Net Neutrality

Towards a Co-Regulatory Solution

Christopher T. Marsden

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List of Abbreviations

3G	Third-generation mobile networks, providing voice and data capacity at midband speed above 128 kilobits per second
3G LTE	Third-generation mobile networks Long-Term Evolution
3GPP	3rd Generation Partnership Project, a collaboration between telecommunications associations to make a globally applicable 3G mobile phone system specification within the scope of the International Telecommunication Union (ITU)
ADSL	Asymmetric Digital Subscriber Line, technology for sending data over copper telephone wires, using asymmetrical speeds: higher download and slow uploading speed
ADSL2+	Asymmetric Digital Subscriber Line 2+, a later higher speed variant of ADSL
AT&T	American Telephone and Telegraph, formerly a US monopoly telephone company subject to universal service, broken up into Regional Bell Operating Companies in 1982–4, leaving AT&T as long distance provider, since absorbed into an agglomerated regional incumbent provider. In this book, AT&T generally refers to its monopolistic pre-1982 existence
AVMS	Audio Visual Media Services, New Directive passed in 2007 to regulate audio visual media in Europe (see below TVWF)
AWTs	Alternative wireless technologies to mobile GSM and UMTS: these include WiFi, wireless local area network (WLAN), RFID and Bluetooth, with longer range WIMAX IEEE 802.16x and other proprietary technologies
BBC	British Broadcasting Corporation, a publicly owned and publicly financed broadcaster, see PSB
BEREC	Body of European Regulators of Electronic Communications, see BERT
BERT	Body of European Regulators in Telecom, proposed regulatory body to help implement 2009 European telecoms laws. Other proposals for a similar body include BEREC, EECMA, and GERT
BPON	Broadband Passive Optical Network, networks utilizing a lower bandwidth Time Division Multiple Access than Ethernet fibre, and also splitting a single optical fibre between many (typically 32) households
BT	British Telecom, UK incumbent with competitive international operations separately managed under BT Global Services, and former owner of O2 mobile networks internationally (now owned by Spanish incumbent Telefonica)
CDMA	Code Division Multiple Access
CoE	Council of Europe, socio-cultural organization established in 1948, which in part seeks to uphold human rights in the 'wider Europe' of both EU Member States and non-members to the east and north,

	with currently 47 members. See also ECHR. It is also responsible for the Cybercrime Convention of 2001, ETS No.185
CRTC	Canadian Radio-Television and Telecommunications Commission, the converged federal regulator of broadcasting and telecoms for federal Canada
DivX	MPEG-4 based digital video compression format
DMCA	Digital Millennium Copyright Act 1998 in the United States, a statute which obliges ISPs to take down material whenever they are notified of copyright infringement, under the Notice and Take Down (NTD) procedure
DNS	Domain Name System, global address system for Internet hosts
DPI	Deep Packet Inspection, means by which ISPs can read into the packets of data they carry to analyse the contents as well as the header, in order to prioritize, deprioritize or even block the packets
DRM	Digital Rights Management, method of embedding content standards and policy into computer-readable form, used to enforce copyright conditions
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplier, the box typically located in the local exchange which provides for typically about 32 households' Internet access from the backbone network
DSM	Dynamic Spectrum Management, technology that can effectively replace DSL to provide faster data transfer using the same copper wiring
DT	Deutsche Telekom, German incumbent operator, also owner of T-Mobile networks internationally
DWDM	Dense Wavelength Division Multiplexing, an ultra-high-speed broadband technology
E2E	'End-to-end' policy choice, based on an engineering principle that the early Internet worked best when all packets were routed with the same priority
EC	European Commission, executive body of the European Union responsible for developing and implementing the *acquis communitaire*, the body of EU law
ECD	E-Commerce Directive, 2000/31/EC, which limits ISP liability for packets it hosts or carries over its networks without knowledge of the content
ECHR	European Convention on Human Rights, more formally the Convention for the Protection of Human Rights and Fundamental Freedoms, signed in 1950 by Member States of the Council of Europe
EECMA	European Electronic Communications Market Authority, see BERT
ERG	European Regulators Group, advisory body set up by 2002 regulatory framework for European telecoms, the grouping of the Member State NRAs
ETNO	European Telecommunications Network Operators, association of predominantly incumbent network owners

EU	European Union, as established in the Treaty of Maastricht 1992. Formerly the European Economic Community (EEC)
EDRi	European Digital Rights Initiative, a non-profit lobbying group on behalf of national privacy and Internet rights groups across Europe
EB	Exabyte: 1,000 petabytes (1 million terabytes or 1 billion gigabytes)
FCC	Federal Communications Commission, the converged broadcast and telecoms regulator for the United States at federal level
FRAND	Fair reasonable and non-discriminatory terms, where a monopoly provider of facilities (whether patents and other intellectual property, or physical goods) provides access to its competitors
FT	France Telecom, domestic incumbent in France, also owner of Orange mobile networks and formerly branded as Wanadoo ISP internationally
FTTx	Fibre-to-the-home: high speed Ethernet-ready transmission wire offered as FTTH (Home), FTTP (Premises) and FTTC (Cabinet – street furniture for telecoms normally available to each neighbourhood, therefore more local than the exchange) varieties
DOCSIS 3.0	Data Over Cable Service Interface Specification, the third generation of these cable broadband data standards
GB	Gigabyte (1,024 megabytes)
Gbps	Gigabit per second (1/8th of a gigabyte per second, or 128 MBps)
GERT	Group of European Regulators in Telecoms, see BERT
GPON	Gigabit Passive Optical Network, an evolution of BPON
GSM	Global System for Mobile Communication also known as 2G, second-generation mobile telephony
HADOPI	Haute Autorité pour la Diffusion des Oeuvres et la Protection des Droits sur Internet (translation: 'High Authority of Diffusion of the Art Works and Protection of the (Copy)Rights on Internet'), an agency established under the 2009 French Law against copyright infringement, more formerly the 'loi favorisant la diffusion et la protection de la création sur Internet'
HDTV	High Definition Television
HSDPA	High Speed Downlink Packet Analysis, a 3G mobile phone standard
HSUPA	High Speed Uplink Packet Analysis, a 3G mobile phone standard
ICT	Information Communication Technology
IETF	Internet Engineering Task Force, a self-regulating technical standards body
IGF	Internet Governance Forum, United Nations multistakeholder discussion forum initially held in Athens 2006, and to be held annually for at least four years thereafter
IMS	IP Multimedia Subsystem, a set of standards for NGNs
IP	Internet Protocol
IPR	Intellectual Property Rights
IPTV	Internet Protocol Television, video programming delivered over IP networks rather than broadcast (cable, terrestrial and satellite) networks

ISOC	Internet Society, coordinating mechanism for Internet standards and policy
ISP	Internet Service Provider; company providing access to the Internet for consumers and businesses. The largest ISP in most Member States is provided by the incumbent telco. ISPs often provide content, have 'portal' pages which offer news, weather and video reports, dating, chat, search and other functions. Mobile networks are also ISPs
ITU	International Telecommunication Union, United Nations body established to coordinate global telecommunications, successor to International Telegraph Union founded in 1865
IWF	Internet Watch Foundation, UK 'hotline' for illegal content reporting established in 1996
KB	Kilobyte (1,024 bytes)
kbps	Kilobits per second
LLU	Local loop unbundling, the regulated process whereby competitors can access the incumbent telco's connections from telephone exchanges to the customer premises, using regulated access prices and conditions
MAC	Migration Authorization Code, required in the United Kingdom for consumers to switch between ISPs
MB	Megabyte (1,024 kilobytes)
Mbps	Megabits per second
MEP	Member of the European Parliament
MMC	Monopolies and Mergers Commission, forerunner to the Competition Commission, the UK general competition tribunal
MPLS	Multiprotocol Label Switching, a standard set for NGNs
NTD	Notice and Take Down, regime by which ISPs can avoid liability for potentially damaging content by removing such content on receipt of notice from a third party
NGA	Next Generation Access, the use of new technologies (such as FTTx) to offer high speed connections between subscriber's premises and the main NGN
NGNs	'Next Generation Networks', all-Internet Protocol (IP) networks
NRA	National Regulatory Authority, in reference to independent national bodies established under national law of the Member States of the European Union, which implement the European communications framework. NRA can also be used generically to refer to any national authority, such as the Canadian CRTC or US FCC
OECD	Organization for Economic Cooperation and Development, 'Think-tank' for developed nations: 30 national members; membership is limited by commitment to a market economy and a pluralistic democracy. Formed in 1961 and grew out of the Organization for European Economic Co-operation (OEEC), established in 1947
Ofcom	Office of Communications Regulation, UK converged regulator of broadcasting and telecoms established in 2002 and operational in December 2003

ONP Open Network Provision, the principle behind interconnection of telephone networks that helped liberalize European telecoms in the late 1990s. The Directives that established this are known collectively as the 'ONP Directives', from 1990 onwards

P2P Peer-to-Peer, usually used in reference to file sharing amongst many peers, an efficient form of many-to-many information sharing as compared to a broadcast model using a central server. P2P is the method of distribution used by Skype, BitTorrent and many other information-sharing programmes

PON Passive Optical Network standards including Broadband PON (BPON) and Gigabit PON (GPON)

PSB Public Service Broadcaster, granted special licensing conditions ostensibly in exchange for meritworthy, educational and news programming. The United Kingdom has four: the British Broadcasting Corporation [BBC] is publicly owned and publicly financed without advertising; Channel 4 is publicly owned but financed by advertising; two, ITV and Channel 5 are privately owned and advertising-financed.

PVR Personal Video Recorder, a hard drive based recorder in the subscriber's home (known in the United States by the brand TiVo)

QoS Quality of Service, protocols and standards designed to offer guaranteed QoS have been mooted for many years, but none has yet been successfully marketed on the public Internet

PB Petabyte: 1,000 terabytes (1 million gigabytes)

RLAN Radio Local Access Network, including standards with popularized names WiFi or WiMAX

SMP Significant Market Power, measure of dominance in European competition law, with a specific application to telecoms law

SMS Short Messaging Services or 'texting', ubiquitous 160-character or less messages sent from GSM mobile phones

SRO Self-regulatory organization, institution designed to provide guidance and enforcement of conduct or content standards, in our case including a broad spectrum from 'self-organized' to co-regulatory forms

Telco Telecommunications provider, term normally used for incumbent former national monopoly provider. There are also 'competitive telcos' – all other providers of switched telecommunications services except the national incumbent

TB Terabyte: 1,000 gigabtyes (1 million megabtyes)

TVWF Television without Frontiers, directive of 1989, formally Directive 89/552/EC as amended in Directive 97/36/EC

UMTS Universal Mobile Telecommunications System, also known as 3G, third-generation mobile telephony

UNE 'Unbundled network elements' or the US equivalent to LLU (see above)

USO Universal Service Obligation, for European consumers the right to a 33 kbps telephone line for European consumers. USO will be upgraded as broadband network speeds increase

VDSL Very high speed DSL

VOD	Video-on-demand, provision of video programming at individual demand rather than by an editorial controller in a scheduled sequence
VoIP	Voice over Internet Protocol, technology to digitize sound in packets sent over the Internet. Its primary advantage is that distance does not affect the cost of the call between two VoIP enabled phones (or computers attached to the phone or a data system)
VDSL and VDSL2	Very high speed (20—80 Mbps) asymmetrical versions of DSL
W-CDMA	Wideband Code Division Multiple Access, a third-generation mobile telephony standard
WAP	Wireless Application Protocol, used to enhance Internet use by delivering specially programmed, simplistic and graphic-poor pages over narrowband networks
Web 2.0	Social networking applications using blogs, podcasts, wikis, social networking websites, search engines, auction websites, games, VoIP and P2P services. These services, which are based in part on the Ajax mark-up language, makes user-generated and distributed content central to consumers' Internet experiences
WiFi	Wireless Fidelity, standard for WLAN designed to Institute of Electrical and Electronic Engineers (IEEE) 802.11a/b/g specification
WiMAX	Worldwide Interoperability for Microwave Access, a broadband wireless technology
WIK	Wissenschaftliches Institut für Kommunikationsdienste GmbH, a telecoms economics research institute based in Bonn, well known for its work on behalf of the EC, German regulators and DT and its subsidiaries, and many other clients
WLL	Wireless Local Loop, a broadband mobile solution offered by RLAN technology
WWW	The World Wide Web, a set of standards including those for graphical user interfaces using hypertext mark-up languages for displaying Internet information, invented by Tim Berners-Lee, now standardized by the WWW Consortium, a Self-Regulatory Organization
ZB	Zettabyte, 1,000 exabytes – future measure of network capacity

Preface

This book arose from three strands of research that I found myself involved in over the last decade, by my extreme good fortune. They are a European research project on Internet self-regulation at Oxford in 2004; research conducted with Jonathan Cave, Ian Brown, Colin Blackman, Jon Crowcroft and others in Cambridge in 2005–7; an ongoing intellectual engagement with a group of brilliant US lawyers and economists enabled by Viktor Mayer-Schonberger and Kevin Werbach (as well as the Telecoms Policy Research Conference) over a ten-year period.

First, Oxford. I had spent 2003 on self-reinforced sabbatical in Barcelona following the dot-com meltdown (specifically my video-on-demand start-up ShortMedia, with inspirational co-founders Doug Laughlen and Ivan Croxford) and more particularly the grotesque fraud at MCI WorldCom, following which I had resigned on principle in July 2002. The lack of consumer broadband in the period 2000–2 ended the hopes of many for a rich multimedia Internet at that point – there was capital, but no users to consume or help create mash-ups from licit or illicitly distributed content. The chance dropped out of the blue to help Damian Tambini to complete research and write the final report of selfregulation.info, as well as investigate the groundbreaking mobile content Code of Conduct, and help write up the results of 'Losing Liberty in Cyberspace' with Christian Ahlert. My thanks to Damian and Christian, to Danilo Leonardi, Marcus Alexander and Louise Scott. That project put me into a short-term research position at the Oxford Internet Institute, thanks to Bill Dutton and Vicki Nash, and from there I met the brilliant Jon Crowcroft, who helped introduce me to the extraordinary work being created at Cambridge. I also thank my colleagues and friends on frequent visits to Tokyo, Adam Peake, Ken Cukier, Motohiro Tsuchiya, Keisuke Kamimura, Izumi Aizu, and others in business and government, as well as those in Seoul, who helped me on my visits to the Far East to understand what leapfrogging is really about.

Second then, Cambridge. There are three strands to this connection. First, Colin Blackman and I had known each other since the late 1990s, and Colin had been very supportive of my early work, publishing in 'info', himself publishing a conference review in my start-up journal *International Journal of Communications Law and Policy* (ijclp.net), and latterly making me Associate Editor of 'info' from 2007. This is a good moment to also thank Martin Sims, editor of *Intermedia* who published my most 'progressive' articles in 2003–4. Second, I had met the 'brilliant mind' game theorist Jonathan Cave, and had jumped at the chance to work with him at RAND Corporation's European operation in Cambridge (which itself had a traumatic year after I joined, closing its Leiden headquarters and satellite Berlin offices, and shutting down my Information Society team with the loss of my two line managers!).

By 2006, Jonathan and I had carved out of the chaos a thriving little Internet regulation practice, conducting ground-breaking research on content regulation for Ofcom, for Google, Microsoft, Yahoo! (disappointingly unpublished), the UK Cabinet Office, British Telecom, governments of Japan, Netherlands and Ireland, and the European Commission. In all cases, we investigated net neutrality and explained the cost-benefit trade-offs of regulated 'walled gardens' and the open Internet, even though it was never in the brief! Third, Jon Crowcroft re-established my contacts with David Clark and Bill Lehr, to whom I had presented local video-on-demand strategies in 2000 at Massachusetts Institute of Technology, their home base. Dave asked me the implausibly optimistic question: 'Where are the Internet-literate social scientists with whom we can conduct trans-disciplinary trans-Atlantic research?' I found a few, self-servingly including myself, and we did some good work in the Cambridge-MIT Institute Communications Research Network (CMI CRN!), led by the ebullient David Cleevely, with Ian Brown coming on board to conduct critical coordination work on information security. What I know of the link between content regulation and information security I learnt at Cambridge and MIT, and more importantly the bars in-between. I should add thanks to Dave Reed, Mark Handley, Frank Kelly, Emanuele Giovannetti and Eddie Murphy.

Third, the United States, or actually five places: Los Angeles, New York, Harvard, Philadelphia and Rueschlikon, Switzerland. On my 'exile' in Barcelona (the best place to be exiled!), I had paid visits to Jon Aronson's research group at University of Southern California Annenberg School, including Hernan Galperin, Francois Bar and Manuel Castells. There we talked about WiFi deployment and telco and mobile resistance to the prospect of open decentralized Internet models at low cost. Side trips from Los Angeles had previously given me rich experiences at workshops at Stanford (on WiFi and spectrum commons organized by Larry Lessig), and at Berkeley several times (thanks to Mark Lemley and Pam Samuelson). I also paid several visits to Eli Noam and the Columbia Business School, for conferences of the Columbia Institute on Tele-Information. Eli is undoubtedly the most coruscatingly insightful and diverse mind in telecoms policy, and I have always been inspired by his gatherings and conversations. I should add the equally diverse and superb Alex Wolfson, who was at this point at Nokia applying research to reality, and Bruce Egan, who applied himself vigorously in all things. Tom Hazlett, Eli's long-time sparring partner on the FT New Technology Policy Forum and elsewhere, has been a constant wise source on the ways of the Bells and of the Beltway (whether we agree or especially not). Though it has been a while since heard of, a further member of this eclectic group is the legendary Dennis Gilhooly.

That's Los Angeles and New York, but mention of Dennis brings me to my formal link to the United States, my residential fellowship at Harvard's Kennedy School in

1999–2000 (yes, nine years is a long gestation for a book), for which I must thank Deborah Hurley. Fortuitously I was there the same academic year as Dennis (working with Jeffrey Sachs) and Herbert Ungerer (at the Weatherhead Center), and between us we put the world of telecoms regulation to rights, and have continued to do so since. I could not mention the Kennedy School without mentioning Jean Camp, a straight-talking colleague and pioneering Internet security researcher, as well as Tony Oettinger and John LeGates at the Programme on Information Resources Policy. As with Eli at Columbia and Herbert at the EC, it helps to have opinions from wise people who knew the Internet way back when, and AT&T when it was still Ma Bell: history matters. Harvard, like Oxford, is the most political of intellectual environments, and I learnt of the secret tunnel that runs from the Kennedy School atrium directly underground to the White House, 100 m away (if you don't believe me, consider how else they could pull rank on so many White House staff and Secretaries?). Oxford also has one, under the Bodleian …

So on to Philadelphia, where Kevin Werbach and Andrea Matwyshyn were such great hosts for formidable workshops in 2005–8. Kevin has been a special influence on my telecoms research, with his combination of startling insight and practical application, at Supernova conferences and FCC, an example of how a policy-influencing academic can make a difference. These workshops proved excellent venues to watch spirited discussions of net neutrality between Tim Wu, Chris Yoo, Rob Frieden, Phil Weiser, Rick Whitt, Joe Waz, Susan Crawford, Monroe Price, Ed Baker and others. Note the media law influence of the latter three, and I should mention that Monroe and also Monica Arino were excellent reference points on the connection between global media and Internet policy.

Finally, Rueschlikon. Those of you who have kept awake this far will notice that the Zurichersee is not in the United States. That's true, but Fritz Gutbrodt of Swiss Reinsurance and Viktor Mayer-Schonberger and Lew Branscomb from Harvard put on spectacular discussions around a variety of innovation and risk issues there for seven years from 2001. As the website tells you: 'The host and sponsor is Swiss Re's Rueschlikon Centre for Global Dialogue. The conferences forge a transatlantic bridge to advance dialogue on the central issues of the information economy.' I don't know what good things I did in a past life to deserve it, but I was always invited, and had wonderful conversations (almost all after dinner outside their wonderful bar, the best bar in my world) with an incredible list of telecoms and Internet luminaries, including (in no particular order) John Gage, Mike Nelson, Sacchio Semmoto, Niklas Zennstrom, Cory Ondrejka, Brian Thompson, Olaf Lundberg, Yochai Benkler, Larry Lessig, Hal Varian, Philip Evans, Steve Abernathy, Gilles Bregant, Ed Felten, John Seeley Brown, Craig Mundie, Peter Siepel, Thomas Hoeren, John Browning, Peter Cowhey, Takeshi Natsuno, Jonathan Sallet, Ron Burt, Urs Gasser, Joi Ito, Andrew

McLaughlin, Kathryn Brown, Tren Griffin, Lauren Hall, Tim Kelly, Clay Shirky, Hans Peter Brondmo, Dave Farber, Brian Snow, as well as Eli, Herbert, Dave Clark, Kevin et al. (and I'm not even counting one-time attendees!) on subjects such as 2007 'Governance of Information', 2006 'Innovative Entrepreneurship', 2005 'Critical Information Infrastructure', 2004 'Openness, Trust, and Sovereignty', 2003 'Network Rising', 2002 'Information, Ownership & Control', 2001 'Convergence'. I have to thank Tom Aust, Kenn Cukier, Bernard Benhamou, as well as Margaritte and Rick Murray for being perfect hosts. Now again, the subject of net neutrality comes up vicariously, interwoven into every subject, and it is this that gives the power to the debate: net neutrality affects and changes everything, it has impact on all other communications policy discussions.

All this travelling brings me back to home, and those I must thank here. First, my colleagues present and past, whose indulgence let me find the time and space to write and think. In no particular order, they include Lorna Woods, Jane Wright, Bob Watt, Sabine Michalowski, Kevin Boyle, Steve Anderman, Audrey Guinchard, Yvonne Cattrall, Hayley Milburn and Liz Harvey at Essex; Martin Botterman, Neil Robinson, Lorenzo Valeri and Constantijn van Oranje at RAND; Damian Tambini at Oxford. I must thank my various co-authors over the years on publications relevant to this work: Damian, Danilo, Marcus, Christian and Vicki at Oxford; Jonathan, Neil, Constantine, Edwin Horlings, Stijn Hoorens, Lisa Klautzer, Bill Lehr, Colin Blackman and Simon Forge, Lorna and Ian Brown when at RAND; Campbell Cowie now of Ofcom; Ivan and Doug at ShortMedia/Re:Think!, Lilian Edwards at Sheffield; Stefaan Verhulst at Markle Foundation. I also have to thank the brave souls who commissioned my consulting reports, including Peter Johnston, Reka Bernat, Alex Blowers, Jonathan Mosedale, Tim Cowen, Jean-Jacques Sahel and Emma Ashcroft. Particular thanks are due to those who know the inside of Ofcom and the European Commission better than I am able: Martin Cave, Tom Kiedrowski, Nico van Eijk, Philip Graf, Peggy Valcke, Herbert and Damian of course, Filomena Chirico, Pierre Larouche, David Levy, Nigel Hickson, Ken Ducatel and Monica Arino. The policymaker perspective on academic debate (and hopefully, vice versa) is absolutely critical to this subject.

It's a truism, but I could not have done this without all of the above. That said, they're not to blame for my work, and any errors and omissions are mine alone.

I should also thank the readers of my net neutrality blog, chrismarsden.blogspot.com, for their comments, including Michael Geist, Simon Dean-Johns, Jasper Sliujs, Andres Guadamuz, Monica Horten, Lilian and Ian, as well as uber-mega-platinum blogger James Enck. I am bound to have forgotten someone so integral to my work that they cannot be overlooked, so apologies to whomever that person is! In fact, remind me and I will post your name(s) on the blog.

The final word goes to those whose personal lives have been affected by my appeals for hermetically sealed peace during the write-up! They include particularly my

parents and Kenza (plus the entire gang in Montreal), who coped with my writers' block, frenzied blogging and final editing with more good grace than anyone has the right to expect. My dedication for this book is to them.

Chris Marsden
Colchester and Montreal
22 June 2009

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INTRODUCTION

Net Neutrality as a Debate about More than Economics

The topic today is net neutrality. The Internet today is an open platform where the demand for websites and services dictates success. You've got barriers to entry that are low and equal for all comers … I can say what I want without censorship. I don't have to pay a special charge. But the big telephone and cable companies want to change the Internet as we know it. They say they want to create high-speed lanes on the Internet and strike exclusive contractual arrangements with Internet content-providers for access to those high-speed lanes. Those of us who can't pony up the cash for these high-speed connections will be relegated to the slow lanes. So here's my view. We can't have a situation in which the corporate duopoly dictates the future of the Internet and that's why I'm supporting what is called net neutrality.[1]
Barack H. Obama, 8 June 2006 podcast

This is a book about net neutrality. It is intended to be read by the non-technical as well as the technical reader, by the non-economist as well as the economic, and also most definitely by non-lawyers. It is most dense in its economic and legal analysis of telecommunications in the opening chapters, yet those who are not telecoms/Internet[2] policy 'wonks' will find plenty to interest them in later chapters that focus on regulatory agencies, consumer welfare more broadly, media policy and freedom of expression, and political judgments such as the stated opinion of President Obama I have highlighted above. It does not accept the neo-classical price-oriented competition-based analysis which has been prevalent in telecoms policy for the past decade to 2008, preferring instead to analyse from that base, to discover net neutrality to be a problem of consumer and media policy. However, its critique of telecoms policy will provoke (perhaps wry) interest in those still wedded to the concept of telecoms based on the siege warfare over cost-based pricing between incumbent monopolies/oligopolies, competitive market entrants and regulators.

It is an international book, in that it is written by an English lawyer who now preaches[3] but used to practise,[4] but with significant input from study of the European Union[5] (and European Economic Area) more widely, and with attention paid to North America[6] and Japan,[7] if less so to developing countries. At the end of the book, I expect you to disagree with me, whether you are a traffic prioritization free-market 'RoundHead' or an information-wants-to-be-free fundamentalist net neutrality 'Cavalier'. My argument will be a 'Middle Way' between these extreme positions that strikes a balance between intervention and innovation, which inevitably means no-one will be happy, including me. It is not a debate with any easy non-controversial answers.

What is net neutrality? Legalistic and technical definitions will be compared and contrasted throughout the book as it is as much a term of art as a term of science. By way of introduction, I should lay out what it is not: it is not a panacea in the absence of effective inset competition in telecoms markets. In the United States, urban duopoly and rural monopoly telecoms throughout the latter Bush years led to significant fears of gatekeeper control over information flows by Internet Service Providers (ISPs). However, net neutrality is an issue that arises in all competitive and non-competitive information environments that use Internet Protocol (IP) and the public Internet to communicate. World Wide Web (WWW) inventor Sir Tim Berners-Lee puts the problem like this:

> Net neutrality is this: If I pay to connect to the Net with a certain quality of service, and you pay to connect with that or greater quality of service, then we can communicate at that level. That's all. It's up to the ISPs to make sure they interoperate so that that happens. Net Neutrality is NOT asking for the Internet for free. Net Neutrality is NOT saying that one shouldn't pay more money for high quality of service. We always have, and we always will. There have been suggestions that we don't need legislation because we haven't had it. These are nonsense, because in fact we have had net neutrality in the past – it is only recently that real explicit threats have occurred.[8]

In short, net neutrality is about the rules of the road for Internet users, and about the relationship between the owners of those roads and the users. Government is asked to make a decision as to which users have priority and

whether road charging should be introduced, ostensibly to build wider and faster roads in future.[9] That is a profound issue, and that brief summary tells you there is plenty of critical detail within this argument that can shift the balance of advantage towards networks or users, and between different players within those groups.

Let's therefore crudely summarize the argument using the slogan that became the rallying cry for Generation X a quarter-century ago: 'I want my MTV (Music Television).' Users who wish to access video and other high bandwidth content cannot all do so at once over current networks, and probably not over future networks. Currently there is no speed limit for the Internet, nor are there sufficient 'lanes' for all users to travel at the speeds they wish (assuming their 'car', their Personal Computer or other device, can do so). So if you want your British Broadcasting Corporation (BBC) iPlayer streamed video, or Skype video call, or YouTube clip, or World of Warcraft update, you are in a queue, even if you don't realize it. In a future with guaranteed Quality of Service (QoS) – a future that has been waiting for 30 years and launched a thousand doctoral theses in computer science and network engineering – you may be able to pay more to get to the head of the queue, or the content provider may pay more to get to you faster, past the other members of the queue whose content providers won't pay. You may also be lucky enough to get into a queue that moves much more quickly for everyone (such as the university-funded Internet2), or unlucky enough to have to access your content over the slow-or-never mobile or wireless options,[10] which at least offers mobility.

So why is this net neutrality 'problem' arising now? Two reasons. First, in developing countries most Internet users – if not most people – have broadband connections. But it turns out that those broadband connections are not fast enough for the uses that people want – not just YouTube but also public service content, for instance BBC video programming or online tax returns, as well as Peer-to-Peer (P2P) content. People are upset, particularly when they realize that they are sharing a connection with their neighbours, and that their speeds slow down dramatically in 'rush-hour' – the evening when they sit down to watch video on their computer. They bought connections that advertise 'maximum speeds' (i.e. unlimited by neighbours' congestion and other speed bumps on the Internet) of perhaps 8 megabits per second (8 Mbps) – enough to download 600 megabytes[11] of data in ten minutes, or a five-minute video clip of reasonably high quality. That speed means they

can click and almost immediately start watching the clip, and it will keep downloading in the background as fast as they are watching – so that they receive a seamless video clip. Downgrade the quality of the video and you can download the quality of the speed – but as a user, you don't want to go back to the future!

This now gets tricky – the speeds need to increase in line with customers' expectations, especially as most of your neighbours are now online – at the same time as you. Your expectations as a consumer are in part developed from your business or especially your university broadband experience, where you will probably have much faster speeds that enable you to download and upload much faster, and share content such as slide presentations by email almost instantaneously. Your office will have fibre-optic connections – that's basically a motorway for the office – which solves most of the 'last metre' problems, at least. Your home won't, not yet and perhaps not ever. It will have a copper pair of wires that were designed for circuit switched telephone calls, down which the phone company squeezes the data packets using technologies based on Digital Subscriber Line (DSL) standards. If you have cable, you have a similar set of problems. Your connection is slow, shared and uses a physical link that is obsolete. But count yourself lucky, if you use mobile or wireless, you could wait forever for peak-time content.

A Brief History of Network Neutrality

Ten years ago, 4 June 1999, I hosted a conference 'near Stratford Upon Avon' in England, inviting some US Internet lawyers to speak to UK communications specialists about the new discipline they were forging, the possibilities it offered and the dangers to its progress. I launched a book with my own and my friends' views (British, European and American) on the subject from a European perspective, *Convergence in European Digital TV Regulation*, warning that the Internet unregulated model would have to accommodate the normative democratic values of the regulated European public service broadcasting model on the one hand, and the economic imperatives of e-commerce on the other. In the book, we also warned that the Information Society would depend crucially on broadband infrastructure, a theme returned to in the book of the conference, published in autumn 2000. A rash of works by conference attendees appeared in 1998–9 on the same theme such as Lemley and Lessig,[12] including path-finding works by Froomkin, Reidenberg and Samuelson.[13]

One particular issue for Lessig and Lemley that summer was the merger of long-distance phone company AT&T and cable company MediaOne. They told the FCC in an ex parte submission to the merger investigation[14] that they feared the 'end of end-to-end'.[15] In brief, they feared that AT&T's Internet openness, in as much as it existed, would be subsumed into the closed pay-per-view world of cable TV companies. AOL, the original 'walled garden' Internet provider (offering filtered, approved and partnered content in a 'safe' environment, as well as open Internet access for the brave), was merging with Time Warner, a copyright and cable behemoth, which threatened an even more closed experience.[16] The interoperability debate is broader than simply an Internet access debate, as it affects innovation in software – indeed, the origin of the argument lies with software industry disputes over interoperability, an argument captured by Lessig in his contribution to the *Microsoft* litigation.[17]

In spring 1999, P2P music sharing site Napster was sweeping college campuses, and the music and movie companies were crying out for protection from the evils perpetrated against their cozy copyright oligopolies by this new P2P technology for file-sharing. I was interested in their argument, and in file-sharing as a technique to break open the broadcast/music oligopoly, though I argued that the European, or at least United Kingdom, relevance was slight as we had almost bankrupt US-owned cable companies and a telecoms monopoly that was denying that demand for broadband existed. In brief, we should be so lucky as to have two broadband companies that threatened to take a high-handed approach to their users' access. I claimed, following Noam and others:[18]

> The answer increasingly employed is to use the guaranteed service quality and enhanced security of the 'walled garden' broadband service providers' network, to avoid the public Internet altogether. These 'walled gardens' have a very satisfactory legal status: they are cable networks. The private network ensures integrity of rights, video delivery, and allocation of property. … The legal framework will ensure that this broadband VOD [Video On Demand], when it arrives, will be more the AOL-style 'walled garden' than true open access: private cable not public Internet.

The lack of legal certainty in assigning property rights, whether to one's personal information or spectrum for 3G mobiles and local loop unbundling

(LLU – sharing the copper wire from telephone exchange to subscriber), was restricting the growth of a broadband Internet, and leading to a localized, Balkanized 'walled garden' private network approach, as Coasean analysis would suggest.[19] In such a fragmented future, the issue of open access to those private networks is critical. Without a more legally certain international allocation of property rights, the old national legal restrictions will continue to apply to profitable mainstream operators, and I wistfully remarked that 'the public Internet [will be] a source of piracy, romance and buccaneering on the high seas beyond the reach of national legal certainties'. This was not just because of the law and economics of the networks, but also the requirements imposed by governments and copyright and privacy lawyers on the content.

If you are a European telecoms lawyer, you will already know the quick march through policy that we need at this point[20] to understand where we have got to, but both US and European observers need to know where their policies diverged in 2001 to predict whether we are converging in 2009. I continue this analysis more extensively in Chapters 1 and 2, but here's the summary.

European Telecoms Liberalization

The EU framework for telecommunications consists of the sector-specific ONP ('Open Network Provision') framework operated by the European Commission and the National Regulatory Authorities (NRAs) of the Member States of the European Union, and EU competition law applied by the European Commission and the national competition authorities and the court system.[21] Corresponding authorities in the United States are the FCC and the US antitrust system.[22] The EU telecommunications sector was liberalized by three legal means:

- Liberalization directives issued under EU competition law, Article 86 of the Treaty Establishing the European Community
- Harmonization Directives issued by the European Parliament and the Council on the basis of Article 95 of the Treaty Establishing the European Community
- A series of merger cases in which the dominance of horizontally and/or vertically integrated operators was structurally curtailed, by divestiture of cable networks,[23] competing mobile networks[24] or even Internet backbone networks.[25]

The measures culminated in the adoption by the European Commission in 1996 of the Full Competition Directive,[26] mandating full liberalization of

telecommunications in the European Union in 1998, and a flurry of merger cases between 1998 and 2000. 1996 was also the year that the United States broke open its regional monopolies via the Telecommunications Act 1996. However, these measures left in place the incumbents' dominance of the local loop, the 'first hundred feet'.[27] It is economically unfeasible for a telecoms operator to duplicate that local loop, though urban cable networks have done so in several countries (notably North America, Germany, the Netherlands and Belgium). Therefore, the telecoms sector has been regulated using an extension of the 'essential facilities' doctrine[28] to the local loop and other monopoly infrastructure, to the chagrin of economists who believe that the North American cable build-out could have presaged similar competitive build in other countries, had shared access to the local loop been denied to them.[29] Nevertheless the European Commission (EC) opened the loop to competition in 2000, or rather to each national regulator's interpretation of how competitive it wanted its local loop to be, a process that is still ongoing.[30] The progress of European telecoms liberalization over twenty years has been slower than hoped for in most cases,[31] despite which incumbents have rolled out DSL to the vast majority of their populations.

The EC at the same time was engaged in its protracted action against the vertically integrated monopoly of Microsoft over computer operating systems, servers and media player software, which was settled in the United States during 2000–2[32] at the outset of the Republican neo-liberal period in the United States, but continued to rumble on in European courts.[33] I should make it clear that the widespread European view is that the George W. Bush presidency was an aberration in its adoption of neo-liberal agendas not only in foreign imperialist policy but also in competition policy, supported for the first six years by a compliant Republican House and Senate, which were under Republican control from 1994 to 2006. Therefore, the rolling-back of competition in US telecoms markets in 2001–6 can be seen from a European viewpoint as a historical anomaly, a period in which neo-liberal economic models succeeded over much empirical data demonstrating continued market failure and abusive monopoly.[34]

The EC was not especially brave in its decisions made after full liberalization in 1998, in part out of deference to member state NRAs which were beginning to operate the system and were given a certain amount of latitude by the EC, latitude that is rapidly decreasing as it becomes apparent that almost 12 years after full liberalization, the now 27 NRAs have hugely divergent effectiveness and regulatory commitment to liberalization. Back in 2000,

architect of liberalization Herbert Ungerer felt confident enough to state: 'The approach of close cooperation with national regulators turned out to be largely successful.'[35] The pricing of interconnection and mobile termination were two issues that continue to reoccur despite being temporarily 'solved' in 1998–9.[36] Ungerer stated: 'Recent regulatory and antitrust decisions tend to be a mix of structural and behavioural measures.'[37] By 2009, the EC was pushing Member States to adopt a supranational authority – Group of European Regulators in Telecoms (GERT)[38] – that would be somewhat similar to the US FCC and ensure conformity by NRAs. Unsurprisingly, those plans had been watered down by governments who set up and supported the more recalcitrant NRAs. The European Commissioner, Europe's premier political figure in communications policy, in 2008 addressed incumbent telecoms operators (telcos) on progress:[39]

> Ten years after the opening of markets to competition, the job of regulators is only half done. I know that you do not like me saying this. But this is my role as European Telecoms Commissioner. It is because of your economic and political power that the Commission has to remain vigilant, as the independent guardian of competition in the European Union … I know that it may be convenient, in the short term, to enjoy the protection of national rules and regulations … Perhaps, this will allow you for some time to keep competition from abroad at bay. And to prolong badly needed transformation and modernization processes a bit longer.[40]

However, back in 2000, it appeared that Europe was following the United States which, through the decisions in AOL/TimeWarner and AT&T/MediaOne, was really moving towards a 'new Kingsbury commitment' in cable, referring to the 1913 agreement that permitted AT&T a monopoly subject to universal service. The mergers of 2000 opened the cable networks to the theoretical promise of competition, which brought them into step with the Telecommunications Act 1996 provisions for LLU (known in the United States as 'unbundled network elements' or UNE), and enforcing competition in Internet backbone services. It came as something of a rude shock when these commitments unravelled at a furious pace in 2001–2, as the Internet bubble burst and analysts such as Lessig and Wu[41] realized that policy needed to rally round a principle: that principle was network neutrality. Whether net

neutrality is the new common carriage, as Sandvig suggests[42] and I unpack in Chapter 1, it is an idea of genuine descriptive power.

Bubbles Burst, Incumbents Delay, Deny, Degrade

Back in Europe, a year passed, the dot-com bubble that was so shiny, soapy and opaque imploded dramatically in summer 2000, the EU regulators also imposed openness conditions on AOL's merger with Time Warner, the largest in history, by requiring divestiture of its part-ownership of a large German ISP. Europe auctioned its 3G wireless licences in a messy, highly expensive process, costing hundreds of billions of dollars at the height of the bubble (paid after it burst), which further delayed any sign of broadband Internet access for the many. With the dearth of high bandwidth content start-ups (a self-fulfilled prophecy in the vicious cycle of capital-starved start-ups and bandwidth-starved consumers), British Telecom (BT) and other incumbent telecoms operators (telcos) continued to deny broadband demand existed, and new competitors by late 2002 were in terrible financial trouble in the wake of the Enron, Global Crossing and WorldCom scandals.[43] Napster was bought by Bertelsmann Music Group but was then sued into submission, replaced by more powerful, often encrypted and less legally suspect technologies such as Gnutella, KaZaA, BitTorrent and others. I crawled out of the wreckage of MCI WorldCom, whose CEO and CFO had committed the largest accounting scandal in the world to that date, a staggering $11 billion (peanuts compared to the Citicorps and AIGs and all the others in 2007–9, of course). The broadband model was bust, I declared to the few who cared, and it was time for a Keynesian-Korean stimulus to mend it: to prime demand by fusing John Maynard Keynes' insights into recessionary spending on public works with the highly effective government-directed but ruthlessly competitive Korean environment for broadband deployment. It did happen in Japan and Hong Kong, which fast outstripped Korea in high-speed broadband by using fibre-optic cables into the building to achieve real broadband speeds of 100 Mbps. Meanwhile, BT in the United Kingdom and its European neighbours finally rolled out broadband in 2002–4, and Britain by 2008 had a dizzying 2–8 Mbps 'theoretical maximum' broadband connections for consumers. A few outliers delivered broadband more quickly, where viable cable and telecoms networks belonged to rival groups,[44] but these were very few and confined to the Netherlands, northwest Italy and Scandinavia.

There was another piece to the 'end of end-to-end' story: the content delivery to the consumer. Could this be achieved using the open Internet, where video would be delivered across continents at the same speed and QoS as all other bits, whether spam or P2P? Or would it need caching close to the end-user and the 'last mile', to ensure higher quality and take traffic off the network? I thought the latter, and further thought that Hollywood would be encouraged to put its wares on the Internet if this could be achieved. I wrote that we didn't have any type of broadband Internet yet in Europe, and that to achieve it we needed first to host content locally. Between drafting this 'Start of End-to-End' paper in 2001 and finally publishing it in 2003, I rethought my views but came to the same conclusion: 'Lord give me openness, but don't give it yet' – we needed an interim step on the way to a truly effective broadband Internet.

The European incumbent telcos had paused in their rush to the cable model, in part because of those regulatory fears of unbundling, of being forced to share their broadband networks with competitors, but largely because they did not have either content or bandwidth to make it worthwhile. Voice phone calls are simply bits on the Internet if there is sufficient bandwidth, and phone companies faced bankruptcy or at the least 'commoditization' if they permitted users to simply buy broadband and use it for Voice over Internet Protocol (VoIP). This was not a new fear by any means, and was the stuff of popular wisdom in 1997 thanks to 'The Death of Distance' by Frances Cairncross.[45] The easy way out for telecoms companies was to sit on their hands and employ an army of economists and lawyers to convince the regulator that unbundling was inefficient and/or morally wrong and sinful in a 'free market'. Note that telecoms has never been a free market but a cabal of monopolists with a fringe of competition from the astute, regulatory minded and – in WorldCom and Enron's cases at least – corrupt.

Having sat on their hands, the phone companies found that most problems magically simply melted away, as if in some Taoist fairytale – their competitors were bankrupt, most content companies were happy to maintain a non-Internet status quo, the regulators were impotent in the face of the highly paid economist hired hands and the phone companies were home free. They forced consumers to buy phone lines with their broadband access,[46] kept prices high and blocked or degraded content they didn't like using snazzy new filtering equipment called Deep Packet Inspection (DPI)

using blade servers and other ultra-high-speed computing power. As Riley and Scott explain:

> In the early days of the Internet, non-discrimination was easy to uphold because it was not technologically feasible for service providers to inspect messages and evaluate their content in real time. But recently, electronics manufacturers have developed so-called DPI technology capable of tracking Internet communications in real time, monitoring the content, and deciding which messages or applications will get through the fastest.[47]

In short, telcos thought they had the field to themselves, except for a nasty-looking start-up in 2002–3 called Sky P2P, Skype for short, by that annoying Swede Niklas Zennstrom, who had dreamt up KaZaA in 2001. However, given that it was a P2P based Instant Message service masquerading as voice, they thought they could block it wherever it formed a serious threat. They had originally lobbied to block it from advertising itself as a phone service as it does not work in emergencies when the power cuts out and your computer battery dies (after all it is a cheap substitute with limits). By 2004, ISPs were being caught blocking a rival to Skype called Vonage in the United States. The other perennial problem for phone companies was the lobbying by the copyright industry to get ISPs to cough up the names of their subscribers who were sharing lots of P2P files (KaZaA had by now replaced Napster and soon was joined by Grokster and BitTorrent and other more advanced P2P technologies). Copyright players had decided since the dot-com bubble burst that their existing business model was just fine, thank you, and they were not forced to return to the table until Steve Jobs and Apple convinced them to join the iTunes digital store – by which time literally billions of copyrighted files were being swapped by users who did not want to return to that twentieth century business model of buying hard discs. ISPs resisted phone companies' attempt to get them to join in the war on their customers, heroically in the case of Verizon's battle with the recording industry.[48]

In desperation, consumer advocates sought a light at the end of this dark 2002–4 tunnel. They found it in what became known as 'network neutrality', the Lessig–Lemley principle of 'end-to-end' (E2E), based on an engineering principle that the early Internet worked best when all packets were routed

with the same priority. Internet engineers had been working to refine the network for years, concerned that the 'one-size-fits-all' E2E approach was not sufficient for high quality and/or large volume transactions, in particular those Holy Grails voice calls and video transmission. In 2002, Tim Wu described 'net neutrality' in a working paper that became a 2003 ex parte submission to the FCC jointly with Lessig. Battle became joined at that point, with the cable and telcos claiming that such was their duopolistic competition, and so near the real competition from the third wireless broadband alternative, that they needed no such regulation. If they were going to fiddle with a customer's Internet, they warned, they would only do so in properly utilitarian manner for their benefit, or at least that which would bring greatest happiness to the greatest number of users, stockholders, bondholders, executives and the like. Companies are not governments, so their concern had to extend across these various constituencies, and profitable investments had to come first in that list of priorities.

That wireless alternative was becoming more than just theoretically interesting. The farcical European 3G auction may have delayed the build-out and aggressive marketing of 3G in Europe, which had led the United States in voice wireless through the 1990s, but 3G was very real in Japan by 2002. It was however almost the polar opposite of the open Internet pursued by net neutrality advocates. It was in fact a 'walled garden', inside which were the preferred partners of the network operators, of which by far the largest was NTT DoCoMo, the wireless arm of the incumbent. It charged its preferred partners 8% transaction fee on their sales, and provided for part of this tariff its billing services to the end-user. Thus ringtones, e-commerce sales and so on would appear on your wireless bill, truly a 'one stop shop'. To go from this 'walled garden' into the wider Internet took you away from the trusted partners of DoCoMo and into a slower and less secure environment.

That sounds like a fairly claustrophobic experience for more adventurous users, but an alternative had presented itself: Wireless Fidelity (WiFi). This was an in-building unlicensed spectrum technology that was simply supposed to enable the end-users to work wirelessly inside their own premises. However, boosting power, marketing the trademark 'WiFi' standards and building the technology into the laptop computer while mass producing wireless modems made the obscure Radio Local Access Network (RLAN) into a device owned by hundreds of millions by the middle of the decade. As I wrote with Ivan Croxford in 2001, 'I want my WiFi' was the consumer

call of the time (echoing 'I want my MTV' of the cable television generation). Moreover, consumers showed demand for national 'hotspot' coverage of WiFi, first in obvious transport hubs like airports and railway stations, then in 'road warrior' salesman refreshment stops like Starbucks. ISPs such as T-Mobile and Boingo and start-up TheCloud supported by BT aggressively partnered with such locations to provide what looked like national urban coverage in the tens and hundreds of thousands – this despite the RLAN being illegal for outdoor commercial use until 2002 in many countries.[49] None of these networks made much money, though they supplemented existing ISP wired and wireless networks, and it is now the case that dozens if not hundreds of WiFi hotspots are available in most urban locations (check your network availability as you read this book).

This phenomenal growth of WiFi occurred largely against the wishes, contractual terms and laws of their hosts, as Wu explained in the original net neutrality paper:

> Operators showed an unfortunate tendency to want to ban new or emerging applications or network attachments, like WiFi devices or virtual private networks, perhaps out of suspicion or an (often futile) interest in price discrimination.[50]

Why? Because it was free, it could be shared with anyone who had the password or could access the unprotected hotspot of a neighbour, and therefore it threatened to 'cannibalize' the revenues of ISPs. If consumers could achieve the theoretical maximums of 56Mbps on their WiFi, they could share data and voice with dozens of their 'friends'. Several legal obstacles were rapidly constructed to stop consumers doing this: first, they were in breach of their contract with many ISPs if they shared – even unwittingly – their wired Internet connection outside their own household. Second, they could be held criminally liable if someone used their network to download illegal matter such as child pornography as shown in a Canadian test case. Third, they could be held civilly liable if someone used their network to, for instance, download copyright material. Importantly, these latter pair of legal problems came equipped with a standard-based solution: the encryption on WiFi base stations was made more powerful and more user-friendly. As a result, most users closed their networks to strangers and prevented a spectrum commons of WiFi free hotspots. However,

in some locations, notably Montreal, Canada, the 'Isle sans Fils' (Island without charge), social entrepreneurs have established free Internet networks using WiFi.

The backdrop to the net neutrality debate is therefore a series of revolutionary technological and user-centred breakthroughs, with the unmetered Internet itself only a decade old for European consumers, broadband only 5–7 years old, WiFi the same, Skype and other VoIP even younger. File-sharing via P2P dates to Napster in 1999–2000, with KaZAa and BitTorrent even younger. Broadband providers faced with this tsunami of innovation reacted quite logically in trying to slow down the pace of change, first by delaying the introduction of broadband, then by slowing its spread via WiFi, and by throttling P2P applications. Video and movie providers shelved previous plans to rapidly deploy Internet-based video in the 'dot-com' bubble of 2000–1, going into partnerships with broadband providers and P2P technology companies. The growth of bandwidth was choked off while both video producers and ISPs puzzled over a way to 'monetize' – to profit from – the new delivery technology.

In summary, telcos are trying to avoid a commoditization of their business, which means they fear and envy their mobile counterparts. Fear – because the user-friendliness and personalization of mobile phones means users are increasingly relinquishing fixed lines for mobiles, as well as investing heavily in more sophisticated terminals and expensive monthly subscriptions. Envy – because mobiles have been able to persuade users to pay for usage and speed of service, and content partners to pay for access to a higher quality, faster and more 'trusted' portal. In Japan by the end of 2008, almost 90% of mobile users had broadband services, and telco fixed-line services have been overtaken by fibre-to-the-home (FTTH) (13.1 m to 12.3 m with 3.9 m cable broadband). There were five mobile subscribers for every two fixed subscribers (105 m to 43 m). In broadband, the 90 m mobile users outnumber DSL users by 7 to 1 and total fixed broadband users 3 to 1.[51] Even worse for fixed companies, VoIP subscribers reached 30% of fixed (10 m users). VoIP users typically pay far lower per minute charges and are therefore much less profitable than dedicated phone subscribers. VoIP is not permitted by most 3G mobile networks, which preserves their telephony revenues. In Austria, an even more potentially devastating substitution has taken place, with 3G subscribers choosing to use 3G modems ('dongles') on

laptops and netbooks (mini-laptops), and in 2009 that number is expected to exceed fixed broadband totals.

From History to the Future

That breakneck dash through recent telecoms history was necessary to give a little context to the net neutrality debate in 2009. You have heard the term and have some sense that it is important or controversial – or at least you must be working for a company or taking a course where someone thinks it is important. It is important to realize that (a) it is not a new debate; (b) it is not going away; (c) it grows in importance as the Internet and the importance of users accessing high-speed content grows in importance. So you've invested wisely so far.

In Chapter 1, I will explore how companies and governments are trying to upgrade home (and therefore small business) connections to fibre, or a close alternative called Very high-speed DSL (VDSL). For now, let's focus on what is happening on your line during peak-time, and what the phone company is going to do about it. Europe is only just over a decade into unmetered Internet access for dial-up connections and it would be a pity to go back to that type of future. So what's changed to threaten Berners-Lee's open Internet? DPI reshapes strategy for traffic management so that what was formerly a dumb network processing packets on a 'best efforts' basis, can now configure all kinds of re- and non-prioritization. Ridley and Scott state that:

> Operators can tag packets for fast-lane or slow-lane treatment – or block the packets altogether – based on what they contain or which application sent them … When a network provider chooses to install DPI equipment, that provider knowingly arms itself with the capacity to monitor and monetize the Internet in ways that threaten to destroy Net Neutrality and the essential open nature of the Internet.[52]

The genie is very much out of the bottle regarding DPI and ways to make providers pay for higher quality: it exists and is used by most incumbent ISPs and many competitors. That means there is a very real issue about how this technology should be used. That affects more than simply speed of access to content. It also affects the rights of the end-user to receive content, and the privacy thereof, as well as the rights of content producers to provide

applications and services that end-users can access in reasonably conducive conditions. A different book could – and must – be written about the uses and abuses of DPI and other technologies, but for our purposes, we should accept that ISPs can manipulate the bits on the Internet for their (and sometimes) our benefit. Should we worry? We should trust but verify, at the very least.

