in the economics literature is too theoretical and neo-classical for my purposes here, for instance the standard statement that in vertical relationships, exclusive contracts lead to foreclosure only under certain circumstances, where a primary condition is a monopoly ISP, a secondary is economies of scale, e.g. Rey and Tirole (2003). This explains video and voice discrimination by ISPs well, but goes no further. A more applied behavioral approach is that of Nick Economides, which can provide fresh and insightful analysis. See Economides (2008).
- 54 See Marsden et al. (2006) at Chapter 8: Conclusion and in the Executive Summary. I am particularly grateful to Jonathan Cave for our joint work on further research needs.
- 55 Because these options are framed by existing uses and service offerings, revealed preference data cannot shed light on underlying preferences or on the structure of the underlying decision (e.g. the extent to which content drives broadband adoption or vice versa). Discrete choice modelling with stated preference data would make the values ascribed to ISP choice by users more robust and give deeper insight into the possible future evolution of the sector under different regulatory regimes. Jonathan Cave enlightened me on this point also.
- 56 Compare the debate to those surrounding the UK national identity card, for instance, as an example of a multibillion pound programme of government-induced spending that leads to substantial lobbies arising to encourage continued government spending on the programme. See Chapter 6 on UK user rights.