All network owners have incentives to stop traffic flowing over their networks that is low value, high volume and for which it is technically unfeasible or uneconomic to charge – notably non-network affiliated content including user-generated and transmitted content. This content is very low value to the network and, with many millions of users all valuing each others' own-created Web 2.0 content, under current market and technological conditions there is insufficient value to charge individual users and thus all content may be throttled in the absence of a charging mechanism.[53] Content on limited bandwidth networks can 'choke' the network capacity, especially at peak times of usage (daytime for business, evening for consumers). In a 'best effort' environment without congestion charging,[54] this content has insufficient disincentives to prevent its flourishing: for instance P2P traffic and its use by early-adopter high-volume users. ISPs can choose to filter P2P traffic of various kinds – typically it is unencrypted relatively crude versions of popular file-sharing programmes, such as BitTorrent which is used to provide upgrades to the most popular multiplayer online game World of Warcraft. Many assertions are made about the implications of certain types of traffic, but regulators currently have no basis for deciding if such assertions represent real problems.[55]

The following types of discrimination might constitute the type of non-neutral behaviour by ISPs that may be found to be harmful to consumer welfare: transparency failures and misleading advertising, 'throttling' or blocking, charging, certain types of more extreme and anti-competitive 'walled gardens'.[56]

First, transparency failures. ISPs may fail to tell customers and application developers which services they offer – estimated bandwidth, latency, etc. This is essential to certain applications, which cannot run with latency, or which are blocked or filtered. Even where there is regulatory commitment to enforce net neutrality, the evidential problem remains. Van Schewick[57] suggested that the main problems currently lie in mobile networks, where VoIP is routinely degraded or blocked.[58] The problem here is that certain users are breaching their terms of use but being insufficiently or non-transparently

sanctioned, and certain programmes are being throttled but the same applies. Often a security justification[59] is used and is often unchallenged by regulators.

Next, blocking or 'throttling' is the furthest deviation from neutrality. Some economists think it justified, but the basic problem is a distortion of competition between the blocked and unblocked companies. For example, a company serving online gaming content from South Korea may typically choose to do so via P2P networks, whereas a US content provider might use a premium service sanctioned by the ISP of the end-user. Not only is the Korean content provider discriminated against, but neither end-user nor content provider may be aware of the nature of the problem.[60] This creates confusion among users as to whether and how content is throttled.[61]

Certain types of traffic that are highly valued by the end-user of the Internet can be discriminated against in whole or in part by service providers that are *not* dominant. This is because they either have good competitive or good traffic management reasons to do so; it makes their networks safer and more efficient, making it complicated to work out when their discrimination is motivated by arguably less benevolent factors, like blocking the competition. There can be motives to throttle content no matter what ISP is discussed, and that behaviour is potentially anti-competitive not within the layer of ISPs, but to content providers upstream which end-users are trying to access via the ISP network.

Blocking together with other forms of traffic shaping is particularly controversial because, under current network management tools, it is a blunt tool. For instance, all P2P traffic using a certain protocol may be blocked. P2P can respond by encrypting its traffic or otherwise spoofing, but this creates an 'arms race' much like that found in security software responses to the threat of breaches. In fact, the claims of ISPs are that P2P traffic contains a high proportion of malware, spam and spyware, and therefore it is filtered in the end-user's interest and in conformity with the terms of use for end-users.[62] Many assertions are made about the implications of certain types of traffic, but regulators have no basis for deciding if such assertions represent big or small problems. The ISP assertion that P2P traffic contains a high proportion of malware may be disingenuous. Email spam and web surfing are the vectors for malware, but the ISPs do not block such traffic. Future networks may try to cap P2P more effectively, which can itself lead to an 'arms race' between encrypted P2P content and attempts by ISPs to detect P2P traffic. This is an

example of how a baseline of traffic and usage would help the regulator to understand the importance of claims made by stakeholders.[63]

Since broadband ISPs have a termination monopoly or duopoly[64] over the end-user, they can use that to charge termination fees to those who wish to get access to the user. This behaviour is familiar to the cable TV industry, where only large content providers can secure free or even profitable carriage, whereas smaller content providers with less contracting power are forced to pay the cable TV operator for access. The fear is that a similar model will be imposed on the Internet, where only large content providers with sufficient negotiating power, and those with political influence to secure favourable carriage terms, will secure free carriage.

Next, let's consider P2P.The claim made is that networks cannot be upgraded successfully given the flood of P2P traffic. This is by no means a universally shared sentiment amongst ISPs and I note recent comments attributed to Matt Beal, BT Wholesale's chief technical officer: 'It is up to us at the core of the network to make sure there is enough bandwidth'.[65] He further stated BT's Next Generation Network (NGN – its all-IP network)[66] would 'put enough [bandwidth] volume out there … so we don't have to [traffic shape]' which is 'quite Big Brother-ish'. There is therefore no consensus as to the type and extent of traffic shaping and other forms of blocking and throttling P2P traffic. Where ISPs do not have effective terms of use, or do not enforce uniformly those current strategies in place to dissuade 'unfair' use, two consequences can follow.

1. Users are summarily terminated or suspended – this can be conducted by any ISP and may well be justified. This practice could be made more transparent.[67]
2. ISPs choose to filter P2P traffic – typically popular file-sharing programmes.

The rights perspective should be put openly. Davies and Banks explained:[68]

> One of the most important trends in recent years is the growth of multinational corporate censors whose agendas are very different from those of governments. It is arguable that in the first decade of the 21st century, corporations will rival governments in threatening Internet freedoms. Some American cable companies seek to turn the Internet into a controlled distribution medium like TV and radio, and are putting in place the necessary technological changes to the Internet's infrastructure to do so.

Increasing use of DPI is being created for both Western ISPs and more autocratic governments.[69] In both cases, the method chosen is co-regulation – the government sets the rules and the ISPs are allowed a broad measure of independence as to process to achieve the results the government sets out. This is controversial in that it passes powers to control freedom of expression into private hands, often without the constitutional protections that govern public authority intervention and censorship. Whether it is China or the United States or Europe that implements the policy, the ISPs are using similar tools and techniques and the language used in regulation is very similar.[70] The effects on user rights may be varied, but the techniques used are undoubtedly filtering, a form of censorship.

This makes network neutrality more than an empirical positivist economic issue: it is explicitly normative and political.

More Than Economics: Open Internet Policy

The network neutrality debate is only in part about economics and technology, despite what you might surmise from various pro-competitive statements by academics and the shape of the US and European debates. The extent to which even lawyers have been drawn into an open-ended debate regarding the merits of duopoly versus inset competition in telecoms, or the relative merits of open interoperable software environments versus proprietary property rights-based or corporate developments, or the benefits of end-to-end 'dumb' networks versus intelligent networks, displays the capture of the subject by economists and corporate technologists. The issues at stake are more fundamental to society than that. As a lawyer who has written for over a decade in favour of pro-competitive telecoms and media policy, I am not ashamed or abashed to state that I emphasize that communications policy is about fundamental rights of citizens as well as public welfare for consumers, and that it is about educated and informed users as well as optimally priced access networks. In short, what is needed is a balanced approach towards network neutrality as a central plank of a converged communications policy, ideally one which tries to both increase competitive choices for consumers as well as ensure the fundamental right for citizens to access the public Internet.

This conclusion should not be startling to anyone who has studied communications policy over the decades, though the capture of the debate by economists and technologists for the benefit of network investment over open access is a long-term trend that may not be reversed in the short term.

I argue that it needs tempering with considerations of fundamental rights, not overturning in favour of a *dirigiste* broadcasting policy. I take my cue from several experts, noting that they are pro-market advocates who also recognize a value to openness – that is, as opposed to private censorship – which extends beyond economically quantifiable results. Lessig offers caution as to the empirical outreach of economic analysis of law, explaining that its aim is totalizing. This analysis reflects the fear of that totalization, the need for a 'balanced diet' between law and economics,[71] and the influence and paramount importance of human rights in policymaking, particularly here in the case of the rights to freedom of expression and privacy. Rights may have been considered 'nonsense on stilts' by utilitarians two hundred years ago, but we have earned the right to consider them today in the case of the Internet in developed countries, at the very least. Berners-Lee explained that the open standard of the WWW describes:

> a vision encompassing the decentralized, organic growth of ideas, technology, and society. The vision I have for the Web is about anything being potentially connected with anything. It is a vision that provides us with new freedom, and allows us to grow faster than we ever could when we were fettered by the hierarchical classification systems into which we bound ourselves.[72]

Lessig explains what the Internet architectural principle of 'end-to-end'[73] means for innovation:[74]

> This end-to-end design frees innovation from the past. It's an architecture that makes it hard for a legacy business to control how the market will evolve. You could call it distributed creativity, but that would make it sound as if the network was producing the creativity. It's the other way around. End-to-end makes it possible to tap into the creativity that is already distributed everywhere.

The legacy of such technical self-regulation is that minimal direct government interference has been seen.[75] The self-regulatory bodies are international in character and were begun as non-commercial self-regulatory organizations (SROs).[76] The end-to-end principle has dictated that any content control be embedded in code by the content creator, and filtered by browser software installed and controlled by the end-user.

If innovation is typically both user-distributed and user-driven, the implications are that innovation is encouraged by interoperability and open access: in general, ensuring that content can be freely shared between those users. This view is in some conflict with content and network owners' desire to be recompensed for provision of local loop upgrades and has led to this animated debate. Note that content providers pay for their traffic to be carried by backbone ISPs, on a best effort basis, and the argument is about ISPs wishing to increase those payments as a result of either enhancing or blocking service, on a mandatory or opt-in basis (clearly a mandatory blocking service for those refusing to pay an extra toll is the most capricious of these possibilities, as we will see in the 'Madison River' case). Lemley and Lessig claim that innovation at the edge of the network is opposed by traditional media and network businesses, as it makes business cases based on controlling distribution bottlenecks redundant: where there is peer sharing, there is less opportunity for traditional bottlenecks and therefore control of revenues. However, the inverse applies also: without some means to secure revenues for the increased bandwidth necessary for Web 2.0 type applications to flourish, do network operators have an incentive to upgrade? Ed Whitacre of AT&T famously made this claim.[77] Of course that also can lead to a type of 'arms race' as P2P networks encrypt all traffic to prevent inspection, in the same way that firewalls on Intranets were evaded using Port:80 and other techniques.[78]

Odlyzko and Levinson refute many of the arguments for fine-scaled charging which underlie the architecture of IP Multimedia Subsystem (IMS) and QoS. They note that:

> Technology appears to be making fine-scale charging (as in tolls on roads that depend on time of day or even on current and anticipated levels of congestion) increasingly feasible. Standard economic theory supports such measures, and technology is being developed and deployed to implement them. But their spread is not very rapid, and prospects for the future are uncertain … the case for fine-scale charging is not unambiguous, and in many cases may be inappropriate.[79]

An emphasis on users as citizens and participants challenges conventional economic views of the debate – where rights are tradable, the emphasis on competition wins out in a neo-classical worldview, though with acceptance that information can improve markets (but a bias in favour of self-regulatory means of achieving more perfect information). For instance, it is conventional

sound analysis[80] that 'The lack of a market failure in the wireless industry suggests that such regulation would be completely unwarranted. Consumers consistently benefit from increasingly lower prices and more features.' This analysis also extends to the wireline industry, where there is competitive entry of a type, at least in business markets and for European consumers, and lower prices for higher speeds. A continual controversy in telecoms concerns the causation for these benefits: does the acceleration of benefits from technology hide an oligopolistic and uncompetitive industry structure? If that is so, and the majority of benefits flow over from more competitive industries and more innovative platforms – notably computing and the Internet – then should telecoms move to a computing or Internet type regulatory structure, with emphasis on prior open standards and ex post competition regulation?[81] This argument was used by Lemley and McGowan in the late 1990s, and has been applied to telecoms over a lengthy period, from the commons perspective by Benkler, Lessig and others, and recently from a more market-oriented approach by Werbach and Weiser. Lemley and Lessig state: 'The FCC's presumption should be against approving mergers or policies that threaten these design principles, without a clear showing that the threat would not undermine the Internet's innovation.'[82]

It was claimed by some pioneers such as Perry Barlow that the Internet was a global phenomenon beyond nation-state control. It was suggested that the 'Internet' is an unbounded cyberspace in which borderless any-to-any communications is possible. In view of its origins, this appears a curious statement. The Internet is a creation of governments and educational institutions, and continues to be regulated by government, and indeed by private corporations as a proxy for government. It can be whatever users, governments and corporations decide it should be. There is no inherent bias towards openness or closure of the network that cannot be undone by critical decisions at this juncture. I note the opinion of Tim Wu, who coined the term 'network neutrality', and his bias towards markets in his work: 'It is absolutely not a call for comprehensive regulation or nationalization of the wireless industry. The perspective is that regulation, if necessary, should be a last resort.' I also note the analysis of the head of the Canadian regulator, the Canadian Radio-television and Telecommunications Commission (CRTC), Konrad von Finckenstein, who states: 'Fundamental issues of technology, economics, competition, access and freedom of speech are all involved.' Consider an excellent summary of these views offered by de Beer:[83]

> Too much of the network neutrality debate seems to be cast in economic terms, with advocates on either side trying to establish whether openness or deregulation will be most effective for competition and innovation … My intention is not to detract from the economic arguments, but to bring in culture as another lens through which to view the network neutrality issue.

Commissioner Reding stated on 6 May 2009 in the European Parliament prior to its vote on the new telecoms law:[84]

> Even though traffic management can allow premium high quality services to develop and can help ensure secure communications, the same techniques may also be used to degrade the quality of communications or other services to unacceptably low levels. That is why, under the new EU rules, national telecom authorities will have the power to set a minimum quality level for network transmission services so as to promote net neutrality and net freedoms for European citizens.

So far, so unremarkable. Note that it is up to the national regulators whether they want to take on this extra task, which is technical, fiddly and may not be a high priority for some – or indeed all – of them. She then goes on to paint that policy in political rather than technical terms:

> The fourth element I would like to underline is the recognition of the right to Internet access. The new rules recognize explicitly that Internet access is a fundamental right such as the freedom of expression and the freedom to access information. The rules therefore provide that any measures taken regarding access to, or use of, services and applications must respect the fundamental rights and freedoms of natural persons, including the right to privacy, freedom of expression and access to information and education as well as due process.

She is stating an extension of a principle for European telecoms regulation: the existing rules for common carriers – the phone monopolies – that require them to connect all users on demand to the phone network and allow them to communicate without prior censorship on their speech, will be extended to require carriers to permit Internet users to maintain their access to the

open Internet, subject to the law as enforced by courts. The open Internet access right – in reality based on the payment by citizens to those carriers – maintains the principle that the telecoms network is a common carrier. What is interesting in this debate is not simply that technology lets carriers fiddle with citizens' communications, but what motives they have for doing so, and how robust is the regulatory response to any ill-considered tampering.

Structure of the Book: Who's to Blame?

My starting point in unpacking the debate is that network neutrality has a positive or forward-facing element related to ISPs investing in faster Internet access and a negative or backward-facing element related to blocking or throttling on existing networks. I extend this negative net neutrality analysis as a proposal for 'net neutrality lite' for Europe, which the United States and other countries may also find useful. It is a pretence to claim that different countries can be independent of each other in these policies, when the content and router worlds are particularly globalized – what Disney, Google and Cisco do in the United States must necessarily have a massive impact on Europe, in particular because most of the credible market entry competition to European incumbent behemoths comes from the United States.[85]

As this introduction begins to uncover, 'net neutrality' is a deceptively simple phrase hiding a multitude of meanings. First, it has to be unpacked to discover that it comprises two separate non-discrimination commitments. Backward-looking 'net neutrality lite' claims that Internet users should not be disadvantaged due to opaque and invidious practices by their current ISP. Forward-looking 'positive net neutrality' describes a practice whereby higher QoS for higher prices should be offered on fair reasonable and non-discriminatory terms to all-comers, a modern equivalent of common carriage. It is a more debateable principle, with many content providers and carriers preferring exclusive arrangements. That is what the first three chapters seek to establish. In Chapter 1, I introduce broadband supply and investment and blocking technologies and requirements, in Chapter 2 the types of 'negative' discrimination that may occur and the development of the debate in both the United States and Europe, and in Chapter 3 issues of QoS, user-generated and/or distributed content. In Chapter 3, I consider 'positive' net neutrality in detail.

I argue that the entire net neutrality debate has been set up as a false dialogue of the deaf between the net neutrality absolutists on one side and

the net neutrality refuseniks on the other. The absolutists are caricatured as favouring absolutely no traffic management, or prioritization, thus leaving the Internet in a type of primordial Garden of Eden in which even content delivery networks such as Akamai that push content closer to end-points (which we explore in Chapter 2) are seen as suspiciously 'efficient' in delivering packets closer to the end-user. Not surprisingly, Lessig and Lemley's argument is portrayed by net neutrality opponents as nostalgia for a halcyon 'Golden Age That Never Was'. Consider: Sandvig states that there has always been traffic management of various sorts on the Internet; Crowcroft robustly establishes the network engineers' perspective that – far from net neutrality being an end-goal – QoS on the Internet has always been a kind of Holy Grail to prioritize and more robustly deliver higher-value services, from the network operator's point of view; Clark, one of the three authors of the original 'end-to-end' principle, states that he would have more carefully chosen his terms had he realized the 'Talmudic' reverence with which his engineering argument was viewed by social scientists.[86] Traffic management on the Internet is a fact of life, and to suggest otherwise can clearly invite – and has created – a storm of derision for those of the extreme net neutrality persuasion.

The refuseniks have their man of straw to deride. However, if it is true that there has always been some kind of QoS on the Internet, it is equally true that for perhaps twenty-five years, carrier-class QoS was to be introduced 'next year'. Of course private networks and virtual private networks have dedicated circuits, and often dedicated networks, devoted to private clients of one type or another. Public networks have not achieved truly differentiated QoS to date, and perhaps never will. So there is another man of straw: the continued attempts to create QoS on a 'best efforts' network could be a hopeless quest, as searches for Holy Grails often are. If that is true, then increasing capacity many fold, as has been achieved by the super-fast Internet2 for university networks, would be the most useful resource in which to invest.

This leads to a further speculation. If the quest for the Holy Grail of QoS truly is doomed to fail, then the net neutrality absolutists are actually tilting at windmills themselves, and any move away from net neutrality is a waste of money. In the fullness of time, and assuming a belief in the self-correcting folly of markets even in the dark days of 2009, ISPs will see the error of their ways and return to the light of an unfettered open Internet. Two obvious problems present themselves: first a great deal of time, effort and money will

have been wasted in the meantime with irreparable harm (as so many harms are, though far from fatal) to innovation and end-user remixing; second, given the sunk costs in investing in DPI equipment and its management, will ISPs have become liable for their content as publisher not carrier by that point? The entire liability protection regime established in the late 1990s might have unravelled by then. Politicians must make these decisions, but how can we expect them to understand the issues, or to arrive at sensible solutions? The entire field is confused, and such principles as they exist are only at the extremes. I will examine this in Chapter 1 and Chapters 4 and 5.

I have to mention copyright if only to indicate a further caricature within the debate. It has two elements. The first is that all high-capacity consumer users of the Internet are file-sharing. The second is that this file-sharing is illegal, as it is sharing of copied 'pirated' files that breach others' copyrights. Both are of course highly contentious, but as with all half-truths, the kernel of truth does lie inside that there is large-scale 'theft' of 'pirated' material, to use the terms preferred by the copyright industry. I write this as The Pirate Bay, a rather blatant example of a site offering access to copyrighted material for free download, thus breaching copyright law, has seen its principal officers both fined and sentenced to prison by a Swedish court of first instance, though with appeal based on the judges' alleged professional bias and connections to the copyright industry. Ever since the prosecution of Napster and its founder Shawn Fanning in 1999, the copyright industries have waged a war on copyright violators online. This decade-long battle against 'pirates' (which conjures images of Somali teenagers with machine guns rather than Western college students in dorm rooms[87]) has of course proved a fairly fruitless exercise for copyright holders, and a burdensome and expensive exercise for ISPs. End-users have typically had their rights broached in some form not least in breach of privacy, and in communications that expose their activities within their households (identity within families is always an early casualty of Internet access disputes). The solution offered is to chase individual infractors and to further attack a class of data traffic, P2P networks, or within that, a sub-class, BitTorrent. This can be achieved by various blunt tools, including throttling, torrent seeding, disconnection at fifteen-minute intervals, and so on. In France, the proposal to establish an administrative solution to close down the connections of persistent violators (so judged by ISP and copyright industries rather than courts) has been defeated in April and June 2009 (the so-called HADOPI laws), while controversy continues

over European Parliament amendments to consumer protection legislation online. We will return to this issue in Chapters 4–6. In Chapter 4, I broaden the debate to consider the types of filtering and blocking that ISPs have traditionally engaged in, and the legal liabilities that they have incurred. I consider the regulatory challenges in dealing with 'lite' net neutrality issues in Chapters 5 and 6 with the specific European and UK responses to content regulation, demonstrating creeping control and a reversal of the presumption that ISPs do not carry liability for their content. My discussion about how net neutrality regulation in the United Kingdom fits into the reviewed 2009 Electronic Communications Framework (the Directives which direct European NRAs to regulate ISPs) may be helpful. The book's argument is illustrated by three reviews of existing policies: an extended discussion of British policy in Chapter 6, a discussion of EC policy in Section 5 and an early discussion of US policy in Chapters 2 and 3, because the US debate has cast its light and darkness on the later debates elsewhere.

I have some partial solutions but no panacea. Mobile Internet claims the same special protections from regulation that its forerunner, mobile termination, claimed, to enable walled gardens to flourish. In Chapter 7, I analyse the problems inherent in regulating the mobile Internet for net neutrality, with emphasis on pre-existing content and price discrimination and regulation in Europe. Finally in Chapter 8, I consider the potential for this debate to develop towards a form of net neutrality 'lite'. Transparency and investigation are easy wins, principles that regulators can only discount on grounds of ignorance ('net neutrality is a solution in search of a problem') or resource depletion ('we don't regulate the Internet, it is too complicated'). It improves competitive forces, such as they are, so the pro-market advocates surely have little to disagree with, especially as it is to be achieved through co-regulatory means at lowest cost to ISPs. Co-regulation is a prevalent but awkward compromise between state and private regulation, with constitutionally uncertain protection for end-users and a worryingly large latitude for private censorship, which has been increasing throughout the last decade even as the law declares ISPs to be 'three wise monkeys', as discussed in Chapter 4. Any solution needs to be holistic, considering ISPs' roles in the round, including their legal liabilities for content filtering. I will grapple with the dilemma that I may be giving the ISPs a free lunch: the appearance of a solution without even a partial remedy for end-users. I create trouble for myself by admitting to both economic and normative rationales, each pulling

in different directions, and attempt unsuccessfully to square that circle. That is why I only recommend net neutrality 'lite' – the easy backward-looking solution.

This is a policy area with no right answers that offer perfect solutions. Of course the Internet should be open to all, but of course private investment is the critical component in building a faster Internet. Of course universal service should be supported, but of course there must be some minimum access to the open Internet for all, whether they use a mobile 3G connection or a fast Internet Protocol Television (IPTV)-enabled premium service. If it says 'Internet service', it should do what it says on the tin, offer an open Internet (alongside walled gardens if expressly advertised as such). I am happier limiting my solution to emphasize the complexity of the problem than trying to claim a one-size-fits-all solution. Net neutrality is an issue with potentially profound consequences, and cannot be entirely left to market actors, however neutral or benign their motives.

CHAPTER ONE

Net Neutrality: Content Discrimination

The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! or Vonage or anybody to expect to use these pipes [for] free is nuts![1]
Ed Whitacre, AT&T

Net neutrality is a contested policy principle regarding access for content providers to the Internet end-user, and potential discrimination in that access where the end-user's ISP or another ISP blocks that access in part or whole, often subject to special fees, bluntly described by Whitacre in the now-infamous comments (see above) in an interview. By Internet content, I refer to content accessible to the general consumer on the public Internet,[2] as opposed to secure private networks, an important qualification as most material on the Internet is private (hidden behind enterprise or other firewalls).[3] The net neutrality debate has two broad elements:

- The 'positive' forward-facing element of charging more for better QoS on the Next Generation Networks (NGNs) now being developed[4]
- The 'negative' backward-facing element, degrading or 'throttling' customers who attempt to take maximum advantage of applications (typically delivered using P2P protocols) over their current broadband connection.

The first is an emerging area, while the second is the object of current consumer controversy.

Dividing net neutrality into its forward-looking positive and backward-degrading negative elements is a common approach used by Felten, Sandvig, Mueller and many others.[5] It is the vital first step in unpacking the term, in comprehending that there are two types of problem: charging more for more and charging the same for less.

Net neutrality has been variously defined, most prominently by regard to its forerunners 'open access' and common carriage by US legal theorists Werbach,[6] and Lemley and Lessig,[7] and the term 'Network Neutrality' was first coined by Wu in 2003.[8] Abusive discrimination in access to networks is

usually characterized in telecoms as a monopoly problem, manifested where one or two ISPs have dominance, typically in the last mile of access for end-users. As we will see, this is not the whole story, and this chapter considers the current US situation at mid-2009 and the progress towards competition in Europe, and tries to identify whether it is a competition or a more general problem. If it cannot be competed away, then we will need to look elsewhere for answers.

ISPs can discriminate against all content or against the particular content that they compete with when they are vertically integrated. Conventional US economic arguments appear to be broadly negative to the concept of net neutrality.[9] Hahn and Wallsten explain:[10]

> net neutrality has no widely accepted precise definition, but usually means that broadband service providers charge consumers only once for Internet access, don't favor one content provider over another, and don't charge content providers for sending information over broadband lines to end users.

Frieden, whose perspective is analytical and consumer-centric, reflects where regulators' perspectives need by law to be focused:[11]

> Network neutrality advocates worry that major ISPs have both the wherewithal and incentive to bifurcate the Internet into one medium increasingly prone to congestion and declining reliability and one offering superior performance and potential competitive advantages to users able and willing to pay, or affiliated with an ISP operating a major bitstream transmission network.

I agree that this is the focus of the problem: Network owners with vertical integration into content or alliances have enhanced incentives to require content owners (who may also be consumers) to pay a toll to use the higher-speed networks that they offer to end-users. Note all major consumer ISPs are vertically integrated to some extent, with proprietary video, voice, portal and other services. My approach is of the middle way proposed in the United States by Atkinson and Weiser[12] and Frieden. It proposes neither:

- an absolute ban on 'positive' price discrimination when justified (for example, when higher-speed access to fibre links to the consumer provides an investment that certain high-bandwidth applications find attractive)

- nor an absolute prohibition on regulatory oversight, particularly of 'negative' net neutrality.

Instead, it begins by asking which abuses are key to the problem, by looking at US regulation, including the abandonment of common carriage, and then European regulation. As discussed later, the problems for end-users in accessing content (and vice versa) are not necessarily the same as those for networks competing with and interconnecting with each other.

The chapter progresses as follows: the first section addresses the changes towards deregulation in US communications policy and the abandonment of common carriage. The second investigates the FCC Four Freedoms, the 'smoking gun' case of Madison River and the 2006 merger conditions on Verizon and AT&T. The third explores the Comcast decision and the ramifications of that case. I then turn to European policy and the previous 'American problem' that many European policymakers used as their lens to suggest that different conditions predetermined different responses. Finally, I sum up the latest manoeuvres in the United States under the Obama administration These are of such recent vintage, and so likely to rapidly develop, that I draw no firm conclusions, in view of FCC Chair Genachowski's speech of 21 September as this book went to press: see http://www.openinternet.gov/read-speech.html. This paints the background for the rapidly developing scene in Europe that preoccupies much of the rest of the book.

The American Challenge: Abandoning Common Carriage

The United States is different to Europe. US telecoms policy, as we saw in the Introduction, has rolled back from allowing competition to information providers on cable networks in its AOL-TimeWarner and AT&T/MediaOne merger cases in 1999–2000, to reversing entirely the presumption of competition on networks. The position established in 2005 by regulatory and court decisions is that competition is to be inter-modal – between the networks – rather than intra-modal – on both the cable and telephone wires.[13] Instead of regulated access to both cable and telecoms networks, there is now a monopoly on both wires, which are classed as 'information' not 'telecommunications' services, and therefore largely unregulated.

The 'Baby Bells', the Regional Bell Operating Companies, divested from AT&T with the Modified Final Judgment of 1984 and re-emerged in 2006 as

two local–long distance–Internet–wireless combines, now called AT&T and Verizon[14] (the latter having also absorbed MCI WorldCom, the biggest Bell competitor in the 1990s). Some tinkering with the terms of those mergers in 2006 does not dispel the greatly increased concentration in the industry, and the abandonment of competition on the telecoms local loop. In the United States, the recreation of 'Ma Bell'[15] via a series of mergers has led to a situation in which only cable companies make an effective challenge to incumbents.[16] Competition is now only 'inter-modal' between cable and telecoms, not 'intra-modal' between different telecoms companies using the incumbents' exchanges to access the 'last mile'. This has been viewed with a bemused detachment by the European Union, whose members and the Commission have carried on pursuing the competitive unbundling of incumbent facilities that began in 1996, inspired by the US Communications Act.[17]

Network congestion and lack of bandwidth at peak times is a feature of the Internet. It has always existed. That is why video over the Internet was until the late 1990s simply unfeasible with patchy quality and why engineers have been trying to create higher QoS, as we will see in Chapter 2. 'End-to-end' is a two-edged sword, with advantages of openness and a dumb network, and disadvantages of congestion, jitter and ultimately a slowing rate of progress for high-end applications such as high definition video. End-to-end may have its disadvantages for those introducing zoning as compared with QoS, and in this it has obvious parallels with 'common carriage' under the Telecommunications Act and its alter ego 'information services'.

Citizens believe they have ancient rights of way and of service. The UK Carriers Act of 1830 was the first legislation for carriage of goods, codifying the common law. The Act applied to all common carriers by land ('more effectual protection of mail contractors, stage coach proprietors, and other common carriers'[21]), including road and railway carriage, then in its infancy for passengers but well established for coal and other commodities. The UK Railways Act 1844 does include provisions for common carriage and 'Parliamentary trains' (low-cost trains that stop at all stations, later known as 'milk trains' because they ran pre-dawn to avoid inconveniencing more expensive trains at peak hours). Common carriers in medieval times included farriers and public houses (every horse to be shoed and person to be allowed shelter without discrimination between travellers).[22] Common carriage should not be confused with charging tolls for higher-speed networks, though the Turnpike Riots of eighteenth-century England were associated

with turning the King's Highway into a private road, and UK opposition to road charging continues to this day.

Common carriage is historically defined by the duties imposed on public networks in exchange for their right to use public property as a right of way, and other privileges:

> Common carriers and public carriers are under duty to carry goods lawfully delivered to them for carriage. The duty to carry does not prevent carriers from refusing to transport goods that they do not purport to carry generally. Carriers may indeed restrict the commodities that they will carry. Further, everywhere, carriers may refuse to carry dangerous goods, improperly packed goods, and goods that they are unable to carry on account of size, legal prohibition, or lack of facilities.[18]

This definition offers several reasons not to 'common carry', which can be extended to ISPs – spam and viruses for instance may be refused. In common-law countries such as the United Kingdom and the United States, carriers are liable for damage or loss of the goods that are in their possession as carriers, unless they prove that the damage or loss is attributable to certain excepted causes (such as 'acts of God, acts of enemies of the Crown, fault of the shipper, inherent vices of the goods, and fraud of the shipper', perils of the sea and particularly jettison).[19] There are several more reasons for ISP data loss – the loss of undersea cables or alleged foreign power denial of service (DoS) attacks, as we will see in Chapter 2. It might be stretching a definition to suggest that P2P streams can be 'jettisoned' in order to allow other traffic to progress during peak time congestion.

It is worth stating what common carriage is not. It is not a flat rate for all packets and also not necessarily for all packets of a certain size. It is, however, a medieval non-discrimination bargain between the sovereign and the transport network or facility, in which an exchange is made: for the privileges of classification as a common carrier, those private actors will be granted the rights and benefits that an ordinary private carrier would not have. As Cherry has written, common carriers are not a solution to a competition problem, they far predate competition law.[20] They prevent discrimination between the same traffic type – if I offer you transport of your high definition video stream of a certain protocol, then the next customer could demand the same subject to capacity, were the Internet to be subject to common carriage (in the US it is not).

Telecoms networks were established to be common carriers as they achieved maturity, following telegraphs, railways, canals and other networks. Noam explained in 1994 the practice from the glass-half-empty school of neorealist communications:

> Common carriage, after all, is of substantial social value. It extends free speech principles to privately owned carriers. It is an arrangement that promotes interconnection, encourages competition, assists universal service, and reduces transaction costs. Ironically, it is not the failure of common carriage but rather its very success that undermines the institution. By making communications ubiquitous and essential, it spawned new types of carriers and delivery systems … the pressure on common carriers come from two other directions: private NGNs offered by systems integrators; and broadband services offered by cable television operators. Neither operates as a common carrier, nor is it likely to.[23]

He thus forewarned that net neutrality would have to be the argument employed by those arguing for non-discriminatory access, as well as accurately predicting the death of common carriage 10 years later. Note under common carriage, discrimination is quite possible, but not between customers, only between identical loads.[24] In the United States, it was finally established that a public telegraph company (and more especially the largest) has a duty of non-discrimination towards the public.[25] The loss of common carriage is an epoch-breaking move towards deregulation, which means that attempts to ensure universal access to an unfettered Internet will require new regulation.

Smoking Guns and Regulation for Net Neutrality: Madison River

Michael Powell when Chair of the FCC decided that a statement of consumer-oriented open access policy should suffice to persuade ISPs to avoid egregious discrimination. In February 2004 at a policy workshop, he declared:

> I challenge the broadband network industry to preserve the following Internet Freedoms: Freedom to Access Content; Freedom to Use Applications; Freedom to Attach Personal Devices; Freedom to Obtain Service Plan Information.[26]

European policymakers have many tools to implement other than black letter law, but even they were challenged by Powell's use of a 'challenge' to establish a principle that had formerly been secured by such established rules as common carriage and the voluminous Communications Act.[27] Nevertheless, and despite its continued legal uncertainty, the Four Freedoms became a cornerstone of policy that was to be applied in the Internet Policy Statement (2005),[28] Madison River (2005), the AT&T and Verizon mergers (2006) and the Comcast action (2007–8). Its legal effect is to be explored as part of Comcast's appeal.

The classic 'smoking gun' regulatory action to prevent blocking of access was the 2005 decision by the FCC to enforce non-discrimination against a small ISP that had been blocking a rival VoIP service, Madison River Communications.[29] It was an easy case in many ways: the abuse was incontrovertible and defended as a legitimate business practice, the vertical integration of the ISP with its voice telephone service meant it had obvious incentives to block its competitor, Vonage, and the practice was intended to degrade Vonage customers' Internet access. It was an example of negative network neutrality being breached: customers signed up for broadband service with the ISP, but the ISP chose to degrade that service to preserve its monopoly in telephone service.

Two notable elements of the Madison River decision have led regulators in Europe to rest on their laurels. The first is that the smoking gun that presented itself was such an obvious case that it may have lulled them into a false sense of security or even denial – the fact that the regulators largely were ignorant of the skills needed to spot such discrimination should have set alarm bells ringing. The second is even more pernicious. Madison River is a small consumer ISP, not a large behemoth national carrier. If it was blocking VoIP from a competitor, would that not indicate that it was likely many small ISPs were doing the same, and perhaps in Europe as much as the United States? Would it not also indicate that the problem may not lie with the huge incumbent companies such as BT or France Telecom (FT), who are in any case well policed in general by effective regulators, but with the smaller companies, who 'own' the customer but do not have economic strengths or scrutiny such that they generally are undisturbed by regulation?

After Madison River, the next large-scale regulatory action came in the 29 December 2006 merger of AT&T and BellSouth, when the merged company

undertook various commitments not to block other companies' applications directed over the Internet connection provided by the merged company. This consent was extracted by a majority in the FCC.[30] AT&T agreed to:

- follow the FCC's four network freedoms for thirty months;
- apply network neutrality principles for its broadband ISP between subscribers and the first Internet exchange point for a period of two years;
- but it expressly reserved the option not to apply network neutrality principles for its IP Television (IPTV) service, and to any service beyond the first Internet Exchange point.

Note from the description of the first Internet Exchange or 'handover' point that, though discrimination is typically characterized as behaviour by last-mile consumer ISPs against content providers, it can equally be undertaken at peering points by third parties.[31] Note that such discrimination may possibly be detected by the end-user when it is conducted by its ISP, while a far more pernicious and potentially undetectable discrimination may occur at peering points.[32] Werbach, Lehr and others have attempted to redefine net neutrality in terms of interconnection and other inter-carrier requirements, rather than end-user centred policy.[33] This reflects the various types of discrimination that are possible at various pinch points on the Internet.

Net neutrality was the subject of a blizzard of legislative proposals in the Congress in 2006–8.[34] Markey's 2006 Bill uses language that is repeated in the Conyers–Lofgren proposal from 2008: if the provider prioritizes or offers enhanced QoS to data of a particular type, to prioritize or offer enhanced QoS to all data of that type (regardless of the origin of such data) without imposing a surcharge or other consideration for such prioritization or enhanced QoS.[35] As a group of academics wrote in 2009, petitioning the FCC to define open Internet access, companies marketing broadband to customers without making clear that a portion of capacity is portioned off for higher bandwidth non-Internet services are not clearly advertising their offer:[36]

> we strongly suggest that the Plan incorporate the FCC Internet Policy Statement of 2005 and extend it to (a) include consumer information that meaningfully specifies connection performance and identifies any

> throttling, filtering, packet inspection, data collection, et cetera, that the provider imposes upon the connection, (b) prohibit discriminatory or preferential treatment of packets based on sender, recipient or packet contents.

Previous policy reform suggestions have suggested that the problem can be resolved by either introducing greater inter-ISP competition[37] or closely policing conditions for vertically integrated service, such as VoIP. In the United States, there is inter-modal competition between cable and telecoms networks, but no intra-modal competition within the incumbent network since 2005. Conventional US economic arguments continued to be broadly negative to the concept of net neutrality.[38] The Europeans saw an 'American problem' caused by the abandonment of LLU regulation[39] for broadband competition in the local access network.[40]

Comcasting the Future?

The use of a 'throttling' technology, essentially P2P applications being slowed by use of Sandvine technology, was at issue in the FCC's Order of 1 August 2008 against Comcast, a major cable broadband ISP.[41] A Comcast deposition to the FCC states BitTorrent throttling began in May 2005–6. The Register noted the misleading nature of Comcast's claims not to have throttled and blocked traffic when exposed in May 2007 by Robb Topolski.[42] The Commission ordered Comcast to within 30 days:

(1) disclose to the Commission the precise contours of the network management practices at issue here, including what equipment has been utilized, when it began to be employed, when and under what circumstances it has been used, how it has been configured, what protocols have been affected and where it has been deployed;
(2) submit a compliance plan to the Commission with interim benchmarks that describes how it intends to transition from discriminatory to non-discriminatory network management practices by the end of the year; and
(3) disclose to the Commission and the public the details of the network management practices that it intends to deploy following the termination of its current practices, including the thresholds that will trigger any limits on customers' access to bandwidth.

Most damningly, the FCC found that 'Comcast has an anti-competitive motive to interfere with customers' use of P2P applications'. This is because P2P offers a rival TV service delivery than cable, which the FCC found 'poses a potential competitive threat to Comcast's video-on-demand (VOD) service'.[43] The Comcast use of DPI to discriminate between providers of P2P was also condemned in strong terms: 'Comcast's practices are not minimally intrusive, as the company claims, but rather are invasive and have significant effects'. The Commission concluded that Comcast's conduct blocked Internet traffic, rejected Comcast's defence that its practice constitutes reasonable network management and 'also concluded that the anti-competitive harms caused by Comcast's conduct have been compounded by the company's unacceptable failure to disclose its practices to consumers'.

The FCC justified its regulatory authority to issue the order, invoking its Title I ancillary jurisdiction under the Communications Act to regulate in the name of 'national Internet policy' as described in seven statutory provisions, all of which speak in general terms about 'promoting deployment', 'promoting accessibility' and 'reducing market entry barriers'. Commissioner McDowell in his dissent worried that 'under the analysis set forth in the order, the Commission can apparently do anything so long as it frames its actions in terms of promoting the Internet or broadband deployment'. On these grounds, Comcast on 4 September 2008 brought a suit[44] to the D.C. Court of Appeals to overturn the order.

The FCC ruling against Comcast's attempts to stop P2P by sending phantom RST reset packets to customers reflects another 'easy' case, that is, about as smoking gun as the VoIP blocking in Madison River in 2005. Werbach (co-leading the Obama FCC transition team in winter 2008–9) made two points that have real relevance for the UK application of the lessons in Comcast.[45] First, the ruling will be litigated in 2009 and may be overturned because Comcast broke the spirit of the FCC's legally tenuous Four Freedoms – such spirits are not actionable, only actual rule-breaking. It will be interesting to see if the court rules that the Communications Act offers such wide discretion to the regulator. Second, he decries outgoing FCC Chairman Martin's comments as politically 'stuntifying', as Martin was not condemning 'metered broadband'. That means caps on usage, and Comcast announced a 250 GB (gigabyte) monthly limit in early September 2008, replacing its previous discretionary terms of use reasonable caps. Comcast also replied by explaining its use of Sandvine technology, and its plans to introduce a 'blunter weapon' in its future shaping of traffic.[46] Comcast responded to the

latest FCC net neutrality ruling by repeating its claim that it engineers its own VoIP product with QoS and avoids the public Internet. It also hints that future investment prospects will be less rosy if the FCC keeps penalizing it. As this stuff gets technical, it is useful to have a decent overview – in particular, note that Comcast has much more functionality in the Sandvine box than they are currently using (courtesy of the first FCC decision in 2008).[47] Legal challenges to any European regulator ruling under current laws can be expected.

Bandwidth caps are widespread in Organization for Economic Cooperation and Development (OECD) broadband markets but are notably irrelevant to the congestion pinch point: peak time Internet usage in the last-mile network. To tackle this, peak-time cap would require a more targeted (and potentially discriminatory?) form of shaping. Such a form has been introduced in the United Kingdom by Virgin Media, the dominant cable ISP, with limits imposed during peak time since May 2007.[48] This at least has the benefit of transparency for users, who are otherwise informed of 'unlimited' broadband offers that in reality are throttled. The OECD price-per-bandwidth charts show precipitous falls for Germany–United States–Canada amongst G7 countries and relative rises for Japan–United Kingdom–France–Italy: the former group uses facilities-based competition and the latter supplements that with LLU. There's not much point including smaller countries in such comparisons – the combination of scale economies for investment and geographical diversity of the G7 means that you can make somewhat meaningful comparisons. For the future of such stats, note price per bandwidth within monthly cap and the cost per megabyte (MB) of additional bandwidth above the cap. The cost of broadband is not the theoretical maximum speed, but the ability to achieve a sustained high speed during peak time. There's not much point driving a Ferrari if you only drive it in evening rush-hour gridlock. Europeans practise 'safe surfing' by prophylactics against P2P users and their sustained high usage of broadband, in large measure, because regulated backhaul costs are very high. As discussed in Chapter 3, it's a middle-mile, not a last-mile problem.

The Future: Towards Open Access in United States Policy

On 13 February 2009, in a fiscal stimulus response to the recession of 2008–9, the US Congress passed the American Recovery and Reinvestment Act of 2009, H.R. 1,[49] signed into law by President Obama on 17 February 2009.

It is estimated that $2.88 billion will be spent on extending broadband into under-served areas, with open access and net neutrality provisions built into the grants. The Congress had passed the stimulus with much jiggery-pokery in the House Committee on Rules that reconciles Senate and House versions of Bills. Of course incumbent lobbyists insist that this horse-trading sets no great precedents for the future of net neutrality, though it actually mandates non-discrimination for the Broadband Technology Opportunities Program. In part, it charges that:

> The National Telecommunications Infrastructure Administration (NTIA) shall ensure that grantees … operate basic and advanced broadband service networks on an open access basis; operate advanced wireless broadband service on a wireless open access basis; and adhere to the principles contained in the FCC's broadband policy statement.

The FCC was charged with aiding the NTIA in defining open access rules, and in a report of June 2009 explained the government role in building out previous such infrastructures, quoting Benjamin Rush, Federalist No. 84 and the United States Post Office Act 1792, as well as examples from the transcontinental Pacific Railway Act of 1862, rural electricity, universal service telephony and the Internet.[50]

The appointment of Julius Genachowski as Obama's new FCC chair (a former senior legal advisor to FCC chairs under the Clinton administration), will mean a serious regulator is once more in charge of the FCC and it can get rapidly back on track – but not necessarily in convergence with European policy. The New York Law Journal reported on Obama's telecoms shopping list, the various items he has got to consider, including:

> Since the [FCC/Comcast] ruling, Comcast announced plans to limit residential Internet usage and has appealed the order to the D.C. Circuit Court of Appeals, arguing that the FCC lacks authority to enforce its net neutrality principles without specific congressional authority. If the appeals court upholds the FCC's authority to enforce its net neutrality principles, then Congress and the new administration may hold off and allow the FCC to adjudicate any violations on a case-by-case basis; if the decision is overturned, interest in net neutrality legislation may be revitalized.[51]

The Kevin Martin–chaired FCC largely abandoned its competitive telecoms role in 2005 when it effectively abolished common carrier telecoms regulation, and seemingly descended into a top-down culture, condemned by the Congress in a December 2008 Staffers' Report.[52] Frieden comments on FCC policy habits, I quote at length to illustrate the process as a captured activity:

> Absent peer review, a full opportunity to consider the views of the general public and general open mindedness, the FCC regularly relies on the biased filings of stakeholders. The Commission regularly accepts as the gospel truth nothing more than assertions. If stakeholders make these assertions long enough and finance 'rock star' academics to embrace these assertions, then it becomes quite easy for the FCC to accept assertions as fact. Economists use this process with great success, because they can create unimpeachable 'rules' and use math to support them. In telecommunications policy sponsored economics professors have stated with a straight face that regulation constitutes a confiscation of property, that carriers providing interconnection are entitled to retail price compensation including all 'opportunity costs,' that just about every telecommunications market sector is robustly competitive and deserving of deregulation and that every merger or acquisition will promote even more competition.[53]

We should therefore take with a large grain of salt suggestions that the Bush-era FCC 'solved' the problem with competition and market entry: the new Obama Administration suggests that this is a false conclusion, however orthodox it appeared until recently.

Europe Net Neutrality, or 'Lex Monopolium'

As we have seen, it has long been a goal of telecoms regulation that a competitive market be created and that sectoral regulation diminishes and possibly disappears.[54] The continuing control of the last-mile bottleneck has made such aims appear facile.[55] The procedural delays in telecoms regulation in the face of determined and aggressive defensive litigation by actors with Significant Market Power (SMP) have been as great as six to eight years.[56] It has led Deutsche Bank Research to coin a new term 'Lex Monopolium', to describe the manner in which telecoms reform has become bogged down

in the legal process.[57] Enck has warned that incumbent NGN plans by for instance KPN in the Netherlands risk stranding investments by competitors in LLU, adding LLU insult to earlier procedural injury.[58] With investment analysts sufficiently concerned about the future uncertainties of European and North American telecoms, it is more concerning when compared with the satisfactory conditions for local loop competition in East Asia. Sophisticated attempts have been made to explain the uncertainties in upgrading the network towards Gigabit Ethernet;[59] yet, the clear and present danger of investor and regulatory uncertainty must be the biggest single factor.

In the absence of a smoking gun and an obvious culprit, European regulators generally claimed that net neutrality is a US problem, a result of duopoly competition and regulatory failure to commit to competition in the Bush years.[60] Competition within a single wholesale network was introduced, for instance, in certain Western European nations under the 'telecoms framework' reforms of 2002. The telecoms framework consists of five directives implemented in Member States in 2003 and reviewed on a process that began in 2006 and may conclude in 2009. The European Commission has proposed adding interoperability and minimal service quality requirements to the interconnection requirements in its review of the regulatory framework, as we will see in Chapter 5.[61] The EC experts' i2010 High Level Group stated:

> The 'net neutrality' debate in the USA highlights operators' propensity to enter into preferential distribution arrangements with some content providers … [this] may be problematic and the issue needs to be subject to wider discussions.[62]

This assumes that LLU provides a choice of platform, and therefore rigorous telecoms competition regulation resolves the issue in Europe, and more especially the United Kingdom. The main subjects of the regulatory analysis are discussed in Chapters 5 and 6.

I claimed in the Introduction that pro-competition litigation in the sector has largely failed in the European Union also, with procedural delays and the high level of proof required under competition law leading to lack of effective recourse against dominant actors.[63] The collapse of many competitors when the 'dotcom bubble' burst left weak competitors to challenge the incumbents

after 2003, although there is some sign of significant infrastructure competition emerging in, for instance, France and Italy. The institutional response to the increased sophistication of both incumbents' networks and defensive regulatory strategies has varied. The OECD has recently restated:

> Although telecommunication regulators have taken steps to forbear from regulation, and competition has been developing, it would be too premature to view the regulator as only a temporary institution. The development of new technologies, new services, issues such as convergence, and the implications that new voice services may have on universal service, all raise new important regulatory issues.[64]

The OECD continues to hold out the expectation that a single regulator be created to oversee both access and services, as video and voice converge, on the Internet:

> The shift by operators to the NGN may create further demands to have a single regulatory structure, but not many institutional changes have been taken in order to deal with convergence. The development of new network structures may well result in the need for a review of existing regulatory structures and their responsibilities, in addition to a change in the regulations themselves.[65]

Historically, a mixture of asymmetrical regulation of the former national monopolist through price control, introduction of competition in mobile, long distance and international services and social pricing of access to ensure provision of service to the economically disadvantaged has generally succeeded in reducing the price of telecoms services. This has been most dramatically the case for those national telecoms markets which were liberalized earliest.[66] Arguably, this has historically been a triumph for price caps and social regulation of access, rather than the result of free market competition, which only emerged in the most profitable long distance or metropolitan sectors of business, international and long distance calling. There is some evidence of local price competition, driven by VoIP and wholesale line rental (WLR) products. With appeal to higher courts and all the legal and economist resources available to the incumbent, it is little surprise that – to take examples – Germany and the United States have seen

regulatory impasses result from their respective 1996 telecoms legislation, as Marcus[67] indicates. The extent to which infrastructure competition has survived is very much a secondary consideration to these more intrusive regulatory factors. Regulators have regulated typically via both quantitative and qualitative requirements, such as:

- Obligation to provide network access following a reasonable request
- Non-discrimination obligations
- Obligation of price control to be implemented by way of cost orientation
- Obligation to prepare separated accounts
- Obligation to implement appropriate cost accounting systems.

These are minimal requirements under the European regulatory framework for operators holding SMP. However, imposition of more onerous conditions than these has produced relatively little competition in the market and broadband rollout.

There have been several recent comparative studies of telecom regulation in Europe,[68] all of which point to extremely large disparities in implementation of telecom liberalization in the period. This is reflected in current levels and types of residential DSL penetration, a fast-maturing technology.[69] Both in Europe following the 1998 opening of telecoms to competition and in the United States following the Telecommunications Act 1996, the incumbents generally showed how to use regulatory procedure to destroy the intent of legislation. Only in Denmark, where the regulator had full government backing and substantial technical regulatory resource from consultants, did broadband LLU initially work.[70] Once the competitors had largely entered bankruptcy protection in 2001–2, the European incumbents finally drove DSL penetration in 2002–3.

The current European consensus on competition in communications is based on a shared 1990s deregulatory vision of contemporary market and technological developments which went with the ideological grain and the technological and economic exuberance of the period. No such consensus existed in the detailed discussion of broadcasting and media policy, which were deliberately excluded from the 1999 communication which led to the Electronic Communications Services Directives of 2002. European Internet markets have a prehistory of monopoly control by national incumbents, with voice telephony liberalization occurring in 1998, and some cross-border regulation liberalizing data services, especially for the corporate (especially

financial services) sector. For consumers in Europe, the explosive growth of Internet access to households followed what became known as the 'Freeserve model' in 1999.[71] Offering 'free' ISP service by revenue sharing per-minute charging with the incumbent telco, a wave of ISPs quickly achieved a million subscribers or more: Freeserve launched in September 1998 achieved 1 million in February 1999.[72] This fragmented European competitive ISP market went through restructuring by merger led by US multinationals that grew by acquisition in the late 1990s.[73] Two critical decisions were made in 2000 that created conditions for competitive ISP markets in Europe. In the United Kingdom, flat rate Internet access was mandated by Oftel, the telecoms regulator, against the opposition of BT, and in response to complaints by AOL.[74] In the rest of Europe, LLU[75] permitted ISPs to offer access to broadband DSL. In the United Kingdom, BT was not prevented by Oftel from charging and provisioning at sufficiently unattractive terms that LLU produced almost no commercial interest until 2003, with a total of only 7,600 lines unbundled till September 2003.[76] Ofcom's priority on replacing the abolished Oftel on 29 December 2003 was to adjust the terms of LLU.[77] There is now a more mature ISP market in Europe, dominated by incumbent ISPs.

The outlook for telecoms competition is subject to a series of complex inter-relationships and evolutionary changes in the medium term. In Europe, LLU has succeeded in creating that last-mile competition only in some urban markets, while cable under-investment prevents effective 'inter-modal' competition.[78] Note that intra- and inter-modal competition are very much interdependent developments. In the Netherlands, the regulator is forcing open access to its dominant cable networks.[79] Far-reaching and unprecedented change in the regulation of incumbents' behaviour has also been instituted in the United Kingdom with the voluntary undertaking by BT that has functionally separated some elements of the retail arm of its residential telephone business from its wholesale arm, creating new wholesale entity 'OpenReach'.[80] The UK regulator has adopted a co-regulatory approach to negotiating the terms and conditions of interconnection with the UK NGN being built for 2010 by BT. The European Telecommunications Platform – an advisory body to the European Commission – states: 'that [the UK] could be an appropriate model for deployment elsewhere. Due to its far-reaching consequences for the regulated firm the appropriateness of the model elsewhere has to be evaluated very carefully'.[81]

Broadband as a sector is very hard to monitor discretely in economic terms.[82] The key question is whether special sectoral regulation should continue for long-run bottlenecks, or whether these are becoming unnecessary as monopoly rents are short-lived?[83] Typically, practitioners claim that convergence of carriage and content means that we should adopt a competition-based approach, but I argue to the contrary[84] that without structural change in the sectors, such an approach is bound to fail.[85] There are very complex vertical linkages, which creates particular problems in competition evidence: today's complainant is tomorrow's supplicant.[86] The most far-ranging examination of the behavioural abuses conducted by a monopolist in defence of its dominance is often held to be that of Microsoft, in the US case which ran from 1995 to 2001, and the European Commission enforcement continues.[87] However, the evidence collection, enforcement and scrutiny afforded to dominant telecoms companies dwarfs that afforded to Microsoft.[88] In the case of the longest privatized European incumbent in a competitive market – BT – it even resulted in the functional separation of the company's regulated access bottleneck amidst attempts to move to a co-regulation model.[89] The investment required for the developed world to achieve high-speed access to an always-on Internet is enormous.[90] Further forwards, broadband Internet access will be increasingly possible through 3G mobiles and VoIP. A partial answer has been LLU: co-locating rival operators' switching equipment in local telephone exchanges, permitting them to use the higher-bandwidth element in the copper wire lines for DSL services. Within Europe, where competitive cable infrastructure is less advanced and regulators most advanced, LLU has been a partial success.

Demand for broadband appears sensitive to both price and 'free at the point of use' P2P applications. It is clear that price sensitivity has created enormously increased demand for broadband – in the United Kingdom, for instance, a very late deployer of broadband DSL (if not cable) broadband take-up increased hugely in 2004–6 as prices dropped. The price of broadband in Japan proved demand was hugely sensitive, with a leapfrogging high-speed deployment of first DSL then fibre in 2002–5.[91] LLU drives lower pricing and therefore greater penetration in the short term.[92] In Korea, price and online gaming proved important demand issues.[93] From the examples of Napster and Kazaa, it is clear that an attractive application at least for early adopters has been access to copyrighted materials via P2P networks. The increasing network effect of VoIP via services including Skype is another attractive

P2P application, especially those sensitive to free international calls at lower quality. The availability of broadband does not equate to service, as cost and bandwidth vary significantly, and there appears a clear correlation between network competition and price/bandwidth.[94]

Though the FCC under George Bush's Presidency gradually moved to a position of extreme deregulation, thus creating a divergence of view, European telecoms is in general bedevilled by regulatory capture, incumbents owned by governments grudgingly permitting some 'inset' competition on their own networks on disadvantageous conditions such as prices or quality, and with no widespread infrastructure competition such as that exists in the United States or South Korea. Reding has stated:[95]

> Up to now, there are two main differences between the US telecoms markets and the EU situation: First of all, the US achieved, partly thanks to the radical shake-up of the market in the 1980s, a considerable degree of infrastructure-based competition … contrast to this, we in Europe have mostly vertically integrated operators and a much lower level of infrastructure-based competition, with some exceptions to this only in Belgium, the Netherlands and Denmark.
>
> Secondly, as the US implemented regulation on a nation-wide level under the guidance of the Federal Communications Commission, the US is today characterized by a telecoms market of continental dimension … we in Europe have entrusted regulation initially to the national telecoms regulators, thus matching exactly the scope of the market of the respective former national monopolies. As a result of this, Europe continues to have 27 different regulatory systems in telecoms.[96]

The often-claimed difference that Europe has more competition, and therefore consumers can always choose their own type of provider, is therefore not the whole story, in most European countries. It may be true in Denmark or the Netherlands, perhaps, but the European rules have to account for the other twenty-five countries too.[97]

Termination Monopoly and Net Neutrality

The problems of net neutrality touch on one of the most contentious market definition issues affecting telecoms: that of defining a market as narrowly as a single network for termination.[98] In mobile regulation, it was this

breakthrough – heavily resisted both intellectually and politically by the mobile firms – that enabled regulators to set cost-based pricing, after notifying the EC that each network formed a termination monopoly for its users. That is, if you want to call me, you will have to use the Hutchison '3' mobile network in the United Kingdom. This raises a series of issues for the mobiles, which I will consider in turn, before considering similar arguments applied to fixed networks – indeed all networks, if we want to be 'technologically neutral' about net neutrality.

Since the development of the EC case law on bottlenecks, more formally called 'essential facilities' in cases from Magill to Microsoft, it has been established that where a monopoly provider of such facilities fails to grant access to competitors, government can intervene to require that access is on fair, reasonable and non-discriminatory (FRAND) terms. 'Essential' means that facilities cannot be replicated with economic viability by a competitor. An obvious example is a network, whether hardware (e.g. telecoms infrastructure) or software (e.g. Microsoft's operating system, Windows), or a standard that has been accepted by the market. I discussed these in specific communications terms a decade ago,[99] and since then the case law has continued to be applied by regulators with gusto in Europe, although with market-oriented caution in the United States. The George W. Bush White House made sure its Justice Department let markets and monopolies innovate freely, but there appears to be a rapprochement with the European approach in the Obama administration.[100]

The accused monopolists unsurprisingly argue that their facilities can be reproduced, and that allowing access to competitors at a regulated FRAND rate is expropriation, unconstitutional according to the Takings Clause in the United States Constitution. Their arguments for reproduction start with the most obvious: they built them, so why can a competitor not build a better mousetrap, or indeed railway. In telecoms, this most obviously applies to the local loop, where not only the incumbent telecoms company, but also the cable company, have very evidently built infrastructure. Two problems with that are:

- telecoms local loop was built by a government-sanctioned monopoly over many decades;
- both telecoms and cable company were given rights of way to construct 'civil works' – dig up your streets and cause serious short-term inconvenience – which makes them continued state-sanctioned special cases, and therefore makes the prospect of further fixed-line competition rather moot.

In any case, the second point is why European law discussed 'public communications networks' as having universal service and other special regulatory requirements, and it is from the special nature of such services that the common farrier/public house/common carrier tradition arises. Cable regulation is a pretty straightforward problem: unless you live on an island of prosperity (such as Singapore, Kong Kong), in a major conurbation or in the United States, you probably don't have cable plant that can support high-speed services, and therefore your choice of broadband telecoms is simply that wire from the incumbent telco.

So much for hardware monopolies in telecoms, how about software? Well, Microsoft argued that it had created its dominance via innovation over a short period of years in the 1980s and 1990s, and that other companies or operating systems – notably Apple the company, Linux the OS and Sun Microsystem's various attempts – could erode its monopoly just as fast. Similar arguments applied to its media servers and software (Windows Media Player) and Internet browser (Internet Explorer). Google makes the same arguments in the search market. We can think of several counter-arguments which are more relevant to Microsoft: it created proprietary standards in those markets, which are reinforced through network effects – the fact that everyone else exchanges their files using the same standard. Furthermore, its dominance was achieved through clever licensing of its technology to hardware manufacturers such as Dell, IBM and Hewlett Packard, which enabled them to gain tremendous market growth in personal computers. It was by no means the first into any of these markets, and the possibility that you could attack its dominance in a market of a billion or more installed machines in 2010 is obviously absurdly lower than in the market of less than a million similarly purposed machines in the 1970s. That was its good strategy and good fortune, and good luck to it, but it finds it troublesome to try to reinforce the idea that it can keep its 'secret sauce' (source code for Windows) and/or at the same time denying competitors FRAND access to its software. Similar 'secret sauce' problems attach to Google and its search algorithms, and others such as Apple's iTunes software (though its European competition problems stemmed more from its discriminatory pricing in the United Kingdom, charging British consumers far higher per-track download prices than their continental cousins).

Is this secret sauce an issue for net neutrality? Consider: 'positive' net neutrality is about FRAND, at least in the terms that I have cast it. If everyone

could use the ISP network at the same price as their competitors, or no additional price if they want no additional speed or QoS above 'best effort', then there would be a lot less of an issue. It is the discrimination between rival firms, the apparent favouring of one over another, and in particular the implications for innovation that make policymakers pause for frowning thought. If a new search firm enters the market and can be accessed as fast over the ISP as Google, then it is in a straight arms race for (a) the best search algorithm; (b) the best server speed that it can control; to provide the best solution to the end-user. Yes, Google has huge advantages as the dominant firm, in its vast server farms, its caching of content near the end-user, its ingenious uses of its various inputs (human, intellectual property, energy, policy), and its brand name and consumer inertia. None of this is unusual and it would be a series of large but not insurmountable problems. Indeed, Microsoft in May 2009 launched Bing.com to assault Google's dominance in the United States. That is good competition. If one cuts a deal with ISPs that the other cannot, via exclusivity *and* higher fees to secure faster access to an ISP's consumers, then that is in my view 'bad', 'unfair' competition that should be ruled out of bounds. Competitors are not given a fair chance to gain the same terms – if they have the chance and don't take it, that's their problem. If they don't get the chance, it's the ISP at fault.

Why? Here we come back to mobile single market termination dominance. If you want to reach me as a consumer, you can only do so via one network, the one I use at home. I am a somewhat unique transient consumer with homes either side of the Atlantic, using a laptop for *Ile sans Fils* (the open free WiFi network in Montreal), '3' mobile broadband in the United Kingdom and WiFi hotspots elsewhere. The Montreal network is generally fast (especially on weekday mornings) and has no download limits as an open network, the '3' network is also fast at the same times but has a 3 GB monthly limit for my $25 subscription (actually $12.50 as I bundle it with a regular 3G telephone). So if you want to attract my services as a consumer, I need services which I can access quickly on a laptop. I gave up on 3G on my mobile when the Nokia browser was too clunky, the '3' network was too slow in peak-time in many locations (it's good at airports and train stations, but then it has WiFi competition there), and my faster open source browser crashed my phone terminally for the second time (and Outlook remote access was a nightmare on a mobile). You can phone me on my UK number with '3', my Canadian number with Fido (a Rogers' acquisition that used to be cheap and had

good customer service when it was independent) and a universal 'London' number with Skype (it routes to me wherever I am if Skype is running on my laptop).

You have choices with me, but not with the average consumer who always accesses the Internet at home. They have one mobile number and one network to access the Internet. As a result, if you want to call them, you have to use their network of choice. If you want to reach them via the Internet, it's also whatever their ISP might be (if they use mobile broadband it could be the same ISP and network). The mobiles have always argued that consumers have lots of choices. They can move to a different network if they don't like the charges or network use policies. They can use VoIP such as Skype if they want to stay on network but avoid charges. They can use a fixed line instead for certain usages. They have the option of WiFi and other connections. However, there are network effects such as using your phone network which imposes switching costs even if you keep your number when you change mobile network,[101] Skype and other VoIP need high quality connections at both ends which makes them imperfect substitutes for switched phone calls, many customers are giving up fixed lines because mobile firms are advertising what an excellent substitute the mobile network represents and the law-abiding citizen will not use a neighbours' open WiFi or their work computer for social uses. All these 'workarounds' also obviously rely on an unusually informed and motivated consumer.

Let's come back to the information point much later in Chapters 5 and 6 when we consider co-regulation but consider motivations first.

It's often said that monopolists abuse their position 'because they can'. If you were king, would you be tempted to exercise *droit de seigneur*, if not immediately then on a rainy February evening in a few decades' time? In the same way, it is said that consumers are abused by that monopoly because they don't object and can't. But the mobile and ISPs termination monopoly is interesting because the consumer probably won't care that they're being abused. Here's why. If you are receiving calls from another user on a Calling Party Pays network, then it costs you nothing even if they pay too much. Whether you care depends on your concern for their welfare, as you have the choice to simply call them back. It appears that many teenagers and consumers are happy for their parents or callers from business lines to pay for their calls whatever the cost. In simple terms, there is no direct cost to the subscriber, the mobile termination monopoly exerts costs on their callers

instead. The second reason is bundling as well as the micro nature of most transactions: there are a hundred or a thousand monthly transactions on a mobile account, and exponentially more on an ISP connection. You cannot expect a rational consumer to react to each transaction in real time.[102] How can they be expected to know what individual call costs are for each caller, or what carriage terms each webpage or application has negotiated with the network?

Consumers are caught in a two-sided market trap. Two-sided markets are those in which an intermediary – such as an ISP – can differentiate pricing and service to each side of the market, suppliers and consumers, making efficiencies as they mediate between the two.[103] Obviously this means both suppliers and customers are reliant on the middleman for access to the other. The ISP has good information about what each will charge and can make strategies accordingly, but suppliers and consumers cannot directly influence each other's behaviour as minutely as the ISPs can, because it is the middleman's extra information (even if it has no monopoly power) that enables him to make better – i.e. more fully informed – decisions. So how can the consumer decide what the appropriate price for the content should be? She cannot, unless the ISP tells her, she directly contacts the supplier (in which of course the Internet helps, via email and feedback forms as well as the metadata trail), or the ISP is regulated in what it can charge either end. A form of regulation is of course competition, and in supermarkets, the price and quality competition at the consumer end means that it is suppliers who get squeezed and where savings are made. Consumers can signal where they want this efficiency to be reduced by paying premiums, for instance in Fairtrade product lines or organic foods, but it is more likely that the supermarket offer will be accepted at face value. In the same way, there may be some high-value products that consumers want to support on the Internet, such as blogs or Wikipedia, but in general, it is likely that they will take whatever terms the ISP has been able to extract from the content provider.

But if we accept the ISP termination market monopoly, it makes a strong *a priori* argument for FRAND terms for the ISP offer to content providers, and for regulated access to ensure no unjustified discrimination. It argues for positive net neutrality of some type. That logic is rather clearer than what has happened in the last eighteen months of negotiation in the European institutions, but then politics is very much played out in a second- or third-best world!

So to summarize, an immediate problem requiring regulatory oversight is counter-intuitive: the immediate problem with net neutrality may not be so much with the dominant ISP (expressed in European debate as one having SMP),[104] but with the smaller ISPs, whether or not you accept they have their own network monopoly. It may be a disguised economic incentive problem that is first identified as a security issue. It may further impact relations between ISPs, in that those (typically smaller consumer) ISPs that are generating most spam can adversely affect the security and traffic management of other networks and cause particular problems at peering points. There may, therefore, be a case for identifying the non-SMP operators as the current miscreants in net neutrality policy. It may be that abusive discrimination can take place even where an ISP does not have dominance.[105] There are many types of traffic that all ISPs are motivated to filter, block or censor, based on laws, policies or carriers' own initiatives.

I suggest that widespread discriminatory behaviour can take place even when an ISP does not have SMP. Competition between ISPs is present in some metropolitan and suburban networks but is limited by both geographical scale and feature-price scope.[106] Note that, when only retail resellers use a broadband line from the incumbent, the degree of price and feature competition is limited given that wholesale prices and bit-rates are set by the incumbent. With dominance in most European markets at wholesale level by the incumbent telecoms actor, LLU has only a minor impact on the overall network's management. In any case, it is a very untypical, highly sophisticated, and motivated consumer who currently is able to analyse the different bandwidth and throttling options and to select to which provider to switch at the end of the contract. It is therefore an easy generalization to claim greater broadband competition in Europe, when for infrastructure (where real investment is made and real innovation in service is possible) this may not be the case either currently or in the near future.[107]

Killing the Golden Goose?

Regulators should be cautious and beware killing the goose that laid the golden egg, because we do not know enough about innovation and the Internet to predict the outcomes of a radically changed DPI-managed QoS environment. As Lemley and Lessig state: 'The strong presumption should be in favour of preserving the architectural features that have produced

this extraordinary innovation.'[108] Lemley and Lessig at the end of the last century stated that telecoms companies as well as Internet broadcasters can raise costs to innovators by the existence of their strategic position.[109] This raising of barriers is neatly summarized by AT&T's Jack Osterman reacting to Paul Baran's original concept of the Internet: '"First," he said, "it can't possibly work, and if it did, damned if we are going to allow the creation of a competitor to ourselves"'.[110]

It is vital to appreciate this problem: what is at risk is the future of video innovation and therefore possibly Internet development itself for innovators. Consider the threats listed by Lemley and Lessig of increasing entry barriers: ISP competition could diminish, one-way broadcast models could be retrofit onto an interactive medium and 'innovators are less likely to invest in a market where a powerful actor has the power to behave strategically against it'. To which we can add the regulatory costs instituted by a paternalistic industrial policy applied to 'level playing fields' when what is actually being provided is a new playing field. Broadcast regulators on the Internet are as comfortable as elephants playing ice hockey.

It is the perfect storm of anti-competitive pressures which now threatens Internet innovation:

- first, the shattering of the competitive ISP market by the combination of the financial crisis of 2000–3 and the deregulation of incumbents (more especially in the United States);
- then the massive pressures to regulate content more tightly in the wake of the security threats of hackers, spammers and terrorists in 2001–4 as discussed at the end of Chapter 2;
- now increasing regulation via use of DPI and other techniques to raise revenues from exclusive content arrangements.

We are in the era of settled incumbents in mobile and fixed broadband. Their networks are public communications, yet no longer common carriage. The rights and responsibilities which they maintain towards their end-users are being redefined for a broadband era. To the extent that they are creating innovative new means of accessing the Internet, their influence is beneficial, and the positive net neutrality that would prevent their charging discriminatory pricing would be both intrusive and disproportionate. Where they are rationing and degrading existing applications and services, their influence is less benign, and it is here in particular that the next chapter

focuses. 'Net neutrality lite' is not deregulation, rather it is regulation to prevent negative outcomes for existing users on their existing contracts. I will argue in later chapters that this requires much more information regulation than is currently the case. Shining sunlight into the murkier corners of carriers' practices is the goal.

Sieradski and Maxwell believe that a convergence between European and US policy is taking place in the interests of consumer policy, abandoning previous attempts to regulate net neutrality as a competition policy issue:

> While the FCC's Comcast decision and parallel initiatives by European policymakers have their roots in the historic obligations of 'common carriers', the question of net neutrality and the right of operators to discriminate is now also very much linked to the right of the consumers to access content and services of their choice … The current tendency in the US and Europe is to emphasize the symmetric, consumer protection angle. On that front, there seems to be emerging a consensus that discrimination or prioritization measures would be tolerated only if they are narrowly tailored to achieve a legitimate objective.[111]

Later chapters discuss the extent to which this consensus is emerging. The next two chapters are critical to the overall argument, as they consider whether ISPs have been motivated to require content providers to pay for superior service via lower levels of service for the same price (e.g. blocking or throttling content) or higher price for higher QoS, based on government fiat or commercial strategy.

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CHAPTER TWO

Quality of Service: A Policy Primer

NGNs can be defined as networks with a packet-based architecture, facilitating the provision of existing and new/emerging services through a loosely coupled, open and converged communications infrastructure. The advent of NGNs is bringing forward a series of innovative opportunities but also a greater array of challenges, touching upon competition, interconnection agreements and new business models.[1]
OECD

This is the most technical of the chapters, though it is not particularly, even for policymakers with no technical background. I explain what NGNs are, how they will be deployed, the types of broadband available and the business cases for QoS. I then examine whether governments are creating a business case for DPI via intelligence requirements placed on ISPs, together with the laws on interception, data retention and behavioural advertising trials. I conclude by examining the recent breaches of European data privacy law in the United Kingdom, and the likelihood that the equipment for intrusive DPI is bought and compensated for by government, and therefore is likely to be employed by ISPs. In that sense, ISPs are 'pushing against an open door' in deploying DPI for QoS.

Given the move towards all-TCP/IP networks, described as NGNs, let us begin this chapter by considering broadband policy from a technical viewpoint.[2] Yoo summarizes the 'original' position of Internet routing:

> Transmission Control Protocol/Internet Protocol routes packets anonymously on a 'first come, first served' and 'best efforts' basis. Thus, it is poorly suited to applications that are less tolerant of variations in throughput rates, such as streaming media and VoIP, and is biased against network-based security features that protect e-commerce and ward off viruses and spam.[3]

NGNs present enhanced opportunities for content, consumers and ISPs. The OECD stated above that NGNs allow for greater traffic prioritization and

control. Engineers appear unable to agree on whether QoS will be introduced in NGNs, as QoS is a very long-standing issue that as I write has never been implemented with commercial success on the public Internet (it is used for traffic management but not for advanced higher-priority commercial services). Content charging will rely on the type of QoS for the Internet, enabling network providers to discriminate between packets, and potentially even enabling content providers to offer better than best effort quality. There is an extreme net neutrality argument that the Internet should not develop QoS and therefore no filtering of packets or preferential increase in QoS should be allowed.[4] As Internet engineering has, for many years, pursued the goal of increased reliability, speed and higher bandwidth, outlawing of QoS is vehemently opposed by Clark and Blumenthal[5] and Crowcroft.[6] Clark, as an author of the original paper describing the end-to-end design, has particular importance, and I take as given their argument that QoS should be permitted.[7] The question is, therefore, under what circumstances such fast lanes should be introduced?

3GPP (3rd Generation Partnership Project), the standards body for 3G mobile telephony, has been working since 2000 on a set of standards called IMS.[8] This is an operator-friendly environment intended to generate new revenue via DPI. In 2005, fixed-line carriers and equipment vendors created IPSphere, a new set of standards for network intercession in IP application flows.[9] Both sets of standards support the ability to filter and censor by file type and content provider on the Internet. In an extreme case, one could degrade all content that is not tagged as paying a premium carriage fee. This enables the carrier to discriminate and decide which content to delay and which to permit to travel at normal speeds to the end-user. In wired networks, NGNs are where IMS and MPLS (Multiprotocol Label Switching) can create a 'single' traffic stream.[10] John Waclawsky, then a Cisco Systems standards expert, explained that: 'This is the emerging, consensus view: That IMS will let broadband industry vendors and operators put a control layer and a cash register over the Internet and creatively charge for it.'[11]

This can also lead to a type of arms race because P2P networks encrypt all traffic to prevent inspection in the same way that firewalls on Intranets were evaded using Port80 and other techniques.[12] Odlyzko and Levinson refute many of the arguments for fine-scaled charging that underlie the architecture of IMS and QoS. They note that:[13]

> Technology appears to be making fine-scale charging (as in tolls on roads that depend on time of day or even on current and anticipated levels of congestion) increasingly feasible. Standard economic theory supports such measures, and technology is being developed and deployed to implement them. But their spread is not very rapid, and prospects for the future are uncertain … the case for fine-scale charging is not unambiguous, and in many cases may be inappropriate.

I see no obligation to take any firm position on the issue. What is important in this discussion is the extent of such potential discrimination, and its justification.

So what will happen? Foresight exercises in broadband policy have been carried out in various territories, for instance, the Netherlands[14] and European Commission[15] exercises of 2002–3, and for the OECD.[16] Broadband policy is under continual review as part of the i2010 strategy of the European Council.[17] The need for a fresh approach considering economic and social issues as part of technology deployment has been emphasized by the National Science Foundation in the United States,[18] with emphasis on QoS and security, an approach explained below.[19] Broadband continues to require definition, as a term of art rather than science. It is defined by reference to its inverse: narrowband.[20] The Dutch government stated:

> 'broadband' is defined in terms of its functionality, not in terms of capacity or technology. Broadband is a continuously available connection suitable for good quality audio-visual applications and the exchange of large data files. With narrowband, one user at a time can use one service only. Super-broadband allows multiple users to use different services at the same time, via different platforms.[21]

It may be that in time 'super broadband' will be redefined as normal broadband. In the Netherlands, current broadband speeds are in the 2–20 Mbps range. In Japan, broadband is offered as standard at 100 Mbps.[22] There is already a very wide range of broadband on offer, but it shares the characteristic of being 'always-on' and of sufficient speed to permit high-quality files (such as video) to be transferred. The interoperability and sector/service convergence of the broadband world should drive a convergence of

speeds. This is an important issue: it is yet unclear whether the world will separate into different-speed 'lanes' with crash barriers defined by different applications and ways of accessing data, or will converge on a common infrastructure/service offer, with application differences driven by, and responsive to, demand changes.

Domestic broadband connections are configured for downloading rather than uploading. The asymmetry of such connections is often a 10:1 ratio or higher (maximum download speed is 1–2 Mbps but upload speed is 100–200 kbps). This provides a quality-based 'entry barrier' – which is one reason why it persists, and why the price differentials depart from cost-justified tariffs, even accounting for congestion. Contention[23] and 'traffic shaping' affect quality. These ratios reflect the perception that home users are generally passive viewers of content developed by professionals. P2P networks and other user-generated content and application developments are eroding this distinction, but it remains a constant in asymmetrical consumer broadband.[24] For example, hosting of an e-commerce website or online marketing activities may lead to the need to upgrade to more symmetrical service. Price differences between symmetrical enterprise and consumer broadband products are very high.[25]

In the future, where products will be offered at 100 Mbps and more, asymmetrical connections will continue to be an important issue. Technologies and charging models for traffic shaping and capacity management will also develop. Expect significant disparity in rates and capacity available within the developed and developing world, and between rural and urban locations. High-bandwidth services such as enterprise-class high-definition video could be provided via IP video; their efficiency will depend on the number of channels. How this efficiency relates to broadband bandwidth and provisioning architecture will drive investment and research and development decisions in fibre optics and backbone networks above 1 Gbps (1,000 Mbps).

The greater the network capacity, the lesser should be the incentive to shape the IP traffic so that asymmetrical connections are offered (just as a twelve-lane roadway can offer six lanes each way, whereas a three-lane roadway must choose which traffic takes precedence with two or even three lanes). However, building such roads is expensive and depends on a network to provide the traffic at the end points, especially in mobile. Bohlin et al. state: 'Fixed line … will act as a complementary backhaul long distance and feeder access network.'[26] All networks, fixed and mobile, rely, to some extent, on incumbent cable and telecom backhaul services.

Wired Broadband

I explain the key components in the development of copper (DSL), fibre (FTTx) and coaxial (DOCSIS 3.0) fixed infrastructure. I do not consider satellite and powerline communications.[27] The focus is on the market development path for high-speed access in the 'local loop', from the local telephone exchange to the enterprise and home. The reason for this focus is that the costs of broadband in the NGN 'core', the network, are already extremely low and, in laboratories, optical fibre produces even more extreme broadband speeds, while last-mile access networks present a bottleneck, in terms of both cost recovery and available bandwidth.[28] The installed legacy networks often run at 655 Mbps, with fibre optics and Dense Wavelength Division Multiplexing (DWDM), which has been widely deployed since 2000, whereas the core NGN can run at 100–400 Gbps. Fibre to the local exchange, which is widely but not universally deployed, may not become universal. The area in which regulatory policy problems will remain in pure speed terms is therefore the local loop to the consumer, but pricing of backhaul will, in the short run, be more critical.

The ability to provide a broadband connection is a relatively simple technological challenge and may prove to be a logical marketing exercise.[29] The cost of the broadband connection is dependent on the range of support services that are mandated by law (as well as the demand-side priming by content and applications) and the cost of deployment: the roadworks and byway costs of installing new plant, and the types of technologies that are emerging from laboratory testing and are being experimentally deployed. Wireless Local Loop (WLL) for FTTx is a promising hybrid of wired and wireless technologies for less-developed geographies where fibre will not reach the premises, but currently fast connections rely on the expensive business of digging up the roads to install new plant.

Copper Networks

This network typically consists of twisted-pair copper in the local loop. This can be upgraded using a DSLAM (Digital Subscriber Line Access Multiplexer) in the local telephone exchange to offer ADSL (Asymmetric Digital Subscriber Line). This technology can offer up to 20 Mbps downloading speed or 2–4 Mbps symmetrical speed. It can be further upgraded successively to later generations of technology in terms of speed: ADSL2+, VDSL and VDSL2 with variations. This involves both more powerful DSLAMs and the placement

of backhaul fibre optical cable and the DSLAM itself closer to the customer premises (ideally in the street cabinet or even in the basement of the residential/enterprise's premises). At full capacity over short range, VDSL2 can provide 70–80 Mbps throughput.[30] This permits multiple high-definition video streams. DSL can have speeds perhaps doubled by Dynamic Spectrum Management (DSM), a technology which achieves 'noise' reduction on lines. Fourteen million lines have been installed in the United Kingdom.[31] So a lot more speed can be squeezed out of DSL before investing in fibre for Next Generation Access (NGA).

It is often overlooked that the maximum speed of a broadband connection is by no means the only variable in effective file transfer. First, the 'burstiness' (i.e. alternation) of the connection can depend on the network load, but is less important in downloading for delayed usage (e.g. downloading to a Personal Video Recorder [PVR]). Second, networks for distributing files are increasingly efficient: P2P networks take advantage of distributed file sharing and thus prevent overloading at one point in the network. Third, the compression of files, particularly video files, is improving rapidly, with latest generation codecs (compression–decompression) several times more powerful than previous generations. Fourth, the degree of Digital Rights Management (DRM) on the file may delay its route through the network if rules are set up to intercept content that is not 'authorized' to travel from one end-user to another. Fifth, the power of processors both in the network and at the end devices has increased so that disassembly and reassembly of digital packets is far more efficient than with previous generations of technology. For all these reasons, the simple 'peak' speed of a broadband connection is not in itself an indicator of the efficiency of file transfer. The increasing cost-efficiency of file distribution is predicted to continue, but the increased storage cost-efficiency of multimedia-ready PCs and PVRs is likely to be the biggest change in consumers' homes in 2011.[32] Given the early stage of consumer adoption of so many technologies, I am cautious about the prospects for rapid demand-led upgrade beyond the copper loop, although I offer snapshots of interesting potential upgrade paths in the sections that follow.

Fibre Networks

The bandwidth advantages of photonics using fibre-optic cable have been clear since the 1980s. The commercial deployment of such technologies outside research establishments and corporate Ethernet networks has been much

slower, a 'textbook' example of the slow diffusion of broadband technologies. Demand studies over time have become more cautious and realistic about the prospects of widespread deployment of fibre,[33] with increased realization that the cost of the fibre itself and the switching gear is trivial compared to other services such as roadworks for installation, billing, network resilience, security, regulation, content and applications and so on.[34] By mid-2006, there were 6.3 million fibre subscribers in Japan, with typically 100 Mbps download/10 Mbps upload capacity.[35] In Sweden there were 500,000 subscribers.[36] Italy's FastWeb was also a leader in Europe.[37] Nevertheless, the low penetration thus far of fibre in Europe should make one cautious at predictions that in a decade there will be 'fibre everywhere'.[38] McKeown illustrates the enormous potential for photonics to enhance capacity in networks, suggesting that integrated photonics was at the same stage in 2005 as integrated microprocessors were in 1965.[39] The potential exists to revolutionize the backhaul and router network, as well as the well-known effects of DWDM in creating much greater efficiency in the network backbone.

Cable Networks

European cable operators have in general been slow in upgrading to broadband.[40] The attempts in the 1980s to introduce an all-fibre network were abandoned on cost grounds in favour of hybrid fibre coaxial, which is the current standard. It can carry broadband at up to 25 Mbps.[41] The US DOCSIS 3.0 (Data Over Cable Service Interface Specification) standard has the potential to offer roughly fibre-matching speeds, as explained by Burstein in relation to US Passive Optical Network (PON) standards Broadband PON (BPON) and Gigabit PON (GPON) (speeds in megabit per second):

> GPON can go 250/125[42] … BPON can raise speeds to 100/30 using similar techniques bandwidth sharing techniques … BPON is 622/155 split up to 32 ways. That's considerably better than the low end DOCSIS 3.0 (160/120), and similar to the high end DOCSIS 3.0 (1000/100), shared to probably hundreds of homes.[43]

In Europe, where cable companies are generally loss-making and owned by US investors, the standards set in the United States are likely to predominate.

NGNs have been deployed across Europe since 2007, with completion of migrations to all-IP networks scheduled from 2009. The change to NGNs

creates new opportunities for de- and co-regulation as well as new potential for incumbents to create bottlenecks in access.[44] For broadband technology deployment, the business case for both incumbents and competitor networks depends on their assessment of the various factors at play.[45] An OECD workshop focussed on these issues[46] and found that only Japan, for instance, had completed the negotiation of the new Reference Interconnect Offer for NGNs by end-2006.[47] Wright has illustrated the extent of the interoperability and standards challenges in NGN by reference to the 'iceberg' (an analogy he credits to Cable & Wireless) intended to illustrate how much interconnection depends on cooperation between industry parties.[48] He has also illustrated the challenges to the existing UK interconnection regime: with 110 logical interconnect points, and 5,500 local exchanges as points of handover, there is a substantially different network architecture for competitors – who access parts of BT's network – to adjust their plans. The environment within which competition is possible is rapidly changing.[49]

Wireless Local Loop from FTTx

In countries and geographies without the medium-term prospect of fibre in the local loop, an alternative which is made commercially available is WLL offered at the point of fibre connection, for instance, the local exchange. This offers the prospect of much higher bitrates than WiMAX because the WLL node also offers backhaul to the NGN network. Because the telecom only has to supply fibre as far as the local exchange, it provides a much more cost-effective way of offering near-FTTx speeds without needing to invest in the 'last-mile'–wired local loop.[50]

Business Cases for Technology to Aid Traffic Discrimination

Fixed wireless offers upgrade paths from current broadband to much greater speeds, which are already available in the core network but depend on upgrading the network to NGNs. In the local loop bottleneck, the options for wired deployment are expensive and depend on anticipated returns on investment, which includes factors such as regulation, security and the ability to discriminate. It is important to consider the technological implications of the various competitive and regulatory options. Return on investment is the key to network operators' decisions to invest in NGNs, and a critical part of that decision is the consideration of whether the network is offered

as a non-discriminating wholesale or retail network, or a 'walled garden'. These decisions, whether taken as a competitive strategy by the operator or mandated by the regulator, are critical to network architecture.

In brief, networks can build for pure speed or safety/convenience/privacy, and there is a critical cost trade-off between these two poles. Consider the mobile telephony network: it offers almost complete mobility (seamless except on urban public transport), filters out spam and viruses and provides vertically integrated content, applications and services that are robustly matched to the platform. It also currently operates at sub-1 Mbps speeds where users share a base station (mobile networks are discussed in Chapter 7). By contrast, many wired operators offer Ethernet connections to enterprises in their premises. This may appear a crude comparison, but it illustrates the point that strategy determines technology, and not vice versa.

There are incentives for network providers to police the traffic by type, if not by content. It enables the network providers, many of whom also operate their own proprietary applications, to charge a different price to non-affiliated content owners than affiliated owners. This differential pricing could make the profitable operation of non-affiliated providers more difficult. On that basis, the 'walled garden' might become the more successful business model. This model not only makes bottleneck control much easier, but also prevents some of the interoperability and open access for users that has led to much Web 2.0 innovation for businesses. Note that (with relative technical ease) users can encrypt their video and P2P content, and thus evade the more basic types of policing carried out by the network provider.[51]

Raising the issue of business cases for broadband filtering technologies illustrates the main conclusion from the study of broadband technologies: it is not the speed of broadband which is a challenge, but the cost and quality of the applications and content provided over that broadband network. This is the type of cost–benefit decision that is likely to influence the deployment of next generation broadband, in particular, the incentives and disincentives in security and QoS in fixed-line networks. I note that technology developments will depend on modelling the incentive structure. Challenges and opportunities ahead include truly addressing incentives in designs.[52] Market evolution is dynamic and complex: the availability and design of a suitable regulatory response must reflect this dynamism, and also the responsiveness of regulators and market players to each other. Therefore, legislation to entrench a particular regime for net neutrality appears

a premature response to the emerging environment. Instead, I will propose in Chapters 6 to 8 that regulators equip themselves with the skills and evidence base to rapidly investigate potential problems of unjustified discrimination.

Government Policy and Deep Packet Inspection

It is important to realize that traffic management takes place on all networks. Routers check packets as they enter the network, and most consumer ISPs try to identify spam email and filter that out of the traffic. Most websites rely on basic traffic measurement information provided by third parties, many of which carry out packet inspection to complete that activity. Trivial and essential though these activities may be, they are inspection – and by a strict measure of the law – interception. That's spying, and government is in the complex position of both making it a criminal offence and requiring it in certain circumstances.[53]

Government legislation requires that ISPs perform various functions for network quality purposes, and to assist in crime fighting. Governments mandate many QoS standards for operators, and many more are contractually required within service level agreements between operators, and from operator to end-customer. Service level agreements typically offer a market-based equivalent to government requirements for network resiliency and emergency management: the need to keep the service running at capacity and guaranteeing to repair faults in good time. However, beyond these basic requirements, governments also set targets for universal service, number portability between carriers, emergency telephone number availability, power redundancy to maintain the system in case of a general electricity grid fault, billing system accuracy, customer service response and independent arbitration of disputes. At a local level, cable franchises are often required to offer a percentage of their channels for designated programming, and all local roadworks are subject to various requirements of repair, compensation and byway legislation. These are far greater costs than the comparatively trivial costs of running a broadband network at several gigabit per second.

To identify content that must be analysed by an ISP requires a type of control to identify the content as it enters the network: a type of very low 'walled garden'.[54] Network providers might be expected to argue that such a new control strategy would require extensive and expensive upgrades to their systems. While this is partially true, there are other reasons why providers may have this capability already:

1. DPI is required for government law enforcement and security purposes.[55]
2. Network providers already provide filters against the more obvious types of 'spam' – unsolicited commercial communications.
3. Network providers cooperate with national security agencies in tracing potential terrorist activities via their file transfers on the Internet.
4. Network providers can trace non-encrypted VoIP communications and block these packets.
5. Network providers are increasingly adopting QoS architectures for their networks in order to prevent users from over-straining the network at times of peak usage and charge content owners for value-added high-volume services such as video files.

These new developments allow network providers to block file transfers, or more appropriately to charge the users a carriage fee for sending large files. This is the solution adopted by mobile operators and some network providers, and is generally termed as a 'walled garden' to denote the isolation of content on the network from other content on the wider Internet. I consider the cost and technology required for this policy below. I am not going to explain technical details of what has changed, except in the broadest terms, because computer scientists – especially Clark, Crowcroft, Clayton and Brown – do that so much better than any lawyer, especially this one. But one central issue stands out from the sometimes confusing technical discussion from a non-specialist point of view: ISPs are using 'black boxes' in their networks to look inside the packets that carry our communications, and to examine their content. This change from shallow to deep packet inspection is what lies at the heart of the change in technology and it carries very serious regulatory implications.[56]

The range of network and information security requirements at European level, which must then be implemented as national law in the European countries, imposes far from trivial costs on the network. They are in addition to existing costs for spam filtering, protection against distributed denial of service (DDoS) attacks, phishing and other 'malware' that ISPs typically invest in to protect their subscribers from the worst excesses of IP traffic. Security is a growing problem as dependence on broadband (as a key element of the critical information infrastructure) grows and as the Internet moves towards pervasive computing, and the 'Network of Things'.[57] There is an escalating arms race as criminal behaviour become more sophisticated.[58]

The objectives and requirements are also changing on both sides: on the attacking side, the evolution from unauthorized access to data corruption, exposure or access denial; on the defending side, the change in data collection, storage, processing locations (centralized or not), data exchange and transfer of liability among buyers, sellers and ISPs. These are all part of the evolutionary play being performed in the market and regulatory 'theatre'. The responses are a mix of technological and 'soft' strategies, developed and deployed at both individual enterprise and wider levels. These include protected 'walled garden' environments and virtual private networks, both protecting consumers behind firewalls that block malware. Loss of Internet openness and end-to-end connectivity is one potential casualty of security concerns. Another is privacy, which in some ways is the mirror of security. An example of this trade-off is the Data Retention Directive 2006 (EC/2006/24).

The Data Retention Directive was approved by ministers in Brussels on 21 February 2006, concluding a lengthy debate inside and outside EU institutions.[59] It requires intermediaries in public communications networks to retain data on telephony, Internet, email and instant message communications for set time periods, imposing significant data storage costs. The implementation of this Directive in national law was due in August 2007, and has been delayed in several countries by the usual constitutional and parliamentary procedural lapses associated with transposition of European law into national law. Therefore this Directive began to impose costs on corporate actors in 2008. The Data Retention Directive was tabled after the Madrid bombings in March 2004 and then fast-tracked under the British EU Presidency after the London Underground attacks of 7 July 2005. Britain, France and Sweden stressed the need to retain data in order to trace terrorists using modern technology. According to the Directive, Member States oblige communication providers to store citizens' phone call data for six to twenty-four months, but the Directive does not stipulate a maximum time period: some Member States want longer storage periods. The data would only detail the caller's and receiver's numbers, not the actual conversations themselves, while so-called failed calls – calls that do not get through – will not be covered.

New legislation may only be passed into law following a mandatory impact assessment since 2003, as part of the better regulation agenda of the European institutions. Therefore, laws imposing costs on European businesses to provide rights for government or citizens to access data for security or data protection purposes must be costed and justified. The new rules for implementing

directives mean that a publicly available impact assessment was issued for the Data Retention Directive. It is an exemplar of the new approach to European legislation that will be adopted in future for legislative proposals. ETNO (the European Telecommunications Network Operators) indicated that for a one-year retention period, costs would be above €150 million for a large network and service provider (more than €100 million for retention of traffic data for software, server and security, and at least €50 million for annual overhead expense).[60] The European Commission indicated that:

> Indirect benefits could thus include a possible reduction in cybercrime, and in any case a situation which is not worse than the current one for law enforcement efficiency. It will therefore be difficult to assess indirect costs before some years (sic) of implementation of the Directive, in 2010–12.

The cost–benefit analysis of security legislation such as this must compare the long-term effect of legislation in countering crime versus increased costs for telecoms operators in implementing measures to comply with the law. In this case, the costs and benefits were not submitted to an independent evaluation for the impact assessment.[61] It is obviously a case of having to compare apples and spanners, so different are the views of ISPs and security agencies.

These security requirements have increased hard and soft law pressure on ISPs to monitor traffic (together with pressure from copyright holders). Added to this is the greater co-regulation of Internet video in the Audiovisual Media Services (AVMS) Directive 2007.[62] The broadcast regulators have relatively limited coordination with security agencies and telecoms policy divisions in governments, but all are pushing for greater regulation of their networks by ISPs, with ever-greater censorship in 'public interests' which each holds to override free speech and Internet freedoms. In the clichéd words of Washington deregulation lobbyists: 'To a hammer, everything looks like a nail' – to a regulator, control of the Internet would be much easier if it looked like telecoms or broadcasting. We return to this issue in Chapter 4, as increased knowledge may transform the liability of ISPs for content that travels over their networks.

Currently, neither is it a requirement for ISPs to notify customers when they block vital P2P-distributed applications, nor are the security reasons given within the remit of typical economic telecoms regulators. This governance

gap is partially overcome by the institutional arrangements in the European Commission.[63] Where the security reasons given by ISPs for blocking P2P traffic, which carries malware and other harmful content, is typically the concern of the Ministry of the Interior (in the United Kingdom, the Home Office) and occasionally the Ministry of Industry, the regulator defers to these senior agencies because it has little technically specific knowledge of data security.[64] In brief, it is the police and the spies who are making policy for network design.

Inside the Black Box: What and Why are They Inspecting?

There are security considerations claimed by ISPs in blocking certain types of content. Spam is routinely filtered by consumer ISPs; and certain types of unencrypted traffic are also allegedly throttled, though given the lack of official monitoring, proof of this remains circumstantial.[65] In fact, ISPs claim that P2P traffic contains a high proportion of malware, spam and spyware, and therefore it is filtered in the end-user's interest and in conformity with the terms of use for end-users.[66] Email spam and Web surfing are the vectors for malware, but the ISPs don't block such traffic. Doctorow explains succinctly that there is a standard Pareto distribution of Internet usage:[67]

> The reality is that network usage follows a standard statistical distribution, the 'Pareto Distribution', a power-law curve in which the most active users are exponentially more active than the next-most-active group, who are exponentially more active than the next group, and so on … Think of it this way: there will always be a group of users in the 'top 2%' of bandwidth consumption … But the real problem of per-usage billing is that no one – not even the most experienced Internet user – can determine in advance how much bandwidth they're about to consume before they consume it.

It is also a classic public goods problem: if no one rations your supply via price or other mechanisms, you will over-consume[68] (as we say in Liverpool: 'If it's free, I'll have two'). Users, with rare exceptions, do not know how much traffic they are using. This is the core of the problem – it is the P2P protocol that ISPs wish to police, not necessarily the users, but protocols do not wait for regulation. They are refined, encrypted and distributed; in short, they evade regulation. Therefore, ISPs can either throttle users by cutting off

their connections at peak times or once they have exceeded monthly quotas, or try looking inside the packets to see whether they are P2P or not. The latter becomes a very dangerous business to engage in because as we will see, governments are not only encouraging ISPs to look, they are actually subsidizing the DPI equipment to do so – and this sometimes in breach of both European and UK privacy and interception laws (the latter intended to prevent private spying, even if encouraged by government policy).

Phishers, identity thieves, spammers and child pornographers are in control of at least 100 million systems globally. This 'botnet' (hijacked and remotely controlled broadband-enabled robot computer) problem is getting worse.[69] Felten worries that regulators are used to standards bodies and classes of companies, when, for instance, BitTorrent is a protocol, not a company or a single standard.[70] Kulawiec states the common perspective amongst network architects:[71]

> You can't block by protocol, because those same protocols are used for lots of other things. (And even if you did, someone would just invent another protocol.) You can't block by content, because no software method is even remotely close to reliable enough and all the ones involving humans are either biased, slow, or both. Besides, it's easy enough to encrypt traffic … The people who wish to profit by providing this material will have figured out very effective ways to bypass the filters.

Therefore, any attempt to block BitTorrent or P2P more widely will fail because the protocol will route around via encryption or other techniques. Regulators who think they can permit ISPs to 'solve' a congestion problem by slowing P2P traffic are therefore fooled into believing a solution can be found when none exists. The idea that the protocol will simply re-engineer itself and pop up elsewhere on the network with even more disruptive effect has been compared to the US concept of failing to control moles digging on your lawn. Unlike gardeners, ISPs have not yet been persuaded to adopt the permanent solution of gassing their moles.

Many assertions are made about the implications of certain types of traffic, but regulators have no basis for deciding if such assertions represent big or small problems. This is an example of how a baseline of traffic and usage would help the regulator understand the importance of claims made by stakeholders. Blocking and other forms of traffic shaping are controversial

because, under current network management tools, it is a blunt tool. For instance, all P2P traffic using a certain protocol may be blocked. Sieradski and Maxwell explain that:[72]

> The Comcast decision does not resolve the question of when DPI will be deemed reasonable or unreasonable. What justification is needed to show that DPI is used in a 'narrowly tailored' manner to serve a 'critically important interest?' Is it reasonable to invade customers' privacy when screening for child pornography or pirated content, but not when screening for disfavored applications? Does it matter whether customers have given their consent to screening? This is closely related to questions in the US and in Europe regarding behavioral advertising and targeting, as well as potential collaboration between ISPs and content providers to screen and block file transfers that violate copyright laws.

The E-Commerce Directive (ECD), as we will see in Chapter 4, gives ISPs limited liability where they act as 'mere conduits' but not where they have constructive or actual knowledge of illegal content. Their traffic is thus something of a Pandora's box – if they look inside, all liabilities flow to them, from child pornography to terrorism to copyright breaches to libel to privacy breaches. The Canadian Privacy Commissioner made a submission to the CRTC in the context of its proceedings on traffic management practices, expressing concern that:

> DPI can look into the content of the message sent over the Internet. To use a real-world example, using DPI is akin to a third part opening an envelope sent by surface mail, and reading its contents before it reaches its intended destination.[73]

The submission continues: 'it is not clear that examination of content is necessary for network management and may constitute an unreasonable invasion of an individual's privacy'.[74]

Let us briefly review what ISPs already do to filter web traffic. The Internet was designed to allow the efficient transmission of information between networks around the world. Its basic functionality does not include censorship. However, as Brown explains: 'In a piecemeal fashion, courts and governments in France, Germany,[75] Switzerland, Finland, the United

Kingdom and Italy have ordered ISPs to filter their users' access.'[76] In a celebrated case, the Superior Court of Paris in 2000 ordered Yahoo Inc. to block the sale of Nazi items to French users. The court found that by providing access to French citizens, Yahoo US was subject to French law, that nothing in the First Amendment to the US Bill of Rights prevented Yahoo from being selective about its auctions and that blocking access to French citizens was technically difficult but not impossible.[77] Yahoo has attempted to comply, but also obtained a Californian court declaration that ruling had no effect on a US corporation. Court experts gave evidence that Yahoo could block French users from certain auctions with 70–80% efficacy.

ISPs required to block access to specific websites have relied on three crude mechanisms:[78] IP address filtering, Domain Name System (DNS) poisoning and keyword searching. A fourth possibility is to use a hybrid which combines two or more of these systems. The simplest filtering mechanism is for ISPs to block traffic to and from lists of websites specified by their IP address. Any packets of data with a destination or source address on this list will be dropped by the routers within ISP networks, especially those that exchange traffic with overseas networks. Skilled and determined users can evade such filters by accessing blocked sites using overseas Web proxies, intermediate machines that retrieve Web pages on behalf of users for a number of purposes such as increased efficiency and privacy protection.[79] Less advanced and motivated users find their access curtailed by IP address filtering. Because WWW servers typically host many (sometimes many thousands) of individual sites, a block on one of those sites will mean none of the other sites hosted on that server will be accessible. When in 2003 the Indian government ordered ISPs to block access to a specific Yahoo! Group, many simply blocked access to the entire domain, cutting access to around 12,000 groups. Pennsylvania's Internet filtering law was struck down in *CDT v. Pappert* (2004) partially because of such overblocking, with no evidence that the Act 'has reduced child exploitation or abuse'. The blocking of 400 sites prevented access to over 1.1 million other sites, whilst being easily circumvented, thus achieving the unintended consequence of censoring ordinary Internet users' experience yet failing to achieve its declared objectives.

DNS servers translate human-readable domain names such as chrismarsden.blogspot.com into the numerical IP address equivalent, allowing Web browser software to connect directly to Web servers. ISPs can remove or change the addresses for blocked sites on their own DNS

servers, and block user attempts to connect to DNS servers elsewhere on the Internet.[80] Like IP address filtering, DNS poisoning will lead to overblocking of sites that share domain names (such as Yahoo! Groups and YouTube videos). It can also block access to non-Web services on the targeted domain such as email and chat. It is trivially circumvented using proxies, and by users requesting Web pages using IP addresses. Both IP address filtering and DNS poisoning need government-compiled or backed lists of servers that should be blocked. Given the speed at which new content appears on the Internet, this is a time-consuming process.

Routers and government-run Web proxies can filter individual pages based on lists of forbidden keywords such as 'Moussavi' in the case of Iran.[81] Search engines have also been pressured by China to filter search results that contain certain keywords such as 'free Tibet'.[82] The quantity of pages blocked by keyword filters is unlikely to be acceptable outside totalitarian states. However, they can also be used to block access to specific Web pages, rather than entire websites, as with IP address filtering and DNS poisoning. This type of filtering is much more resource intensive than IP address filtering. Keyword filters in routers can be circumvented using proxies that encrypt data sent back to the requesting user, avoiding their detection. Clayton, Murdoch and Watson also found that the specific mechanism used in Chinese networks to block access to pages based on keywords could simply be ignored by Web browsers and servers.[83] Hybrid filtering systems have been developed that combine one or more of the filtering techniques described in the preceding text. BT's 'Cleanfeed' system redirects requests for Web pages on a list of specific servers to a keyword filter that blocks access to specific Web pages hosted on those servers. This combines the efficiency of IP address filtering with the precision of keyword filtering applied to specific pages. However, Clayton showed that the BT system could be reverse engineered to find child pornography sites contained on the secret filtering list.[84]

A further problem with most filtering technologies is that they are targeted at content distribution systems, particularly the Web, which are becoming decreasingly popular in terms of total Internet traffic. P2P systems such as BitTorrent are estimated to carry up to 60% of data on large Internet networks. Many P2P systems are designed in response to music and movie industry attempts to block the sharing of copyrighted works and are hence much more robust in the face of censorship. All of these systems avoid reliance on single machines that can be shut down or blocked, and on DNS names

that can be poisoned, and are able to exchange encrypted files that cannot be keyword-filtered by intermediaries.[85]

Interception and the Law

The continued attempts by ISPs to intercept communications on their own networks are by themselves legal under the law of interception. However, they may not allow others to intercept on their behalf or grant to others the right to intercept for their own purposes. The law appears clear on this point, in the United Kingdom at least, as follows. Interception of communication is subject to the Regulation of Investigatory Powers Act 2000 (RIPA) which states in Section 2(2):

> For the purposes of this Act, but subject to the following provisions of this section, a person intercepts a communication in the course of its transmission by means of a telecommunication system if, and only if, he –
> (a) so modifies or interferes with the system, or its operation,
> (b) so monitors transmissions made by means of the system, or
> (c) so monitors transmissions made by wireless telegraphy to or from apparatus comprised in the system,
> as to make some or all of the contents of the communication available, while being transmitted, to a person other than the sender or intended recipient of the communication.

One element of intercepting is that making available some or all of the contents of the communication to a person other than the sender or intended recipient is not permitted. It is enough that some portion of the contents of the communication is so made. Whether some of these contents (via the channels) are made available to anyone other than the ISP or a third party, they are *available* to someone other than the sender/recipient. The UK test is strict and requires both parties (sender and receiver) to consent.

This bar on interception has not stopped the British intelligence services from continuing activities designed to monitor Internet traffic. Packet-sniffing schemes such as Carnivore, a system implemented by the Federal Bureau of Investigation that was designed to monitor email and electronic communications, have been active since at least 1997. It used a customizable packet sniffer that can monitor all of a target user's Internet

traffic.[86] A larger-scale operation was built by various Western governments, called Echelon, which was investigated by the European Parliament in a report released on 5 September 2001.[87] Since the 11 September attacks on New York and Washington DC that year, intelligence agencies' surveillance has vastly increased. To give an example of the scale of the intelligence monitoring of networks, consider the latest UK government programme, explained by a government minister:

> the objective of the Intercept Modernization Programme (IMP) is to maintain the UK's lawful intercept and communications data capabilities in the changing communications environment. It is a cross-government programme, led by the Home Office, to ensure that our capability to lawfully intercept and exploit data when fighting crime and terrorism is not lost.[88]

The IMP programme was originally intended to comprise a central database of all UK citizens' private communications, at vast expense estimated at £12 billion in 2008 values, to be authorized by primary legislation in a Communications Data Bill proposed for the 2008–9 Parliament. Following a re-examination by the then-Home Secretary Jackie Smith, the central database was abandoned in favour of data retention by ISPs, which could be accessed by the police under a RIPA order. The ostensible reason for abandoning £12 billion UK database by government was user privacy: 'Most of the proposed 10-year budget for the system would be spent on deep packet inspection equipment that would allow ISPs to tap into third party communications data carried by their networks.'[89] Jackie Smith stated that providers will be refunded the cost of collecting and processing the data by the government: 'I agree that what we're asking the industry to do is something that will put a burden on them.' The government plans to spend £2 billion for ISPs to intercept details of their customers' emails, VoIP calls, instant messaging and social networking. Under the proposals, mobile and fixed-line operators will be required to process and link the data together to build complete profiles of every UK internet user's online activity. Police and the intelligence services would then access the profiles, which will be stored for twelve months, on a case-by-case basis.

Having explored the Data Retention Directive, RIPA and IMP, let us look at a more commercial use of DPI: behavioural advertising.

Behavioural Advertising: Phorm Trials

The most controversial of all recent attempts by UK network owners to secure revenue from users has been the experiments conducted by the behavioural advertising company Phorm with the UK's largest ISP, BT (and discussions with the next two largest, TalkTalk and Virgin Media[90]), and Korea's largest ISP, Korea Telecom.[91] Phorm employs a user-tracking system by which BT and other ISPs intend to target users more effectively than Google. A variant of this technology was first deployed widely in the United States on wireless ISPs.[92] Phorm operates a behavioural advertising system somewhat like that of NebuAd in the United States,[93] intending to offer its ISPs and website clients a more accurate tracking of customers' Internet use, in order to more closely target advertising and other marketing via that data.

Phorm uses DPI to take a copy of ISP subscribers' Web browsing, in order to insert targeted advertising, as Clayton explains: 'This enables their systems to inspect what requests were made to the website and to determine what content came back from that website. An understanding of the types of websites visited is used to target adverts at particular users.' What this does in advertising terms is provide much more highly targeted adverts based on user's particular browsing histories. This is a highly attractive proposition to advertisers and could make a great deal of money for Phorm and its partner ISPs, if users were notified and agreed in advance to such tracking of their browser histories – it is much more granular than Google's AdWords, for instance, and Google made $21 billion in advertising revenues in 2008.[94]

The Center for Democracy and Technology (CDT) released a US legal analysis on the legality of Phorm under the Electronic Communication Privacy Act, claiming that 'Based on what we know so far, this new advertising model appears to defy reasonable consumer expectations and may violate communications privacy laws.'[95] If that process were to be successfully implemented, ISPs in particular could offer websites a more precise method of advertising than Google and other search engines. It could help pay for the next generation of access technologies, in the view of then-UK Communications Minister Lord Carter and the regulator Ofcom (Office of Communications Regulation). Carter told Parliament on 11 March 2009 that Phorm was an interesting new business model and that both it and QoS could help develop faster broadband.[96]

It is both a marketers' dream and a privacy advocate's nightmare because the details that would be accessed by ISPs and Phorm may be illegal even

with the subscribers' consent. Committees of both the US Congress and the UK Parliament are carrying out inquiries into behavioural advertising in 2009.[97] Article 15 ECD[98] has also required Member States not to impose undue restrictions on ISPs since 2002:

No general obligation to monitor

1. Member States shall not impose a general obligation on providers, when providing the services covered by Articles 12, 13 and 14, to monitor the information which they transmit or store, nor a general obligation actively to seek facts or circumstances, indicating illegal activity.
2. Member States may establish obligations for information society service providers promptly to inform the competent public authorities of alleged illegal activities undertaken or information provided by recipients of their service or obligations to communicate to the competent authorities, at their request, information enabling the identification of recipients of their service with whom they have storage agreements.

This Article 15 is continually causing Member States to either derogate from ECD in the interests of crime fighting and anti-terrorism law or simply ignore the provision altogether. To an academic, this may appear scandalous, but UK civil servants have privately explained that so many features of wire-tapping and anti-terrorism law have been passed or amended since 2001 that there would by now be several thousand derogations across the Member States, certainly more than the small unit in the European Commission could deal with.

In contrast to this avalanche of control measures, there are European laws which are meant to protect citizens' privacy and liberty. Directive 95/46/EC[99] is the main law giving Member States responsibilities and citizens data protection rights against corporate actors. This European law sets a high standard for data protection, arguably higher than that in the United States. National data protection agencies have a permanent joint working group (the Article 29 Working Group) and are required to implement the Directive as uniformly as possible. The European institutions are also required by law to consider the Opinions issued on prospective legislation by the European Data Protection Supervisor, established in 2002. Directive 2002/21/EC lays down the tasks of telecoms NRAs, which include cooperating with each other

and the European Commission in a transparent manner to ensure the development of consistent regulatory practice, contributing to a high level of protection of personal data and privacy and ensuring that the integrity and security of public communications networks are maintained.[100] Directive 2002/58/EC (the 'Electronic Privacy Directive')[101] includes measures intended to prevent spam, supplemented by a 2004 Communication[102] on spam.[103] The critical test in both 2002/58/EC and 1995/46/EC is that subscribers have to opt for arrangements that may otherwise infringe their personal privacy, and that sensitive data must not be passed to third parties unless authorized and anonymized.

Unfortunately the original Phorm system trials by BT in 2006 and 2007 did not inform users or ask for their permission.[104] It is becoming increasingly clear that the government department responsible for interception of electronic communications was aware of, and tried to provide helpful regulatory guidance on, the trials and the behavioural advertising system. It emerged in April 2009 that the department, when contacted by Phorm in August 2007, had responded by asking 'If we agree this, and this becomes our position do you think your clients and their prospective partners will be comforted?'[105] It appears that the consultations between the department and Phorm were extensive and amounted to forming a collaborative view of the law, with comments such as 'My personal view accords with yours, that even if it is "interception", which I am doubtful of, it is lawfully authorized under section 3 by virtue of the user's consent obtained in signing up to the ISPs terms and conditions.' In an email dated 22 January 2008, a Home Office official wrote again to Phorm and said: 'I should be grateful if you would review the attached document, and let me know what you think.' The publication of this history of emails resulted in a debate in the House of Lords in 2009. Baroness Miller stated that:[106]

> The fact the Home Office asks the very company they are worried is actually falling outside the laws whether the draft interpretation of the law is correct is completely bizarre.

As a result of the legal controversy that followed when the trials were made public in early 2008, the ISPs and Phorm itself agreed to insert both notification and consent into any future trial or deployment of the technology, and BT did so for its third trial in December 2008.

In legal terms, the system is not just contrary to permissions required in European privacy law under the 1995 and 2002 Directives, but also unlawful interception under the exclusively UK RIPA. In March 2008, the Foundation for Information Policy Research (FIPR) wrote to the Information Commissioner arguing that Phorm's system involved illegal interception contrary to RIPA.[107] Clayton, FIPR's treasurer (a security expert at Cambridge University), presented a report on the system, which Phorm responded to ensure technical accuracy.[108] Clayton stated: 'Examining the detail makes it crystal clear that our [FIPR] earlier letter came to the right conclusion. Website data is being intercepted. The law of the land forbids this.' Bohm, General Counsel for FIPR, stated: 'the illegality stems not from breaching the Data Protection Act directly, but arises from the fact that the system intercepts Internet traffic.' According to FIPR's legal analysis, BT appear to ignore the fact that they can only legalize their activity by getting express permission not just from their customers, but also from the Web hosts whose pages they intercept, and from the third parties who communicate with their customers through Web-based email, forums or social-networking sites.[109] Bohm's further analysis suggests that Phorm also infringed the database right for some website owners and almost all website owners' copyright, and none of the statutory exceptions in the Copyright Designs and Patents Act 1988 would be applicable.[110]

The European Commission is tasked with monitoring Member States' implementation of European law, in this case Directive 2002/58/EC, the Electronic Privacy Directive. In response to UK citizens' complaints that ICO was failing to prosecute Phorm and BT for breaching the Directive in not asking consent for the original trial, the European Commission formally asked the UK government to explain why action had not been taken. When the response received was unsatisfactory, it repeated its request for information in stronger terms. When that second response was unsatisfactory, the Commission responded in January 2009 by threatening the United Kingdom with legal action.[111] In April 2009, the European Commission initiated formal legal action against the UK government for ineffective application of the Directives (note this does not apply to interception laws).[112] Commissioner Reding stated:

> We have been following the Phorm case for some time and have concluded that there are problems in the way the UK has implemented parts of EU rules on the confidentiality of communications. I call on

> the UK authorities to change their national laws ... This should allow the UK to respond more vigorously to new challenges to ePrivacy and personal data protection such as those that have arisen in the Phorm case.

The British government responded to this infringement action within the two-month time limit on 14 June 2009, though as I write the response has not been made public.[113]

Conclusion: DPI and Club Goods

It is not only business decisions on QoS that decide the outcomes and deployments of DPI and other tracking or storage equipment in ISP networks. I will argue one simple conclusion holds: there is a 'perfect storm' of confluence of these other regulatory instruments driving ISPs to install DPI and other 'packet-sniffing' equipment. More than that, there are commercial and regulatory finance incentives for ISPs to install that equipment. Once you have the equipment in place, abandoning net neutrality becomes a no-brainer. The motive is simple: do it because you can. Governments have introduced at the bequest of their security services various measures, including anti-terrorist, anti-paedophile and anti-pirate legislation, increased controls on ISPs and creeping erosion of 'mere conduit' status – including examples such as co-regulatory requests for filtering on all ISP consumer users. We will explore this further in Chapters 4 and 6.

Equipment manufacturers – notably those of ultra-fast blade servers and DPI equipment – are using a joint-purpose technology that can be used not only for legitimate traffic management and law enforcement, but also for blocking of content as requested by government. It may only be marginally stretching the truth to describe this as equipment 'made for China, imported to Europe'. If Buchanan's insight into the excessive use of unmetered club goods[114] holds true for P2P downloaders, perhaps it also holds true for ISPs. If government is willing to pay you for your DPI equipment, dual-purpose technology that can be used for much more than law enforcement purposes, do you have an incentive not to use that equipment to its maximum effectiveness? Government has given ISPs the tools to eliminate net neutrality. How they use these tools therefore becomes a matter of pressing and legitimate public policy.

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CHAPTER THREE

Positive Discrimination and the ZettaFlood

How should telcos help? First, create secure transaction environments online, ensuring that consumers' privacy concerns do not prevent m- and e-commerce. 'Walled gardens' … secure credit and other online methods can achieve this. Second, don't become content providers. Telcos are terrible at providing media to consumers … Third, do become content enablers … in developing audio and video formats by participating in standards-building consortia.[1]
Marsden (2001)

This chapter considers the case for 'positive' net neutrality, for charging for higher QoS, whether as in common carriage to all comers or for particular content partners in a 'walled garden'. As the opening quotation demonstrates, I have advocated variants of this approach before. The bottleneck preventing video traffic reaching the end-user may be a 'middle-mile' backhaul problem, as we will see. It is essential to understand that European citizens have supported a model in which there is one preferred content provider charged with provision of public service content (information, education as well as entertainment): the public service broadcaster (PSB). Some countries have more than one of these. The UK has four: the British Broadcasting Corporation (BBC) is publicly owned and publicly financed without advertising; Channel 4 is publicly owned but advertising financed; two, ITV and Channel 5, are privately owned and advertising financed.[2] These PSBs are accustomed to 'must carry' status on the terrestrial, cable and satellite networks of their own countries, and have leveraged that onto IPTV over the Internet and broadband. Thus, in Europe, it is not premium events such as sports broadcast that have led the way in the QoS debate: it is PSBs. The question thus becomes: is net neutrality only for PSBs (sic) or for all content? Obviously, 'must carry' for PSBs may squeeze other non-QoS content into a slow lane. Moreover, if citizens are accessing PSB content (already paid for by television regulatory arrangements), they will have little (or zero) propensity and incentive to pay more for the QoS to stream that in high definition (HD) over their Internet connections.

The debate will come to PSBs and commercial content providers, and you and me as bloggers and social network members, later in the chapter. First, I examine whether the Internet is about to drown in a sea of video-induced data, whether there will be a 'ZettaFlood'.

The ZettaFlood

Ever since the Internet became commercial – and arguably long before that, even when the initial ARPANET was being built – engineers and analysts have worried that the increase in users, while essential in the astonishing growth that is summarized in Metcalfe's Law, would eventually overwhelm the network, with traffic so dense that individual routers would drop too many packets for the reliability of the network. As the users reach over a billion, with several billion more using Internet-almost-ready mobile networks, and as their connections increase in speed a hundredfold from the old dial-up lines to broadband, there is a potential 'meltdown' brewing. This rapid – if not exponential – growth in traffic has led such doom-mongers to predict that 'Something Must Be Done'. That a decade or two has passed since the problem and doom was first predicted has – if anything – increased the volume and intensity of the calls to slow down or monetize the growth.

To summarize: there are many more users than the network was built for, and they are using the network to a far greater extent than originally planned. Not only are there millions of university scientists and government users (the original user base) with fibre connections to extract enormous shared computing power, but there are a billion residential and corporate users with varying qualities of fixed or mobile connections. To increase the speed and volume of data transferred using the fibre links which large enterprises use is relatively trivial compared to the problems of those using mobile or old telephone and cable lines to access the data. I do not intend in this book to go into depth on the problems the aggregated data presents for the different ISPs in dealing with each other, but clearly an ISP with a million narrowband (dial-up) users' data to send and receive is in a very different position to one with ten million broadband users, or a million fibre-enabled super-fast broadband users.

Let us briefly explain what happens. 'Freetards' – and this certainly is a pejorative term[3] – is the term employed most infamously by technology commentator Orlowski to describe those who continue to believe that 'information wants to be free' and should be, accusing them of free-riding

on the back of the average user. Leaving aside the 'information communism' implications of the philosophy, if it can loosely be called that, the debate has focused around alternatives to current pricing and distribution models on the Internet, including the far from retarded ideas of Wikipedia, Creative Commons and P2P software distribution. The claim is that 'freetards' are using a dangerously disproportionate share of consumer bandwidth in their almost unlimited use of domestic connection as a P2P file-sharing upload and download facility. It can be illustrated as follows: a consumer with a 10 Mbps download/1 Mbps upload speed on his/her domestic connection uses about 3 GB of data per month (this is an average value, but it is certainly in the 1–10 GB range). By contrast, using the maximum theoretical speed at all times, it is possible to use a total of 3.6 TB (3,600 GB approximately).[4] Maths isn't my strongest suit but this is approximate, theoretical, therefore highly implausible (as connections are not that reliable 24/7/365). That one mythical 'freetard' would be using a thousand times the monthly usage of the average user, or the entire usage of a small town. Could attacking this one user be beneficial to the other 999 people in that town using that telephone exchange? Users are summarily terminated or suspended. This can be conducted by any ISP and may well be justified, but could be made more transparent.[5] ISPs choose to filter P2P traffic, typically popular file-sharing programs, as in a best effort environment without congestion charging[6] that content has insufficient disincentives to prevent its flourishing. ISPs can choose to filter P2P traffic of various kinds; typically it is unencrypted relatively crude versions of popular file-sharing programmes, such as BitTorrent, which is used to provide upgrades to the most popular multiplayer online game 'World of Warcraft'. Many security assertions are made about the implications of certain types of traffic, but regulators currently have no basis for deciding if such assertions represent real problems.[7]

The virtual lynch mob in question is of course an illustration, and in any case this is not the main problem. P2P networks are a problem because they seed many concurrent 'streams' of data in order to 'max out' the available bandwidth – that is also why they are efficient compared to single 'streams' of data. It is as if every second person in the queue at the ticket office is actually working for the same person sitting outside, drinking coffee, while the rush-hour throng mills past. She will of course receive her ticket more quickly, but at the cost to everyone else in the queue, many of whom will be 'timed out'

of buying a ticket and be forced to buy on the train or find alternatives. As Felten rather more technically, accurately puts the dilemma:[8]

> a single router (in the 'middle' of the network) … has several incoming links on which packets arrive, and several outgoing links on which it can send packets … if the outgoing link is busy transmitting another packet, the newly arrived packet will have to wait—it will be 'buffered' in the router's memory, waiting its turn until the outgoing link is free. Buffering lets the router deal with temporary surges in traffic. But if packets keep showing up faster than they can be sent out on some outgoing link, the number of buffered packets will grow and grow, and eventually the router will run out of buffer memory. At that point, if one more packet shows up, the router has no choice but to discard a packet.

This is where the buffer has set rules for that critical decision to discard packets:

> When a router is forced to discard a packet, it can discard any packet it likes. One possibility is to assign priorities to the packets, and always discard the packet with lowest priority. This mechanism defines one type of network discrimination, which prioritizes packets and discards low-priority packets first, but only discards packets when that is absolutely necessary. I'll call it minimal discrimination, because it only discriminates when it can't serve everybody. With minimal discrimination, if the network is not crowded, lots of low-priority packets can get through. Only when there is an unavoidable conflict with high-priority packets is a low-priority packet inconvenienced.

This minimal discrimination is what has always happened on the network. P2P services are designed for this orderly non-prioritized packet queuing, and flood the queue to make sure they get through. That makes the job of the router more difficult and is what leads to positive net neutrality problems – when packets are deliberately put into a slow lane. As Felten puts it, this is 'another, more drastic form of discrimination, in which routers discard some low-priority packets even when it is possible to forward or deliver every packet.' He terms that 'non-minimal discrimination' and its key characteristic is the decision to put a high-priority toll-lane in place which necessarily limits the speed of all other traffic.

So the lazy consumer can pump out 3.6 TB theoretically – multiply him by a million (or find a billion 'normal' lightweight users) and you have not petabytes (PB) but exabytes (EB). That's a lot of data. Cisco Systems, which makes many of the routers used for Internet traffic and therefore has an incentive to suggest rapid traffic growth, has estimated that we are growing traffic towards several hundred EB a year, and Gilder and Swanson[9] have talked of the next one up, the zettabyte (ZB): 'We estimate that by 2015, U.S. IP traffic could reach an annual total of one zettabyte, or one million million billion bytes. We began using the term "exaflood" in 2001.' This flood of data, which they believe will be largely video data, could overwhelm the network: 'Today's networks are not remotely prepared to handle this exaflood. Wall Street will finance new telco and cable fibre optic projects, but only with some reasonable hope of a profit. And that is what net neutrality could squelch.' They claim, moreover, that net neutrality which prevents networks making special arrangements with high-volume video service providers, and thus perhaps investments by networks in fibre, will prevent the next stage of less limited fibre-employed bandwidth at which point net neutrality could really be employed.

One element of this is almost certainly correct: as fibre is built out towards the consumer from the local telephone exchange, the costs of that upgrade (80 percent of it is 'civil works', digging holes in the road and trenches in the pavement) will be prohibitive for smaller players, and only possible by monopoly or duopoly networks. As Banerjee and Sirbu summarize[10] in a conclusion backed by Van Der Berg, facilities-based competition among fibre network providers is unlikely due to the economies of scale in installing fibre for an entire street or neighbourhood. They therefore hold that regulators should be wary in removing open access requirements in return for investment in fibre, as it could lead to remonopolization, or perhaps duopoly competition. This is of course what has already happened in the United States under the Bush-appointed head of the FCC, and the recent activity in 2007–9 over net neutrality is the belated response of the regulators to alleged abuses. If fibre means that this duopoly – or monopoly – takes control of the customer access line, then it appears vital to ensure competition for services on that line, whether by Skype, Google or whomever else. As Sirbu further holds, if service competition is limited only to ISPs which own facilities, this would lead to greatly reduced service-level competition, and that reduced service-level competition raises the net neutrality issue.

So we will almost certainly need net neutrality rules at the next stage, the fibre-based consumer Internet. Can we not afford them now, as Gilder and

Swanson suggest? Is it a luxury, so that copper-based networks will not be able to carry HD video? And if ISPs cannot afford the maximum use of their networks now, what should they do about it? That is the first set of questions addressed in this section, before a short journey around what happens to that data as it is aggregated and passed around the Internet (where fortunately we already have fibre), and then the $64 billion question of what policymakers are currently doing about it, and what they could and should in future.

'Walled Gardens' or Preferred Partners

The obvious answer to the data flood is to constrain the customer to locally hosted and/or cached bandwidth. That means a 'walled garden', as my quotation opening the chapter suggests. Carriers can offer exclusive, preferential treatment to one application provider over others, creating a type of 'walled garden' of preferred suppliers. This is less distorting than blocking, depending on the type of walled garden and the 'height of the walls'. I differentiate 'walled gardens' from an open/interoperable access 'commons'.[11] A 'walled garden' is a type of IP content service offered without access to the wider Internet. For example, most mobile telephone networks provided walled gardens to their subscribers. This has wider regulatory implications, involving the development of gatekeepers rather than open access models. Continuing the analogy with commons and walled gardens, one can imagine that a walled garden can be protected and entry or exit charges imposed. By contrast, a commons is open access, with no controls. The walled garden gatekeeper is likely to be the owner of the garden, the operator. 'Walled gardens' have historically described content or services bundled by an access provider as a package with fixed or mobile Internet access. The content is usually supplied under contract by content/services providers and presented to the end-user by the access provider as a branded portal. The content or service can be acquired from a third party in exchange for a direct payment. An agreement to share advertising revenue is an increasingly common model. The service offered by an access provider may restrict users to content only in that walled garden. In this case, the access provider is a gatekeeper (like Vodafone Live! when it first launched). Alternatively, the access provider may give users the freedom to access the wider Internet and consume other content and services, including those which may compete with those in the portal. In this case, he is not a gatekeeper to the Internet (like the fixed ISP model).

An example is mobile users, who inhabit a more personal and pervasive environment than fixed Internet users, with additional constraints on full openness. The mobile industry has developed hitherto on the basis that operators control the use of their networks and the devices that connect to them. For that reason, the initial content offerings of mobile providers have tended to be provided in a walled garden in which the customer experience is guaranteed by the operator and discriminatory pricing can be imposed on third-party content providers through their contracts with the mobile operator. It is an open question whether net neutrality measures should be imposed on the practices of such mobile operators, a topic explored in Chapter 7.[12]

In a 'walled garden', the number of content providers, and the innovation they are permitted to undertake, is effectively regulated by their relationship with an ISP. 'Walled gardens' may evolve so that access providers (both mobile and fixed) are likely to continue to offer content and services to their customers, bundled with broadband access. These services are often provided with guaranteed QoS (e.g. IPTV services). These services are not necessarily anti-competitive *if* the end-user can access the wider Internet and choose to consume other content. The critical competition issues are:

- Access providers who provide bundled services could be motivated to degrade content services or applications which compete with their own portal services
- If they do this, they will not be incentivized to tell their customers that the QoS for these services is inferior
- They could use this to leverage payment from content and applications providers
- Access providers may agree preferential arrangements with some content or applications providers but not make the same terms available to others

It is clear that discrimination and other forms of quality control are exercisable in a manner which does not fully support open access to content. If networks and commercial content providers cannot monetize their respective parts of the value chain, network effects can reverse into a vicious circle, in which neither content nor network can secure investment to provide service.[13] Instead, the inflexion points at which investment in the lagging element is needed to prime the next phase of disruptive growth can become crisis points. At this point, investments may be constrained and a 'virtuous circle' of

investment may be replaced by a vicious circle of under-investment. As users currently display relatively little apparent motivation to price discrimination in order to gain greater bandwidth, knowing that the extra bandwidth is only in the 'last mile' and does not necessarily result in higher speeds for their favourite service, the incentives for end-users to signal willingness to pay for greater service may be weak. Again, there is an information problem, with ISPs unwilling to demonstrate clearly the practical advantages of advertised speeds of for instance 'up to 8/16/24Mbps'. This investment conundrum is claimed by some ISPs as a justification for traffic management and price discrimination.

Problems in the 'Middle Mile'

The Internet used to claim a cost-free transport model – effectively free peering, in that it was assumed that ISPs sent the same amount of information over a link as they received. However, as ISPs specialized in consumer or business customers through the 1990s, it became obvious that their traffic flows were diverging, and that many consumer ISPs, for instance, received much more information than they sent. Consumers are assumed to act in a mainly passive mode, receiving web pages and email in response to short (in packet terms) requests, which is why asymmetric connections are provided. Your bandwidth is predicated on receiving 10 times more packets than you send, and your speed of connection is based on that number. That is one of the reasons why consumers who act as 'broadcasters', by sending more information than they receive, are difficult for network engineering: they are not 'supposed' to act like that. The reasons for sending much more information vary, but uploading a lot of files, acting as a P2P exchange, or hosting a popular website on your local connection, can all cause more traffic to flow out than in. When it does, that Internet connection behaves in a manner which is more like a business connection than one for consumers. A real business dedicated 'leased line' (or 'partial circuit' depending on the terminology) is a vastly more expensive link than a consumer broadband connection, perhaps 50 times more expensive. It is not difficult to see why ISPs prefer consumers to act like consumers when they use their network.

With many thousands of ISPs, and the demand for peering much greater than many of the larger (so-called 'Tier 1') ISPs could meet, smaller ISPs began engaging in one of two practices. They either pay for transport, directly or via a transit arrangement with a large ISP that is able to peer with Tier

1 providers, or they collaborate by using an Internet Exchange, such as the London Internet Exchange (LINX). In this way, the very largest ISPs continue to peer, and certain smaller ISPs might do the same thing, but much of the traffic on the Internet 'pays its way' through the network. Even until recently, many analysts did not fully appreciate that so much traffic on the Internet was monetized and had to pay its way. Brett Glass, owner-founder of Wyoming-based ISP Lariat Networks, states that pricing and regulating overtly anti-competitive behaviours include 'price squeezing, price gouging in the "middle mile" by large ISPs and refusal to deal by backbone owners'.[14] Small ISPs regularly rehearse this complaint. The Internet is, for the most part, therefore not free for most traffic: all but the very largest ISPs charge for traffic to be carried over their networks, and this really matters.

The average Internet packet 'hops' across a dozen or more network routers before reaching its intended recipient. All the delays at each router add up, so that if the packet really does take twenty hops with an average 10 ms delay, it is a meaningful – for video and computer gaming in real time, actually disastrous – 200 ms. For several other time-sensitive applications, it could be a fatal delay.[15] For instance two-way voice communication, as in a telephone call, can break down with delay, as can streaming video, as can interactive gaming. That is why most rich media applications of this type include 'buffering' as a means of protecting against delay. De Beer reminds us that: 'No internet transmission is truly instantaneous, so the issue of time delay is really a relative question. And traffic shaping necessarily requires an implicit or explicit judgment about the relative time-sensitivity of the delayed telecommunication.'[16]

The five most common types of delay are 'dropped packets', delay, jitter, out-of-order delivery and error. Dropped packets might occur where the routers fail to deliver (drop) packets if their buffers are already full, as a result the receiving application may ask for this information to be retransmitted, possibly causing severe delays in the overall transmission. There is straightforward delay where the packet is held up in queues, or takes a circuitous route to avoid congestion, which can make useless an application such as Skype or online gaming. Jitter occurs where packets from the same source reach the destination with different delays, which can vary unpredictably (depending on the queues at the routers involved for each packet). This is critical to the quality of streaming audio and video, whereas buffering can cope with delay. In out-of-order delivery the packets arrive in a different order, which

requires special reordering protocols, again very important for video and VoIP streams. Error takes place when packets are misdirected, combined together or corrupted en route. The receiver has to detect this and ask the sender to repeat itself, as with dropped packets. The list of delays can be terminal for some applications, and this explains why rich media, especially video, transport is unreliable using the Internet.

It is important at this stage to discuss the sceptical view, and not only because, at least in relation to today's consumer Internet, I largely agree with it. The primary voice of caution is Odlyzko,[17] not least because he called out WorldCom's nonsensical claim that Internet traffic was doubling every hundred days in the late 1990s (it was always a stock market-scaring ruse to increase the stock price of the ultimately criminally doomed executives). Odlyzko continues to worry that ISPs will waste resources trying to become cable companies as in the late 1990s, estimating that carriers do not need added revenue from price discrimination to finance residential broadband infrastructure.[18] Odlyzko argues that carriers have systematically over-valued one-way entertainment including video over two-way services (telephony, instant messaging, texting or social networking sites) that use less bandwidth. Expanding networks to handle a premium video ZettaFlood would be a mistake. He also argues that video should use P2P distribution and other efficient methods, rather than replicate broadcast with real-time streaming. Criticizing the study by Clarke,[19] Odlyzko states 'resists giving broadband operators leeway for price discrimination (except by offering consumers different connection speeds) or increased ability to vertically integrate into content or applications to facilitate price discrimination.' He believes that the operators' own shareholders may benefit from network neutrality rules that would limit such wasteful ventures and force them to stick to their core competence – providing basic connectivity. He also identifies the potential for price discrimination and discrimination against network neutrality at any Internet bottleneck, for instance via Google, the leader in online search advertising.

I explained to the European Commission in a study on the potential future of video consumption[20] that the great majority of the population will be 'time shifting linear consumers', who use broadband mobile and in-home devices, time-shift their media to suit their schedule instead of that of the broadcaster and fundamentally alter the media landscape. Either consumers choose to 'stream' linear video at alternative on-demand schedules, or as non-linear

interactive users, they adopt an entirely 'pull'-based behaviour, in which content is downloaded as if in a peer-to-peer music file-sharing network, for offline consumption on demand. We are no closer to understanding whether they stream (try to experience a real-time broadcast, subject to buffering) or download content for viewing later, than we were four years ago.[21] What remains true is that the difference is largely artificial, because streamed content is actually buffered and played with delay, so it is essentially a fast download with less delay, not a 'live' programme. Try streaming live radio programming on the Internet alongside the broadcast version: it will rapidly become obvious which is broadcast and which is cleverly disguised downloading for later consumption.

Odlyzko is joined in his sanguine analysis of the prospects for high QoS streamed video and other one-way traffic by a 2009 study for UK regulatory Ofcom by Analysys Masons, the pre-eminent European telecoms consultancy, who conclude that the local exchange and currently commercially available access technologies can cope with the increase in bandwidth required, without the need for QoS to discriminate between traffic types, but that backhaul to the Internet backbone will have to become significantly more efficient:

> Even with aggressive predictions of user demand, the cost implications may not be excessive if future [backhaul] pricing benefits from the economies of scale that fibre-based backhaul products offer unbundlers today, and if there are technological advances that further reduce the [bandwidth] cost.[22]

In other words, there is sufficient potential capacity in the new IP networks to deal with more video traffic, but that capacity is currently too expensive for ISPs to access. If it becomes cheaper, due to efficiency savings (and regulated pricing), then video can be supplied cost-effectively to the local exchange. Once in that exchange, it can be delivered using upgraded local connections, either fibre or new generations of cable, DSL (telecom) or mobile/wireless links. The possibility of net neutrality regulation preventing some kind of fast-lane access is discussed: 'innovative business models might be limited by regulation: in the event that the ability to develop and deploy novel approaches was restricted by new regulation, this might curb the potential for growth in online video services.' Analysys Masons also provide some estimates of historical and future growth in bandwidth provisioning, based

on their confidential discussions in preparing their report. They estimate that from 2001 to 2008, ISPs increased their peak-time bandwidth per household from 4 to 24 kbps, a 23% annual growth rate.[23] They estimate that in future the growth of peak-time video watching may increase this from 24 up to 300–2,000 kbps by 2018. This would be a major, indeed exponential, increase in cost for ISPs, but is related to backhaul, not local access. Note that ISPs must aggregate all their local exchange customers, so 24 kbps for 1,000 users would indicate a theoretical minimum of 24 Mbps required at the local exchange, a significant 'pipe' for the Internet data required. Analysys Masons estimates that the average UK household used 5.25 GB of data per month, based on industry figures.[24] Those used to Internet backbone prices using dark fibre should note that the price of a 155 Mbps BT central circuit was in 2008 almost £200,000. Regulated local access is a very different pricing environment.

In the United Kingdom in mid-June 2009, this question of backhaul cost was thrown into public view when BT acknowledged that it had been throttling BBC services as well as Google's YouTube.[25] Under the 'fair use' policy of BT's Option 1 broadband package, BT cuts video streaming from 8 Mbps down to 896 kbps between 5 pm and midnight, which BT said was sufficient to watch BBC iPlayer, but obviously nothing else concurrently. John Petter of BT Retail stated that:

> We can't give the content providers a completely free ride and continue to give customers the [service] they want at the price they expect … [its] much bigger issue than the BBC iPlayer, it's true of all forms of video content coming across the web. It's becoming a more and more pressing issue … If it wasn't a significant sum, we wouldn't be focused on it.[26]

This caused much speculation as to the transfer-pricing within BT, as their wholesale executives had claimed repeatedly that there was plenty of capacity in their network. I quoted Matt Beal in the introduction, for instance. However, if BT Retail is paying the same regulated price as other ISPs (which under regulation, it must be) then the cost structure appears to be challenged. Burstein, a continual critic of ISP throttling, stated in response that:[27]

> the entire problem would disappear if Ian Livingston [BT CEO] actually asked his network people 'how much does all this bandwidth really cost?' The answer will be 2–5% of our charge, going down as often as up. The

> right answer, based on data from a dozen large carriers, will be 'well under a pound/month/subscriber'. One particularly efficient European, not far in size from BT Retail, has told me their figure is 55 cents.

If BBC and Google will be forced to pay excessively for access to the end-customer by an ISP insisting on QoS (or just negative neutrality throttling), do they have choices? Let us explore local caching options.

How to Avoid the Middle Mile

Note two means by which networks currently manage traffic: caching close to the end-user to save on costs and service delays on the wider network, and capping bandwidth for end-users. First, consider CDNs. The Wall Street Journal on 16 December 2008 claimed Google wanted to hire faster capacity, when it actually wanted to try to cache more locally, to push content to the edge.[28] Saul Hansell explained in the wake of the article:

> Sometimes the issue is framed as a total bandwidth egalitarianism, when that's not really what they want. There is a huge fight here, not over whether there will be first class and coach seats, but how those seats will be priced and who will pay for them. Google and others are saying that, in effect, every seat in the same class of service should have the same price, and that Internet providers can't add surcharges to companies they don't like or give discounts to those they do.[29]

Do caches breach net neutrality? Kevin Baughan from Virgin Media (the UK cable provider) recently stated that Virgin is experimenting with both edge/network caching, and in the Ashford 50 Mbps trial area, provisioned a 10 Gbps link directly to Level3 (a Tier 1 backbone provider), in an attempt to answer the question of whether storage trumps transmission, or the reverse. One intriguing idea he floated was that perhaps ISPs should be building their own internal CDN capabilities, striking deals with other CDNs and content players to mirror the most popular content.[30] Virgin already has taken its two major sources of network congestion offline, by hosting BBC iPlayer (catch-up TV) services on its cable channels, and by aggressively targeting BitTorrent and other P2P traffic via DPI.[31]

Two elements of this are important – if Akamai is an 'SME solution', based on the idea that the big content providers like Yahoo!, Google and BBC

'Project Canvas' install their own servers with ISPs, then does local caching by proprietary networks solution fall foul of net neutrality? First, Akamai's CDN is in an increasingly competitive market. Second, should there be FRAND regulation of these caches? The idea is that if Google can build such servers then so should everyone else, if they wish. This should be paid for by content providers to ensure equality: Disney can't persuade BT to pay it for the content or the server. This is a well-known principle in for instance LLU regulation, so use it for caches too. The non-profit content providers such as Wikipedia (and you) will continue to rely on the open Internet and usual speeds, so that that does not remove the need for net neutrality regulation at all.

Second, ISPs can simply cap the total monthly capacity for its customers. That does not affect their peak-time usage and congestion problems, but does ensure that ISPs save money on backhauling the content from the open Internet to the local telephone exchange. Time Warner Cable was an early leader in capping customers, in its Beaumont Texas trial allowing 5–40 GB caps with $1 per GB excess fee.[32] The pricing plans ranged from $29.95 a month for a 5 GB cap and 768 kbps download speeds to $54.90 for a 40 GB cap at 15 Mbps. AT&T was set to impose bandwidth caps in Reno, Nevada of between 20 and 150 GB for new customers in 2008, extending to existing customers in 2009. It was relatively transparent about its plans, and its announcement resulted from discussions with FCC Chair Kevin Martin. However, Burstein wrote:

> I'm one of the few who said Comcast's 250G cap was reasonable in 2008, because there is a cost of bandwidth. But every policymaker in D.C. knows that the 20, 40, and 80 gig caps are a blatant attempt to discourage access to content of your choice.[33]

The question of what level of monthly cap is acceptable is one that regulators must grapple with, especially as mobiles currently offer caps as low as 1 GB. Moreover, caps must suggest a decision not to prioritize such services, as high-priority service would mean large volumes of video being downloaded which would make the cap redundant (or dangerously low). If you download a series of 'House' in HD video, a 20 GB cap would make no sense.

There is unquestionably a regulatory issue that is vital in the delay of media transmissions, whether you agree that it is middle or last mile. It will affect the content provider, who should at this point be introduced to what has thus

far been a rather dry technical discussion. Decisions regarding traffic and QoS on the backbone are intimately connected to the experience enjoyed by the end-user, so it is properly the place of regulation, however 'light touch'. As De Beer puts it:[34]

> Access providers should not be empowered to exert influence over citizen's ability to telecommunicate by making judgments about which information from which sources is transmitted more or less quickly. That is unacceptable in any free and democratic society.

He further identifies the core of the problem as ignored by the Canadian regulator CRTC:

> … control over content could be exercised other than editorially, but the Commission did not seem to consider that possibility. A distinction was drawn between controlling the speed of telecommunications and the content itself. The Commission held that simply delaying a telecommunication does not alter its meaning or purpose. That is also an odd conclusion to reach, because a delay could very much affect the purpose of communicating via the internet.

As we saw with BT's recent action, throttling speeds beyond about 800 kbps for BBC iPlayer would mean that it could no longer be properly accessed during peak time. Would that appear to be network rules making a decision for BBC licence fee payers? If rules are introduced for the middle mile, they will need careful drafting. Faratin, Clark et al. state:

> the design of such a rule will be both complex and informationally demanding… While there may be opportunities for abuse by providers with excessive bargaining power, the complexity of what is in place today, and what seems to be working today, would argue that the best way to address any potential concern would be to focus on the sources of bargaining power and identify anti-competitive opportunism, rather than to impose ex ante restrictions on the range of bilateral contracts.[35]

They plump for more transparency, unsurprising given the obscurity of many Internet peering arrangements, and the lack of regulatory oversight. Indeed,

it can be argued that only the Bell mergers of 2006, leading on from the WorldCom and AOL mergers of 1999–2001, really produce an opportunity to examine these arrangements. The type of 'emergency regulation' that is possible in merger cases is ill-suited to the careful balancing act that may be needed to ensure competition is fair and effective across Internet peering arrangements. They state:

> If it were possible to bring a 'best practice' or 'common practice' in interconnection out from the non-disclosure agreement and into the light, this might also help reduce bargaining costs, but in a more flexible way than might be achieved via regulatory constraints. An industry forum that tried to discuss this openly (and which was given a clear mandate for how to behave so as to avoid anti-trust concerns) might offer a substantial contribution to efficient operation of this asymmetric world, and might mitigate the sorts of fears that have prompted calls for more direct regulation.

I agree with their final warning: 'Regulating the middle mile will be a difficult and time-consuming business that will require great skill by regulators in ensuring the right degree of co-regulation and industry involvement.' So far, regulators have shown no sign of appetite to enter into examination of this critical arena for negotiation and interconnection. They will need to do so to have real understanding of middle-mile problems.

Public Service Broadcasters

The net neutrality/QoS argument in Europe is particular because PSB occupies a position of strong bargaining power with legislatures and regulators. What would happen if the PSB and the monopoly carved up the market? What if the incumbent refused to allow video content from the PSB? The former may be quite likely, the latter in several countries unthinkable. The argument can therefore be characterized as: will Net Neutrality apply only to PSBs, or to other/all content providers? I consider a different set of content provider preferential treatments below. The doyen of PSBs, the BBC, formalized its position in February 2008:

> The BBC considers that [proposed EC] rules would be sufficient for the time being. The key issues are transparency, the capability to identify problems promptly, and the ability to impose remedies in a timely

> way ... NRAs should require service providers to disclose to consumers promptly and in full the 'blocking' or any significant manipulation of any services ...
>
> As a public service broadcaster, the BBC depends on the internet as on other distribution platforms for access to its viewers. This access must be unhindered ... If the internet moves away from non-discriminatory treatment of all content and broad neutrality, the resulting environment will undermine the EU goals of developing creative content online in the single market and potentially threaten cultural diversity and media pluralism.

The BBC then suggests what I term a co-regulatory solution:

> we would suggest that the Commission should consider stimulating (or facilitating) a stakeholder forum, possibly involving NRAs as well as industry, to address issues related to non-discriminatory access to the internet; for example: transparency about service management at user level; best practice exchange about prompt identification of abuses; monitoring impact of application of EU rules in remedying abuses.[36]

The BBC began streaming television content as a mainstream proposition to the Internet in 2006.[37] It created huge controversy as it encoded content at 800 kbps and that content was subject to extreme peak-time congestion: it was live coverage of the European Championships football tournament. The BBC helpfully informed consumers that if they could not access the content properly on their broadband connections, they should contact their ISPs and suggest specific traffic management changes! The ISPs' response was predictable: they began blocking BBC services. The BBC then launched a service called iPlayer on a P2P service, which was controversial not only for creating large peak-time congestion problems, but also because it was initially only available to Windows Media Player users, enraging various Apple and Linux home users. Despite these controversies, the BBC dedication to streaming programming to all licence fee payers has continued.

James Enck reports[38] that Anthony Rose, BBC Head of Digital Media Technology, stated his hope that the industry could now move on to consider issues around ISP incentivization and monetization. The iPlayer team resisted playing out HD content until 2009, due to concerns that the

experience would be unsatisfactory for many consumers, due to contention rates on DSL connections. HD content on the iPlayer is encoded at 4 Mbps. The minimum threshold bitrate for true HD is above 3 Mbps, which would be challenging for a lot of broadband connections and would risk high buffering levels. There is a necessity to ensure the experience is comparable with what HD TV viewers have come to expect.

Rose made a case for the BBC assembling the puzzle pieces for 'others' (presumably ISPs) to build a business model around the iPlayer. He expressed an interest in working with ISPs to develop tiered service offerings to more closely align costs with revenues, as well as to cooperate on technology-based strategies to alleviate pressure on networks. The BBC suggests tiered pricing for live TV, as the obvious solution to bandwidth constraints on the iPlayer service – ISPs should charge end-users more. Rose stated that:

> The future lies in tiered services. What we need to do is to create the iPlayer services at different quality levels and then let ISPs offer different bandwidth propositions to users... Of course, nobody should get a worse experience than today. For example, the user can get a good quality iPlayer service for, say, £10 a month but for £20, a much better iPlayer quality would be available. This can lead to win-win situations and ISPs will see video services as a profit centre rather than a cost burden.[39]

Video is as much a 'bandwidth hog' in the United Kingdom as elsewhere, and the free availability to BBC licence holders of the company's video offerings from early 2007 resulted in serious peak-time congestion issues where several subscribers in each exchange were watching the BBC simultaneously via the iPlayer. Ofcom had carried out a Market Impact Assessment (accompanying the BBC Trust's 'Public Value Test') on the iPlayer idea, to estimate its impact on ISP traffic.[40] The later joint distribution network between BBC Worldwide Ltd (the BBC's commercial arm), Channel 4 and ITV, 'Project Kangaroo',[41] was referred by the Office of Fair Trading (OFT) to the Competition Commission.[42] The concept behind Project Kangaroo was that the CDN for live broadcast video over the Internet be provided via a proprietary P2P client, which would be more efficient than using BitTorrent, for instance, and might provide more ISP cooperation in its distribution. It was effectively vetoed by the Competition Commission following investigation over 2008–9, stating

that it would result in 'substantial lessening of competition in the supply of UK TV VOD content at the wholesale and retail levels', and the PSBs gave five-year undertakings not to replicate its activities.[43] The Commission on 4 February 2009 had concluded that: 'a relevant merger situation would be created if the Joint Venture proceeded; Kangaroo would be likely to lead to a substantial lessening of competition in the supply of UK TV VOD content at the wholesale and retail levels; prohibition of Kangaroo was the only remedy that would address the issue.' As a result, the BBC has embarked on exploration of non-commercial alternatives paid within the licence fee funded part of the BBC, code-named 'Project Canvas'. Canvas will supply catch-up programming via digital terrestrial and satellite TV, and will be open to any other operator on FRAND terms, avoiding the competition problems that scuppered Kangaroo.[44]

Note that the political economy of UK communications is such that it is unthinkable that PSB streams cost extra for the BBC and Channel 4 to distribute with ISP-induced QoS, though the commercial content might be more debatable. Both are funded by a type of universal service tax and other government subsidies (in kind and otherwise) paid directly by the taxpayer. For ISPs to try to breach net neutrality and charge extra or throttle this service would be to deny the taxpayer their public service content. ISPs effectively have to swallow the pain of distributing the content, and therefore there is a radically different environment than, for instance, in the United States.

Commercial Content Providers and Net Neutrality

Let us accept that the ISPs may not be the bad guys. Just as we will see that copyright holders, security agencies, police forces, libel lawyers, anti-paedophilia campaigners and others are pushing ISPs to regulate content that passes over their networks, so content providers may try to make ISPs pay for premium content that their subscribers desire. The street is two-way: net neutrality is as likely to be circumvented by content owners – and indeed governments – as by ISPs. If a provider of live football, baseball or cricket tells ISPs that they must bid for exclusive live rights, just as TV networks do today, the winning provider will presumably enter into agreements for distribution and billing to make that arrangement as agreeable to the end-user as possible. That includes the end-user who is not a baseball fan and does not want her local loop congested by the baseball backhaul. In that case, would an ISP arrange to host as much content as

possible on local servers or even to broadcast to that server by satellite to avoid backhaul congestion? This is no fairytale: ESPN has secured carriage agreements on 60 US ISPs,[45] while several European incumbent ISPs have signed exclusive sports rights deals. Small US ISPs have claimed that discriminatory treatment should be outlawed[46] – a judo move on net neutrality turning it against the major content provider! The cable model is arriving, and net neutrality is being eroded often to the largest content providers' benefit and upon their strategic decisions. Is this a major problem for net neutrality if it boosts the size of pipes for everyone? I would argue that it is not, but will it really boost everyone's pipes, or let you eat your neighbour's congestion?

Take an example from the United Kingdom. Pay-TV operators are in a constant bargaining game with content providers, in which their relative strength depends on the competition between the operators' platforms and the substitutability of the content offer for the end-user. If you need Premier League football and your platform has not struck a deal, then you will not subscribe to that platform, demonstrating the insubstitutability of the product and the bargaining powers involved. It is complicated where the content offer has been purchased by a rival platform, as when Sky TV buys the Premier League highlights. In this case, rival platforms complain that this vertically integrated provider is in a position to exploit its position to their cost. Hence, Sky TV has had disputes recently with BT, Virgin Cable and ITV, in all cases over the supply of premium programming and Sky's perceived domination of the market. The BT dispute was the sole 'Internet' TV dispute and it is worth examining.

BT is obliged to supply backhaul at the same cost to its retail arm as to other ISPs, which means that IPTV is either an expensive option or a non-interactive option (to butcher the definition). BT broadcasts digital terrestrial TV to a set-top box with a hard drive, enabling users to record programmes as required and download specifically requested premium content. It is an ingenious and bandwidth sensitive method of delivering 'near-IPTV'. It is close to a linear continuum, which given the price its own wholesale arm charges is just as well.

BT is unable to negotiate terms for a carriage agreement of Premier League football – famously, it has been said of Englishmen that they follow three main sports: 'football, football and football'. Moreover, Rupert Murdoch described football as the 'battering ram' of his pay-TV business in the early 1990s. It will not be BT's battering ram, not least because Murdoch's Sky owns

the rights (News Corporation owns 36% of Sky, giving it effective control) and it has not yet negotiated a terrestrial deal, let alone for BT's service. BT argues that because Sky is dominant in pay-TV, with a master-and-servant relationship with cable, that therefore BT is caught in regulatory asymmetry: Sky can unbundle BT's local loop for its highly successful Sky Broadband service, but BT cannot access Sky's equally dominant pay-TV content for its platform, because content is not regulated under EC competition law, only under UK law.[47] Briefly, this is because culture is a national competence jealously protected from EC intervention, and the EC regulates the electronic communications networks, not the pay-TV content. This will become very messy when net neutrality comes of age – is it a content or a carriage issue? De Beer is pulling on these tangled threads in the Canadian context, as Gibbons and Woods have done in the United Kingdom.

Content providers with market power can carry out three actions that impede consumer enjoyment of their broadband connection:

1. Refuse to license their technology and prosecute or persecute those who put the content online vicariously – this has been the past decade's policy
2. Cut exclusive deals with pay-TV operators or ISPs for all content, thus preventing the majority of users from accessing the content at any price
3. Distribute the content without regard for network traffic management, thus flooding the local loop and preventing users' enjoyment of their or anybody else's content during peak hours, if not continuously.

Note that each action is motivated by entirely different beliefs and that the third action contributes to net neutrality but not to realistic settlement of the issue. Pipes are narrow and end-users have to be rationed, if not forever, certainly now. The flooding of the ISP network by the BBC iPlayer content is not sustainable in the United Kingdom, and it has acknowledged this by supplying iPlayer content to Virgin Cable by using a TV channel, not the Internet connection. Sensible decisions should be made to ensure that video content reaches end-users without flooding the capacity leased out to all local loop ISPs that are not cable. If not, cable wins by virtue of not having unbundled competitors (a logic employed by telcos in BandX and other decisions in 2003–5 to secure equal deregulatory treatment).

The second option, which is pursued by several European ISPs and content carriers as well as ESPN in the United States, is standard premium content/cable TV negotiation. Is it better to guarantee bandwidth and limit audience

to one network while gaining revenue from an exclusive deal? That is a decision for the content provider, not the regulator, as long as that provider is not dominant. We are in for an extended period in which the business rules for premium content online will be established and it is not my intention to suggest that net neutrality should do more than make clear that the widest possible access is the most advantageous policy for consumer welfare.

Conclusion: Termination Fees for Content Providers

Since broadband ISPs have a termination monopoly or duopoly[48] over the end-user, they can use that to charge termination fees to those who wish to get access to the user. This behaviour is familiar to the cable TV industry, where only large content providers can secure free or even profitable carriage, whereas smaller content providers with less contracting power are forced to pay the cable TV operator for access. The fear is that a similar model will be imposed on the Internet, where only large content providers with sufficient negotiating power and those with political influence to secure favourable carriage terms will secure free carriage. The argument in Europe is particularly pernicious because PSB occupies a position of strong bargaining power with legislatures and regulators. The argument can therefore be characterized as whether net neutrality applies only to PSBs or to other/all content providers? The street is two-way: net neutrality is as likely to be circumvented by content owners – and indeed governments – as by ISPs. In Chapter 2 in the case of governments, and in Chapter 4 in the case of copyright and child protection policy, it is discussed that ISPs are under constant pressure to investigate their traffic and that this threatens to introduce liabilities (and potential commercial benefits) to their business model, with drastic implications for net neutrality.

CHAPTER FOUR

User Rights and ISP Filtering: Notice and Take Down and Liability Exceptions

ISPs whose participation in telecommunications is not content neutral are exposed to the risk of significant copyright liability.[1]
De Beer (2009)

The Three Stupid Monkeys of Cyberspace: Internet Self-regulation

Net neutrality does not mean an entirely neutral net, as we have seen. This chapter explores the public pronouncements which encourage private filtering and censorship of the Internet, its murky legal stature and government attempts to substantially increase the levels of censorship that take place, by encouraging private ISPs to censor their customers. This chapter follows the new developments in copyright liability and video advertising that threaten to undermine net neutrality long before any form of QoS prioritization is introduced. By the end of this chapter, you might have concluded either that the net is so discriminatory and censorious for the average customer that net neutrality is but a myth, or alternately that private actors are engaged in so much censorship – aided, abetted, funded and cheer led by governments – that it is time for its spread to be stopped.

Do DPI and abandoning net neutrality mean we're moving towards a position where ISPs are more liable as they know the content of their subscribers' communications? In this chapter, I consider the iceberg, the nine-tenths of the net neutrality debate that is often hidden from view for telecoms regulatory discussion. This includes information security (which we examined in Chapter 2), illegal and harmful content, the law affecting e-commerce, copyright, privacy, defamation and emerging areas such as video regulation and data retention. ISPs, I used to say, were like the 'three wise monkeys' of cyberspace: they saw no evil, they heard no evil and they spoke no evil. The law recognized this: ISPs had no prior or constructive knowledge of the communications they carried, and if they were informed by Notice they took down potentially liable content (Notice and Take Down or NTD). Like the proverbial 'three wise monkeys', ISPs and web hosting services should

'hear no evil, see no evil, speak no evil'. As mere cyphers for content, they are protected; should they engage in any filtering of content they become liable. Thus, masterly inactivity except when prompted by law enforcement is the economically most advantageous policy open to them. It is argued that courts are too slow to respond efficiently and effectively to the millions of copyright infringements and harmful and racist websites occurring on the net.[2] Subsequently, the regulation of content has been delegated to ISPs. As Nas has put it in regards to the European situation: 'Through the ECD governments have forced liability on ISPs (...), hidden under a black veil of "self-regulation".'[3]

The law does play a direct role in Internet content, as well as its signalling role. The Council of Europe Cybercrime Convention came into force early in 2005, and a protocol to the Convention mainly intended to cover hate speech (European law but vehemently opposed by the US negotiators in the Convention) was signed in 2004 but has not yet gained the ratifications to bring it into force – and will not in the United States. There is here a change of role, in that generally the Council of Europe – a pre-existing human rights body formed in 1949[4] with the signature of the European Convention on Human Rights[5] (ECHR) in 1950 before the European Economic Community was formed in 1955 – issues soft law instruments such as recommendations or conventions that are generally supplanted by European Community law. However, despite the huge body of soft law emanating from the Council of Europe,[6] it is the hard law of the Convention which has led the way. Note also that the Council of Europe, recognizing the difficult boundary between law enforcement and liberty, has in 2007 issued a Recommendation on Freedom of Expression and the Internet.[7]

Let us briefly survey the history of government-induced web censorship. Of course the Internet has always been regulated. As Reidenberg[8] and later Lessig[9] stated, the environment of the Internet is itself a determinant of its physical and virtual boundaries. The software that makes the Internet work is a pre-existing 'law' of the Internet, just as gravity and other laws of motion that regulate the humans who interact via the Internet. But the use of legislative and jurist's tools to regulate the Internet has largely been by means of applying existing offline laws to the online environment: for jurisdiction, for criminal obscenity, for libel, and more prevalent, for copyright infringement. The new development in Internet regulation is the application of offline medium-specific content rules to the Internet. It was a fate that the Internet

escaped in 1996–7 when in the United States and Europe regulators were persuaded not to intervene in the emergent medium (a judgment proved correct with hindsight, by the later adoption of broadband than previously predicted, as companies collapsed in the dot-com bubble – they would have surely collapsed even quicker with liability added).[10] In the Supreme Court's quashing of the Communications Decency Act in *ACLU v. Reno* and the decision of the European Parliament narrowly to avoid extension of the Television Without Frontiers (TVWF) Directive of 1989 to the Internet in its 1997 revision,[11] the regulators gave the new medium a breathing space to self-regulate and otherwise demonstrate its maturity and disprove the need for regulation.[12] That breathing space is now over.

In a 1995 response to the threat of legislation against illegal and harmful material on the Internet,[13] the World Wide Web Consortium began to develop the Platform for Internet Content Selection;[14] the basis of filtering was immediately incorporated into browser software and used to classify web pages by the major ISP portals in the United States – and by default worldwide. The idea was simple: to engineer websites and user software to enable control of content at the device – the end of the network – rather than by ISP or another intermediary. In European debate, the overall regulatory response was considered in a 'convergence' report published in September 1996.[15] This report formed the backdrop for the debates[16] which led to the 1999 proposals for the 2002 communications regulation package.[17] The 1997 Bonn Ministerial Conference Declaration expressed the desire for end-user filtering rather than intermediary liability:[18]

Responsibility of the actors

41. Ministers underline the importance of clearly defining the relevant legal rules on responsibility for content of the various actors in the chain between creation and use. They recognize the need to make a clear distinction between the responsibility of those who produce and place content in circulation and that of intermediaries.
42. Ministers stress that the rules on responsibility for content should be based on a set of common principles so as to ensure a level playing field. Therefore, intermediaries like network operators and access providers should, in general, not be responsible for content. This principle should be applied in such a way that intermediaries like network operators and access providers are not subject to unreasonable, disproportionate or discriminatory rules. In any case,

> third-party content hosting services should not be expected to exercise prior control on content which they have no reason to believe is illegal. Due account should be taken of whether such intermediaries had reasonable grounds to know and reasonable possibility to control content.

This 1996 policy led to the eventual passage of ECD in 2000, which enshrined this principle of the Internet host 'safe harbour' of non-liability. Discussion during the 1997 renegotiation[19] of TVWF[20] led to a recommendation in 1998 (updated in 2006) that continues to serve as the Commission's policy towards content regulation. Further, Commission's legal instruments including ECD maintained the co-regulatory approach to Internet regulation laid out in the 1998 Recommendation.[21] The ECD remains the legal instrument most suited to the online environment, leaving much detailed regulation via codes of conduct to the market actors. It is therefore this novel form of 'code' which joins software code and legal code in the policing of the online world – 'medium law' as I will characterize it. I do not attempt a detailed analysis of the definitions of content in European law, which others have covered elsewhere.[22] The political winds are blowing towards a gesture that will regulate Internet content without regard for its definition. As the competitive telecoms operators group states in regard to Internet video regulation:

> There is a serious risk that … the reality will be considerable legal uncertainty and huge differences in the scope of regulation at national level.[23]

The information in this chapter is supported empirically by two extensive studies I carried out for the European Commission in 2004 (directed by Damian Tambini) and 2007–8[24] (which I directed). It gave the opportunity to examine in depth the private censorship arrangements in Germany, Netherlands and the United Kingdom. I am particularly grateful to the interviewees and relevant team members in the study, for their degree of candour in discussing Internet censorship and government pressures.[25]

Liability for Harmful and Potentially Illegal Content on the Internet

Communication through the Internet requires the passive reproduction and distribution of material. ISPs automatically reproduce and distribute material to subscriber requests. The ISP's computer also makes copies of the

material every time a computer asks to view the subscriber's web page and sends those copies through the Internet. That file does not travel directly to the user. Instead, it generally goes through other computers hooked up to the Internet. Each of these computers makes at least a partial copy of the relevant file. As Yen has described, 'a practically unlimited scope of liability soon follows.'[26] In order that these nodes on the network between content provider and end-user are not all held strictly liable[27] for the web files they continually copy in the act of transmission, legislators in the United States and European Union have held that only a limited liability holds for these intermediaries, typically ISPs.[28] Under NTD, ISPs have the duty to remove illegal and harmful content from the Internet once put on notice by a complainant. The quantity of complaints and websites removed under NTD is unknown, and the process by which ISPs determine whether a website contains illegal or harmful content remains obscure. This raises questions of accountability, transparency and the overall appropriateness of delegating content regulation to private actors under a self-regulatory framework; as in principle this could be seen as a privatization of censorship. Once an ISP disables access to a website the content disappears from the Internet, which is undoubtedly an effective form of censorship.

Noam has shown that consolidation in the Internet industry increased in the United States from about 1996, though most sectors remain competitive.[29] He examines eight sub-sectors: Internet backbones, ISPs, broadband ISPs, portals, browser software, search engines, media-player software and IP telephony. He explains that

> common elements are high economies of scale (scalability) based on the high fixed costs and low marginal costs, and the way they are often complemented on the demand side by network effects (which economists call 'positive externalities').

The value chain is a simple tool to evaluate systematically the full range of activities required to bring a product or service from conception through production to final consumer delivery.[30] In addition, value chain analysis has been extended to analysis at an industry level, encompassing links between firms in a similar manner to links within the firm.[31] The emergence of new technologies will have – and has had – fundamental impacts on the value chain of affected industries.[32] In particular, disruptive technologies[33] have the potential to overturn an existing dominant technology or product, and

in so doing, introduce new value-creating processes, reconfiguring the value chain. This is not to say that bottlenecks and legal constraints do not constrain these new types of enterprise, but their responses are not as uniform, smooth or predictable (in relative terms) as in the traditionally linear, vertically integrated or controlled environments which broadcast and telecoms regulators have analysed.[34] Competition in network markets results in highly volatile and 'snowballing' investment decisions: there is a tendency in networked sectors to reactions swinging from excess inertia to volatility.[35] Competing business models differ in the power of the operator within the value chain, and the feasibility of vertically integrated 'walled gardens'. Multimedia value webs have large enough transaction costs to promote internalization by integration rather than reallocation through market-based relationships. Network operators may expand up the value chain into content provision, and content providers may expand down the value chain into service provision and content aggregation. This has two implications. First, the internalization of functions previously available in a competitive market may increase entry barriers and thus market power. Second, integration may change the amount of liability and regulatory pressure brought to bear (this will be anticipated in integration decisions).

ISPs[36] provide the actual connectivity to the end-user. ISPs are integrated with content services and access suppliers. Most large ISPs provide a default home page 'portal', with news, features and search facility. The largest ISPs are subsidiaries of access providers (local cable or telephone companies). Though other ISPs can access the local loop at wholesale prices, competitors fear that the regulated access price leaves them disadvantaged (note our middle-mile discussion in Chapter 3). Public access, through work, government institution, cybercafe or school and the device itself, is not included in Noam's list, but the filtering software that end-users and these intermediaries rely on is integrated into such software as search engines, media players, portals and especially browser software. Filtering software is now compulsory in libraries in the United States[37] and schools in France,[38] amongst other places – where the state can control public access to illegal and harmful content, it does so.

I briefly examine the legal background as it exists in the United States, but note there are major differences increasing the incentives for a European ISP to take down content without any form of investigation. NTD is formalized under the Digital Millennium Copyright Act (DMCA) 1998 in the United

States, which obliges ISP to take down material whenever they are notified of copyright infringement.[39] The DMCA establishes the NTD procedure as follows:[40]

> The ISP must have a designated agent to receive notices and it must use a public portion of its Web site for receipt of notices;
>
> The ISP must notify the US Copyright Office of the agent's identity and the Copyright Office will also maintain electronic and hard copy registries of Web site agents
>
> Proper written notification from a copyright owner to an ISP must include:
> - the name, address and electronic signature of the complaining party,
> - sufficient information to identify the copyrighted work or works, the infringing matter and its Internet location,
> - a statement by the owner that it has a good faith belief that there is no legal basis for the use of the materials complained of, and
> - a statement of the accuracy of the notice and, under penalty of perjury, that the complaining party is authorized to act on behalf of the owner.

At the same time, DMCA protects ISPs from liability for unknowingly transmitting or storing copyrighted material. It provides 'safe harbour' or immunities to ISPs for infringing action from the ISPs' users under four circumstances:[41]

(1) The ISP acts merely as a conduit, unknowingly transferring infringing materials.
(2) The ISP temporarily stores infringing materials for the users' convenience.
(3) The ISP acts as storage for infringing material, except when 'the ISP knows or should know, or financially benefits from, the infringing material'.
(4) The ISP uses information location tools, such as hyperlinks, to find infringing materials unless the ISP has actual knowledge or received notice of the infringing materials.

ISPs are still liable for their direct infringement, but they cannot be held liable for contributory or vicarious infringement. However, even though the DMCA establishes more clarity than the ECD it is nevertheless criticized for taking

a 'shoot first, ask questions later' approach. It should also be noted that the DMCA only applies to copyright. In other areas of 'harmful content' there exists a patchwork of regimes: for non-intellectual property speech, such as defamation, ISPs have immunity from liability under the Communications Decency Act Section 230; child pornography seems to have its own set of rules with active ISP filtering permitted by omission. However, Wendy Seltzer, former staff attorney of Electronic Frontier Foundation stated: 'I do think that the DMCA safe harbor has caused a lot of self-imposed censorship on copyright claims', because

> when NTD is implemented by service providers to take down material on the mere allegation of copyright infringement, with no proof that any infringement has occurred, or when individuals take down sites based on overblown threats, speech is chilled. The chilling effect is when the take down happens before judicial determination of infringement.[42]

Note that government can intervene directly under court order on consumer protection grounds, but it does so in the case of more grievous public order cases. A recent example is action on 4 June 2009 by the US Federal Trade Commission (FTC) which announced that it had taken the following action:

> A rogue ISP that recruits, knowingly hosts, and actively participates in the distribution of spam, child pornography, and other harmful electronic content has been shut down by a district court judge at the request of the FTC. The ISP's upstream providers and data centers have disconnected its servers from the Internet.[43]

It was alleged that the ISP 'actively recruits and colludes with criminals seeking to distribute illegal, malicious, and harmful electronic content including child pornography, spyware, viruses, Trojan horses, phishing, botnet command and control servers, and pornography featuring violence, bestiality, and incest. The FTC alleges that the defendant advertised its services in the darkest corners of the Internet, including a forum established to facilitate communication between criminals.' It also is alleged to have ignored NTD requests, shifting criminals to other IP addresses, and 'engaged in the deployment and operation of botnets', groups of remotely controlled infected computers.[44] FTC also alleged that Pricewert/3FN controlled over 4,500

malicious software programs, distributing 'malware includes programs capable of keystroke logging, password stealing, and data stealing, programs with hidden backdoor remote control activity, and programs involved in spam distribution'.[45]

In the United States, liability regimes have differed according to speech-based and copyright-based liabilities. The Communications Decency Act 1996 provides that 'No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider.'[46] Yen states:

> the general philosophy motivating these decisions – namely, that the liability against ISPs for subscriber libel would result in undesirable censorship on the Internet – remains vitally important in assessing the desirability of ISP liability.

Holznagel has indicated that US courts have applied these 'safe harbour' provisions to widely protect ISPs, even where (a) it was aware of unlawful hosted content, (b) it had been notified of this by a third party, [c] it had paid for the data.[47] Frydman and Rorive observe that courts 'in line with the legislative intent … applied the immunity provision in an extensive manner'.[48] The research project on NTD that Ahlert and I reported in 2004 attempted to shed light on ISP self-regulation differences in response to the US and EC legal frameworks. In the United States, the absolute speech protection of the First Amendment and procedural concerns mean that NTD is counter-balanced by 'put back' procedures, whereas in Europe no such protection of free speech exists, where speech freedom is qualified by state rights. In both jurisdictions, Frydman and Rorive state that '[NTD] may lead to politically correct or even economically correct unofficial standards that may constitute an informal but quite efficient mechanism for content-based private censorship.' It is clear that the economic incentive for ISPs is to remove any content notified, otherwise do nothing to monitor content, and let end-users, the police and courts, and ultimately the ethics of the content providers decide what is stored and sent over their access networks. Frydman and Rorive state that:

> Business operators should never be entrusted with … guidelines defining the limits of the right to free speech and offering procedural guarantees against censorship … which belong to the very core of the human rights of a democratic people.

That is nevertheless the situation which ISPs seek to self-regulate.

In Europe, 'safe harbour' protection of ISPs from liability was established by the ECD. ECD is less defined than the US framework, for two reasons:

- It does not provide an exemption from liability, if the ISP acts according to a clearly defined procedure. This would remove the burden of investigation and judgment of the ISP, and transfer it to the parties involved, the complainant and the content provider.
- It does not create an incentive for the ISP to properly investigate whether content is illegal, but rather to remove the content expeditiously.

Article 14.3 leaves Member States to ensure that self-regulatory NTD procedures are established, and Article 21.2 provides that, when the Directive is next re-examined, the issues to be analysed will include the NTD procedures and the attribution of liability following the taking down of content. The basics of ECD are that Article 12 protects the ISP where it provides 'mere conduit' with no knowledge of, nor editorial control over, content or receiver ('does not initiate [or] select the receiver'). ECD Articles 12–14 provides for limitations of liability of intermediaries providing services consisting of mere conduit,[49] caching[50] and hosting.[51] Article 15 prevents Member States from imposing on Internet intermediaries covered by Articles 12–14:

- The general obligation to monitor the information which they transmit or store
- The general obligation actively to seek facts or circumstances indicating illegal activity.

The prohibition to impose on ISPs any general monitoring obligation avoids costs on these ISPs and consequently ensures lower cost of access to basic services for users. Frydman and Rorive establish that it was based on the 1997 German Teleservices Act, though with 'slightly more burden on the ISPs in comparison with the former German statute'.[52] Where ISPs provide hosting services, under Article 14 they are protected from liability, in two ways:

[a] the provider does not have actual knowledge of illegal activity or information and, as regards claims for damages, is not aware of facts or circumstances from which the illegal activity is apparent; or

[b] the provider, upon obtaining such knowledge or awareness, acts expeditiously to remove or to disrupt access of the information.

Frydman and Rorive state 'undoubtedly the Directive seeks to stimulate co-regulation'. It does this by formally permitting national courts to over-ride the safe harbour in the case of actual or suspected breach, of national law, including copyright law and certain types of illegal content, such as hate speech or paedophilia.

Under NTD, hosting parties remove content in case of a legitimate notice by a third party, without a court of law establishing proof of illegality. Do ISPs have to determine whether or not a complaint is legitimate?[53] The drawback of NTD is a quandary for the ISP. To strictly investigate all claims is expensive, in legal and forensic resources, whereas compliance is self-serving, cheaper and easier. The ISP may remove content immediately upon notice.[54] The ISP is encouraged to become a blind censorship body on behalf of lawyers for rights holders and other aggrieved professionals. ECD contains no standard NTD procedure, even though a framework is established for self-regulation – a bargain in the shadow of the law. The reference to the scheme can be found in Article 14.3, Article 21.2 and Recital 46, which reads:

> In order to benefit from a limitation of liability, the provider of an information society service, consisting of the storage of information, upon obtaining actual knowledge or awareness of illegal activities has to act expeditiously to remove or to disable access to the information concerned; the removal or disabling of access has to be undertaken in the observance of the principle of freedom of expression and of procedures established for this purpose at national level; this Directive does not affect Member States' possibility of establishing specific requirements which must be fulfilled expeditiously prior to the removal or disabling of information.

The key provision here is the establishment of the concept of 'actual knowledge'. ISPs argued in favour of being mere conduit providers, without any liability regarding the content passing or being hosted on their servers, because of the impossibility of screening all content and subsequently judging what might be illegal or harmful. The ECD, though maintaining the mere conduit principle, limits this principle substantially, because when an ISP now 'obtains actual knowledge' of a site containing infringement, it must act 'expeditiously to remove or disable access to the information concerned'. Critically, whereas in some cases it might be easy to define what 'actual knowledge' means, in many it might not, and when an ISP receives a notice from a hotline it may

simply treat the complaint as actual knowledge and remove the content. This defers responsibility for judgment to 'hotlines', which might be better trained for such an investigation. What constitutes actual knowledge remains undefined, including for instance whether it must be a letter with proof of the identity of the complainant. The term 'awareness' seems even vaguer. Article 14 establishes the concept of 'apparent' illegal content, which the ISP needs to remove expeditiously, if made aware. Nas notes:

> what expeditious is, or how 'apparent' can be construed in a universally understandable and predictable way, is left open to the market … left to this self-regulation, providers don't see much space to refuse requests to take down offensive, damaging or illegal content.[55]

ISPs are obliged neither to publish statistics nor to justify their actions. Nas further points to commercial pressures, which force ISPs to observe risk-avoidance so they rapidly take down.

ECD does not specify the essential information that a notification should include, leaving the matter to be settled by agreement between business operators. Instead, it encourages the national marketplace to produce its own standard procedure.[56] RightsWatch was a multistakeholder project funded by the European Commission in the period 2000–2 to standardize the NTD procedure in six steps: location, notification, verification, information, take down and confirmation; yet, it failed to reach consensus between the participating stakeholders (ISPs, civil society, rights holders, academics) on how NTD ought to be coherently institutionalized.[57] The Code of Practice of the UK ISP Association (ISPA) mentions the complaint procedure, but it does not directly refer to the NTD procedure. All major ISPs in the United Kingdom have agreed to 'use their reasonable endeavours to resolve a complaint within 10 working days of receipt of notice be it by email, letter, telephone call or in person', but make no data available about type and number of complaints and how fast, or slow, and how they react to those complaints. The only provision that can be found in this regard aims at protecting ISPs from too much government interference: it limits the liability of ISPs:

> it is the role of the Government to engage in any filtering or censorship process above the consumer level. It should not be the responsibility of a Member to determine the legality or suitability, filter or otherwise

> restrict reception of, or access to, material save where such action is taken following an identified breach of the Code of Practice.[58]

Furthermore the Code lays out another rather political statement as opposed to a guideline, which would serve to help individual ISPs in their decision-making process:

> ISPA UK supports its members in any independent decision taken by the member to proactively limit the accessibility of illegal material via its service, but strongly states that no greater legal burden, standard of care or obligation should be placed on the member who takes such action than is placed upon those members who do not take such action.[59]

The lack of standard NTD procedures poses several problems. First, ISPs are not able to know whether they are properly informed, whether the information (complaint) received is correct (founded) and whether they can face liability claims by web page creators when their pages have been shut down,[60] and it is established ex post that the content was neither illegal nor harmful. Consequently there is potential shortcoming in the protection of freedom of expression and Baistrocchi suggests the current regime may actually promote unfair competition in some situations[61] where companies engage in a form of commercial war on the Internet, putting bad faith claims against their competitor's Web content.

NTD Effects: Shoot First, Don't Ask Questions

Self-regulation is expensive, and businesses must see a clear benefit in order to support it. Costs include direct costs such as salaries of regulatory staff, which need to be spent to monitor, promote or enforce. There are also indirect costs of self-regulation such as opportunity costs, and markets that are foregone. There will always be more directly profitable activities, which provide more benefits in the short run than those enjoyed as a result of the careful long-term investment into self-regulation. Hence it seems reasonable to speculate that the more costly the particular self-regulatory activity is, measured against the benefits, the less likely a business is to invest the needed resources to (in the case of ISPs) provide a proper balance between potential liabilities and freedom of expression.

If the webmaster of a major e-commerce site uses his servers for P2P music or video files, a very likely scenario, and the ISP which hosts this business receives a notice by a rights holder, will the ISP dare to block the whole website? Industry is willing neither to discuss NTD nor to provide insightful data on it. Hence, self-regulation in this area, which can have drastic consequences for freedom of speech, is neither transparent nor, subsequently, sufficiently accountable. Very little is known about the overall impact of NTD on Internet content. ISPs are not willing to provide data regarding frequency and types of notices and how they react. XS4ALL, known for its openness in dealing with the regulation of ISPs, reports:

> In the first six months of 2003, XS4ALL received a total of 750 serious copyright-related complaints: that is 31 complaints per week, or four and a half per day. The majority of these complaints are about straightforward infringements of copyright, and can be dealt with pretty easily. The remaining 10 per cent of the complaints however, demand a huge amount of time and attention from highly skilled legal professionals.[62]

Nas noted further:

> [In 7 months of 2003] out of the total 750 complaints, 681 stem from four large right holders, which amount to about 90 per cent. Most of these complaints are about FTP servers, usually on ADSL-nodes, about Usenet postings and sometimes about websites and home pages.

The responsibility for regulating content on the Internet has been transferred to private companies without developing proper criteria defining the duties and rights of the ISP, the complainant and the content provider. The procedure is open to abuse and creating doubts about its fairness, transparency and accountability and raising questions likewise about the effectiveness and desirability of self-regulation in this area. NTD is not transparent. Neither is there any information available on how many websites, chat rooms or blogs have been taken down, nor according to what criteria the ISP investigated, or how the content was actually removed; which is significant as an ISP has several means available to block access to websites. These range from:

- 'soft' measures, which block access to anybody, but the content provider – leaving him time to respond and remove the section of the website subject to the complaint – to

- 'hard(er)' sanctions, which can result in overblocking. ISP's can potentially block access to an IP address entirely, making thousands of individual websites unreachable.

Neither the ECD, nor Cybercrime Convention, nor national laws in the European Union specify in detail the process of NTD, leaving ISPs in an uncertain legal environment. Measured against the potential impact of the actions of an ISP on accessibility of information and on freedom of expression and speech, the legal situation under which ISPs operate NTD is worrisome. The ECD regulatory settlement has created an environment in which the NTD incentive is higher than the potential costs of investigation and liability. ISPs are not surprisingly taking the path of least resistance. There are several loopholes in applying the NTD procedure in the European Union. How are effective safeguards ensured to protect ISPs from acting on *wrongful take down?* How are responses prioritized for copyright infringement and other claims of differing degrees of seriousness? Also, it is worth considering what type of liability is imposed upon the sender of unfounded notices to ISPs which lead to the take down.[63] These issues need to be addressed in Directive Revision.[64]

Medium Law Explained: The AVMS and Regulation without Frontiers

Is content delivery converging such that only one medium's regulation matters? That medium is the broadband Internet, and the growth of audio and video over this medium means that the Internet may no longer be treated as an extension of the print medium that was its roots. The consequence is that self-regulation of the Internet may be replaced by something much closer to a merger of printed press and audiovisual regulation. We may be seeing the 'regulation of the Internet'. European legislators signalled their intent to regulate the Internet via the 2007 AVMS Directive[65] combined with the 2006 Recommendation on the Protection of Minors[66] (EU). The European Commission is determined to fulfil its cultural and economic goals in ensuring that the unregulated Internet is not able to substitute for the broadcast audiovisual environment. As the Internet grows in power, it also grows in scrutiny. The European Parliament passed a 2005 Resolution expressing that it:

22. Considers that the revision of the Directive should ensure the development of new technologies and new services, in order to

secure the growth of the European economy in accordance with the Lisbon strategy;

26. Is concerned about the pressure to reduce regulation in this sector and recalls that the Directive establishes minimum standards which have not succeeded in preventing deterioration in the quality of programmes.[67]

TVWF[68] was the main EU legislative instrument about broadcasting. It dates from 1989 and has been revised once, in 1997. The TVWF places every TV broadcaster under the jurisdiction of one member state, which is required to impose certain minimum standards on the broadcaster's programming, and all the other Member States are required to ensure free reception of its TV broadcasts: the 'Country of Origin Principle'. TVWF affected only licensed broadcasters directly. AVMS[69] regulates two types of video providers: linear and non-linear. Linear providers will be regulated according to a revised broadcast regime and will encompass both traditional broadcasters and providers of IPTV. AVMS encompasses all commercial media services offered over the Internet, mobile networks, telecoms networks, terrestrial, cable and satellite broadcasting networks, or over any other electronic network whose principal purpose is the provision of moving images to the general public. This could touch on the provision of multimedia services over all forms of video communications. The AVMS will affect a very broad range of stakeholders who formerly were unregulated or regulated by the ECD;[70] thus, it is applied to an industry whose structure is both more complex and more dynamic than the traditional industries of broadcasting or telecoms, and one in which the effects of regulation may have significant impact on the eventual industry structure that emerges. In some cases, the natural response by the market to heavy regulatory burdens and/or increased regulatory risk may be to increase this rate of integration, and hence to make the market structure less competitive and open than would have been the case otherwise.[71] AVMS may increase 'walled gardens' and make the case for countervailing net neutrality openness more pressing.

The definition of 'audiovisual media service' is built on six elements in Article 1(a) of the AVMS (Recitals 13 to 17). 'Audiovisual media service' means:

- a service as defined by Articles 49 and 50 of the Treaty of European Union
- the principal purpose of which is

- the delivery of moving images with or without sound,
- in order to inform, entertain or educate,
- to the general public
- by electronic communications networks.[72]

Article 1(b) defines 'media service provider' as those who hold editorial responsibility. Table 4.1 indicates the Commission's interpretation of excluded services from the scope of the definition. Both scheduled linear programming and VOD services (non-linear content) are to be subject to a set of prohibitions or restrictions on offensive content (inappropriate for children, racist or xenophobic) and forbidden commercial content (including types of advertising and sponsorship). Article 1(c) defines a linear audiovisual media service as a service 'where a media service provider decides upon the moment in time when a specific programme is transmitted and establishes the programme schedule'. This equates it with 'television broadcasting' and 'television broadcast'. Linear services include scheduled broadcasting via traditional TV, the Internet or mobile phones, which 'pushes' content to viewers. It also includes all recorded and therefore delayed linear content, whether recorded on PVR or other means. Article 1(e) defines a non-linear service as an audiovisual media service where the user decides on the moment in time when a specific programme is transmitted on the basis of a

Table 4.1 Exclusions from AVMS Definitions

Defining element	Exclusions
Services as defined by Articles 49 and 50 of the Treaty	Non-economic activities, such as *purely private* websites, weblogs (blogs)
The principal purpose of which is	Services where audiovisual element is *only ancillary* (example: travel agency website, gambling websites)
Delivery of moving images with or without sound	Does not cover audio transmission or radio or *electronic versions of newspapers*
In order to inform, entertain or educate	Audiovisual content *without editorial aspects* – e.g. traffic webcams
To the general public	Private correspondence – e.g. emails
By electronic networks[73]	e.g. DVD rental, cinema

choice of content selected by the media service provider. Non-linear services include on-demand films or news, which the viewer 'pulls' from a network, and exclusions are shown in Table 4.1.

TV broadcasting rules would apply to linear services, whereas non-linear would be subject to a basic set of minimum principles, e.g. to protect minors from inappropriate content, to prohibit certain types of advertising. The linear/non-linear (or push/pull) distinction depends upon who decides when a specific programme is transmitted and whether schedules exist, differing degrees of regulation of content 'pushed' by suppliers or 'pulled' by users reflecting differences in user choice and control. VOD 'non-linear' services would be subject to less regulation than traditional TV 'linear' services, but more controls than the general law. Where the viewer actively requests ('pulls') the individual video file on demand, this is considered a non-linear use of video. This latter type of service would be regulated according to minimal standards, lighter than linear 'broadcasting' regulation, but still encompassing a wide range of prohibitions against particular types and durations of advertising, other commercial communications, different types of expression and so on. The definitions do not exclude video blogs, interactive computer games or delivery over mobile networks. Non-linear content is to be regulated subject to minimum rules. Therefore it is not subject to the highly complex set of linear rules but to a set of prohibitions on offensive content and forbidden commercially driven content (including advertising that is inappropriate for children, racist and xenophobic material, and certain types of sponsorship). This is not dissimilar to the rules in the ECD and the Annex to the 1998 Recommendation.[74]

At the 2005 Liverpool Audiovisual Conference, Ofcom's Chair stated:[75]

> Ofcom's concern is that the practical benefits to producers of a harmonized regime may be finely balanced in comparison with the costs of additional regulation … as the Commission itself has repeatedly acknowledged, many, possibly all, of these benefits can be achieved through the empowerment of consumers to protect themselves through mechanisms such as rating, filtering and parental controls, coupled with effective industry initiatives to block access to some forms of material. We need to avoid regulatory double-banking.

The European Commissioner's response protests too much:[76]

> I have heard and read here and there, that Brussels intends to regulate the Internet, to introduce new red tape. Frankly, this is nonsense! Never ever has the Commission had such a foolish idea! But let me ask you some questions: who in this room is in favour of child-pornography on the new media? Who stands for the freedom to spread incitement to racial hatred on the new media? If one of the service providers present here in this room considers that these abuses are just business-as-usual, he should stand up and take the floor. It is the duty of the Commission to propose a framework under which these **shared European values** are protected. **But I have no intention to 'regulate the Internet'!** (emphasis in original)

Other politicians in the room remarked that, even for elected politicians rather than regulatory specialists, these Cybercrime Convention[77] comments (therefore irrelevant for economic legislation fora) were at least five years' out of date for European rhetoric, and pre-*ACLU v. Reno* for US politicians. This regulatory approach is, however, firmly rooted in co-regulation, in new forms of self-regulation underpinned by legislative foundation and in the possibility of intervention by the regulator.[78] Co-regulation is therefore the approach proposed by the AVMS, in similar terms to the extremely detailed piece of 'soft law' that is the 2006 updated recommendation. This latter piece of 'political signalling' (a recommendation has no binding force) is intended to address the online industry by reference to its self-regulatory mechanisms.

The principle of proportionality applies: the costs of regulation should be proportional to the benefits of enforcement. The EC stated that AVMS is binding as to the result to be achieved but leaves to the national authorities the choice of form and methods. The definition does not lay down exclusions or how 'light-touch' regulation should be applied, so national implementation can vary significantly. Horlings et al. stated that: 'Regulation can only be effective with flanking self-regulation and technological and other instruments to protect viewers.'[79] The viewer/consumer choices and investment decisions of firms will be affected by the regulatory environment. The AVMS as proposed leaves substantial leeway to Member States to adopt different regulatory approaches, whether lighter touch or otherwise. Consider three types of regulatory regime:[80]

1. *'Heavy' regulation* – a system imposing uniformly high costs. This is the current broadcast regime, although naturally these high sunk compliance costs for companies are not uniform across Member States. Broadcast contextual regulation can be considered as the highest cost case scenario extended across all platforms and requiring compliance function, with the possibility of strong regulatory response to breach.
2. *Light-touch regulation* – in which companies can take full advantage of the single European market from a liberalized and low-cost base. In many respects, this is an ideal scenario.
3. *No specific regulation* – but general civil and criminal law which can be applied to specific communications case studies.

The latter has been the situation for Internet content since its inception, despite a variety of new laws. The application of criminal law in specific European cases has resulted in unintended consequences and content provider losses: consider, for instance, the German conviction of former Compuserve general manager Felix Somm,[81] or the *cause célèbre* French case of Yahoo! and its online Nazi memorabilia auctions.[82] There is no 'no regulation' option without reference to national law. Indeed, criminal law prosecution is possible even in countries where there is the specific civil law remedy of regulation. AVMS does regulate the Internet, for particular content types, but it is not unique in so doing. For instance, the areas of harmful and unsuitable communications, racism and xenophobia are addressed by a range of legal measures.[83] A recent EU report[84] expressly addresses the boundary between freedom of expression and racism and xenophobia and explains the complex legal situation with regard to international law.[85] Internet video companies are not operating in a legal vacuum, but the possibility of criminal or other court enforcement of general law is at once a less common but more expensive alternative to regulation and self-regulation. Although the United Kingdom has established an effective co-regulatory solution to block UK-originated child pornography, other countries such as the United States rely on criminal prosecution.[86]

UK Policy: Government, Parliament Recommend More NTD

It would take an entire book – indeed the European research project – to begin to map the various European self- and co-regulatory policy initiatives since 2000, which have gradually moved ISPs into a position where they act as filters and censors for much of the Internet content accessed by consumers.

In focusing on the ECD and AVMS, I have given some idea of the tensions arising, but these are far more pronounced in for instance the co-regulation of paedophilia and suicide sites in Scandinavia and the United Kingdom, the co-regulation of search engines in Germany and many other emerging issues. In February 2009, for instance, Reding announced a new self-regulatory code for social networks, the beginning of their sectoral regulatory journey.[87] Given that it is a code which will be monitored for implementation by the Commission, as Reding describes it is as close as can be imagined to co-regulation:

> The Commission convened a Social Networking Task Force in 2008… The Commission acted as a facilitator for bringing together all these stakeholders and also contributed to gather input from a wider range of organizations through a public consultation run in summer 2008. I am happy to announce that today we will witness the signature of the first European agreement on safer social networking by some of the most popular players on the European market.. I believe this is a very important step forward and it comes at a time when other countries have also taken action in this field – and I am now thinking about the agreements MySpace and Facebook reached with the state attorney generals in the United States, as well as at the UK Home Office Social Networking guidance approved in April 2008.[88]

Reding states the continued activity in the area:

> The industry will provide the Commission with a self-declaration on their individual safety policies, specifying how they implement these principles, by April 2009. For transparency, they will also make public the non-confidential part of this information. The European Commission intends to monitor what we hope and expect will be continuing progress in the development of safety measures, as well as efforts to implement these measures effectively and in a transparent way. We will come back to this agreement and evaluate the progress made in a year's time.

To give a flavour of national-level policies, consider UK policy in the 2007–8 period. Dr Tanya Byron, a television personality and child psychologist, was appointed in September 2007 by the Prime Minister to lead a review into

'Child Safety on the Internet and Computer Games', reporting after a six-month investigation in March 2008.[89] Note that the review did not consider illegal material within its remit: the content at issue is legal content. The review was created in response to increasing calls by ministers for tighter regulation of these technologies to 'think of the children', notably by Patricia Hewitt, when Secretary of State for Trade and Industry, and Home Secretary Jacqui Smith in a series of calls for involuntary (sic) self-regulation of the Internet, to protect against various perceived threats. This use of the precautionary principle to attack the previous speech freedoms on the Internet culminated in policy terms with the Byron review and its conclusions. The review was feared by the industry and dubbed the 'Supernanny review', after an infamous television programme. It was feared that the review would lead to greater regulation being imposed upon the industry, under the 'Nanny State' tendency, as Margaret Thatcher described the propensity towards state-directed parenting in the absence of proper individual parenting skills. This fear was heightened by the decision to base the review under the Department of Education (as renamed), with a remit to increase the responsibilities placed on teachers as substitutes for parents who neglect their role. Notably, no serious discussion about freedom of speech and the basic principles of the Internet was heard, and the ministries responsible for Internet content and regulation, Industry and Culture & Media, played a secondary role.

The conclusions produced by Byron were:

- enforced self-regulation by the industry;
- a beefed-up version of the existing multistakeholder consultation body which, instead of having a community policing function inside the Home Office, would now report to the Prime Minister;
- far greater resources for media literacy expended by the sponsoring ministry, the aforementioned Department for Education, instead of the function falling mainly to the independent regulator Ofcom; and
- finally and bizarrely, a system whereby the existing rating systems for games would be supplemented by the statutory regime for films, such that any games package would contain both ratings, one on the front and the other on the back of the game (later abandoned by government in favour of the European self-regulatory scheme).[90]

The results of the review were actually greeted by industry with some relief, as they had feared a much more interventionist approach. In fact, the outcome

is effectively state regulation under the rubric of self-regulation, and with it significant erosion of speech freedoms for adults, in addition to the target of children. It mixes elements of the Australian, French and Francophone European approaches. In effect, state oversight of Internet and computer industries is foreseen.

The review takes little account of economic arguments, unsurprisingly. The Internet and computer games served functions which favoured innovation as well as freedom of speech, a fortuitous and designed outcome. By interfering quite radically in the speech and market freedoms of UK ISPs in this globalizing industry, the review may erode British competitiveness in as much as it considers this possibility. A spurious claim that Britain can lead in introducing child-safety software blithely ignores the fact that the approach proposed follows the earlier interventionist approaches, rather than in any way leading. It is a further erosion of the already massively declining British computer games design industry, which had in the early 1990s been pre-eminent.

So in what way is it least bad? First, it wrestles this co-regulation away from the Home Office and therefore the police function, though there is reference to the need to deal with suicide sites, suggesting further intervention. Second, such an initiative reporting to the Prime Minister inevitably became politically marginalized as weightier matters of economic recession and General Election loomed in 2008–9. Finally, its very personal identification as the result of a policy alliance between a deeply unpopular Prime Minister attempting to demonstrate his human touch, and a media figure, means its half-life is even shorter than that of the French design on which it is clearly based: the 'Forum des Droits sur l'Internet' chaired by Isabelle Falque-Perrotin.

It is evident from Impact Assessment in the table at Paragraph 3.121 of the Byron Report that the civil servants have persuaded the project to adopt six options: 'do nothing', the 'holy trinity' (regulate/co-regulate/self-regulate) and two agency options: a new agency and Ofcom. Byron dismisses agencies as too independent of government and therefore unable to exercise political influence to engage disparate departments in 'joined up government'. This also prevents self-regulation, while regulation is too inflexible. Therefore, 'on balance' – though no formal method has ever been revealed for this impact assessment outcome – the Byron decision is to transfer the Home Office Internet Safety Taskforce into the 'multi-stakeholder council', the Council for Child Internet Safety. Byron states at Paragraph 3.122: 'this, broadly speaking, is a self-regulatory approach with industry and government

working in partnership.' Crucially, she states that 'the Council would need to think carefully about who was best-placed to monitor compliance with industry standards.'

Chapter 4 of the report explains its approach: enforced self-regulation – which Byron admits means that non-UK actors cannot join in the full work of the strategy. So what censorship and codification is envisaged? 'I do not recommend that the UK pursue a policy of blocking non-illegal material at a network level at present. However, this may need to be reviewed if the other measures in this report fail to have an impact on children viewing inappropriate content.' Regarding the ECD, she suggests that companies 'should not hide behind the law' when they could monitor content beyond the Article 14 protections:

> It seems fair for companies to balance the benefits of making their sites safer for children, and the added value this brings to their brand, against the risk of liability.[91]

She suggests all computer buyers must receive filtering software pre-installed, as in France: 'since 2004, the French government has required all ISPs to provide their customers with filtering software'. There is a stick to this voluntary system:

> if these approaches, which seek to engage parents with the issues and available tools fail to have an impact on the number and frequency of children coming across harmful or inappropriate content online within a three year timeframe, I suggest that Government consider pursuing a policy of requiring content filters on new home computers to be switched on by default.[92]

Parliament followed up on Byron's report, and stated that social networks must do better, warned networks to move from 24-hour take down to a much more rapid response, which will be much more expensive, though any cost–benefit impact assessment is absent:

> We recommend that Ofcom or the Government should set out their interpretation of when the ECD will place upon ISPs liability for content which they host or to which they enable access. … Government should

> be prepared to seek amendment to the [ECD] if it is preventing ISPs and websites from exercising more rigorous controls over content … We recommend that proactive review of content should be standard practice for sites hosting user-generated content.[93]

Ministers are planning to introduce rules to make websites carry age certificates and warning signs on films featuring sex, violence or strong language. Then-Culture Secretary Andy Burnham in 2007 said he wanted online content to meet the same standards required for television and the cinema. Burnham used the example of the BBC iPlayer which carries content warnings on programmes screened after the 9 pm watershed and allows parents to turn on a 'parental guidance lock' to stop youngsters accessing inappropriate material.[94] Most impressive of all, for those interested in overturning the entire ECD, is the suggestion by UK children's charities that the consumer Internet should be compulsorily filtered.[95]

The Changing Role of ISPs: Wiser Monkeys or Wider Liability?

Hackers may rule their own domain, but on the consumer mass Internet, ISP rules catch most users most of the time (just as speed cameras catch enough speeding motorists to have their intended deterrent and revenue-raising effects). The 'Myth of the Super-user' was identified by Ohm.[96] The super-user myth needs debunking to have any serious conversation about the subject of this book, what consumer ISPs may or may not do to regulate the behaviour of their users. While educated users are able to work round almost any technical filter, the average user cannot – and is trapped. This reasoning is what led the Paris court to approve filters placed in Yahoo! France users in the infamous 'Nazi auction' case of 2000 (and onwards, as appeals in both France and California by Yahoo! lengthened the process). Just because some users can evade the filter, mostly who are members of or similarly constituted to the first highly computer-literate Internet users who invented the norms of Internet use back in the libertarian early or pre-commercial days, does not mean that governments and ISPs cannot regulate the vast majority of users. The super-user is an outlier, not a predictor of the future of the mass user. Filters will create substantial censorship for the average user, while not affecting those sophisticated miscreants who choose not to be caught.[97]

This reasoning is critical to what follows. If most users follow defaults and do not attempt to outflank the protections built into the computer's hardware, software or the ISP and other hosts' architectures, then the ISP's rules 'stick'. While perhaps millions of people have bought 'hacked' iPhones for use on other networks than those they locked into, billions have followed the default privacy settings installed on their computers or mobile phones by manufacturers of hardware and software. The implications of this 'lazy consumer'[98] are profound, in two opposed but inter-related ways. First, policymakers should not seriously expect users to exercise consumer sovereignty in any meaningful way – consumers will do what they are told, more or less. Second, policymakers should not expect users to abandon their new-found conveniences and return to old methods of doing things just because a law is passed mandating that. The reasons for consumer reuse of copyrighted material are many and do include monetary considerations. But that is not the primary motive for many: it is because it has been more convenient to find and download a song using free services than those that are paid for. When entire catalogues of songs are refused to legitimate[99] commercial services (most infamously The Beatles and Monty Python[100]), it is no surprise that users prefer to use a more comprehensive 'one stop shop' service. In the same way, users looking for a 2-minute clip of a TV programme are not likely to return to buying a copy of the programme for $20, searching through the chapters and playing on a region-restricted device the clip at the end of that process. They will continue to use 'YouTube' (or whichever service offers the best search and higher-quality playback in years to come). That is not rebellion against the law in any thoughtful way – it is use of the laziest technology to achieve their immediate satisfaction.

What does this mean for net neutrality? It appears that ISPs can then exert rules that will be generally followed by users. They will have more of a struggle against an alliance of users and application providers who are providing what users actually prefer to the existing legitimate channels of delivery. So taking on YouTube may be a recipe for disaster as it marries the lobbying and commercial power of Google with the billions of users. The same applies to Skype and to the BBC iPlayer. However, when it comes to the 'freetard' debate, then ISPs may have a chance of success. Articles 12–15 of the ECD do not currently apply to other intermediary activities such as the provision of hyperlinks, search engines and data aggregation services.[101] However, laws in Germany, Norway and other places have led to pressure

on search engines and social networking sites, especially, to self-regulate in a more formal manner than previously. Expect regulation to increase rapidly in line with political judgments that control is safer than freedom of speech.

The overwhelming case presented is that government favours more private censorship with loose – and therefore largely unenforceable – links to the government, but very strong policy and informal bonds. It presents an uncomfortable model for the type of censorship possible using QoS and other non-neutral Internet filters. Lessig sums up the problem of using ISPs and others to catch copyright and other infringers, in Remix: 'We wage war against our children, and our children will become the enemy.'[102] I followed Lessig when arguing at the time the UK Creative Commons licence was published:

> They break the law and refute its purposes. This is both very damaging for the credibility of digital media businesses, but [also] mass digital civil disobedience.[103]

Whether we are right or wrong, the idea that ISPs should police copyright violators without a court's intervention is against the basic tenets of freedom of expression and due process, raising constitutional issues that will reappear in Chapters 5 and 6.

Derek Bambauer and Lilian Edwards have independently drafted principles for governments such as Australia and the United Kingdom on how to censor: 'any filtering or blocking ought to be transparent, open, democratically determined, judicially backed, and accountable.'[104] The standards raised by Byron and others should be judged against these principles. The principles raise serious challenges for future ISP regulation: can ISPs maintain a semblance of non-liability in the face of overwhelming political pressure to examine content? If they bow to this pressure, net neutrality cannot possibly be maintained. Once the monkeys start to record our conversations, their liability for the content increases, and their need to censor us rises with that. The monkeys appear to be opening their eyes, ears and mouths.

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CHAPTER FIVE

European Law and User Rights

On the question of network neutrality, so called, which I think has been vastly over-inflated in all of this debate, the Commission has quite rightly identified the fact that there is a potential – a potential – for operators to use differing QoS provision in a discriminatory way, for example, by giving a higher capacity or better service quality to their own services as opposed to those of competitors … But the fact remains that any other service limitations which are anti-competitive, and they could certainly include restrictions on access to competitive services like VoIP, have and can be dealt with by the regulators under the existing framework of competition and access regulation. And that is clear. But what is fundamental is that customer needs to know if there are service limitations and customers may wish to buy a package with service limitations if it is cheaper.[1]

Malcolm Harbour, Member of the European Parliament (MEP),
16 April 2009

In this chapter, I explore the recent legislative proposals at European level to address net neutrality, especially those in the reform of the 2002 Electronic Communications Package. At the time of writing, the entire package has been referred to mediation after it was voted down at Second Reading in the European Parliament in May 2009. You will therefore know the outcome of the Swedish Presidency negotiations with the European parliament and the new European Commission at the end of 2009, and can view this chapter with hindsight. Before I examine the state of the proposals, and the history of the negotiation of the reforms as they affect net neutrality, it is first necessary to place net neutrality within the wider goals of the European Commission, to develop the European Internet content industry, enhance productivity through ICT, defend and develop European culture, and defend fundamental rights (the subject of an Irish referendum due on 2 October 2009 to decide whether to ratify the Charter of Fundamental Rights within the Lisbon Treaty).

User-generated and distributed applications and services on the Internet are seen as crucial to development of the European broadband economy. Commissioner Reding stated:

> We are now living through a new disruptive phase of the Information Society. Some people call it Web 2.0 or social networking. I can list some of the components: blogs, podcasts, wikis, social networking websites, search engines, auction websites, games, VoIP and P2P services. What is new about these uses of the Internet is that they exploit the Internet's connectivity to support people to network and to create content. This is a new paradigm in which users are co-producers of services.[2]

Web 2.0 makes user-generated and distributed content central to consumers' Internet experiences. This phenomenon has fundamental impacts on the value chain of affected industries.[3] Notable European examples are VoIP software Skype and the P2P client Kazaa. User experience with digital games and multimedia suggests that they are likely to drive innovation and adoption of Web 2.0 and P2P services and markets. Ruthless competition in these markets results in highly volatile and snowballing investment decisions: for states seeking to attract such investment, there is more of a winner-takes-all pay-off from the entrepreneurial investment climate provided.[4]

If innovation is typically both user-distributed and user-driven, the implications are that innovation is encouraged by interoperability and open access: in general, ensuring that content can be freely shared between those users. This view is in some conflict with content and network owners' desire to be recompensed for provision of local loop upgrades and has led to an animated debate in the United States. Note that content providers pay for their traffic to be carried by backbone ISPs, on a best effort basis, and the argument is about ISPs wishing to increase those payments as a result of either enhancing or blocking service, on a mandatory or opt-in basis (clearly a mandatory blocking service for those refusing to pay an extra toll is the most capricious of these possibilities, as in Madison River). Lemley and Lessig claim that innovation at the edge of the network is opposed by traditional media and network businesses, as it makes business cases based on controlling distribution bottlenecks redundant: where there is peer sharing, there is less opportunity for traditional bottlenecks and therefore control of revenues. However, the inverse applies also: without some means

to secure revenues for the increased bandwidth necessary for Web 2.0 type applications to flourish, do network operators have an incentive to upgrade?

The European Commission and Member States monitor developments in this area closely, especially in view of content and innovation policies, under which the importance of content provision (as well as network deployment) for jobs and growth are emphasized.[5] A goal of the European Commission is to encourage the development of European content providers to match the American success stories: 'The creation of an open and competitive single market for online content is one of the key aims of the European Union's i2010 initiative.'[6] The European approach to 'Content Online' is laid out in a Communication from the European Commission, noting that the European user-generated content industry's future entry barriers and business model are at stake in this debate, a fact of which the Commission and Member States are aware and which needs to be fully considered in future policy discussions in order to take a holistic view of the problem. In particular, the role of start-up and small companies in content and service provision is likely to be a substantial engine for such growth. If this seems a long way from discussions of incumbent monopolies and user rights in Europe, then that is both the correct perception and the major policy problem in net neutrality: those that benefit from net neutrality are all outside the rooms in which most of the negotiation takes place, traditionally between incumbents and their competitors, all ISPs and in the main committed to trying to charge for access. As we will see, the disjuncture between telecoms law discussions and policy demands for user rights and participation took the entire 2009 review off the rails over the issues of filtering and net neutrality.

European Regulation and its Previous Net Neutrality Problems

The availability and design of a suitable regulatory response must reflect dynamism and also the responsiveness of regulators and market players to each other. Therefore, if any legislation is required (and we will see that new proposed legislation will impact national regulators in 2012 or so), it should be future proof and not overly prescriptive to avoid a premature response to the emerging environment. Can regulators equip themselves with the skills and evidence base to rapidly investigate potential problems of unjustified discrimination? The European legal basis for regulatory intervention, especially

the Access and Interconnection Directive, potentially provides for a wider and better variety of regulatory tools to intervene than the current US situation.[7]

Two specific issues in this watch list are: detection of any discrimination, and the standing of the content providers complaining of such discrimination. I deal with each in turn.

Should QoS be introduced, the types of harmful discrimination that can result may be undetectable, as we saw in the opening chapters. Blocking is relatively easy to spot. Throttling or choking bandwidth, even where unjustified, may be harder to spot and even harder to efficiently regulate. It is a moot point whether unjustified discrimination short of blocking is useful to an ISP, as discrimination against a particular content type may be overcome by sophisticated content providers via encryption in a technological 'arms race'.[8] Moreover, for discrimination to create a business case, it needs to be effective in creating substantial incentives for content providers to pay a premium. Though it may not be possible technically to identify all discrimination, the most egregious types of discrimination may provide only a marketing advantage if obvious enough for customers to identify the benefits.[9] Paradigmatically, only clear discrimination may be really worthwhile for network operators, such that the cost–benefit is at least in theory obvious to content suppliers, network operators and end-users. A solution may be to require network operators to provide their service-level agreements on QoS to both content providers and more transparently to the end-user via a regulatory or co-regulatory reporting requirement, explored in the UK context in Chapter 6. European regulators expecting a 'smoking gun' to present itself as in Madison River should be advised that a more proactive approach to monitoring and researching non-neutral behaviours will make network operators more cognizant of their duties and obligations. To do so without incurring the interest of a concerned regulator may be hazardous. Regulators can monitor both commercial transactions and traffic shaping by ISPs to detect potentially abusive discrimination.

Under the current law, it may be difficult for content providers to raise disputes with third party network operators with whom they have no contractual relationship, as the 2002 European Framework anticipated disputes under contract law or interoperability disputes between network providers. Content and communications providers have little ability to enforce these obligations directly against network operators. NRAs are responsible for imposing obligations on network operators and ensuring

enforcement. Communications providers have stronger standing to lodge complaints with NRAs and have the direct rights to seek interconnection with network operators. Content providers lack strong rights to assert claims as they are users of communications services rather than providers of communications services seeking access. The question of legal standing for content providers under Directives is a technical legal question that is to be dealt with in 2009 amendments,[10] and upon which there was discussion in the European Regulators Group (ERG) and elsewhere.[11] The EC has asked in the ERG 'if discussion should not be dealing with net neutrality issues.'[12]

2002 Framework and Net Neutrality

Before I explain the controversial nature of the reforms in the European package, I will briefly detail the current 2002 Framework. The Framework is based on the notion of market analysis that reveals a dominant monopoly actor with SMP, generally the incumbent telco. The key to the Framework are five Directives: regulating access (2002/19/EC), the regulatory framework (2002/21/EC), authorization of networks and services (2002/20/EC), universal service and consumer protection requirements (2002/22/EC) and electronic privacy (2002/58/EC). NRAs can impose SMP remedies as follows:

Non-discrimination (Access Directive 2002/19/EC, Article 10): NRAs may impose obligations on the wholesale access provider to ensure that it provides others with services on the same conditions and of the same quality as it provides to its affiliates or to itself. Non-discrimination remedies will depend on the form of degradation:

- For non-affiliated content providers, degrading QoS for certain types of content will be discriminatory if similar content from the network operator's affiliates or partners is not degraded.
- Where content type discrimination takes place (for instance blocking VoIP), degrading QoS for specific types of content (or communications) in all cases and regardless of its source may constitute discrimination against particular categories of content providers, but the position will depend on the circumstances.
- Degrading QoS for content that uses certain delivery mechanisms (e.g. P2P) may not be considered discriminatory, particularly if there are network management justifications for the degradation and the network operator's affiliates do not receive a higher level of QoS using similar distribution techniques.

Transparency and disclosure of network information is implemented by Access Directive 2002/19/EC, Article 9:

- NRAs may require the wholesale access provider to disclose, among other things, network characteristics and the terms and conditions for the supply and use of the network by an ISP (through publication of a wholesale access 'reference offer'). Disclosure of network QoS policies is not specifically mentioned, but ISPs would need to know about any QoS policies of the network operator in offering their own retail services.
- A National Regulatory Authority (NRA) could require a network operator to be more transparent about what content services are degraded on their network, which may encourage operators to only degrade QoS in more justifiable circumstances.

In addition to these SMP remedies, there could also be more general remedies imposed on all public communications networks, known as general access remedies. These include end-to-end connectivity, under the Access Directive 2002/19/EC, Article 5(1)(a): NRAs may impose obligations on ISPs as 'undertakings that control access to end-users' to ensure end-to-end connectivity. For example, NRAs are intended to have the power to secure interoperability 'if network operators were to restrict unreasonably end-user choice for access to Internet portals and services' (Access Directive 2002/19/EC, Recital 6). Providing lower QoS for communications providers that do not pay may be deemed to limit end-to-end connectivity if certain applications *will not function* without higher QoS. This is less likely to be imposed than SMP, however, because end-to-end connectivity is not defined in the Framework and may be read narrowly to require only interconnection for the purpose of voice call or Short Messaging Services (SMS) termination. QoS policies will likely need to be 'unreasonable' in order for an NRA to take action. Recital 6 suggests that 'reasonable' restrictions on end-user choice for access to Internet portals and services are acceptable. What is 'reasonable' is not specified and may be easier to justify due to capacity constraints, which is why much attention in drafting the 2009 amendments focused on this critical issue. In addition, the Framework does not directly address end-to-end connectivity for content providers although Recital 6 suggests that connectivity includes access to portals.

NRAs may intervene to secure the policy objectives of the Framework, such as ensuring end-to-end connectivity and that users derive the maximum benefit in terms of choice, price and quality. Communications providers may ask an

NRA to intervene (and the NRA can act at its own initiative) in a dispute with an ISP over the nature of its access to the ISP's subscribers. The legal basis for these powers is Access Directive 2002/19/EC, Article 5(4). In addition, network operators have the right to negotiate interconnection with each other for the purpose of providing publicly available electronic communications services in order to ensure interoperability of services under the Access Directive 2002/19/EC, Article 4(1). Communications providers have the right to seek interconnection with an ISP, but terms are subject to commercial negotiation. Historically, these rights have been focused on interconnection for the purpose of call termination, as we saw in Chapter 1. An NRA may resolve a dispute with a network operator at the request of a party seeking access to the network, under Framework Directive 2002/21/EC, Article 20.

There is also a requirement on ISPs to provide QoS disclosure, under the Universal Service Directive 2002/22/EC, Articles 20(2) and Article 22, including details of services provided, service quality, tariffs and maintenance charges in contracts with consumers. NRAs have powers to extend these transparency obligations in two ways, by adding to the categories of information that must be disclosed, and to benefit end-users other than consumers. ISPs that do not disclose their QoS policies to consumers may not satisfy their general disclosure obligations (i.e. details of services provided), but the Directive does not explicitly require these disclosures.

Remedies could be imposed if access was provided on a discriminatory or exclusive basis, such as only to an affiliate or strategic partner of an ISP. It is less likely that access remedies may be imposed for content services (e.g. IPTV, subscription video services) because end-to-end connectivity traditionally has been regulated by NRAs for communications rather than content. Content providers are not clearly entitled to negotiate interconnection as it would not be for the purpose of providing a 'communications service'.

If content providers cannot formally make individual complaints to regulators until the implementation of the package reforms in 2011–12, it may be that an independent investigation into potential discrimination can be made on the regulator's own initiative, depending on its constitutional and formal powers. While this is appropriate for a converged regulator such as UK Ofcom, which regulates both content and carriage, it may not be the case in other European jurisdictions. Both the European Commission and ERG would be well-advised to consider the types of response that regulators could make to such complaints if standing is found to be lacking. No matter

what theoretical powers may exist, their use in practice and the issue of forensic gathering of evidence may ultimately be more important. An ex ante requirement to demonstrate internal network QoS metrics to content provider customers and consumers may therefore be a more practical solution.

I note that the danger of fragmentation and regulatory arbitrage are due to two reasons:

- a type of 'regulatory holiday' for ISPs in one country but not another is quite likely,[13] and
- enforcement of net neutrality may be highly divergent even under the current 2002 framework.

First, however, I examine the proposed European laws which those NRAs would have to enforce.

2007 Proposals and the Failure of Liberalization to Date

Commissioner Reding indulged in some straight talking about government-owned (fully or partially) incumbents in Europe, in a 2008 Venice speech:[14]

> I call on you, incumbents, and your association ETNO, to re-think your policy recommendations to national ministers. You have to take a decision: Do you want to be friends or foes of a single telecoms market in Europe? Do you really want to let, for short-term reasons, the single market slip away to your US competitors?

She was referring particularly to the apparent bargain between national incumbents not to intervene too vigorously in each others' markets. There has only been a merger of two former monopolies in the eleven years of open competition in European telecoms, those of Finland and Sweden (to form TeliaSonera), though several Eastern European incumbents (e.g. Hungary, Poland) have substantial investment from FT and Deutsche Telekom (DT). In general, the EC ignores the lobbying by these companies and their national regulators in the Council of Ministers, assuming they are simply stooges for their masters in Paris and Bonn. Reding was therefore accusing incumbents of arranging cosy cooperation, a corporatist attitude far removed from Internet innovation.

For those reading for the first time about European Parliament procedures under co-decision, here is how it works. The College of Commissioners (the civil service) puts forward a legislative suggestion to the Council of Ministers, which debates amends or adopts it. It is then formally put to the European Parliament, which debates, amends and votes in a First Reading. Following that, the Council reconsiders the package with amendments, and puts a new package back to the Parliament. Throughout this process there is a continuous series of meetings between the Rapporteurs (chairs) of the relevant Parliamentary committees, the Commission officials responsible and the Council of Ministers as represented by their President (one of the 27 Member States takes a six-month revolving Presidency, a political compromise which makes the Commission as the permanent civil service much more powerful than in most Parliamentary systems).

The European Commission on 14 November 2007 issued a new proposed Universal Service and Consumer Rights Directive, explaining that:

> In Article 21 … NRAs are given powers to require from operators better tariff transparency (paragraph 4) as well as clear information on possible restrictions on access to all types of content and applications (paragraph 5). The possibility for the Commission to take implementing measures is intended to ensure, where appropriate, a minimum level of harmonization in this area (paragraph 6).
>
> In Article 20(5): this provides for a transparency mechanism concerning possible restrictions on end-users' choice of lawful content and applications in order to empower end-users to make an informed choice of services, thus allowing them to reap the full benefits of technological developments in the Information Society.
>
> In Article 22: this grants to the national regulatory authorities the power to prevent degradation of QoS by setting minimum quality levels for network transmission services for end-users. The possibility for the Commission to take implementing measures is intended to ensure, where appropriate, a minimum level of harmonization in this area (paragraph 3).[15]

As it explained in its accompanying Impact Assessment,[16] the Commission favoured harmonization and the granting of updated rights to enforce

minimum standards to users, rather than leaving them (as currently) in the hands of regulators.

As it explained:[17]

> [W]hile the 'net freedoms' are already embedded in the design of the framework, they are expressed as obligations on the undertakings and corresponding powers of the NRA, and not in relation to users' rights to ensure connectivity. … the current regulatory framework does not provide NRAs with the means to intervene were the QoS for transmission in an IP-based communications environment to be degraded to unacceptably low levels, thereby frustrating the delivery of services from third parties. In such an event, end-users' connectivity to services provided on the Internet (TV, telephony, Internet, etc.) could be at risk. The impact of prioritization or of systematic degradation of connectivity could be larger on services needing real-time communications (e.g. IPTV, VoIP, in which latency is critical) and ultimately affect end-user choice.

It cites OECD[18] as authority and maintains that intervention is necessary:

> This option would address 'network neutrality' and basic connectivity by establishing a safety net for quality of transmission: in case the elements of the basic connectivity would become seriously under threat, the NRAs could intervene by setting common minimum quality levels for network transmission services for end-users, based on standards agreed at EU level. This would guarantee minimal level of connectivity and greater choice for consumers ensuring the delivery of third party services at suitably high quality levels appropriate to their needs. Provisions in the area of 'net freedoms' would also be made more explicit.

Reding explained what is actually a proposal for 'net neutrality lite':[19]

> The Commission's vision of an open and competitive digital market does allow for traffic prioritization, especially for providing more innovative services or managing networks effectively … Of course, abusive or anti-competitive behaviour limiting consumer choice is a serious risk:

> through prioritization of traffic, in some situations, the Quality of Service of all operators could degrade to unacceptably low levels … For the future, the Commission has proposed, in its review of the Telecoms package, to create the possibility of setting minimum quality levels for network transmission services based on technical standards identified at EU level.
>
> Turning now to the need to guarantee the basic net freedoms, especially against the selective blocking of websites by [ISPs], I don't believe that restricting consumers' choice can ever be an appealing driver of more growth. I certainly don't believe that restricting access to the internet will attract many more innovative European internet companies. And I don't believe that restricted access to the internet is the right answer to a faster deployment of [NGAs].

The questions here regard the barriers to entry for European content providers. Would content-sharing sites develop if discriminatory content charging was the state of the world? Furthermore, the network effects required to make content successful may only be possible because content sites do not initially seek to monetize content: monetization is enabled because the network effect created a critical mass of contributors and consumers. The 'next YouTube' may face disincentives to achieve such growth. Reding is a natural sympathizer with auteurs and creators, as a skilled politician, as a former journalist and as the Commissioner responsible only for the media, not telecoms, prior to 2005 (media, culture, youth, education was the entire briefing: very much a cultural diversity policy orientation). Therefore her instinctive reaction to the net neutrality debate, to the annoyance and frustration of economist or technocrat advisors, was to favour net neutrality first, then work out finer details later. In this, she shared the political antennae of the majority grouping in the European Parliament.

2008: Net Neutrality Very Lite?

This political instinct towards net neutrality without detail is reflected in the rather obscure wording of the First Reading draft of the Universal Service Directive,[20] reflecting European Parliament First Reading amendments and Commission responses, of 27 November 2008:[21]

Recital 14a (new)
A competitive market should also ensure that users are able to have the QoS they require, but in particular cases it may be necessary to ensure that public communications networks attain minimum quality levels so as to prevent degradation of service, usage restrictions and/or limitations and the slowing of traffic. Where there is a lack of effective competition, national regulatory authorities should use the remedies available to them under the Directives establishing the regulatory framework for electronic communications networks and services to ensure that users' access to particular types of content or applications is not unreasonably restricted. It should also be possible for national regulatory authorities to set minimum QoS requirements under Directive 2002/22/EC with regard to the interests of users and all other relevant circumstances.

Recital 14d (new)
Since inconsistent remedies QoS requirements will significantly impair the achievement of the internal market, the Commission should assess any guidelines or other measures adopted by national regulatory authorities for possible regulatory intervention across the Community and, if necessary, adopt technical implementing measures in order to achieve consistent application throughout the Community.

As of 27 November 2008, the agreed text between the Council of Telecoms Ministers and the EC had incorporated some (but not all) of the European Parliament's amendments to the Universal Service Directive, so that the Article 22 as amended read:

Article 22: QoS
1. Member States shall ensure that national regulatory authorities are, after taking account of the views of interested parties, able to require undertakings that provide publicly available electronic communications services networks and/or services to publish comparable, adequate and up-to-date information for end-users on the quality of their services, including and on measures taken to ensure equivalent comparable access for disabled end-users. The information shall, on request, also be supplied to the national regulatory authority in advance of its publication.

2. National regulatory authorities may specify, *inter alia*, the QoS parameters to be measured, and the content, form and manner of information to be published, including possible quality certification mechanisms, in order to ensure that end-users have access to comprehensive, comparable, reliable and user-friendly information. Where appropriate, the parameters, definitions and measurement methods given in Annex III could be used.
3. In order to prevent degradation of service and hindering or slowing of traffic over networks, Member States shall ensure that national regulatory authorities are able to set minimum QoS requirements on undertakings providing public communications networks. The Commission may, having consulted the Authority, adopt technical implementing measures concerning minimum QoS requirements to be set by the national regulatory authority on undertakings providing public communications networks.

These measures designed to amend non-essential elements of this Directive by supplementing it shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 37(2). On imperative grounds of urgency, the Commission may use the urgency procedure referred to in Article 37(3).

A competitive market should ensure that users are able to have the QoS they require, but in particular cases it may be necessary to ensure that public communications networks attain minimum quality levels so as to prevent degradation of service, the blocking of access and the slowing of traffic over the networks. In particular, the Commission should be able to adopt implementing measures with a view to identifying the quality standards to be used by the national regulatory authorities.

This wording would be put to the vote of the Parliament on Second Reading in May 2009. However, the wording is particularly vague and leaves to Member States the entirety of interpretation of reporting requirements, even if the EC has some powers to require minimal QoS standards. This legislation, however amended, is the beginning of the problem, not the end. The accompanying press release explains in brief that '[NRAs] will be able to take action in order to secure minimum QoS for internet users in order to maintain, if necessary and appropriate, "net neutrality" in Europe'.[22]

But note that it is the Commission which will have the coordinating role in setting technical standards, reflecting the patchwork of responses thus far at national level and therefore concerns about fragmentation of the single European market.

Commissioner Reding was at this point in negotiations still vague on her specific views on net neutrality, judging by her Internet freedom speech:

> (...) we will only be able to reap the full social and economic benefits of a fast moving technological landscape if we manage to safeguard the openness of the Internet. Openness is one of the key ingredients that made the Internet so successful as an innovation place, and we have to make sure that it is not compromised ... Net Neutrality has to be guaranteed. New network management techniques allow traffic prioritization. These tools may be used to guarantee good QoS but could also be used for anti-competitive practices. The Commission has taken additional steps, through measures proposed to reform our telecom package, to better prevent such unfair abuse to the detriment of consumers.[23]

Is Reding's view to be interpreted as meaning that net neutrality is only a competition issue, or also a consumer welfare issue more broadly? She left this deliberately vague. She lists the various US legal, technical, civil societies and Internet Governance Forum (IGF) moves that are afoot – then she has no solution, except to insist that security, privacy and freedom of expression should not be opposed to each other. They often are in reality, as we will see in the next chapter.

Lobbying Around Issues of User Rights

The critical timing for influencing the Council of Ministers, Commission and Parliament on net neutrality was the period between First and Second Readings in the European Parliament, the winter of 2008–9. The lobbying was apparently determined and professional even by Washington standards, much as it had been when the European Parliament tried to regulate Internet video in the 1997 revision to TVWF, as we saw in Chapter 4.

The lobbyists on behalf of the incumbents were out in force, commissioning studies and building coalitions such as 'Net Confidence'. Monica Horten[24] reports that AT&T led this effort, that the economists' studies predicting negative impacts of net neutrality was highlighted and that the rejected

First Reading amendments were reworked as 'compromises' for the Second Reading, placing responsibility on ISPs only to report (self-regulated) restrictions on service:

> Recital 14 [...]
> Given the increasing importance of electronic communications for consumers and businesses, users should be fully informed of [...] the traffic management policies [...] of any relevant restrictions and/or limitations imposed on the use of the electronic communications services by the service and/or network provider with which they conclude the contract. [...]. Where there is a lack of effective competition, the relevant national [...] authorities should use the remedies available to them in Directive 2002/19/EC to ensure that users' access to particular types of content or applications is not unreasonably restricted.
>
> Article 21(3)
> Member States shall ensure that national regulatory authorities are able to oblige undertakings providing connection to a public electronic communications network and/or electronic communications services to *inter alia*:
> (b) inform subscribers of any change to the provider's traffic management policies [...]; restrictions imposed by the undertaking on their ability to access content or run applications and services of their choice.

The German regulator had commissioned a Wissenschaftliches Institut für Kommunikationsdienste GmbH (WIK) study, which identified net neutrality as a competition problem. The problem analysis is sound but obviously helpful for a client committed to regulatory holidays and masterly inaction. The rather cursory analysis of two-sided markets might have benefited from closer inspection of Economides' work.[25] In early 2009, both Copenhagen Economics and the Centre for European Policy Studies published new papers – the former commissioned by the incumbents has a headline-grabbing enormous figure for what 'it' ('it' is presumably full enforced net neutrality) would cost Europe.[26] Ofcom was quite sensibly adopting the 'lite' strategy. Ed Richards, Ofcom chief executive, stated:

> We don't think we should bring it over from the US lock, stock and barrel. We have quite often got more competitors in Europe than in the US. The

> key for us is transparency. Consumers must know whether there are different arrangements for different ISPs and network providers must have the freedom to make commercial decisions about how to run their networks and invest in new-generation networks.

ISPs: stop lying. Consumers: stop abusing. We will all be happier. This lobbying had an effect opposite to its intention: non-government lobbyists such as the Pirate Party in Sweden, members of the European Digital Rights Initiative (EDRi), La Quadrature du Net in France, the Open Rights Group in the United Kingdom and others lobbied the Parliamentarians very hard. Given that elections were held on 4–6 June for the next five-year Parliamentary term, the arguments of the massed civil society representatives, including Facebook and email campaigns, were taken much more seriously than it might have been taken earlier in the five-year fixed-term Parliament. This indicates a potential Parliamentary back down in 2010 as it is now significantly more pro-market after a socialist group loss in those 4–6 June 2009 elections.

Member States and French 'HADOPI' Law

The backdrop to the European Parliament debates was a series of laws aggressively aimed at individual Internet users and lobbied for by copyright holders, notably the music and film producers and distributors lobby. In Sweden, this included the sensational case in which the founders of Pirate Bay, a website that assisted file sharers, were successfully criminally prosecuted for aiding and abetting copyright infringement, a case which has been appealed in Sweden in autumn 2009. However, the greatest publicity and threat to Internet users' rights was posed by a new French law that threatened to cut off users who had been three times informed by a tribunal that they were infringing copyright. This tribunal termed HADOPI would not be a court, but a body to exercise the rights of ISPs and particularly copyright holders. It was particularly controversial because, despite defeat in the French House of Deputies in spring 2009, it was reintroduced successfully by the Sarkozy government in May 2009. The lack of due judicial process contributed to the overall impression that this was part of an authoritarian attack on individual users' rights to freedom of expression and privacy.

The anti-piracy law, the so-called HADOPI law, would introduce graduated response against illegal content downloading.[27] The law would enable the introduction of 'three-strikes' measures against file sharers. According to the

modified law voted by the Senate on 30 October 2008, if illegal downloading is reported by an authorized body (industry associations and professional bodies), three consecutive actions would take place:

1. HADOPI, the body created for this purpose, sends the infringer a warning email.
2. If the infringement is repeated within six months, a new email will be sent together with a warning by registered letter.
3. If the infringement is repeated within a year, the Internet user will be penalized according to the gravity of the act.
4. The sanction can be the denial of Internet access ranging from one month (duration decreased by the senators from three months as initially in the draft law) to a year during which time the Internet user must continue to pay the ISP subscription and is included on a black list that forbids her to subscribe to any other ISP.

The French National Assembly (the second chamber of the Parliament) voted in favour of the HADOPI law in April 2009, which put the French government at odds with European Parliament Amendment 138 on the Telecoms package, which explicitly states that only judicial authority can impose restrictions on citizens' fundamental rights and freedoms. The European Parliament's opinion called on the European Commission and all Member States to 'avoid adopting measures conflicting with civil liberties and human rights and with the principles of proportionality, effectiveness, and dissuasiveness, such as the interruption of Internet access.'

The passage of the 'HADOPI law'[28] on 13 May 2009 was immediately referred by 60 members of the French parliament to the Constitutional Court, which on 10 June struck down the elements of the law which create a punishment prior to judicial instruction. The Court stated at Paragraph 12:[29]

> Whereas under Article 11 of the Declaration on the Rights of Man and Citizen of 1789: 'The free communication of thoughts and opinions is one of the most precious rights of man: every citizen may therefore speak, write and print freely, except to respond to the abuse of this freedom in cases determined by law' that the current means of communication and given the widespread development of communication services to the public line and the importance of these services for participation in democratic life and the expression of ideas and opinions, this right includes freedom to access these services ...

> [Para. 15] freedom of expression and communication is all the more valuable that its exercise is a prerequisite for democracy and one of the guarantees of respect for other rights and freedoms and that attacks on the exercise of this freedom must be necessary, appropriate and proportionate to the aim pursued …
>
> [Para.17] Whereas, moreover, that under section 9 of the Declaration of 1789, every man is presumed innocent until proven guilty, it follows that in principle the legislature does not establish a presumption of guilt in criminal matters, however, in exceptional circumstances, such presumptions may be established.

Notably, the Court took a rights-based approach, as one would expect from a constitutional court. It is the same reasoning as that adopted by the European Parliament in the vote on Amendment 138 and reflects Reding's words that the Internet has become fundamental to freedom of expression, granting new constitutional rights to Internet users. Like it or not, this means that citizen access to Internet content is now a right of some sort, and we have definitively moved beyond an economic model for access. However, the Second Reading debate took place in the month between passage of the HADOPI law through the French Parliament (up to 13 May) and its striking down in part on 10 June.

European Parliament Second Reading: 6 May Vote

The European Parliament on 6 May 2009 decided to reject the compromised Rapporteur-Council amendment on the proposed User Rights Directive at Second Reading,[30] thereby invoking the Conciliation process.[31] What happened is that the First Reading vote of the Parliament had decided that no provider could cut off a user's access without judicial approval. The Rapporteurs of the Committees (Malcolm Harbour was one, quoted at the top of the chapter) agreed to water down this amendment to the original Commission/Council proposal at a meeting the day before the Second Reading vote. The Parliament as a whole then voted down the political agreement by reinstating the amendment.

The Council of Ministers on 12 June refused to agree to the new Parliamentary amendment, and the entire E-Communications Package would be put to a Conciliation Committee of the Council of Ministers and Parliament. If that Committee could not reach an agreement in autumn

2009, the entire package would fail. Previous experience of such a Committee failing was until 2009 unprecedented, but the Working Time Directive did in fact fail to reach agreement in Conciliation in 2009, after a five-year legislative process.[32]

Rapporteur Catherine Trautmann's report included the original Amendment 138/46 as adopted in the First Reading by the European Parliament. The initial text 'without a prior ruling of the judicial authorities, notably in accordance with Article 11 of the Charter of Fundamental Rights' was replaced by 'and the right to a judgment by an independent and impartial tribunal established by law and acting in respect of due process in accordance with Article 6 of the ECHR.' Although the proposed French HADOPI authority established by the three-strikes French draft law, if passed, is not a 'tribunal established by Article 6 of ECHR', the text allowed vaguer legal interpretations by removing 'prior ruling', which the French government interpreted as permitting such an authority to disconnect a user's Internet access, with later court challenge possible to this decision. In order for Parliament to vote to reassert its will on user rights, MEP Rebecca Harms insisted on a change in the voting list to vote on Amendment 138 before the rest of the package. She was supported by MEP Alexander Alvaro and disagreed with by Rapporteur Trautmann. By European Parliament standards of multilingual discretion, this was a sensational and stormy vote.

The removal of Amendment 138 of the Telecoms package by the European Council and Rapporteurs Harbour and Trautmann was overturned. It appears Harbour and Trautmann, very practical conservative politicians, were reaching a compromise on the package in the interests of its wider adoption. The Harbour Report changed initial Net Neutrality Amendment 166 (adopted in the First Reading in 2008) to customer information through contracts. Many argue that consumer and competition law are inadequate by design to regulate fundamental rights. The compromise with the Council includes the text 'limitations on access to and/or use of services and applications' which is much vaguer than the Amendment 166 language of:

> Member States shall ensure that any restrictions on the rights of users to access content, services and applications, if such restrictions are necessary, are implemented by appropriate measures, in accordance with the principles of proportionality, effectiveness and dissuasiveness.

Harbour described civil society lobby concerns over net neutrality as 'pure fantasy … There is absolutely nothing in this proposal that says anything about that.'[33] Harbour had in April admitted that there were service limitations in his own report, as cited in the quotation at the beginning of this chapter.

Except for Amendment 138, the other citizen rights amendments were rejected at Second Reading, adopting the Harbour report and rejecting the Trautmann report. The Parliament declared that it expects Conciliation without which the whole package will fall; the Commissioner asked the Council to accept this single amendment in the interests of the wider package, but the Czech Presidency of the Council responded extremely aggressively, on what was actually the Czech government's last week in office.

The UK government position was that the amendment makes direct reference to the Charter of Fundamental Rights of the European Union within the text of the new Framework Directive, despite the fact that the Charter has no legal standing until it is ratified – a process directly linked to the ratification of the Lisbon Treaty. Additionally, government legal advisers have indicated that the Clause of the Charter referenced creates additional legal inconsistencies that would create a cumbersome and disproportionate process that would require further legal clarification through both national courts and, no doubt, the European Court of Justice. One option that has been muted is to agree the Citizens' Rights directive and the new Regulation creating the European Body of Regulators (now known as [BEREC]) and limit the Conciliation process to issues relating to this amendment. The Swedish Presidency (July–December 2009) will have to settle the matter, in a country with very high awareness of digital rights issues thanks to the Pirate Party.

Horten explains that the intention of the Council was to weaken, if not to remove, Amendment 138/46: the change from the reference to the Charter of Fundamental Rights of the European Union (the 'Nice Charter') to the Convention for the Protection of Fundamental Rights and Freedoms, which is an instrument of the Council of Europe. First of all, the Nice Charter is non-binding – it would have been binding if the Constitutional Treaty had been ratified, and it will be when/if the Lisbon Treaty will be ratified by all Member States, which may occur if the Irish referendum produces a 'Yes' vote.

The watering down of rights language, and especially the HADOPI law permission for a tribunal rather than court to remove users' Internet access, is of course extremely controversial and constitutionally outrageous. In the case of the original amendment 138/46, the Commission would have to take

France to court, as a part of an infringement procedure to assert that the establishment of HADOPI and the latter's enforcement of the three-strikes policy would be a violation of Community law. An alternative scenario might take place if a French court asks the European Court of Justice what would be the correct interpretation of the term 'judicial authority' and/or 'independent and impartial tribunal', possibly on the basis of a request by one of the parties of the case. This would be known as a preliminary ruling.[34]

User Rights and the Amended Text: A 'Lite' Compromise?

The outcome of 6 May was, if not perfect, satisfactory for the Commission, with much greater focus on consumer rights and transparency than the Council of Ministers had initially wanted– but no prevention of QoS by providers if that is clearly notified to the consumer in advance. Note that dispute settlement procedures are included without prejudice to statutory rights,[35] and the text has encouragement of co- and self-regulation where appropriate. The texts are as follows[36] beginning with Recitals.

> (22) End-users should be able to decide what content they want to send and receive, and which services, applications, hardware and software they want to use for such purposes, without prejudice to the need to preserve the integrity and security of networks and services. A competitive market will provide users with a wide choice of content, applications and services. NRAs should promote users' ability to access and distribute information and to run applications and services of their choice, as stated in Article 8 of Directive 2002/21/EC. Given the increasing importance of electronic communications for consumers and businesses, users should in any case be fully informed of any limiting conditions imposed on the use of electronic communications services by the service and/or network provider. Such information should, at the option of the provider, specify the type of content, application or service concerned, individual applications or services, or both. Depending on the technology used and the type of limitation, such limitations may require user consent under Directive 2002/58/EC.

The FCC's Four Internet Freedoms are listed to begin the Recital. First, note that competition 'will' solve the problem, but then also note the information transparency requirements laid on top of this, though 'at the option of the

provider', which suggests self-regulation. Then note that the Recital goes on to constrain both ISPs and national governments' abilities to intrude inside user traffic.

> (22a) Directive 2002/22/EC neither mandates nor prohibits conditions imposed by providers, in accordance with national law, limiting users' access to and/or use of services and applications but does provide for information regarding such conditions. Member States wishing to implement measures regarding users' access to and/or use of services and applications must respect the fundamental rights of citizens, including in relation to privacy and due process, and any such measures should take full account of policy goals adopted at Community level, such as furthering the development of the Community information society.
>
> (22b) Directive 2002/22/EC does not require providers to monitor information transmitted over their networks or to bring legal proceedings against their customers on grounds of such information, nor does it make providers liable for that information. Responsibility for punitive action or criminal prosecution is a matter for national law, respecting fundamental rights and freedoms including the right to due process.

The European Commission introduced some last-minute drafting in a new Recital 26 to the Universal Services Directive 2002/22/EC to make clear their position. Recital 26 passed at Second Reading by the European Parliament reads as follows:

> A competitive market should ensure that users enjoy the QoS they require, but in particular cases it may be necessary to ensure that public communications networks attain minimum quality levels so as to prevent degradation of service, the blocking of access and the slowing of traffic over networks.
>
> In order to meet QoS requirements, operators may: use procedures to measure and shape traffic on a network link so as to avoid filling the link to capacity or overfilling the link, which would result in network congestion and poor performance.
>
> These procedures are subject to scrutiny by NRAs acting in accordance with the provisions of the Framework Directive and the Specific Directives

> to ensure they do not restrict competition, in particular by addressing discriminatory behaviour.
>
> If appropriate, NRAs may also impose minimum QoS requirements on undertakings providing public communications networks to ensure that services and applications dependent on the network are delivered to a minimum quality standard, subject to examination by the Commission.
>
> NRAs are empowered to take action to address degradation of service, including the hindering or slowing down of traffic, to the detriment of consumers.
>
> However, since inconsistent remedies can impair the achievement of the internal market, the Commission should assess any requirements intended to be set by NRAs for possible regulatory intervention across the Community and, if necessary, issue comments or recommendations in order to achieve consistent application.

Note that this begins by discussing anti-competitive activities, but then goes on to discuss common carrier-type requirements to protect consumers. It is definitely 'lite', referring only to degradation of service. The vital first point to note is that this is net neutrality 'lite': the formula is to 'prevent degradation of service, the blocking of access and the slowing of traffic over networks'. That allows NRAs to intervene where service slows, from its current level. It includes safeguards for the Commission to set standards where national regulators may diverge. Should these proposals become legislation in 2010 at the European level and therefore 2012 at national level, they may go some way towards satisfying the concerns of consumers for transparency and for ISPs with flexible regulatory responses. However, if a week is a long time in politics, three years is an eternity in broadband content development.

The Directive itself includes text that explains the ISPs' duty to inform subscribers of their traffic management policies in Article 20(1):

> Article 20: Contracts
>
> 1. Member States shall ensure that, when subscribing to services providing connection to a public communications network and/or publicly available electronic communications services, consumers, and other end-users so requesting, have a right to a contract with an undertaking or undertakings providing such connection and/

or services. The contract shall specify in a clear, comprehensive and easily accessible form at least:

(b) the services provided, including in particular …
- information on *any other conditions limiting access to and/or use of services and applications, where such conditions are allowed under national law in accordance with Community law*
- the minimum service quality levels offered, namely the time for the initial connection and, where appropriate, other QoS parameters, as defined by the NRAs,
- *information on any procedures put in place by the undertaking to measure and shape traffic so as to avoid filling or overfilling a network link and on how those procedures could impact on service quality*,
- the types of maintenance service offered and customer support services provided, as well as the means of contacting these services,
- any restrictions imposed by the provider on the use of terminal equipment supplied.

It then explains in Article 21(3) that such measures may be self- or co-regulatory:

Article 21(3):

Member States shall ensure that NRAs are able to oblige undertakings providing *public electronic communications networks and/or publicly available electronic communications services* to inter alia:

… (b) inform subscribers of any change to *conditions limiting access to and/or use of services and applications, where such conditions are allowed under national law in accordance with Community law;*

(ba) *provide information on any procedures put in place by the provider in order to measure and shape traffic so as to avoid filling or overfilling a network link, and on how those procedures may impact on service quality*; …

If deemed appropriate, NRAs may promote self- or co-regulatory measures prior to imposing any obligation.

In Article 22(3) it explains that NRAs must be informed by ISPs and must inform the Commission before taking further action:

> In order to prevent the degradation of service and the hindering or slowing down of traffic over networks, Member States shall ensure that NRAs are able to set minimum QoS requirements on an undertaking or undertakings providing public communications networks.
>
> NRAs shall provide the Commission, in good time before setting any such requirements, with a summary of the grounds for action, the envisaged requirements and the proposed course of action. This information shall also be made available to BEREC. The Commission may, having examined such information, make comments or recommendations thereupon, in particular to ensure that the requirements do not adversely affect the functioning of the internal market. NRAs shall take the utmost account of the Commission's comments or recommendations when deciding on the requirements.

Within the limits of legislative wording, and given that any law will then be implemented in the 27 Member States with harmonization needed between their NRAs, this language appears to offer those NRAs who wish to become more active on net neutrality and consumer rights the opportunity to do so. It is not clear how much enthusiasm such NRAs will have when this finally becomes national law, perhaps in 2012.

Events of 12 June – Towards User Rights for European Internet Users?

The Czech Presidency effectively delayed the response to the Parliament vote in the Telecoms Council of 11 June, not formally discussing the issue: 'the Council cannot take any formal position at present, since the Parliament has still not officially informed the Member States about its Second Reading position.'[37] It thus washed its hands of its sorry European Presidency, a Presidency in which its economy had continued to fail and its government had been forced to resign. It will be for the Swedish Presidency in autumn 2009 to pick up the issue, with the newly elected European Parliament elected on 6 June for the period 2009–14. A Trialogue (Commission, Presidency, Parliament) is scheduled for late September and a formal vote on 15 December 2009. As you read this, you will know whether the Council will accept Amendment 138 in order to get the package agreed, or whether the Parliament will back down. MEP Malcolm Harbour was re-elected so it may still be his brief, with the interested two new Pirate Party members of the Parliament! These are tumultuous times for European digital rights.

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CHAPTER SIX

Institutional Innovation: Co-regulatory Solutions

If you try speed humps or disconnections for peer-to-peer, people will simply either disguise their traffic or share the content another way. It is a game of Tom and Jerry and you will never catch the mouse. The mouse always wins in this battle and we need to be careful that politicians do not get talked into putting legislation in place that, in the end, ends up looking stupid.[1]
Charlie Dunstone, CEO, TalkTalk, UK consumer ISP

National Regulators' Response to Net Neutrality

European regulators lack forensic skills to analyse the potential consumer harms that can be created by unjustified discrimination, rather more than legislative authority to act on net neutrality – especially if the 2009 amendments become law. Because net neutrality 'lite' raises a set of new issues for regulators, the necessary skill set needs to be acquired and developed in consultation with other national and international regulators and the European Commission. In this chapter, I consider the approach taken in several European countries, notably the United Kingdom, which has the 'converged' regulator between content and carriage that makes it better able to regulate for net neutrality than more traditional telecoms regulators. Note one critical proviso. Regulation to ensure any form of net neutrality in Europe should have as light a touch as possible, while maintaining effectiveness based on three recourses:

1. Information regulation to require service providers to inform consumers about the choices they are making when they sign up for a service and any relevant changes to the service, for example, blocking of certain services. The relevance of the changes is consumer driven, and therefore full and prompt disclosure by companies via their websites is necessary. Even if not all customers choose to exercise the option to monitor the situation, providing the information promotes transparency. It also may head off calls to help desks, given that the technical fault may actually be a change of network policy.

2. Continually upgraded monitoring and surveillance.
3. Where necessary, investigation and timely but evidence-based intervention to correct harmful and unjustified discrimination.

These regulatory interventions do, however, require regulators to impose a reporting requirement on service providers to provide transparency in their traffic-management practices. This reporting requirement could be provided in a co-regulatory forum, as in codes of practice adoption by, for instance, ISPA in the United Kingdom and its counterparts in EuroISPA. However, there will be a need for content provider participation in, and consultation over, such a scheme to ensure it receives full industry backing. Consumers should also be consulted, and as Dunstone states in the opening quotation, the means adopted have to be flexible and proportionate. This co-regulatory approach, taking the United Kingdom as a case study, is the focus of the chapter.

'Light Touch' Regulation?

Communications lawyers such as Varney/Feintuck, Gibbons and Woods, human rights lawyers such as Phillipson and communications scholars such as Collins[2] have established the primacy in both UK and EU communications law of the welfare of the consumer and citizen,[3] to whose benefit competition is one but by no means the only means employed by the regulator.[4] Section 3(1) of the UK Communications Act 2003 states:

> It shall be the principal duty of Ofcom, in carrying out their functions—
> (a) to further the interests of citizens in relation to communications matters; and
> (b) to further the interests of consumers in relevant markets, where appropriate by promoting competition.
> (3) In performing their duties under subsection (1), Ofcom must have regard, in all cases, to—
> (a) the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed; and
> (b) any other principles appearing to Ofcom to represent the best regulatory practice.

There is therefore a bold statement of the dual nature of the individual member of society: first as a citizen whose needs for information and communications

services are paramount, then equally as a consumer whose greatest benefits may be secured 'where appropriate by promoting competition'. This is far from a neo-classical view of regulation and competition. Ofcom in practice has tended towards the competition perspective with no intervention until harm is proved, wherever possible, and a 'light touch' in regulatory matters, based on the initial principles established by Lord Currie, its first chair, and its current Chief Executive Ed Richards. Currie in 2002 stated that:[5]

> we will search for solutions which involve co-regulation; and that we will use the power of market competition to release and use innovation for everyone's benefit. We want to create the market conditions in which dynamic, vibrant industries can develop. I personally favour a light-handed style of regulation, letting go wherever possible. Market forces – the invisible hand – often provide the best regulation, provided there is effective competition and monopolies are held in check. But we will intervene decisively and firmly where necessary. Where there is a major problem, Ofcom will act decisively.

Richards by 2009 disowned the expression 'light touch' in the wake of the economic recession and evidence of disastrous light touch regulation in financial services, stating to BBC Internet site users that 'I don't like the expression "light touch" regulator. We try to be as unintrusive as we can be, not to intervene unless we have to, but if we have to and there's a public interest in intervening, we are willing to do so swiftly and effectively.'[6] He also reflected that:[7]

> The first five years of Ofcom's life were characterized by focussing on the fundamental problem of the previous twenty years – regulation of the enduring bottlenecks, ensuring downstream equivalence and, through it, effective competition. More recently we have also significantly raised our game in ensuring effective consumer empowerment and consumer protection.

On 3 March he went further on the specific issue of net neutrality and broadband service, stating that:[8]

> We are very concerned about consumer transparency. It's something that a significant number of consumers have raised with us. With this in

> mind we have recently published a code of practice which ensures that ISPs offer greater clarity over broadband speeds and caps.

These are very real pro-consumer policy shifts within Ofcom as expressed by its chief executive in public. They reflect a significant realignment with the statutory duties, and a reflection on the previous 'light touch' reliance on market forces to provide for consumer/citizens. Ofcom is, unusually for a sectoral regulator, required to write a justification for any decision occasioning a conflict between their treatment of the citizen and the consumer.[9] The objective of Ofcom under Section 3(2) of the Act is to make clear that a regulator's role is far wider than simply to act as a competition tribunal between telecoms providers. Section 4 makes clear the elements that Ofcom must balance, and a huge and disparate group they are. They include the 'desirability of promoting':

- purposes of public service television broadcasting;
- competition in relevant markets;
- facilitating the development and use of effective forms of self-regulation;
- investment and innovation in relevant markets;
- availability and use of high-speed data transfer services throughout the United Kingdom;
- the special needs of children, elderly and disabled citizens, ethnic minorities, nations and regions, and crime prevention, and finally of consumers and other users.

They also include, presumably intended to cover rights to reply and balanced and pluralistic voices in the media 'the need to secure that the application in the case of television and radio services of standards … is in the manner that best guarantees an appropriate level of freedom of expression'. Ofcom is increasingly resorting to forms of co-regulation to balance these aims.

New Regulators, New Co-regulatory Bodies

Ofcom is certainly not the first converged broadcast-telecoms-spectrum regulator of the modern era, following Malaysia 1999, Italian AgCom 2000 and Swiss Ofcom 2001. However, given the strategic importance of the United Kingdom for competitive liberalization in European telecoms, it may be the most ground-breaking new regulator in Europe. Several European regulators are constrained by constitutional and institutional barriers

from merging access and services regulation (for instance Germany) but are finding that the economics and social elements of access regulation throughout utilities can be regulated using one corpus of experts – and therefore merging energy regulation with communications regulation, as in Netherlands and Germany.

The response to continued access problems by regulator and industry may be to institute co-regulatory bodies to determine access. By giving industry actors the incentive to negotiate agreement on the increasingly complex service-level agreements and access conditions necessary for co-location of their switching equipment, the hope is that flexibility and speed of response can provide more investor certainty than the glacial progress of competition law investigations. Before examining in detail the UK response, we first define co-regulation in practice, a subject returned to in greater theoretical depth in Chapter 8.

Co-regulation expresses a form of regulation which is neither state command-and-control regulation in its bureaucratic central or NRA specialized functions,[10] nor 'pure' self-regulation as observed in industry-led standard setting. The state and stakeholder groups including consumers are stated to explicitly form part of the institutional setting for regulation. Co-regulation constitutes multiple stakeholders, and this inclusiveness results in greater legitimacy claims. However, direct government involvement including sanctioning powers may result in the gains – speed of response, dynamism, international cooperation – being lost. It is clearly a finely balanced concept, a middle way between state regulation and 'pure' industry self-regulation. Co-regulation reflects a more complex dynamic interaction of state and market, a break with more stable previous arrangements. Price and Verhulst assert the limits of both government and private action in co-regulation and the interdependence of both – there is little purity in self-regulation without at least a lurking government threat to intervene where market actors prove unable to agree.[11]

The term 'co-regulation' encompasses a range of different regulatory phenomena, which have in common the fact that the regulatory regime is made up of a complex interaction of a general framework of legislation and a self-regulatory body. The varying interests of actors result in different incentives to cooperate or attempt unilateral actions at the various points of the value chain. Without regulation responsive to both the single European market and the need for constitutional protection of national levels, co- and self-regulatory measures cannot be sufficiently responsive to economic and

cultural environments to be self-sustaining. Can co-regulation provide a solution to net neutrality?

The term 'co-regulation' gives a sense of the joint responsibilities of market actors and state, in the activity under investigation. It has been used by Ofcom to suggest a state role in setting objectives which market actors must then organize to achieve – with the threat of statutory powers invoked in the absence of market self-regulation.[12] However, co-regulation is used in such a wide variety of circumstances that its specific meaning must be seen in the national, sectoral and temporal context in which it is used. For instance, in the case of the premium telephone regulator in the United Kingdom, ICSTIS (now renamed PhonePayPlus), Ofcom's stated aims in co-regulation were:

> approving the ICSTIS Code and the ICSTIS budget, where it is satisfied that these enable Ofcom to meet its obligations under the Act; using its powers to ensure compliance with ICSTIS Directions; and carrying out sufficient oversight, and using its backstop powers where necessary, to make sure that regulation is effective.[13]

The basis on which Ofcom delegated its powers under the Communications Act to ICSTIS was:

> in keeping with the principles of co-regulation and with the arrangements in existence before the enactment of the Act and the creation of Ofcom … Ofcom will only approve a code if it is satisfied, amongst other things, that there is a person who has the function of administering and enforcing the code. It follows, therefore, that approval of a code effectively signals the approval of an 'enforcement authority' to regulate premium rate services.[14]

Co-regulation in the European context must also be proportional to the aims of the legal instrument, as well as conforming to the competition law of the European Union. Enforcement is the ultimate responsibility ('the safety net') of the state.

Ofcom Co-regulation in Telecommunications: The Strategic Review

In 2004, Ofcom conducted strategic reviews of spectrum, public service broadcasting and telecom regulation. In 2004–5, it conducted the first telecoms 'strategic review' (TSR) since the Duopoly Review of 1991, the 1982

Review that led to BT privatization and the Telecommunications Act 1984. It is the entire work programme that forms the basis for assessing the success or failure of the Ofcom converged model. The TSR took place after Oftel's 2003 completion of the market reviews for the Telecoms Directive package, which was the culmination of a seven-year convergence-based review stemming from 1996. It was clear in the case of the TSR that there was no point conducting a review whose aim was to tweak the last policy cycle and make LLU work as successfully as in the Netherlands or Denmark. The 2004 TSR came at the end of a precarious time for competition in the telecoms industry in the United Kingdom.

The 1991 Review that decided to introduce facilities-based competition to BT and Cable & Wireless (in its Mercury domestic operation) via US cable investment produced a consolidated but insolvent cable industry by 2003, and an insolvent but unconsolidated competitive telecoms industry. The combined meltdowns of investment in cable and competitive telecoms are therefore the backdrop to the competitive landscape. It should also be admitted that the incumbents are actually in rude health post-meltdown.

The outcome of the three-part TSR was a negotiated settlement that resulted in BT separating much of its regulated national wholesale telecom network into a separate subsidiary called 'OpenReach', which began activities in January 2006.[15] This radical reorganization of the former incumbent's access lines business was undertaken 'voluntarily' by BT, with the threat of a referral by Ofcom behind the decision. To enforce this action via a referral under the Enterprise Act 2002 may have required a political intervention by the incoming secretary of state for trade and industry after the May 2005 general election, a referral to the Competition Commission for a full sectoral enquiry, and potentially judicial review of the outcome.[16] I contend that it would be politically naïve in the extreme to suggest that such a decision would be made by Ofcom without the support of the secretary of state. This could have prevented any remedy until at least 2009, and may have severely depleted the regulator's resources.

The Office of the Telecoms Adjudicator[17] has been established to oversee the various service-level agreement issues that arise when competitors claim that BT is behaviourally discriminating in its dealings with them. An industry co-regulatory body was set up called 'NGN UK',[18] chaired by the Telecoms Adjudicator Peter Black. It will deal with three specific initial issues: IP interconnect architecture, the IP interconnect commercial model and network intelligence interoperability.[19] Ofcom formally considered the future of LLU

products in its market reviews in 2006–7 (especially flat rate Internet FRIACO, voice access origination and broadband), but conducts much of its strategic NGN work through the steering of this formally independent body. It is clear that the future of UK access regulation will be determined in these negotiations,[20] and the stakeholder Next Generation Access (NGA) initiative of the Regulatory Affairs Group of the Broadband Stakeholder Group, a forum funded in part by government and steered in consultation with government and Ofcom.

It is remarkable that a solution to interconnection is being sought in the United Kingdom, with the 'voluntary' agreement of the incumbent to form OpenReach and its active participation in NGN UK, though it is premature for the operational significance of either to be judged fully. In the Microsoft litigation, it was suggested that the diversion from innovation produced when an incumbent chooses to deliberately raise entry barriers rather than attempt a Schumpterian innovation-led competitive strategy was preventing the most efficient outcome for the company, the market and the consumer.[21] In this case, the telecoms incumbent appears to have (grudgingly) accepted the case for innovation and separation of the regulated access business from its value-added retail businesses. This may set a precedent for other markets where regulators have sufficient intellectual and political capital, and incumbents sufficient stimulus to move away from the regulated business. It does only provide an extremely partial structural solution to the various institutional barriers in both access and content businesses. Architecture of NGA will be vital to continued competition, and van der Berg states: 'From a regulatory perspective a point-to-point network offers more possibilities for regulatory measures such as LLU and Wholesale Broadband Access.'[22]

The success of the co-regulatory model for NGN will be a true test of the new regulatory settlement.

Critique of OpenReach

Initially the outcome of the TSR and its co-regulatory bodies was a far more rapid deployment of LLU. Ofcom hailed OpenReach as a successful policy innovation that reduced its workload and prevented disputes from arising. However, criticism has been aimed at the solution adopted as toothless. Burstein takes a critical view:

> Structural separation currently is looking to fail badly in Britain, after an important initial success in opening the retail market and bringing down

> prices from exorbitant to not so bad and spurring enormous growth. The weaknesses are now becoming visible. BT Wholesale has a reinforced monopoly of the local loop, so requires stronger than ever regulation. The loop charge alone is more than the total charge in some other regions.[23]

He notes that cableco Virgin is charging a premium for its high-speed DOCSIS 3.0 service, and then discusses Ofcom's views:

> Ofcom talk of 'super-fast broadband' is an attempt to fool the British people. BT's [plan] is 50–90% slower than what's building in New York, Boston, Paris, Geneva, and Amsterdam. That looks to be the only choice for half the country unless Ed demands more from BT.

He notes BT's refusal to upgrade its network, claiming a lack of consumer demand, as discussed in Chapter 3:

> [BT CEO] Ian Livingston isn't afraid they will lose the customers even if they do only a modest upgrade of their copper lines. So they are fighting with everything they have to keep the copper valuable for many years. As long as the companies can make money on copper, they have enormous incentive to not upgrade. Verizon, FT, KPN and others facing competition can't think like that. If they didn't replace copper with fiber, they would be clobbered.

This is fairly brutal criticism, which if true, means that structural separation has failed to incentivize the incumbent to upgrade its network, but rather led it to sweat its existing assets. There is no need in this book to take a particular view, but it remains remarkable the degree to which UK regulation has tried to rely on consensus and co-regulation despite what may be characterized as diametrically opposed views amongst many stakeholders.

Co-regulation and Broadband QoS Reporting Requirements

Notwithstanding the backstop of regulatory intervention, based on the incomplete evidence thus far, net neutrality will be primarily enforced via reporting requirements. This is a form which can be classed as self-regulation where there is an incentive on market players to cooperate, and co-regulation

or formal regulation if there is not, in which market actors and self-regulatory bodies maintain a constant dialogue with regulators and consumers. This is a preferable lighter-touch regime compared to those of government-funded regulation and non-regulation of European Net Neutrality, and a flexible and responsive framework. The pace of change in the relation between architecture and content on the Internet requires continuous improvement in the regulator's research and technological training. This is in part a reflection of the complexity of the issue set, including security and Internet-peering issues, as well as more traditional telecoms and content issues.

Regulators will need to ensure that the network operators report more fully and publicly the levels of QoS that they provide between themselves and to end-users. Internet architecture experts have explained that discrimination is most likely to occur at this level, as it is close to undetectable by those not in the two networks concerned in the handover of content, as discussed in the 2006 US mergers. It is very difficult (if not impossible) to monitor the former for any one other than the two network operators themselves, and therefore shedding light on QoS in this area will require reporting. As this information is routinely collected by the network operators for internal purposes, this should not impose a substantial burden. In fact, in the United Kingdom, Ofcom has worked with the consumer/industry research website Samknows to conduct panel research on broadband quality.[24]

These regulatory interventions do, however, require a reporting requirement on service providers to provide transparency in their traffic-management practices. I noted in Chapter 5 that the danger of fragmentation and regulatory arbitrage is apparent here for two reasons: a 'regulatory holiday' for ISPs in one country but not another is quite likely, and highly divergent enforcement of net neutrality. Therefore the EC as well as Member States will need to monitor developments in this area closely, especially in view of policies for Content Online and the wider 'i2010' goals, under which the importance of content provision (as well as network deployment) for jobs and growth are emphasized.[25] In particular, the role of start-up and small companies in content and service provision is likely to be a substantial engine for such growth.

Ofcom has so far responded with a combination of denial that there is a problem, an acceptance and willingness to deal with those problems that were shown to have emerged, regulation of customer switching problems

between ISPs, regulation of video on broadband offered by the public service broadcaster BBC and a light touch attempt to persuade ISPs to offer greater transparency to users. I examine these in turn.

The initial Ofcom position was that there was no evidence of discrimination, no complaint from other ISPs, and therefore no need to examine the problem. In its 2006 response to the 'ContentOnline' consultation,[26] Ofcom defined net neutrality as permitting no QoS on the network, itself terming this an 'extreme' position: 'Net neutrality implies there is absolutely minimal differentiation. It is therefore at the extreme end of this continuum of different approaches.' This meant that institutionally Ofcom had decided there was little evidence of a problem, by taking that extreme definition. It explains that it has tools to deal with SMP operators, and that competition will settle the issue for non-SMP ISPs:[27] 'if a single operator without SMP were to introduce charging for the delivery of third party content services, or to block specific services, consumers would be able to move supplier.' This is despite the mounting evidence that ISPs were non-transparent in their blocking and throttling and that ISPs were preventing consumers from switching by refusing to release their MAC (Migration Authorization Code) numbers (see below). In case of such evidence, Ofcom admitted:

> If this [easy switching] is not the case, then there may be a role for regulatory intervention to protect consumer interests. However, any intervention would be best focussed on addressing the lack of consumer information, consumer empowerment or migrations processes.

That became exactly its policy throughout 2007–8.

When the problem was exposed at the Ofcom Annual Conference 2006, by several non-dominant ISPs' own admission that they were throttling BitTorrent, Ofcom's position of denial could no longer be maintained.[28] Ingram stated: 'there is no requirement for new legislation to ensure that the net remains neutral – there are existing solutions'.[29] Ingram importantly stated a willingness to engage with the research community and others to discuss issues of consumer concern, stating 'Under the Communications Act, suppliers have to comply with various General Conditions in order to take part in the market. If there was evidence that the market wasn't doing so adequately, these could address, for example, the information that providers supply consumers about their products'. Evidence was building

that BitTorrent throttling was preventing download of updates to hugely popular multi-player online game World of Warcraft and that subscribers were unable to switch between providers in response. Within two months of Ingram's remarks, Kiedrowski stated:

> we could apply Article 5.1 of the Access and Interconnection Directive, which allows NRAs to impose ex ante obligations on operators to ensure end-to-end connectivity, without the need to find SMP. We could use our powers derived from the European Framework which enable us to require suppliers (even non-SMP suppliers) to comply with various general conditions in order to take part in the market to address particular issues, for example, in relation to information transparency.[30]

This was to follow in an Ofcom intervention to ensure migration between ISPs.

Ofcom was forced to take regulatory action to ensure customers could migrate ('switch' or 'churn' in telecoms terminology) between ISPs, by ensuring portability of MACs.[31] In 2005, it became clear that many ISPs were not cooperating in letting unhappy customers switch away to better providers, whether for throttling or (more likely) other issues. This came into sharp focus in the period before the collapse of abusive ISP E7even UK Ltd on 3 July 2006,[32] but it had been an issue during the crisis at ISP Bulldog in summer 2005.[33] In December 2006, after public consultation, Ofcom imposed a new General Condition, GC22, governing the obligations of broadband providers to switching customers. GC22 entered into force on 14 February 2007. Ofcom stated: 'Under GC22, all broadband providers must use the MAC Broadband Migrations Process ('the MAC process') if they receive a migration request from an end-user, customer or another provider.'[34] An eighteen-month enforcement action ensured, which Ofcom stated would force ISPs to comply with customer requests:

> The focus of the extended programme has been direct engagement over the course of six months with the broadband providers who were the subject of the most MAC-related complaints from consumers. As a result of this action, these companies have reviewed their processes and procedures for providing consumers with MACs and made a range of improvements to these processes.[35]

Ofcom had to get tough with non-compliant ISPs, though the length of the action shows how difficult it proved to achieve the basic requirement that customers be able to switch provider – if they had managed to work out why their service was so poor. I consider the transparency issue below.

Kiedrowski further stated: 'It is a supplier's responsibility to ensure that information about these kinds of [throttling] considerations is communicated to consumers in a way that is understandable and we're encouraged that ISPA has published a best common practice document for their members, encouraging them to provide clear information about internet filtering practices.' He stated that Ofcom could use its powers under the general conditions to require all – even non-dominant – suppliers to provide better consumer information about their products, if self-regulation continued to be inadequate.

The best practice document released by ISPA in fact did not succeed in encouraging ISPs to demonstrate real transparency and Ofcom was forced to engage in some strenuous arm-twisting to arrive at a mediated self-regulatory position whereby ISPs did agree to provide the information on broadband speeds (if not necessarily service) in their Code released on 5 June 2008. They clearly warned ISPs that a failure to continue to improve transparency could result in a regulatory action under those General Conditions of their authority to offer services. Point 39 of the Code states: 'Where ISPs apply traffic-management and shaping policies, they should publish on their website, in a clear and easily accessible form, information on the restrictions applied. This should include the types of applications, services and protocols that are affected and specific information on peak traffic periods.'[36] Ofcom warns ISPs that 'Ofcom also intends to monitor compliance with the Code through a number of methods including, but not limited to, carrying out regular mystery shopping exercises by Ofcom itself or its agents.' The Code states that ISPs are required to:

- provide consumers at the point of sale with an accurate estimate of the maximum speed that their line can support;
- explain clearly and simply how technical factors may slow down speeds and give help and advice to consumers to improve the situation at home;
- offer an alternative package (if there is one) without any penalties, if the actual speed is a lot lower than the original estimate; and
- explain fair usage policies clearly and alert consumers when they have been breached.

Ofcom has therefore tackled several issues relating to net neutrality, if somewhat reluctantly in keeping with its 'deregulatory' agenda. It recently asked if mobile applications and services might gain from a net neutrality approach, 'Should Ofcom explore open access requirements to ensure opportunities for innovation? What role might 'net neutrality' play in the mobile sector?'[37] This reflects the now well-established place for such debates within Ofcom consultations. However, Richards warns that 'The shibboleth of net neutrality should not be allowed to become an obstacle or a distraction to investment in NGNs in the UK.'[38]

Ofcom's approach remains agnostic and wary towards intervention on behalf of the current generation of Internet consumers, for fear it might slow investment for the next. It also remains committed to light touch self-regulation where possible, despite Richards' more recent remarks: 'Within the UK, the need for specific regulation is likely to be lower, with ISPs and VoIP providers working together through industry bodies to agree a self-regulatory approach to providing consumers with transparency on whether service prioritization or quality of service charging is being applied.'[39] The fact that Ofcom is often having to bang the table to get ISPs to commit to even these non-enforced codes is evidence that co-regulation will be more effective than the much-vaunted self-regulation.

To see co-regulation in more effective practice, it is necessary to look east across the North Sea, to European Economic Area (not full European Union) member, Norway.

'Nettnøytralitet' in Norway

The regulator in Norway has made the ISPs and cablecos sign up to a co-regulatory pact on transparency and consumer rights in February 2009, following over two years' research and multi-stakeholder discussions.[40] This stands in contrast to the slower progress towards detailed reporting standards in the United Kingdom. The subject arose due to a dispute between an ISP, NextGenTel, and the Norwegian state broadcaster NRK in mid-2006. NextGenTel limited the bandwidth available to the website of NRK, which the operator said was generating excessive traffic caused by its subscribers streaming free Internet TV provided by the broadcaster. NRK published a statement on its website stating that NextGenTel had considerably decreased the transfer capacity from its website to NextGenTel broadband customers. According to the broadcaster, the operator had asked for an additional payment for an increase in capacity. In its statement, NRK said that the matter was

out of its control and that NextGenTel customers should contact the operator directly – which the customer did in their droves, according to local reports. NextGenTel threatened to place a 1 Gbps limit on traffic from NRK.

The Norwegian Code states:[41]

- Internet users must be given complete and accurate information about the service they are buying, including capacity and quality.
- Users are allowed to send and receive content of their choice, use services and applications of their choice and connect any hardware and software that doesn't harm the network.
- The connection cannot be discriminated against based on application, service, content, sender, or receiver.

There are various explanations that any network management must be non-discriminatory. Head of the regulator Willy Jensen states:

> Everyone who endorses these guidelines has made it clear that they support an open Internet on which different providers can compete freely to offer content and services. Internet users need to be assured that the ISP they have chosen will not act as a gatekeeper for their Internet use.[42]

Government Policy: Universal Service Obligation and Neutrality

One right does unreservedly apply to European citizens: the right to a 33 kbps telephone line. A type of Universal Service Obligation (USO) that is upgraded as broadband network speeds increase can ensure a minimal open Internet layer is maintained. I do not in this book take any position on whether the USO will be extended for NGNs, nor is it possible to do so in an environment where the future bandwidth supply/demand capabilities are so uncertain. A group of academics and engineers have proposed rules on what can be called 'Internet' service. Those rules might be considered a form of transparency regulation. Essentially they claim that any service that differentiates between packets is breaching the end-to-end principles of the Internet protocol and therefore should not be labelled as an 'Internet' service. They suggest legislative wording as follows:

> Network providers that offer special features based on analyzing and identifying particular applications being conveyed by packet transmissions must not describe these services as 'Internet' services. Any

> representation as to the speed or 'bandwidth' of the Internet access shall be limited to the speed or bandwidth allocated to Internet access.[43]

This proposal that 'broadband' should not be marketed as Internet service unless it offers unfettered Internet access is not yet accepted in the United Kingdom, but note the website-based campaign 'It's the Internet, stupid'[44] is continuing this proposal for the Obama administration stimulus plan.

I suggest that regulators will need to form a view of what access to the public Internet is required in order to make effective conclusions on the future for USO during the course of 2010. I emphasize that this debate is likely to grow in complexity during that period and urge regulators to conduct research in this area. Unfettered Internet access of some type is a currently enjoyed 'public good' for consumers, particularly in the use of Web2.0-type applications and services, and this public sphere is a regulatory policy of continued consideration. In the United Kingdom, policy towards universal service in broadband has been driven by first the work of the government-funded quasi-independent industry group the Broadband Stakeholder Group[45] (chaired by Phorm director, former Ofcom partner and advisor to Lord Carter in 2008–9, Kip Meek) and second a series of policy discussions held in 2008, called the 'Convergence Thinktank'.[46] The multi-stakeholder industry-led Broadband Stakeholder Group made the following relevant recommendations to government:[47]

> Recommendation 4 – Explore alternative commercial models to support network investment
>
> Further work should be undertaken by stakeholders to debate and explore alternative commercial models to support network investment. Good solutions need to be found that align the interests of operators with upstream content and service providers and end consumers whilst mitigating concerns about blocking or degrading third party applications and services.
>
> Recommendation 9 – Review universal service/universal access The current universal service directive refers only to functional Internet access. However, as the adoption of broadband continues to accelerate, this definition is starting to look outdated. Ofcom's consultation on universal services should address both the definition of universal service and future approaches to funding universal service/universal access.

A background paper for the government's 2008 'Convergence Thinktank', yet again an industry-led multi-stakeholder consultation, stated:[48]

> Digital and broadband open up the prospect of many new entrants into the media market, and remove the need for intermediation between producers and consumers … [but] Some powerful bottlenecks will remain.

The Thinktank was to inform the new much-heralded 'Digital Britain' report,[49] drawn up by former Chief Executive of Ofcom (2003–6), (Lord) Stephen Carter, appointed Communications Minister on being removed from the Prime Minister's Private Office in 2008. It was written as a draft report to which criticism could be aimed, in January 2009,[50] before the final report was presented to the Cabinet of the British government on 16 June 2009. Concurrently, the Ciao Review to the UK Treasury of September 2008 was designed to examine how far deregulation and market forces could produce NGA solutions.[51]

Carter Report: Digital Britain

The UK government put a noose around its neck in the early part of this decade by declaring its aims for leading the G7 in broadband – an overambitious target.[52] Known arch-realist Stephen Carter appointed a list of business advisors on the Digital Britain report, eliminating such hostages to fortune. Carter overall makes some interesting points on both network deployment and universal service, but I highlight the area where he deliberately chose to come down on the side of industry, not consumers. ISPs are given carte blanche to breach net neutrality under Action 2 in Carter's interim report:

> ISPs can take action to manage the flow of data – the traffic – on their networks to retain levels of service to users or for other reasons. The concept of so-called 'net neutrality' requires those managing a network to refrain from taking action to manage traffic on that network. It also prevents giving to the delivery of any one service preference over the delivery of others. Net neutrality is sometimes cited by various parties in defence of internet freedom, innovation and consumer choice. The debate over possible legislation in pursuit of this goal has been stronger in the US than in the UK. Ofcom has in the past acknowledged the claims in the debate but have also acknowledged that ISPs might in future wish to offer guaranteed service levels to content providers in exchange for

> increased fees. In turn this could lead to differentiation of offers and promote investment in higher-speed access networks. Net neutrality regulation might prevent this sort of innovation.
>
> Ofcom has stated that provided consumers are properly informed, such new business models could be an important part of the investment case for NGA, provided consumers are properly informed.
>
> On the same basis, the Government has yet to see a case for legislation in favour of net neutrality. In consequence, unless Ofcom find network operators or ISPs to have Significant Market Power and justify intervention on competition grounds, traffic management will not be prevented.

In particular, note the continuing analysis that only BT might be regulated as the dominant SMP operator – when throttling goes on over all consumer ISPs. The report chooses the expression 'so-called net neutrality', reflecting 2006 Ofcom thinking. Some trade press journalists picked up on the decision to substitute net discrimination for any actual government support for roll-out. On net neutrality, not only is there no mention of mobiles in connection with 'so-called' net neutrality, a vital consideration for a growing number of people using sub-dial-up-speed 3G broadband (see the discussion in Chapter 7), but the proposals do not discuss preventing ISPs from throttling customers to below current levels, or measures to prevent them targeting specific applications, in contrast with the FCC or CRTC. Carter told Parliament he was in favour of permitting discrimination and behavioural advertising. The Register put it well:

> In the UK, net neutrality was stillborn as an issue, but Carter was happy today to give its corpse a kick. As well as advocating tiered content delivery, he backed 'traffic management'; the somewhat euphemistic industry term for BitTorrent throttling.[53]

Carter considered the argument for universal broadband in the draft report,[54] confirmed in the final version:

> ACTION 17: We will develop plans for a digital Universal Service Commitment to be effective by 2012, delivered by a mixture of fixed and mobile, wired and wireless means. Subject to further study of the costs and benefits, we will set out our plans for the level of service which we believe should be universal. We anticipate this consideration will include options up to 2 Mbps.

A key Tony Blair advisor, Lord Puttnam who chaired the Joint Lords-Commons Scrutiny Committee on the draft Communications Bill of 2002, bewailed the lack of ambition in Digital Britain, and sees a 2 Mbps ambition (not a declared goal but an aspiration according to Lord Carter) for USO as 'Twentieth Century thinking':

> The report has its priorities straight but I worry greatly about its scale and ambition regarding the level of bandwidth we need. I've been talking to people in Singapore about needing gigabytes by 2015. Either the authorities here are barmy and don't realize what the British creative industries here need, or we are. There's a massive gap of where the balance of credibility lies. Are we a Twenty-first-Century nation or are we equipping ourselves for the 20th Century?[55]

Carter on Net Neutrality: Disconnecting Illegal File-Sharers

The action on net neutrality in the final report comes in the shape of instructions to Ofcom to tell ISPs to throttle connections of users suspected of illegal file-sharing – a UK HADOPI but without any apparent appeal to judicial authority. It is a proposal that caused great controversy, and may prove Dunstone to be prophetic in warning government not to place itself as the cat chasing a mouse that is all but impossible to catch. The Report stated:

> Ofcom will be placed under a duty to take steps aimed at reducing online copyright infringement. Specifically they will be required to place obligations on ISPs to require them:
> – to notify alleged infringers of rights (subject to reasonable levels of proof from rights-holders) that their conduct is unlawful; and
> – to collect anonymized information on serious repeat infringers (derived from their notification activities), to be made available to rights-holders together with personal details on receipt of a court order.[56]
>
> Ofcom will also be given the power to specify, by Statutory Instrument, other conditions to be imposed on ISPs aimed at preventing, deterring or reducing online copyright infringement, such as:
> • Blocking (Site, IP, URL)
> • Protocol blocking

- Port blocking
- Bandwidth capping (capping the speed of a subscriber's Internet connection and/or capping the volume of data traffic which a subscriber can access)
- Bandwidth shaping (limiting the speed of a subscriber's access to selected protocols/services and/or capping the volume of data to selected protocols/services)
- Content identification and filtering

This power would be triggered if the notification process has not been successful after a year in reducing infringement by 70 percent of the number of people notified.[57]

This blocking of end-user Internet access is almost exactly the HADOPI authority which was ruled unconstitutional in France a week earlier – graduated response without a court ruling, to restrict users' access, as we saw in Chapter 5. Consultation responses were due by 15 September 2009, but delayed until October under a hardened proposal to shorten the timescale radically. The document at Paragraph 4.39 set out an indicative timeline, with government response by 15 December 2009, and no technical measures taken against subscribers until 'Zero+28 months', zero being date of royal assent to any order instructing Ofcom to set up the mechanism.[58] That suggested at earliest May 2012, and given the general election due by May 2010, indicated late 2012 as the more likely date for implementation. This is likely to be a highly controversial three years from the time that I write this, and whether Ofcom will actually reach the 'throttling point' under the next government must be open to severe doubt.

Reaction to the Digital Britain Report

The report is notable for its free market attitude, with very little government intervention, except to discriminate against file-sharers as we saw above. The Ofcom instruction to throttle users' connections is a work of quite breath-taking complexity as well as obviously riding roughshod over due process of law. On net neutrality, the final report is silent, but the interim report and the UK attitude to Phorm, as seen in Chapter 2, reveals the current government's market-led approach. Even here, it has prominent critics, as Christopher Bland commented:[59]

> Digital Britain, described by its author in this newspaper yesterday as 'industrial activism', represents a well-intentioned mixture of inadequate analysis and old-fashioned tinkering with matters best left to markets.[60]

Charles Leadbetter summarizes Carter:

> There is nothing in the Carter report about how Britain will create the next Google or Youtube, where the money, entrepreneurship and markets will come from ... If we are not careful the Digital Revolution will become a manifesto to protect incumbents rather than promote competition and innovation. Reading Digital Britain one cannot help but feel the government finds the opportunities for people to self-organize through the web all too unsettling for its more technocratic, controlling tendencies.[61]

Whether Leadbetter, Bland and Puttnam are correct or not, the UK aspiration for broadband and network discrimination does seem very conservative. A backward-looking industrial policy based on broadcast one-way communication has captured the debate on both sides of British politics – in contrast to the United States or Sweden, for instance. All the action remains in Brussels – on network subsidy, on Universal Service, on net neutrality.

However, lest I be accused of believing that UK fixed ISPs provide an imperfect example of net neutrality commitments, it is instructive to consider the much more closed world of mobile ISPs, the subject of the next chapter.

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CHAPTER SEVEN

The Mobile Internet and Net Neutrality

Let us be quite frank: the growth of Mobile Internet so far has been disappointing in Europe … The costs are too high … For the vast majority of consumers, the horror of getting a terribly expensive bill acts as a powerful deterrent to enter the Mobile Internet … Users expect the mobile web to be as open and easy to use as the fixed line internet … The only question is for the European industry, how quickly will you make this transition?[1]
Commissioner Reding (2008)

'Abandon hope all ye who enter here' is a phrase from Dante's Divine Comedy, representing the warning at the entrance to Hell. It was also reputedly written on the Traitors' Gate at the Tower of London,[2] for those condemned to death as traitors by the king.[3] I hope that this chapter on mobile is the augury of a happier outcome. However, I use the phrase to warn you that this chapter is in part the climax of the previous lengthy discussion on the Internet and its environment, which means you should not start here even if mobile is your main preoccupation. Mobile is a rapidly growing and potentially major element of the future Internet, and its environment cannot be sensibly considered in isolation from fixed networks. I do not in this chapter or other works,[4] and nor should you.

(A note on terminology: Europe uses the term 'mobile' while the United States uses 'wireless'. I will use the terms interchangeably, and when I refer to WiFi or WiMAX alternatives to mobile or wireless networks, I will make that specifically clear. Europeans often state 'wireless' when they mean 'non-mobile' – i.e. WiFi and WiMAX. Also note that this chapter focuses on the mobile 'walled garden' model as deployed in Europe, following to some extent the Japanese pioneers. 'Wireless' is more open in the United States, reflecting a regulatory regime that does not generally make mobile a special case. In Europe, mobile has always made special pleading for 'unregulation' or rather for forms of self-regulation, as we will see.)

Mobile network operators (MNOs) in Europe have limited competition, with between three and five networks in major markets. The costs of terminating calls on mobile networks, previously unregulated, have recently been examined and regulated particularly vigorously in the United Kingdom, even though regulated termination costs are now lower elsewhere.[5] The European Commission states:

> Mobile termination rates are also typically 10 times higher than fixed termination rates … [this] cannot be justified by differences in underlying costs, networks or national characteristics. They are an indirect subsidy that benefits mobile operators with a large market share to the detriment of smaller and fixed-line operators. They also direct funds away from critical investments like upgrades to high-speed internet networks, and hinder innovative services like converged fixed-mobile products and competitively-priced bundles of calls.[6]

We will see later in the chapter that these termination charges represent a hidden subsidy paid by fixed ISPs to their mobile cousins. The chapter proceeds from introducing the value chain in the mobile 'walled garden' and its development. We then analyse the pre-existing content controls on mobile applied through law. The third section considers the MNO's own self-regulation of content via contract and classification to avoid inappropriate content, and why this became particularly important as an unsupervised 'tween' (young teen) regulation issue in Europe. The fourth section considers the mobile broadband self-regulatory schema, before the fifth section considers the degree of price control regulation exerted on mobiles and the MNOs' vigorous rear-guard anti-regulation defence. Finally, I look at the effects of this regulatory asymmetry and whether MNO calls for mobile to be treated differently from other ISPs can be justified. I conclude by examining what the effect of price and content control on mobile is likely to be for incentives for fixed ISPs, and produce a result that I describe as the 'fixed' strategy.

Mobile Self-Regulation: Content and Control

Mobile services have been used to serve web pages to European users since approximately 2000. The first generation of mobile Internet devices used Wireless Application Protocol (WAP) to deliver specially programmed,

normally simplistic and graphic-poor pages over narrowband networks, in Europe dominated by the standard Global System for Mobile (GSM). The screen is typically very small, and the pixilation (granularity) of the screen means that photographic images are cartoonlike. Text services (SMS) have developed as 160-character text messages, rather than WAP-enabled chat or listserv. In fact, sending a text in the twenty-first century is rather reminiscent of sending a telegraph message in the nineteenth century – and in terms of cost per bit, further reminiscent (a 160 a bit of character message costs up to 30 euro cents).

These 2G networks delivered data at about 65 percent of the speed of the modems used for fixed-line computers circa 1994/5. The simple 2G phone offered 64k colour screens, access at up to 27 kbps to '2.5G' networks and larger screen size.[7] The third generation – especially SmartPhones – and the data-card connected personal digital assistants and laptop computers are all enabled to receive web pages without re-coding for WAP. These are therefore the first portable Internet devices. Accessing the Internet over mobile networks at perhaps 0.1–0.3 Mbps, and with WiFi up to several Mbps, they can approximate the wired Internet use experience. With larger full-colour screens, they are fully specified Internet devices for image, sound and video. Note that in late 2008, only 13 percent of phones shipped to suppliers were SmartPhones, so 87 percent have inferior browsing experiences even if technically able to support 3G.[8]

The first European commercial 3G broadband networks for mobile were those of Hutchison Whampoa's 3 service in the United Kingdom and Italy.[9] By end of 2004, most EU member territories had metropolitan broadband wireless services – by 3G and WiFi 'hotspots' – which means that customers with handsets have had a real Internet experience for 4 years. Mobile phones can now be used to access the public Internet and download graphic files, sound and video clips. They can be used for adult services and premium services, such as the 3 'G's: girls, video gaming and gambling, which were supposed to be the revenue streams for 3G mobile in Europe when it launched. As we will see, the 'walled garden' for users came with strong content filters that have restricted mobile operators' access to that revenue.

From the consumer's point of view, the main differences between old and new generation mobiles are characterized by the different applications they facilitate, which can be summed up as follows:

- 2G allows WAP and SMS applications;
- 2.5G allows multimedia messaging service including low-resolution video games;
- 3G allows rich media, streaming, full-motion high-resolution video.

This means that the policies associated with material accessed via PCs might also be raised by mobile access to the Internet, not just net neutrality but also harmful content, spam, viruses and criminal use of networks. Such technological advances have also led to the development of new business models for network operators, which focus largely on collecting revenue from online content. The models include:

- Vertical Integration: network operators offering their own content (e.g. Vodafone Live!)
- Intermediation: network operators allowing third parties to provide content (payment authorized by the network operator)
- Transit only: providing open access to the Internet (with payment, if any authorized by third parties such as Bango.net)

In the United Kingdom, mobile operator '3' is currently the only operator offering open access to the Internet for adult subscribers, whereas the other operators employ walled gardens.[10] It is important to recognize the existence of these different models, as the possibilities for co- and self-regulation associated with the content delivery model will clearly vary according to the sources of content.

Note in the value chain in Figure 7.1 several innovations are compared with the familiar fixed-line Internet value chain. First, for services in the mobile portal, there is a strong contractual sanction for content providers failing to fulfil their self-regulatory duties, which in the fixed environment is true only for the largest integrated portals (the famed AOL walled garden). Second, the pre-pay user has no regulatory sanction from the MNO, with no contract and no billing relationship, though the MNO could discover the identity and block service to the SIM card of users if unacceptable use is discovered. Third, the type of network control at the institution of work/research/education that the public access layer establishes is not relevant in the mobile environment except in the case of group contracts for mobiles given to employees.

Even before the start of the value chain there is a fourth critical difference: the MNO owns the network and can control the content flow onto networks

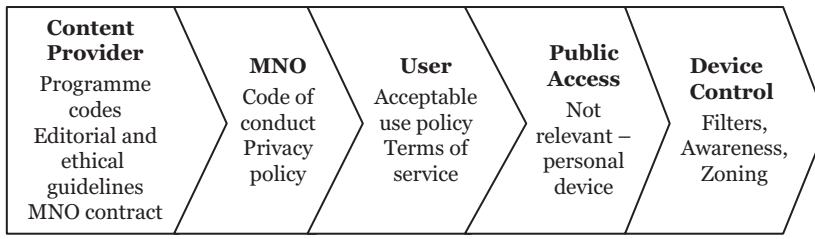

Figure 7.1 Value Chain for Mobile Network Operators

in a manner unfamiliar to fixed ISPs before DPI. Therefore the lack of control over end-users is replaced by a control over the network. This is a critical change from end-to-end where control must be exercised close to or at the end-device, in that mobile networks can institute control in the network itself, are required so to do for law enforcement purposes, and choose so to do to stop spam overwhelming the network. That is not to suggest that as a policy choice such a radical departure from fixed Internet regulation is to be recommended, not least on speech grounds, but it does represent a different architecture of the ISP–network provider relationship.

The primary types of mobile data service fall into four functional categories:[11]

1. content-enabled services, e.g. addition of location-enabled application with maps and search function, to form a navigational service that navigates to destinations;
2. e-commerce services, including financial transactions;
3. content-based data services, including music, TV and entertainment-based educational content ('edutainment'), games, health, video, news, transport information and adult entertainment; and
4. communications-based data services, primarily involving P2P communications such as voice, messaging (SMS and multimedia messaging service) and email.

Generally, the provision of content to consumers is organized in one of three major approaches, which also may be mixed:

1. 'walled garden' –MNO creates a users' space for wholly controlled content and services, some of which may be bought in from third-party content providers; the 'walls' around the 'garden' keep consumers tied to these offerings;

2. open access – any website or services over any mobile operator that allows Internet access and has a suitably fast mobile network for multimedia services;
3. semi-open access or web-access approach – as in NTT DoCoMo's i-mode service. This is more open than a 'walled garden' and uses connection to any web-enabled site via its proprietary software, but has two tiers of accessible sites and business partners, where open Internet access is available but 'walled garden' content is accessed more easily.

A simplified view of the basic operational value chain or mesh for multimedia mobile is based on extensions from narrowband 2G digital mobile. Whether the model is a 'walled garden' or open access, MNOs play a fundamental 'gatekeeper' role in the mobile multimedia content value chain. The handset supplier (e.g. Apple, Nokia and Sony Ericsson) may preload some limited multimedia content on the handset to provide resident applications for off-air as well as on-air usage. The role of the MNO is critical to the decision whether to allow open access or to vertically integrate operations 'in-house'. This changes the risk-reward in the value chain and the type of regulatory arrangement that is likely to be effective.

The multimedia content provided by mobile service providers is similar to that on the Internet. However, while Internet content is often free at the point-of-use (albeit usually supported by advertising), often mobile entertainment is charged for by the mobile service provider. MacInnes et al.[12] argue that this reflects their 'gateway' role. This is reflected in the indicative revenue shares reported by mGain.[13] The other 'hub' firm in this value chain is usually the content provider, which also collects a significant share of the revenue. It is worth noting that there are many prospective business models for the provision of mobile content from the perspective of wireless network providers, and the above case studies may describe only one.[14] McInnes et al. classify them according to four models:

1. pipe – the wireless network provider simply provides transport services;
2. pipe-sales – the wireless network provider interacts more directly with content providers and provides billing services;
3. portal – the wireless network provider delivers the content via a portal, and so exerts bargaining power over the content providers;
4. full portal – the wireless network provider takes control of all aspects of branding, marketing and delivery, and the content provider simply supplies content wholesale.

The different models have obvious implications for the power of the operator within the value chain, with the last offering full functionality and the ability to create a vertically integrated 'walled garden'. However, different actors, such as device manufacturers or publishers, also can act to provide portal services and act as aggregators (e.g. Nokia's *Club Nokia*).[15] The 'fitness' of one business model over another will be determined by its ability to adapt to changes (technological, regulatory, etc.) and the ability to access finance (reliant upon the business model producing an adequate business case).

Walled Gardens: Filtering Content for Child Safety

MNOs have eliminated many of the end-to-end options in Internet design by closing off a walled garden for public safety and their private profit. In a position paper presented in November 2003, Ahlert, Alexander and Tambini explain that:

> Major concerns for the self-regulatory framework include adult content (porn), interactive services, unsolicited messages, commercial transactions, location based dating, gambling, and P2P. The major necessary strategies for dealing with these concerns are content rating, filtering and blocking, NTD procedures, public awareness, cooperation with the government.[16]

They identify scale economies and entry barriers which make effective and sustainable regulation of the mobile Internet possible:

> The emerging market for 3G services in the European Union will be dominated by a few major MNOs, which in theory should make self-regulation a realistic and viable alternative to state regulation. Uncertainty of actual consumer uptake despite projected high popularity of 3G, media convergence, and the evolving EU regulatory framework all offer incentives for 3G mobile operators to invest in self-regulation.[17]

Mobile networks already have three examples of self- or co-regulation in place. These are:

- an ombudsman service for customer complaints over pricing and service, and
- a premium rate regulator (for instance, RegTel in Ireland or ICSTIS in the United Kingdom);
- codes of conduct for classification of adult content.

Ombudsman scheme for consumer disputes: In the United Kingdom, Vodafone was instrumental in establishing OTelO, and T-Mobile and Orange in establishing the Communications and Internet Services Adjudication Scheme (CISAS), an ombudsman for ISPs and phone companies. OTelO charges all members a fee, CISAS is free – an interesting example of regulatory competition.[18]

Premium services: European broadcasters, fixed and mobile operators increasingly use premium services to fund interactive television 'reality' and quiz programmes, such as Gross Bruder/Big Brother/Gran Hermano. Premium rate co-regulators are members of the International Audiotex Regulators Network, the network for premium service regulators. Operating since 1995, there have been two meetings a year.

Other regulatory requirements on telephony content include:

- Intercept, integrity and surveillance: Networks must comply with network integrity and security measures to ensure surveillance is possible, that the European emergency number 112 is accessible.
- Mobile handset theft: Mobile networks also have systems to deactivate the SIM card of phones reported as stolen.
- Number portability: Further measures to monitor phone use include a Home Location Register (HLR) in each member state, to permit mobile numbers to be ported by subscribers from one network to a new subscription on a different network.
- Spam blocking: In several Member States, unsolicited commercial messages (spam) are regulated by, for instance, the UK Telephone Preference Service (www.tpsonline.org.uk/) and E-Mail Preference Service, again in common with fixed telephony. Mobile networks also undertake unilateral action.

There will inevitably be disagreement between states as to the extent of the risk posed to openness and innovation by mobile phones and Internet access. What is deemed to be inappropriate or even harmful in one country may be regarded as completely unproblematic in other European states. To this extent, a co-regulatory approach is an appropriate one, allowing public and governmental input to ensure a degree of variation between mobile net neutrality applied in different countries. In signalling support for self- and co-regulation, the mobile multimedia sector may appear more credible and legitimate in the public's eyes. The classic mobile 'walled garden' provides

its own policing for the most part, and is therefore least affected by state regulation. Such regulation reinforces this status quo and raises entry costs to what is already a market with extremely high entry barriers: it is inimical to net neutrality.

The European Commission reported in 2003 on mobile content:

> Germany, France and Finland indicated that transmission via mobiles, in particular through UMTS [3G], is covered by regulation. Sweden considers that its legislation on illegal content is in principle applicable to mobile phone transmissions, but mentioned that this had not been tested in the courts. The Netherlands argued that the self-regulatory provisions had been drafted in a technologically neutral way, but were limited to 'hosted information'.[19]

Commissioner Reding has made clear her commitment to co-regulation in the mobile communications market,[20] although this is not necessarily supported at the level of all European states. To be workable, co-regulation must first and foremost be the result of genuine dialogue between government and industry with room for meaningful (rather than merely trivial) periods of consultation with non-governmental groups such as civil rights groups and the general public. Second, the establishment of such co-regulation must be clearly understood both by those who are limited by its principles and those who seek its protection. Finally, it is essential that such co-regulation be backed up by the creation of clear lines of accountability and monitoring. Given the importance of the rights and privileges that are protected and limited by these principles, it is essential that these are treated with respect.

In addition to 'blanket' regulations of fixed content extended to mobile, the United Kingdom and Norway responded by pointing to codes of conduct being developed to learn from fixed ISP self-regulation. The UK Code was drafted by a committee including all six UK network operators and virtual operators (3, Vodafone, Orange, T-Mobile, Virgin Mobile, O2). Informal consultation with content providers, infrastructure and handset suppliers and government at national and European Commission levels took place. The Code itself was written in the 'regulatory vacuum' of 2003 as the new super-regulator Ofcom was being established, against a background of discrete coordinated lobbying by mobile networks, and pressure for self-regulation

from Parliament during the Communications Bill debates of 2002–3. There was therefore a combination of:

1. Regulatory commitment (fostered by cooperation in 2002–3),
2. Regulatory resource freed within the companies by the handover period from existing regulators to Ofcom (second half 2003), and
3. Political pressure to establish a workable regime prior to the broad 3G launch in 2004.

The six operators include all four of the largest pan-European operators.[21] A draft was presented for public consultation prior to the full publication of the Code in January 2004. Details of the Code's implementation (see below) were announced on 7 February 2005 with the launch of the Independent Mobile Classification Body (IMCB).[22] The Code itself is unremarkable, but its ex ante adoption, prior to many adult services being known to the general public, is exceptional and reflects high awareness in the sector both of potential harms and of the value of self-regulation. In part, this can be attributed to the market size and regulatory resources of the four giant companies behind the drafting. The main points of the code are:

- All commercial content unsuitable for under-18s will be classified as '18', and will only be made available to customers when the networks are satisfied that the customer is 18 or over.
- The classification framework will be comparable to those applied to other media, and will be created by a body independent of the mobile operators.
- Chat rooms available to under-18s will be moderated.
- Parents and carers will be able to apply filters to network operators' Internet access service to restrict the content available via a particular phone.
- Mobile operators will work to combat bulk and nuisance communications.

In addition, the Code observes the same NTD requirements with regard to illegal material as those applying to fixed-line ISPs. There are, however, several limitations on what the Code covers. The UK Code explains that: 'The Code covers new types of content, including visual content, online gambling, mobile gaming, chat rooms and Internet access. It does not cover traditional premium rate voice or premium rate SMS (texting) services, which will continue to be regulated under the ICSTIS Code of Practice.'[23] Nor does it cover wider Internet content not directly supplied by third parties to

the mobile operator. Responsibilities here mirror those of fixed-line ISPs. However, the Mobile Entertainment Forum (MEF), a trans-Atlantic grouping of over 70 content providers, has issued its own Mobile Code of Conduct, dealing with premium content. This may prove a precedent for a code dealing with adult content.[24] The Code also fails to cover issues which have already stimulated media concern such as the use of camera phones and Bluetooth technologies for content creation and distribution that does not require downloading from a website, or other forms of P2P file-sharing. The extent of likely Internet filtering by mobile operators is somewhat unclear. Under Section 4, operators pledge to 'continue' to take action against spam – they already have prevented much content arriving on-net. To at least this extent, then, Internet content is to be filtered. Further, although the Code committed each operator to introducing an adult content filter only Vodafone fulfilled its commitment, with the UK's other operators missing their agreed end of 2004 deadline.

The UK Code is an opt-in self-classificatory scheme overseen by an independent classification body.[25] Content is classified as '18', adult content, or not – with optional interim ratings for younger children. Enforcement of the Code is formally dependent on individual operators: 'Each mobile operator will enforce the terms of the Code through its agreements with commercial content providers.' It remains to be seen how this relationship will pan out but such a contractually required labelling system for 'commercial' content coming from third parties should work, because inappropriate content is to be filtered out at the 'gateway' between the network operator and the provider. Content on the open Internet will pose larger problems. Therefore, it is likely that the most effective approach will be to combine the utilization of filtering software, content labels and URL block lists (see Chapter 2 for descriptions).[26] The easiest way to block harmful content will be to block the Internet entirely, or make access difficult by throttling, and issuing warnings that the content 'out there' is unregulated.

Will MNO discrimination become the model for all ISP discrimination? The adoption of content controls by the mobile industry is both different to narrowband ISPs and potentially a forewarning of broadband fixed ISPs' role. There are several features of mobile phones which make such concerns more pressing. For example, control might be increased in the sense that it is easier for network operators to adopt content controls, such as filters, as they are the only gatekeeper to the Internet for individual users of their services.

In addition, network operators also have influence over which online services will be available to consumers as they currently have a degree of control over the user interface on their handset due to their role in providing the software and operating systems in conjunction with the handset manufacturers.[27] A policy risk is that children's use of mobile phones is much less open to supervision by parents and educators and might therefore pose a greater risk than PC-based access to the Internet. These nuances can be summarized as follows:

1. Ubiquity: Given the increasing pervasiveness of colour screen technology in even standard mobile phone models, many secondary and even primary school students are likely to have phones with colour screens at the birth of the wireless Internet, whilst most children have only gained access to the Internet via PCs at a later stage in that technology's development. This means the need for protective measures is pressing.
2. Supervision: Unlike PC-based access to the Internet, mobile use is more likely to be private and by its nature is mainly unsupervised. This may be tempered to some extent by the possibility of parental monitoring of itemized phone bills, although in the United Kingdom as elsewhere in Europe, large numbers of mobile users have Pay-as-you-go accounts, with under-16s especially likely to have such accounts.
3. Control: With PCs, access to the Internet is provided and controlled by an ISP and users can choose which ISP they contract with after buying their PC. Such choice and competition amongst ISPs mean that individuals could easily opt in or out of various filtering options by shopping around amongst ISPs. In the case of mobile-accessed Internet, however, a handset is usually bought as part of a contract with a particular operator. Even if it is practically possible to change network, this is not something which many customers would do on a regular basis. So long as this remains the case it is easier for network operators to adopt content controls, such as filters, as at any point in time they are the only gatekeeper to the Internet for individual users of their services. This feature, combined with the different models for content delivery described above means that MNOs can and do provide so-called 'walled gardens', which effectively limits Internet access to content approved by (and financially benefiting) the network operator.
4. Filtering defaults: It was widely expected that on mobile phones, filtering defaults when available would largely be opt-in, unlike opt-out Internet Explorer, AOL and Google, meaning that 2.5/3G mobile phone users

would by default have access to adult content. In the United Kingdom, this position has been reversed, in large part due to lobbying by child protection groups, meaning that those purchasing new mobile phones will now usually need to opt out of filtering applications, which will only be possible after age verification.

5. Convergence of capture and distribution in one device: Most devices now offer digital image capture capabilities and also enable distribution of these images – picture messaging is an example of this. This means that, in principle, the distribution of inappropriate pictures, or even pornography is only 'One Click Away' from digital image capturing, but in a way that cannot be controlled by filters at the network level. This is a potential loophole in the widely acclaimed filtering strategies currently used by network operators, although it remains to be seen whether this will be a significant concern in practice.
6. P2P file-sharing: Given that 3G bandwidth is still much slower than standard broadband connections, P2P file-sharing of photos, movies or music is still unlikely as it is time consuming and costly. However, as operators are now starting to offer seamless roaming packages whereby mobile phones can be used at home with standard wireless broadband connections and on the move with wireless hotspots, P2P may further drive usage of mobile-accessed Internet by children.

A 'walled garden' of online services may restrict uptake but does effectively eliminate networked P2P problems of illegal file-sharing via the Internet (though not by MMS, such as the picture messaging used in an infamous Irish schoolgirl pornography case of 2003/4[28]) even though this is perhaps an over-reaction to existing and emerging problems. Similarly, filters may prove overly effective. Filtering technologies in use are much more effective in mobile phones – if the measurement for effectiveness is that some adult sites are simply fully blocked – than in the traditional fixed-line environment. Anecdotal evidence also suggests that sometimes over-blocking occurs and perfectly legitimate services are sometimes not reachable. Technically, mobile Internet on-net can exclude off-net and really 'wall in' mobile Internet users. That would eliminate P2P including pornographic images by banishing mobile users from the wider Internet, which appears an over-reaction to existing and emerging problems, which creates restrictions on speech freedoms. It is the approach which was initially taken by all UK operators

except '3', which in September 2005 finally permitted 3G broadband mobile users to access the open Internet. New browsers such as Opera Mini, and new types of SmartPhones allow access to normal web pages, and of course 3G 'dongles' on laptops allow real web surfing.

There may be still significant hurdles for workable codes of conduct to overcome: it remains to be seen whether there is any preferable alternative. Certainly it is hard to imagine the mobile or content industries welcoming a more direct regulatory solution. Self- or co-regulation is also likely to be the most appropriate response in the context of rapid technological advance; it will almost inevitably be easier for industry groups to assess the implications of such change and to revise their codes of practice accordingly. Self-regulation would have the benefit of being a more moderate response to the problem, but co-regulation would provide more transparency, accountability and room for public and governmental engagement.

Regulatory rules can be imposed on 'walled garden' operators (e.g. mobile, cable and broadcast entities) regardless of whether they are content originators. Thus they may be less able to compete with operators who can take refuge behind the ECD combination of protection from liability and 'cost-based' pricing, but it is an obvious prediction that liability and charging are affiliated. In other words, a fairly clear choice exists between (being) one of two types of ISP. One is a 'blind' ISP, which neither asks nor tells about content, exercises no control and makes no charge on the basis of content. The other is the 'walled garden' model of the 'sighted' ISP, which shoulders – and charges for – regulatory and therefore network liability. The former is like the traditional fixed ISP, the latter more like cable or mobile operators.

Mobile Network Neutrality

It is stating the obvious to note that any net neutrality ruling that did not affect wireless carriers would immediately create asymmetrical incentives that would divide the public Internet into mobile 'walled gardens' and fixed open Internet customers. That would most probably increase the mobile Internet's differentiation from fixed service (assuming technological changes at the same pace for both mobile and fixed). In such an asymmetrical world, there would be two classes of Internet access: the true Internet on fixed and the 'walled garden' plus whatever open Internet was permitted on mobile. Revealingly, at the first Open Mobile Summit, the only European incumbent

to speak argued for walled garden revenue models,[29] though acknowledging that surfers would increasingly browse 'off-portal' (outside the garden).

Mobile is increasingly substituting for fixed Internet access for many consumers.[30] Lewin, Williamson and Cave state that 'Competition between suppliers using fixed fibre access networks and those using mobile broadband networks for the spend of those at the margins'[31] will be a significant feature, with low-cost low-usage customers opting for mobile broadband – as 64 percent of Austrian consumers have done. This is despite Cisco's predictions that mobile broadband will only account for 0.1–0.3 percent of total traffic as far as 2012.[32] This limited backhaul demand from fixed networks nevertheless means that they 'expect mobile broadband to offer both a partial substitute for fixed broadband and a complement'.[33] That means it must claim to be a real Internet alternative, not simply a slow and clumsy supplement. If mobile is replacing fixed connections, then consumers will expect to achieve comparable access to their favoured applications, as well as web browsing and email more generally. If mobile will not, or cannot, offer that comparability, the whole enterprise appears designed to persuade consumers to accept third-best. Television over the mobile device, or P2P file-sharing more generally, will appear patchy at best if streamed over the mobile Internet connection, at least using current technologies and with current network quality and speed. There are of course technological and regulatory short cuts such as broadcasting TV over the Digital Video Broadcasting – Mobile frequencies, which would mean a mobile device is both an Internet access terminal and a TV set. However, at face value, the current claim is that mobile Internet access can replace fixed for many consumers. If there are real and tangible differences that can never be bridged (or not until Long-Term Evolution [LTE] is introduced perhaps 5 years hence) due to the technological, economic and social constraints of the mobile device, it would be helpful to make plain to consumers what the offer really is.

There is the same pair of problems with mobile as with the fixed Internet, though the problems are for mobile more profound. First, quite clearly speeds are too low and quality too inconsistent to enjoy all the benefits of Internet applications. Second, the value realized by net users is too low currently to guarantee future investment in a fast open Internet as opposed to a walled garden of preferred content that can be offered at higher quality in return for greater returns to the network provider. Both these problems – speed and revenue – are compounded in the case of mobile by the number of networks.

Where fixed has one or at best two networks to each consumer, mobile offers three, four, five or six (seven in the case of India), depending on national decisions on how many networks to licence. Even with some limited network sharing, it means that mobile networks are taking smaller slices of the mobile pie than fixed operators of their own. It looks like these sums simply will not add up – that the more successful operators might speed up their walled gardens while the less successful operators eke out a living with network sharing and very low data quality.

The issue of wireless net neutrality has created more controversy in the United States, where interconnection charges between mobile and fixed are symmetrical and 3G wireless has rolled out more quickly in terms of data use. In particular, the launch of the iPhone by Apple created a sensation for data users, and became the must-have item of 2007. Its launch was controversial, first because it was not originally a 3G phone, second it did not incorporate WiFi and third it was tethered to a single network (AT&T Wireless), which has led to continued calls for the FCC's 'Four Freedoms' to be applied to wireless.[34] The market for 'cracked' iPhones anecdotally appears to have been enormous, with iPhones being exported to other countries prior to their introduction there. The tethered nature of the iPhone appears to have concentrated minds on the fact that the fixed ISP rules just don't apply to mobile: devices are blocked from networks, technologies are excluded, content is filtered and overall the environment is a 'walled garden' not an open access platform. That inevitably causes significant policy issues to arise.

Tim Wu in 2007 issued a report on net neutrality for US wireless: 'to examine what carrier practices may be harmful for consumers or society.' The report makes four major recommendations:

1. Cellphone Carterfone – 'The basic and highly successful Carterfone rules in the wired world allow any consumer to attach any safe device to his or her phone line through a standardized jack. The same rule for wireless networks would liberate device innovation in the wireless world, stimulate the development of new applications and free equipment designers to make the best phones possible.'

This is in part a response to the tethering of devices using network rules that caused such a controversy with the Apple iPhone on AT&T's network. Soon thereafter, Google launched an Android open API phone on T-Mobile's network, which suggests that some kind of competition is occurring in the

market without regulation. This innovators' dilemma is of course at the heart of the Microsoft competition litigation.

2. Basic Network Neutrality Rules – 'Wireless carriers should be subject to the same core network neutrality principles under which the cable and DSL industries currently operate. Consumers have the basic right to use the applications of their choice and view the content of their choice. Wireless carriers who offer broadband services should respect the same basic freedoms. Carriers can tier or meter pricing for bandwidth without blocking or degrading consumer choice.'

This is 'net neutrality lite' for wireless.

3. Disclosure – 'Consumer disclosure is a major problem in the wireless world. In addition to the disclosure of areas lacking coverage and rate-plan information, carriers should disclose – fully, prominently and in plain English – any limits placed on devices and bandwidth usage or if devices are locked to a single network.'

Note the new UK mobile broadband code, designed to produce a baseline of transparency.

4. Standardize Application Platforms – 'The industry should re-evaluate its 'walled garden' approach to application development, and work together to create clear and unified standards for developers. Application development for mobile devices is stalled, and it is in the carriers' own interest to try and improve the development environment.'[35]

This is where an open operating system such as Google's Android can change the nature of mobile development. Rich Miner of Google describes it as:

> A Linux-based mobile phone platform including an operating system, middleware, services and applications – everything you need to build a mobile phone! Open source software stack allowing extensive customization and commercialization; Mobile-centric design optimized for always-on, resource constrained embedded platforms; Rich and robust APIs to enable mobile mash-ups.[36]

He also described the 'walled garden' environment that has been the Internet experience: 'this was the world we found: billions of mobile users

and a mission to connect with them; tools for mobile development that were difficult to use; constrained devices; mobile browsers that delivered a poor experience; complex paths to get our applications to our users.' These are undoubtedly the experiences of many users.

He describes six drivers of change, a change fostered by the Open Handset Alliance which Google helped to organize:

- Device innovations are reducing hardware constraints
- 3G is now delivering always-on wireless broadband
- Phones have browsers with desktop level capabilities
- People who know software are driving the platforms (i.e. Google)
- Developers can get mobile apps directly to consumers
- Controlled stacks being replaced by long-tail content

As a result of concerted lobbying of the FCC by Google, corporate actors with similar open access strategies and NGOs, the FCC in 2008 introduced special open access rules for the released broadcast 700 MHz space.[37] This chapter can only dip into the issues raised, but in any case it remains to be seen whether the commitments secured from the auction winner, Verizon, will prove to be another AOL-style 'Kingsbury commitment' – or a one-off sop to net neutrality advocates that is rapidly forgotten as the industry attempts to erect further walled garden barriers. Prior to the auction, Verizon had charged that offering open access conditions would reduce the price of the spectrum to any private bidder that won, and that this interference was both unjustified and unconstitutional.[38] However, it tactically withdrew its case prior to winning the auction with a price only 3 percent above Google's reserve price for the spectrum ($4.74b to $4.6b).

Problems with 'walled garden' mobile are not confined to Europe and the United States, of course. Michael Geist provides an excellent analysis of the ongoing accusations from content owner The Weather Network (you need good forecasts in Canada, and that is its content!) against wireless carriers blocking content. The basic problem is that content sites that do not make a 'walled garden' deal with the wireless carrier find their web pages 'rendered' into a different format by the carrier, with different advertisements substituted. This is a whole different level of discrimination than fixed ISPs are known to have engaged in. They claim:

1. Wireless resellers blocking advertisements from a mobile site
2. Wireless carriers stripping out tracking codes embedded in web pages, thereby limiting ability to deliver advertisements
3. Wireless carriers establishing 'walled gardens' that provide preferential access that reduces data charges for sites within the walled garden

4. Forcing users through the wireless carrier homepage when accessing the Internet on feature phones
5. Prior approval of applications for use on smart phones
6. Extra fees for text messages that include ads
7. Wireless carriers limiting to whom ads in text messages may be sold[39]

It appears surprising, therefore, that mobile operators claim everything in the garden is rosy, that their new 3G 'dongles' (plug-in USB connected wireless modems) can offer a genuine substitute for fixed-line access, and that speeds can be 'up to 14.4 Mbps', which would be genuinely as fast as the theoretical maximums of fixed access. The cap on monthly usage would not suggest quite the confidence that mobile networks claim, with 3 GB or 5 GB quite common high-usage caps, and 1 GB even more frequent for the casual user, based on current advertised rates in the United Kingdom.[40]

3G Networks: Roll-Out and Code of Conduct

The roll-out of 3G networks has been slowed by overspending on licences, limiting the funds available for solving technical problems to bring a new and difficult technology to market.[41] Higher data rate services than these are available in some countries, notably South Korea and Japan, but Europe is still behind. The data rate – and its pricing, which goes with network capacity for high bandwidth – is essential in setting the expectations of customers and sales. The data rate sets not just the volume of sales but also the type of content that will sell. Simpler content with lower bandwidth demands such as ringtones and music have been the leaders. In Europe, 3G is being enhanced with next generation (3.5G) enhancement High Speed Downlink Packet Analysis (HSDPA).[42] HSDPA became more widely available to the mass market in 2008–9. The high costs of 3G networks means that alternatives for lower cost high-bandwidth WiFi and WiMAX are being sought by alternative providers to the incumbent telcos and MNOs.

One major trend concerning data rates which has delayed multimedia take-up is the price of data transfers over mobile, as measured against disposable income. Price has been used by MNOs as a way of limiting demand, to protect network capacity in the hope that faster high-capacity networks can be rolled out soon. Mobile data transfer costs for use of the network to download content or for streaming remain high, so users tend to minimize the amount of data transferred. Moreover, the markets targeted initially for much mobile content are teens and twenty-somethings,[43] with

limited income, rather than business. This has acted as a major brake on content sales.

The development of mobile broadband has been much slower than anticipated since the 3G auctions were conducted in summer 2000, with mobile broadband 'taking off' in the period since 2007. In June 2009, benchmarking tests by Epitiro showed UK broadband running at about 0.9 Mbps in evening peak time, a rate below that which would permit video streaming of the BBC iPlayer. The delays to the network also make it unreliable for video gaming or VOIP:[44]

> Testing by broadband benchmarking company Epitiro shows that the average mobile broadband speed clocks in at 0.9 Mbps. Of these, users received on average 24 percent of the maximum 'up to' headline speeds advertised. The fastest 20 test agents recorded an average speed of 1.8 Mbps ... During peak hours (6 pm to midnight) speeds dipped by approximately 20 percent ... web browsing which appeared to be 34 percent slower than on fixed ADSL connections. Ping times, an important metric for online game playing came in at around 150 ms which is too high for acceptable gaming performance. Another metric that affects real-time applications such as gaming and Voice over IP is packet loss, a measure of data loss. One unnamed provider suffered 2.1 percent whilst the average was 0.67 percent, with the lowest at 0.1 percent.

The slow speed and unreliability of mobile broadband has led Ofcom to pursue with the mobiles a formally self-regulatory scheme to prevent misleading consumer advertising and marketing of their limited broadband offer. The European Commission recently noted:[45]

> Regarding broadband, in July [2008] Ofcom published a new voluntary code on broadband speeds. Some 43 ISPs, covering over 90 percent of broadband customers, had signed up to it by December 2008 ... This Code, however, applies only to fixed broadband and not to mobile broadband, where QoS issues are also highly relevant in particular because of the instability of transmission speeds depending on traffic.

On 1 June 2009, Ofcom released the Code of Conduct, including information on coverage, as well as the factors that impact download speeds, and pricing.[46]

In a section marked 'Monitoring' – somewhat incongruously for self-regulation but in line with its fixed ISP co-regulation 'lite' announced a year previously – it states:

> Ofcom has been fully consulted throughout the process and our Director of Consumer Policy, Claudio Pollack, said: 'Ofcom welcomes the mobile operators' commitment to give their customers better information about mobile broadband services. We will be undertaking further research and monitoring of mobile broadband to check that consumers' needs are being met.'

This suggests MNOs are on notice to improve their service and make their customer advertising more truthful and less misleading. The Code of Conduct itself is remarkable for its brevity. It states – the entire Code! – in full:[47]

> *Principles of Good Practice for selling and promoting Mobile Broadband*
>
> Uptake of mobile broadband services is increasing rapidly. Customers appreciate the widespread coverage and convenience of being able to connect wireless devices to a 3G mobile network.
>
> As the market is in a relatively new phase and in order to promote consumer awareness of the potential of mobile broadband, the UK's mobile operators have agreed some good practice principles that underpin the way in which they and their customer service staff communicate information that is relevant when purchasing and using mobile broadband services. The principles cover:
>
> - Coverage
> - Factors that determine download speeds
> - Pricing transparency
>
> Coverage
>
> 1. Make coverage information available via a website (e.g. a map or a post code checker).
>
> Promotion of factors that determine download speeds
>
> 2. Download and upload speeds that are given in advertising and promotional material must be achievable by end-users and should be accompanied by an explanation that speeds are variable. An indicative

range of download and upload speeds under normal conditions can be given.
3. The factors that determine download speeds should be explained (e.g. distance from mast, surrounding environment, number of other users, network connection).
4. A glossary should be made available describing technical mobile broadband terms used in customer literature and on on-screen indicators (e.g. 3G, HSDPA).
5. Translate raw data speeds into some real life examples such as: 2 megabits per second delivers a 5 minute music track in approximately 20 seconds.

Pricing transparency
6. Pricing information should set out the relevant tariff options, including a description of any fair usage limits. There must an explanation of the consequences of the usage limit or fair usage allowance being exceeded.
7. Where operators make references to megabits, megabytes and gigabytes in close proximity, they should give an explanation of the differences. A description of what, for example, a megabyte of data usage allows should be provided.
8. Pricing information should include either the roaming charges or a hyperlink to where the roaming charges are set out (which should also set out explanations of what a megabyte of usage allows and provide description of fair usage limits and any other relevant information).

Given that the entire Code is only 365 words, it is presumably a first draft, and details can be added with more 'close consultation' with Ofcom. For instance, there is no mention of upload speeds or of peak congestion (except that allusion to 'number of other users'), which is a huge issue with mobile, as the EC pointed out.

This is thus far the extent of regulation of mobile broadband, and it is a very sparse self-regulatory scheme. The regulation of mobiles in this way is not a surprise to many who have seen the mobile sector declared Europe's telecoms success story in the past two decades. Given the intransigence of fixed-line incumbents that we saw in Chapter 1 and the Introduction, it is perhaps understandable that the Member States saw mobile oligopoly as a success story, with rapidly increasing penetration and falling prices.

Viewed with hindsight, we can see that social network use of cellular mobile technology was the driver rather than particular European MNO innovation: mobile is a global success story, with vast oligopoly profits and high charges in most countries. It was once said that commercial television was 'a licence to print money': self-regulated MNOs appeared to be the new way. In the next section, we will see that mobile termination monopolies permitted exponentially higher charges to fixed operators than they could charge back to mobiles, the European mobile subsidy that drained much of the profitability out of fixed phone companies.

Mobile Call Termination and the Fixed Subsidy to Mobile

We saw in Chapters 1 and 2 that a mobile termination monopoly endures, in that you can only call me by routing that call through my mobile network. Mobiles have been able for many years to maintain very high termination prices even under regulation (and especially where not), in contrast to regulated fixed prices. Small operators of mobile networks have called for the full abolishment of termination charges, because high terminating rates mean largest companies benefit most. 3 has no 2G termination monopoly to exploit with its network, in fact it rents its 2G network and operates as a mobile virtual network operator, making margins only on its 3G network termination. 3 is the rogue operator amongst the UK mobiles, lobbying to remove the termination charges it pays its four incumbent 2G rivals (T-Mobile, FT's Orange, Telefonica's O2, and Vodafone). Its UK Chief Executive Kevin Russell launched a 'Terminate the Rate' campaign with BT on 20 May 2009, stating that:

> The amount of legal authority and PR mobilized by the Big Four is unbelievable ... We get subsidised by BT but we want the subsidy to go.[48]

The reason is that 3 customers call the other bigger networks much more than their customers call it, so it pays more in termination at the above-cost charges they are permitted.

The effect of compulsory subsidy by European fixed-line customers of their mobile friends, through termination rates ten times above fixed-to-fixed rates, is to increase mobile penetration above cost-oriented levels, such that

people who would have chosen to make no call or a fixed-line call, instead used a mobile to either receive a call or send a text: the very cost-conscious have a mobile phone whereas in 'bill-and-keep' countries they may not. Think of it as a form of unexpected universal service for the poor. The model encourages prepaid as well as monthly subscriptions, so that twice as many UK customers have prepaid SIMs as monthly contracts, though this is highly variable by country, so that France has twice as many monthly contractees as prepaid customers. The more prepaid customers, the lower the monthly minutes used (i.e. lower actual phone utility).[49] Astonishingly, the European average is about 1 minute for every 3 minutes used in the United States.

In the United States, where termination rates are the same as fixed-line rates (which means networks effectively 'bill and keep' – peer to swap traffic), average minutes per month are 700–800, and subscriber penetration is 84 percent, though note that Canada with a less competitive market for mobile has much lower penetration and usage (62 percent and 430 minutes).[50] It may be that penetration growth in 'bill and keep' countries has been slower than in calling party pays (CPP) systems, though figures are obscured by the propensity of more price-sensitive customers in CPP systems to buy multiple SIMs for different networks, such that penetration exceeds 100 percent by significant levels (otherwise explicable only by many people having own-use and office-use mobile phones, itself a measure of unexpected honesty or insecurity in job tenure).[51] However, overall the statistics appear to indicate that prices lowered faster and earlier in the United States than Europe, by 75 percent in 1996–2001, hence that very high usage rate, and that penetration achieved saturation slightly slower. Summarizing the US experience as compared with Europe, I draw the following six conclusions:

- Fixed networks have not subsidized mobile, as the 'bill-and-keep' interconnection regulation has ensured parity;
- Mobile penetration levels are almost identical at a saturation 82 percent;
- Mobile usage per customer is three times higher than in Europe;
- Networks offer continental coverage at identical prices, while in Europe, the hypothetical Euro-traveller would pay 26 countries' roaming charges while doing business in the Internal Market;
- Universal service is maintained by coverage requirements on licences,[52] and spectrum licences remain sufficiently attractive that the open access 700 MHz D Block auction was successfully concluded, though critics claim

that it failed to achieve openness via a new market entrant or to garner maximum price for spectrum;[53]
- The lack of a special pleading regime for economic pricing of mobile termination has contributed to an inclusive discussion of net neutrality for mobile in the United States, in contrast to that in Europe.

In the European Union, the average mobile termination rate is 8.7 euro cent (and as high as 15.09 cent in Bulgaria).[54] India's telecoms regulator, TRAI, in March 2009 announced a slashing of the mobile termination rates by a third – effective April 2009. That is 0.32 euro cent per minute (or 2 percent of what the Bulgarians pay). Mobile monthly usage in India has increased in 2003–8 from 326 minutes to 464 minutes, almost twice EU levels. Commissioner Reding stated:[55]

> High mobile termination rates are thus an indirect subsidy for the larger mobile operators – a subsidy that has to be paid by all fixed operators, by smaller mobile operators and by all consumers. While there may have been a greater tolerance of high mobile termination rates when mobile networks were first being rolled out across Europe, they can no longer be justified today, at this advanced stage of mobile market development.

This explains why US users make much larger volumes of calls, and mobile companies who cannot charge higher termination to fixed operators are therefore not paid the European 'mobile subsidy'. Mobile companies have fought a very long running battle to maintain their high prices, in the case of the United Kingdom for instance it is now over a decade old, but this EC activity indicates that this regulatory episode is drawing to a close.[56]

This led the EC to issue an Article 7 Recommendation on mobile termination rates following consultation, under its responsibilities to coordinate a single market for communications within the terms of the Framework Directive.[57] The issuing of a recommendation requires NRAs to take 'utmost account' of EC recommendations, in conjunction with the requirements to ensure accurate cost accounting for wholesale and retail markets. In this case the Recommendation requires that 'NRAs should ensure that termination rates are implemented at a cost-efficient, symmetric level by 31 December 2012' (para 12).[58]

The high termination rates direct funds away from critical investments in NGA.

Regulatory Symmetry and the 'Fixed Strategy'

In mobile markets, the 'dongle' has led to a surge of substitution of fixed broadband by mobile, as well as new broadband users, with over 100 million 3G broadband users (both 'dongles' and phones). Will mobile broadband users be allowed to exploit their dongles to use the Internet openly as they can on their fixed ISP? The Economist states:

> The growth, however, comes with a couple of big drawbacks for the operators. One is loss of control. Subscribers can do what they want: the operator is merely a 'dumb pipe' to the internet. Next, rates have been falling quickly ... 'Network neutrality', the principle that operators should not discriminate between different forms of traffic, will not succeed on mobile networks, says Holger Knöpke of T-Mobile.[59]

The argument that there are sufficient networks to compete away such a hopeless (from the universal open viewpoint) scenario is based on the success of open wireless platforms offered in particular by the 3G entrants in Europe. While most 3G licensees are extending their 2G networks, we saw that Hutchison 3 began 3G service earlier, and has a more open service, than its rivals, marketing itself as offering Internet service at cheap rates via its 'dongle' and also Skype-to-Skype calls for free on its phone network.[60] I argue that 3 is the exception that proves the rule, as indeed does the United Kingdom. The UK fixed incumbent, BT, sold its mobile network to Telefonica in 2002, under pressure to reduce its debts. As a result, there is not only separation in the United Kingdom between wholesale and retail arms of the incumbent, but between the fixed and mobile incumbents, leading to a much more even regulatory and lobbying battle, even if Russell expresses amazement at the 'Big Four' and their legal expenses. Elsewhere in Europe, for instance in the homes of T-Mobile (Germany), Telefonica (Spain) and FT, there is resoundingly less pressure to regulate the termination monopoly of the mobiles. The renegade 3 may put pressure on regulators in the markets it has entered (including Italy), but without an incumbent to make much bigger noises, all it does is show that in very specific, almost freakish, conditions, as in the United Kingdom, there is a real choice of 'walled garden' or open

access. More importantly that open access is at a price and coverage that makes it somewhat attractive to low-volume transient users.

The special pleading of mobiles, and the relaxed or incompetent regulation of their termination rates (depending on your viewpoint), is greatly to the detriment of consumers with fixed-line connections. The approximate number €100 billion keeps coming up:

1. It is the minimum number in what ECTA claims has been the cross-subsidy effect of distorted fixed-to-mobile termination rates over the past decade;
2. it is what the mobiles 'lost' on the 3G auction due to its timing at the height of the dot-com bubble (the total cost in Europe was substantially higher but the spectrum was never going to be given away);
3. it would make an enormous hole in the cost of getting every European household onto at least 50 Mbps VDSL broadband lines – even if the backhaul would still be a bottleneck.[61]

Should these three numbers be related? The regulatory purists would say no, the realists would say of course they are. The European broadband environment has been enormously distorted by these problems for the past decade, and arguably its one reason why competitive broadband has been patchy at best. The answer to that is to stop deceptive advertising and enforce QoS standards on ISPs including mobile, while Ofcom is still trying to avoid including mobiles in its preferred co-regulation. My position is rather more interventionist than most, based on a lack of belief that NRAs are effective at ensuring that consumers are well informed and competition works effectively, and therefore that minimum quality requirements should be necessary. Consumers are misinformed and misled by most ISPs, and competition works ineffectively in general. Of course many NRAs may ignore net neutrality requirements, and the Commission should be careful what it asks for and enforces in the new regulatory package. Therefore, I see a need to fire a legislative shot across the bows of all ISPs to ensure they conform to minimum QoS 'net neutrality lite'.[62] If customers get what they pay for, they might be happier with ISPs.

This leads to some lateral thinking and what I term the 'fixed strategy' – a regulatory option for redressing the balance in the fixed-mobile debate while ensuring at least 'net neutrality lite'. How can ISPs make money on their NGNs if they continue to over-promise and under-perform? Four options present themselves:

1. PHORM – behavioural advertising, act as targeted advertisers and extract some of Google's revenue without directly charging them.
2. The 'Mobile' option: Discriminate and offer consumers walled gardens of 'approved' (i.e. prioritized) content – exclusive offers where possible, such as with Disney or the Premier League.
3. Stop spending money on DPI and offer customers what they want, high-class Internet service – that's what Odlyzko believes, as we saw in Chapters 1–3.
4. The Fixed strategy.

The United Kingdom is unique: an incumbent SMP operator, BT, which has no mobile (as opposed to wireless) network, has the OpenReach structural solution. It also has a reasonably strong tradition of regulating mobile networks, over a twenty-year siege laid by the most expensive lawyers in London. Yet still the Competition Commission castigated Ofcom's latest attempts to regulate mobile termination.[63]

So here's the 'Fixed' plan to invest in higher bandwidth without the need for behavioural advertising, QoS deployment or 'walled garden' portals:

- Reduce mobile prices to cost – check Indian termination rates to see what cost is;
- Then the fixed operators stop losing market share and interconnection charges hand-over-fist and they can invest in higher-speed broadband as their advantage over mobile;
- enforce net neutrality against mobiles too – if their mobile broadband is the advertised 14.4 Mbps, they can afford to give their customers the whole Internet.

What does this radical option do? It enforces a transparent cost-based technology-neutral settlement on the operators, and thus a transparent and open access solution for consumers. Will Ofcom and the European Commission do it? Do oligopolists fly?

As regulation stands, mobile will be a walled garden for the most part, and fixed ISPs will either move towards that walled garden (reversing the historic strategy of AOL) or a gulf will open between the two types of access. It is reminiscent of the story of the little man who dies and goes to heaven, meeting Saint Peter who offers him a guided tour to settle in. He sees the areas settled by the Hindus, Presbyterians, animists, Muslims, Jews, Protestants,

Methodists, Confuscians, in fact all the peoples of the Earth, whatever their beliefs, smiling in endless bliss and tranquillity. Finally, they come to a high wall, behind which they can hear raucous noise and loud music accompanied by squeals of delight. The little man asks Saint Peter who is enjoying the party: 'That's the Catholics, they think they're the only ones here.' European mobile may not be a special type of the Internet heaven, but it is likely to offer a safer and more sanitized experience though with less surprises and innovation.

In the concluding chapter, I sum up the argument in the book, focussing on the prospects for effective co-regulation of 'net neutrality lite'. The last three chapters have pointed out the extreme reluctance with which European regulators have agreed to regulate for net neutrality in any form, with the honourable exception of Norway. US observers may think that 'lite' net neutrality is a long way backwards from their debates, but it is also a long way forwards from the current situation in most EU countries for fixed ISP access, and as we have just seen, for MNOs.

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CHAPTER EIGHT

Conclusion: Towards a Co-regulatory Solution?

The time, it is to be hoped, is gone by when any defence would be necessary of the 'liberty of the press' as one of the securities against corrupt or tyrannical government. … It is as noxious, or more noxious, when exerted in accordance with public opinion, than when in opposition to it.[1]
J. S. Mill

We have seen in the previous chapters that 'net neutrality' is a deceptively simple phrase hiding a multitude of meanings. First, it was unpacked in the Introduction to discover that it comprises two separate non-discrimination commitments. Backward-looking 'net neutrality lite' claims that Internet users should not be disadvantaged due to opaque and invidious practices by their current ISP. Forward-looking 'positive net neutrality' describes a practice whereby higher QoS for higher prices should be offered on FRAND terms to all-comers, a modern equivalent of common carriage. It is a more debatable principle, with many content providers and carriers preferring exclusive arrangements. We saw in Chapters 1–3 how current ISP (and government) practices have been highly deceptive in places, blocking content for specific anti-competitive and non-specific traffic management purposes. We saw that there is little 'middle-mile' competition in fixed ISP markets, even in Europe where the commitment to regulation for competition remains. We also saw that we have the worst of all possible worlds: no competition and no common carriage currently. In the remaining Chapters 4–7, we saw the attempts to at least introduce transparency into the debate, as well as the rights of end-users. Co-regulation was seen to be a prevalent but awkward compromise between state and private regulation, with constitutionally uncertain protection for end-users and a worryingly large latitude for private censorship, which has been increasing throughout the last decade even as the law declares ISPs to be 'three wise monkeys', as we saw in Chapter 4. Mobile Internet in Chapter 7 was seen to be claiming the same special protections from regulation that its forerunner, mobile voice termination, claimed, to enable walled gardens to flourish. This type of asymmetrical regulation was seen to be especially dangerous for

the future of fixed ISP net neutrality. Any solution would need to be holistic, considering ISPs' roles in the round. It needs to acknowledge Mill's point: censoring the Internet is as noxious as censoring the press was 150 years ago, especially when it is claimed to silence only those society condemns, such as copyright 'pirates', suspected paedophiles and pornographers.

I have some partial solutions but no panacea. Transparency and investigation are easy wins, principles that regulators can only discount on grounds of ignorance ('net neutrality is a solution in search of a problem') or resource depletion ('we don't regulate the Internet, it is too complicated'). It improves competitive forces, such as they are, so the pro-market advocates surely have little to disagree with, especially as it is to be achieved through co-regulatory means at lowest cost to ISPs. I grapple with the dilemma that I may be giving the ISPs a free lunch, the appearance of a solution without even a partial remedy for end-users. After all, if all ISPs are using that same backhaul pipe to the incumbent's wholesale network, how can any one offer a significantly different solution? Informing end-users that 'you can have any colour as long its black' is a hundred-year-old solution, ill-serving the twenty-first century user. The popular solution amongst academics would be to proclaim the immutable if economically inconvenient truth that information wants to be free and the Internet wants to be open. I create trouble for myself by admitting to both economic and normative rationales, each pulling in different directions, and attempt unsuccessfully to square that circle. That is why I only recommend net neutrality 'lite' – the easy backward-looking solution.

This is a policy area with no perfect solutions. Of course the Internet should be open to all, but private investment is the critical component in building a faster Internet. Of course universal service should be supported, and there must be some minimum access to the open Internet for all, whether they use a mobile 3G connection or a fast IPTV-enabled premium service. If it says 'Internet service', it should do what it says on the tin, offer an open Internet (alongside walled gardens if expressly advertised as such). I am happier limiting my conclusion to emphasize the complexity of the problem than trying to claim a one-size-fits-all solution. I am no technologist or economist though I write articles and papers jointly with some of the best, and listen closely to the others. My solutions are very much grounded in current policy realities, and that is where they offer a potential route forwards, in that they are politically feasible and desirable.

In this conclusion, there are four parts: first I try to fit the Internet to other public forums, to find out what we would be losing if net neutrality was abandoned. The second section details co-regulation as an alternative way to approach net neutrality instead of state regulation. The two sections together are an attempt to make politicians understand what 'net neutrality lite' is for, and that it is a partial solution worth having, and which co-regulatory methods are needed to get there. I discuss the need for a users' Internet Bill of Rights, and the very apparent global problems that private or 'co-regulated' filtering and censorship cause, whether for private ends such as copyright enforcement or public ends such as restricting freedom of expression, as well as the potential impact on developing countries. Finally, I sum up by looking at what evidence may be needed for regulators to address net neutrality policy discussion. As others have warned, when policy makers collude in private Internet censoring, they should be careful what they wish for.

The Open Internet and the Public Forum

Is the open public Internet 'just' a pub with its beers, pay-TV and gossip? Or is it a coffee house with information trading, innovative discussion and WiFi? Neither comparison rings entirely true, and the 'Wealth of Networks' analysis of Benkler thinks of it as a giant experiment, combining laboratory with user innovation and feedback, as well as those other things, while Boyle describes a wider movement 'Enclosing the Commons of the Mind' and Post extends a comparison with Jeffersonian America.[2] It is certainly very complex and may well have bottleneck characteristics which mean that any tinkering by regulators just moves the problem elsewhere – as Odlyzko suggests, perhaps from ISPs to Google or ESPN. The open Internet is, it is constantly said, a commons. That is the basis for claims that it should be preserved and regulation induced to prevent any more enclosure of that commons, while at the same time ensuring that the commons is not ruined by free-riders, that there is no 'tragedy of the commons'. Net neutrality is, in its various guises, an attempt to preserve the public space for the public benefit, whether as a modern Speaker's Corner in the many voices authoring blogs, or in common carriage rules intended to remind the carriers of this commons that they have special rights and responsibilities, as we saw in Chapter 2. Just like Speaker's Corner, the open Internet is by no means the only, or – some might say – the

most important place for public opinion to be formed, but it has so far been more or less guaranteed free and open to those with a computer and ISP. In physical space, there are private members' clubs and working men's clubs, Methodist chapels and Friendly Societies, professional associations, country and golf clubs, Freemasons and Opus Dei all have their place, but it is the open public space that gives legitimacy to all these private or semi-private spaces: it is the guarantor of free speech for the others. That all sounds rather grand and pompous, so let us bring it down to Earth for this conclusion. Let us compare this populist but technologically enabled space, the Internet, to one of its forerunners. Let's go to the pub.

British public houses are – as we saw in the common carriage discussion in Chapter 2 – granted special rights and given special duties, primarily that to accommodate all-comers who so request. How does the Internet currently resemble a pub? It has its share of gaming[3] and gambling, of queuing and noise, of public lounge and saloon, of the snug (in certain areas), of spam, of video, of music, of piracy (those smuggled CDs), and of course many people of a religious persuasion are convinced it's a den of vice – it certainly is a place to meet romantically (or otherwise). It has its private privileged alternatives – the members' club, the nightclub with its VIP room, the other more private spaces with their reserved tables and guest lists. It is related to the coffee houses which provided the first insurance (Lloyds) and stock market speculation in London. It is a place for all people and all seasons. It is also the place for debate and conflict, even violence and police response. More libel is committed in an evening's 'character assassination' in a local pub than in a year of a newspaper, hence the popularity of the widest viewed English language soap opera, 'Coronation Street' and its ubiquitous gossiping in the 'Rovers Return' pub. The pub is monitored in several ways: first the police license its hours and services; second, police make (somewhat) random visits to check on activities; third, publicans in the United Kingdom often install video cameras to film the entrance. Furthermore, popular pubs have security guards on busy evenings. You might say that the surveillance is as methodical here as on the Internet. We accept these measures of surveillance – though both cameras and security guards (who are now licensed by a regulator to ensure they are fit and proper persons) as well as some licensing authority decisions continue to grate.

Pubs, like ISPs and Internet content providers, have complex economic value chains which constantly threaten the independence of the local public

house. Parliament has continually intervened in the past twenty years to ensure that the ideal of the public house, the common carrier, as a public space, is maintained with at least some defence against the tyranny of the economics of scale and scope that tend towards the concentration of pubs with brewers in vertically integrated national or even multinational conglomerates. The idea that pubs are 'free houses' unconnected to each other and selling any beer or other service they wish is a romantic but false idea, and many pubs are parts of chains tied in one way or another to each other, or vertically integrated with beer suppliers. However, rules prevent over-monopolization of this market, and untied pubs and guest beers predominate since the abuses of competition were recognized and acted upon in the early 1990s.[4] Radical regulatory action saved pubs: the Monopolies and Mergers Commission (MMC) investigated the market.[5] Its report found a complex monopoly existed in favour of brewers who owned tied houses or who had tying agreements with free houses in return for loans (brewer loans) at favourable interest rates. MMC recommended barring any one brewing company owning more than 2,000 licensed pubs. Government followed this advice: the Beer Orders[6] modified the recommendations of the MMC report. The Office of Fair Trading in 2000 concluded that there seemed to be a reasonable amount of competition nationally, even if some regional and local concentration existed, and government followed its advice and revoked most of the Beer Orders.[7] In 2009, Parliament once again investigated pubs,[8] and after nearly a decade of deregulation their findings were different. Parliament urged self-regulation by pub chains to be taken more seriously:

> Since the British Beer & Pub Association code of practice was updated in 1997 the industry has changed and we suggest that this code of practice should be revised ... if the industry does not show signs of accepting and complying with an adequate voluntary code then the Government should not hesitate to impose a statutory code on it.

They recommended urgent government action to the industry, not relying on the previous light mixture of regulation and self-regulation. Pubs are by no means a common agora and debating house paradise lost, but the mix of law enforcement, licensing and pro-competitive changes has restored some tenuous vitality and independence to the trade.

I raise the pub issue not only because of certain similarities of economics and speech freedoms associated with both the Internet and pubs historically, but also to illustrate the specific, sustained and careful consideration which Parliament has given to maintaining some openness in the industry. If it is willing to devote such time and energy to pubs on behalf of one part of its electorate, can it not also find resources to devote to fully exploring net neutrality and the Internet? The Internet's core values of openness and democracy have been established by accident and design. Horten states:[9]

> By authorizing blocking practices, the Telecoms Package puts Europe on a path to a closed series of Internets. It puts at risk innovation, trade, and any policy goals to encourage cross-border trade. It puts at risk the European Union's Information Society goals. And, it stands to chill democratic speech.

Strong arguments remain for checking closely that ISPs inform consumers when they reach caps, and for ensuring we do not return to rationed Internet use as we did in the 1990s with dial-up – Martin Cave and AOL helped start FRIACO in 2000, let us not abandon flat rate pricing now![10]

Medium Law

The future of the Internet is a non-trivial issue,[11] in fact it is central to the future of productivity in most industries. It is an enabling technology, which means that the exchange of information on this open platform promises (and delivers) real efficiencies in the economy and society generally, as it helps collaboration and improvement.[12] It is also socially enabling – whatever your view – for all the reasons encompassed in the expression 'Web 2.0' or 'the participative web'.[13] That is, it has become a virtual playground, classroom, laboratory and at its most basic – chatroom. The rise in the number of people using email, Facebook, MySpace, Wikipedia, Skype, Instant Messaging and other applications has extended so far into mass participation that it has truly affected society and the economy in all its facets. Children, in particular, are now 'born digital' in many locales in developed society,[14] and their access to the consumer Internet is an essential part of their development, as Pew Internet surveys and others increasingly show. Moreover, small businesses and solo home-based workers depend on this tool as a vital part of their participation in the economy.[15] The promise of virtual worlds and massive online collaboration

(not just the Web, but online gaming, Wikipedia-type knowledge sharing and transfer and other avatar environments including over-hyped but fascinating poster child of digital life, SecondLife) is to extend this pervasive impact of online environments even further in the coming decade.

The Internet matters far more than television or radio or the simple telephone, whatever technology debunkers may continue to claim. Of course it is true that many collaborators and innovators use very powerful Internet connections at school, university and in office environments. However, much of their out-of-work collaboration, and creativity and innovation, take place using consumer Internet connections via desktop computers, laptops, netbooks and smart 3G mobile phones. Therefore, the question of what happens to their 'domestic' Internet connection is vital. Yes, it should be faster, but should this speed increase be entirely to guarantee the existing ISPs' phone quality and video service? How much of the increase should be 'open' to all Internet traffic, and how much a toll lane for reserved high-speed signals? Note that this open question is posed in terms of proportion, not absolutes. I state immediately that I do not believe in social or economic justifications either for barring any proprietary high-speed traffic at all, or for strict versions of net neutrality that would not allow any traffic prioritization. It appears to me that there is too much at stake to either expect government to supplant the market in providing higher-speed connections or for the market to continue to deliver openness without the most basic of policy and regulatory backstops to ensure some growth.

The legal policy and regulatory implications of rapidly standardizing innovation on the communications ecology were well understood by Benkler who was concerned with the need to maintain interoperability and openness to ensure a 'commons' in which unaffiliated and non-commercial innovation could flourish (building on de Sola Pool).[16] So this is important, it is not just another industry and it is becoming more important, not less. That also means it is infusing our society and polity as well as the economic relationships we have.[17] Therefore, we are not simply considering economic analysis of bottlenecks in another transport-based industry, or a convergence of regulation between television and the Internet, but regulating the global Information Society. I moved on from competition analysis of bottlenecks a decade ago to the wider, you might say meta-narrative, and if it was impossible then to separate the economic and wider policy considerations of the consumer Internet, how much more so is that the case today? That is

not to say that much good work is not being done in economic analysis of networks, when it so clearly is, but to attempt to partition net neutrality – which is to say, the future of content on the Internet – as simply an economic issue just won't wash. Noam states:

> There is nothing especially new about [media law's] recent round net-neutrality as a conceptual issue, or in terms of its policy options, except for the terminology.[18]

This is a debate about media law as much as telecoms law, and given that the Internet can carry almost previous forms of media with great efficiency, making its regulation 'Medium Law'.[19]

There used to be separation between telecommunications and e-commerce law: no longer. Where content providers – newspapers, TV companies, search and e-commerce providers, and those making user generated content – formerly paid a flat rate to access the Internet based on the same service, that may no longer be the case on the next generation of Internet services. As a result, those most able and willing to pay may receive first-class service, while other content travels in the slow lane, where ISPs can track the incoming traffic. This trend is not just a telecoms dispute, but affects all online content and e-commerce providers. As that effectively is every major provider of content and commerce, it means medium law (i.e. mass market content online that formerly used several media) is intimately tied into telecoms law. Furthermore, security and anti-terrorist measures are also driving ISPs towards filtering all incoming traffic. This may change the entire architecture of the Internet, its business model and freedom of speech. It is happening beyond the analysis of the discrete fields of information security, e-commerce law, media law and telecoms law. It could overwhelm all those areas. It could be a 'perfect storm'.

Regulatory analysts often 'don't get it' because they focus on narrow questions of telecoms regulation. There are at least two other critical factors at play: concern over illegal and inappropriate content (such as child pornography, music protected by copyright and latterly video files being inappropriately shared, and malware including spam), and the security agenda which aims to enforce QoS to separate 'good' or preferred from 'bad' or discriminated-against packets. There is a legitimate concern that this represents a division between the rich and powerful senders of packets and the lesser content types. These three policy areas, telecoms, content and security regulation,

have come together. Policies made in their respective arenas tend to the same result in terms of incentives to deploy NGNs which could change the Internet forever, to become faster and safer but more closed.

As the law and practice stands today, it seems most customers do not know when they have been targeted as over-strenuous users of the Internet. Once targeted, customers generally cannot prove their 'innocence' – they have to accept the terms of use of the ISP without appeal (except theoretically via courts for breach of contract, or regulator for infringement of their consumer rights). The number of alternative ISPs is small and shrinking – not only is the ISP business expensive, leading to concentration in the industry, but the costs of renting backhaul from dominant operators is – as we saw in the UK case in Chapter 3 – sufficiently high that no-one would want to offer service to a suspected 'bandwidth hog'. We may expect to see more protest behaviour by 'netizens' who do not agree with a law or policy, especially where ISPs are seen to have failed to fully inform end-users about the implications of policy changes. Regulators (and their political equivalents) will not be able to ignore such problems.[20] The Pirate Party MEPs in the European Parliament 2009–14 will make sure of that.

Globalization and Net Neutrality

The book of that conference a decade ago which I discussed in the opening chapter, was called 'Regulating the Global Information Society' – ten years on, the problems of development and the global Digital Divide have become yet more pressing. Net neutrality is very definitely a global issue as two examples indicate.[21] Internet connectivity is still very expensive for most developing countries, despite attempts to ensure local Internet-peering points (exchanges) and new undersea cables. To flood the existing and then new links with an exaflood of traffic, much of which came from major video production countries such as India, Nigeria and of course Hollywood, could place the local ISPs in serious financial peril. Casualties in such undertakings include for instance countries blacklisted by major ISPs for producing large amounts of spam: imagine as a Nigerian consumer how you would feel if your ISP was blacklisted in your relatives' country, blocking your email, simply because the ISP you use is also used by spammers.

The second development problem that net neutrality debate centres on is the wireless Internet. Most developing countries' citizens have much lower bandwidth than the West, and most of their connectivity is mobile: India is

probably the poster child for a country with at least ten times more mobile than fixed phone subscribers. There is a straight race ongoing here between free WiFi and WiMAX projects that are accompanying initiatives such as local variants of the $100 Laptop, and the type of walled garden, low-speed Internet access that mobile providers have until now been providing. In the next several years, the developing world Internet user is going to try to test the limits of mobile networks to their maximum, and capacity as well as price might determine the extent to which they can expect a rapidly developing or a Third World Internet experience.

In this conclusion, I flag up development issues because they are critical. Universal service is still a pipedream for many in the developing world, and when that arrives, the definition it is given will determine the minimum threshold that ISPs have to achieve. As Mueller states, net neutrality 'must also encompass a positive assertion of the broader social, economic and political value of universal and non-discriminatory access to Internet resources among those connected to the Internet.'[22] The types of non-net neutrality employed in China and Iran in June 2009 were not economically motivated, but political censorship designed to prevent citizens' access to foreign discussion of the twentieth anniversary of the Tiananmen Square massacre, and the closely contested Presidential elections, respectively. Mueller claims that the tendency of governments in both repressive and traditionally democratic regimes to impose liability on ISPs to censor content for the plethora of reasons we discussed in the last three chapters argues for a policy of robust non-interference:

> The flip side of an NN policy that valorizes the right of Internet users to access each other without interference from intermediaries is the belief that network users wronged by other users must hold the wrongdoer responsible – not the intermediary network operator.[23]

This is especially valuable in countries where there is much less discussion of how ISPs being used as censors can create unambiguous dangers to user privacy and freedom of expression. Mueller suggests that the net neutrality metaphor could be used to hold all filtering and censorship practices up to the light, as well as governance in other areas of Internet regulation, such as domain name governance. As this issue has globalized and attracted activists, it has become an important policy issue discussed at the United Nations IGF. The IGF discussions of net neutrality and other issues are expected to substantially increase in its

forthcoming meeting in Egypt in November 2009,[24] and it highlighted the issue in its December 2008 meeting.[25]

Taking Co- and Self-regulation Seriously

The general trend we saw in Chapters 4–6 is towards an expansion of scope of co-regulation, often at the expense of statutory regulation. NRAs such as Ofcom in the United Kingdom are exploring the possibility of 'sunsetting' particular regulations in the event that co-regulatory alternatives can be found. Where there is a clear industry interest in co-regulation to improve market penetration, or to head off threats of statutory regulation, there are adequate market incentives for resources to be allocated to co-regulatory activities. However the calculation of enlightened self-interest required is vulnerable to changing personnel and market structures such that co-regulatory institutions, where they do not have access to compulsory funding, will not enjoy the funding necessary to meet standard requirements of transparency, accountability and due process. A wide variety of models of co-regulatory tools exist. Some of these are based on adequate standards of transparency, inclusion, due process, resources, and some clearly are not. There is some concern that insufficient standards apply to both law enforcement and protection of freedom of expression rights. Public harm can result.

Co-regulation expresses a form of regulation which is neither state or NRA regulation with specialized functions,[26] nor 'pure' self-regulation as observed in industry-led standard setting. The state and stakeholder groups including consumers are stated to explicitly form part of the institutional setting for regulation. Co-regulation constitutes multiple stakeholders, and this inclusiveness results in greater legitimacy claims. However, direct government involvement including sanctioning powers may result in the gains of reflexive regulation – speed of response, dynamism, international cooperation between ISPs and others – being lost. Ayres and Braithwaite stated:[27] 'Practical people who are concerned with outcomes seek to understand the intricacies of interplays between state regulation and private orderings.' Responsive or reflexive regulation reflects a more complex dynamic interaction of state and market, a break with more stable previous arrangements.[28] This applies to other globalizing phenomena, for instance, financial and environmental law.[29]

Co-regulation is a vitally important concept to define, refine and examine against a rigorous methodological template. Price and Verhulst assert that there is little purity in self-regulation without at least a lurking government

threat to intervene.[30] The term 'co-regulation' encompasses a range of different regulatory phenomena, which have in common that the regulatory regime is made up of a complex interaction of general legislation and a self-regulatory body. The varying interests of actors result in different incentives to cooperate or attempt unilateral actions at the various points of the value chain.[31] Without regulation responsive to both the single European market and the need for constitutional protection of freedom of expression at national levels, co- and self-regulatory measures cannot be self-sustaining. In the media sector since Boddewyn's pioneering 1988 study of advertising,[32] there have been many studies of co-regulation, including Tambini et al.,[33] Larouche[34] and those for the Council of Europe.[35]

Schulz and Held[36] view self-regulation in Anglo-American debate as concerned with 'reconciliation of private interests' whereas their formulation – regulated self-regulation[37] – is indirect state regulation based on constitutional principles. It is the combination of 'intentional self-regulation' – the actions of market actors, whether in social or economic settings – with the state sanction in reserve which results in self-regulation 'regulated' by the possibility of state intervention. Schulz and Held suggest that 'regulated self-regulation' can be any of these categories: co-regulation, self-regulation or a third category – 'audited self-regulation'. In the case of ISPs, audited self-regulation might involve at least a standard being set that an audit firm could certify organizations against (or at least that organizations could self-certify with reporting requirements), but could involve the setting of an international standard. At a minimum, dedicated budgetary and personnel resources, with activity reports, would be required to demonstrate regulatory commitment. The German concept of regulated self-regulation gives the state a role when basic constitutional rights need to be upheld.

A legal approach to co- and self-regulation extends from the definitions in the 2003 EU Inter-institutional Agreement.[39]

- Co-regulation: 'The mechanism whereby a Community legislative act entrusts the attainment of the objectives defined by the legislative authority to parties which are recognised in the field.'
- Self-regulation: 'The possibility for economic operators, the social partners, NGOs or associations to adopt amongst themselves and for themselves common guidelines at European level (particularly codes of practices or sectoral agreements).'

- Co-regulation and self-regulation 'will not be applicable where fundamental rights or important political options are at stake or in situations where the rules must be applied in a uniform fashion in all Member States'.[39]

Co-regulation in the European context must also be proportional to the aims of the legal instrument, as well as conforming to the competition law of the European Union. Enforcement is the ultimate responsibility ('the safety net') of the state. Also note the 2006 Recommendation[40] and Directive 2007/65/EC at Recital 36:[41]

> self-regulation constitutes a type of voluntary initiative, which enables the economic operators, social partners, non-governmental organizations or associations to adopt common guidelines amongst themselves and for themselves … Co-regulation gives, in its minimal form, a legal link between self-regulation and the national legislator in accordance with the legal traditions of the Member States. Co-regulation should allow for the possibility for State intervention in the event of its objectives not being met.

Four elements reinforce the role of EU institutions in addressing issues arising from the practice and assessment of self- and co-regulation:

- the European Union has particular competence in specific policy areas where alternatives to regulation can be of particular importance, deriving directly from the legal (treaty) base;[42]
- the European Union has established already a lead role in articulating the 'Better Regulation Agenda', laying out an implementation framework through the Inter-institutional Agreement on Better Regulation;[43]
- many of the issues raised, in terms of regulatory competence and objectives, and of evidence collection, are inherently cross-border or even trans-European; and
- in recognition of subsidiarity, the most common EU instrument of regulatory policy is the Directive, rather than the European Regulation. The use of this instrument in areas where self- and co-regulatory alternatives are likely to be relevant requires concrete and consistent guidance to implementing Member States, to avoid regulatory and market barriers and fragmentation. Formal mechanisms for harmonizing and reconciling

> formal regulation in different Member States prove to be less effective in relation to self-regulatory institutions.

Net neutrality regulatory solutions can be classified by the 'degree of self-regulation' involved, from basic informal communication through to formal regulation. Table 8.1 describes the extent of government involvement by analogy with the Beaufort Scale of wind strengths, in a continuum from complete calm (no involvement) to the strongest intervention (hurricane).

Specifically, levels 9–11 represent co-regulation (i.e. government legislative force behind the regulatory forum), while 0–8 represent the evolution of self-regulation from its first beginnings towards the onset of co-regulation. This broad classification by policy involvement is not perfectly aligned with direct or indirect government funding. Such support includes aid to self-regulation by soft law and other policy interventions, including financial assistance. For instance, governments or the European Union may choose to support self-regulatory standard setting as a genuinely non-regulatory policy, as in scales 2 and 6 above, which may include financial support. Examples in the table are drawn from a recent EC study, and more explanation is offered there.[44]

A Bill of Internet User Rights?

If co- and self-regulation are unsuitable mechanisms for fundamental rights to be arbitered over, am I – and is the EC – 'doing a Lessig'? Are we suggesting watered-down, market-oriented forms of regulation where the State should be stepping in with all its majesty to prevent abuses of its citizens' rights? My colleague Steve Peers recently published a report for the European Parliament explaining how cybercrime detection threatened to strike too hard at individual liberties without appeal.[45] He suggests we need a non-binding Internet Bill of Rights:

> The drafting and promotion of an 'Internet Bill of Rights' could summarize these rights and draw them to the attention of Internet users, industry actors, the public sector (regulators, police officers, teachers, et al), relevant NGOs and the media. The Bill of Rights could be drawn up initially by the European Parliament, but could be open for signature and/or support by industry actors, NGOs, Member States, other EU institutions, media bodies and others. It could be endorsed and promoted on the websites of companies, NGOs, EU institutions and

Table 8.1 A 'Beaufort Scale' of Self-Regulation

Scale	Regulatory scheme	Self–Co	Government involvement
0*	'Pure' unenforced self-regulation	Creative Commons SecondLife	Informal interchange only – evolving partial industry forum building on players' own terms
1	Acknowledged self-regulation	ATVOD	Discussion but no formal recognition/ approval
2	Post-facto standardized self-regulation	W3C#	Later approval of standards
3	Standardized self-regulation	Internet Engineering Task Force (IETF)	Formal approval of standards
4	Discussed self-regulation	IMCB	Prior principled informal discussion – but no sanction/approval/process audit
5	Recognized self-regulation	ISPA	Recognition of body – informal policy role
6	Co-founded self-regulation	FOSI#	Prior negotiation of body; no outcome role
7	Sanctioned self-regulation	PEGI# Euro mobile	Recognition of body – formal policy role (contact committee/process)
8	Approved self-regulation	Hotline#	Prior principled less formal discussion with government – with recognition/ approval
9	Approved compulsory co-regulatory	KJM# ICANN	Prior principled discussion with government – with sanction/approval/ process audit
10	Scrutinized co-regulatory	NICAM#	As 9, with annual budget/process approval
11	Independent body (with stakeholder forum)	ICSTIS#	Government imposed and co-regulated with taxation/compulsory levy

# Denotes the presence of government/EU funding.

* Option 0 is infrequently found – a pure self-regulatory body with no prior or later approval is close to invisible in practice; it is certainly the case that only the very 'early stage' hybrid of self-regulation can be viewed in this space.

> national public sector bodies. The suggestion is not for a list of new rights or a legally binding instrument, but for a 'showcase' of relevant rights to inform the public about the application of human rights principles to the Internet.

This suggests rightly that the vast majority of politicians, and even more so telecoms analysts, company executives and others, too often overlook the fundamental nature of the Internet: it is people's primary means of freedom of expression. Peers models his Bill of Rights on the European Union's Charter of Fundamental Rights, but including a final Article 14 on how to interpret the Bill. I reproduce Article 14 in full given its importance for my conclusion. Article 14 is of particular importance as it establishes the application of the general rights outlined above.

> *Article 14: General provisions*
> 1. The content of these rights, including their field of application, their scope and interpretation (including any derogations and limitations on the rights), the level of protection guaranteed by these rights and the prohibition on abuse of these rights, shall be governed by the rules on the protection of human rights guaranteed by the constitutions of the Member States, international human rights treaties, including the European Convention on Human Rights, the general principles of Community law and the EU Charter of Fundamental Rights, or by other relevant rules of national, international, Community and Union law, in their respective fields of application.
>
> 2. This Bill of Rights is without prejudice to other rights applicable to the Internet, or rights applicable in other fields, guaranteed by the constitutions of the Member States, international human rights treaties, including the European Convention on Human Rights, the general principles of Community law and the EU Charter of Fundamental Rights, or by other relevant rules of national, international, Community and Union law, in their respective fields of application.

There are a plethora of rights-based treaties and other international legal instruments, in addition to the entire legal canon in each nation on, for instance, copyright or freedom of expression. The driving force behind this

non-binding further declaration should be educative, not only of consumers, but also of governments and corporations. Whether that effect is produced depends on large part on individual and collective policy drive by national governments, for which the first requirement is transparency for users, based on evidence-driven intervention. The following final section explains the types of evidence that NRAs and governments should be collecting to ensure well-informed policy.

The Future: Evidence-Based Regulation

As we have seen, market evolution is dynamic and complex. The availability and design of a suitable regulatory response must reflect this dynamism, and also the responsiveness of regulators and market players to each other. Therefore, if any legislation is required it should be future-proof and avoid being overly prescriptive, to avoid a premature response to the emerging environment. Instead, I propose that regulators equip themselves with the skills and evidence base to rapidly investigate potential problems of unjustified discrimination. The European legal basis for regulatory intervention, especially the Access Directive, potentially provides for a wider and better variety of regulatory tools to intervene than the current US situation.

Two specific issues in this 'watchlist' are detection of any discrimination, and the standing of the content providers complaining of such discrimination. Should QoS be introduced, the types of harmful discrimination that can result may be undetectable. Blocking, as discussed in Chapter 2, is relatively easy to spot. 'Throttling' or choking bandwidth, even where unjustified, may be harder to spot and even harder to efficiently regulate. It is a moot point whether unjustified discrimination short of blocking is useful to an ISP, as discrimination against a particular content type may be overcome by sophisticated content providers via encryption in a technological 'arms race',[46] and in order for discrimination to create a business case, it needs to be effective in creating substantial incentives for content providers to pay a premium. Though it may not be possible technically to identify all discrimination, the most egregious types of discrimination may only provide a marketing advantage if obvious enough for customers to identify the benefits. Paradigmatically, only clear discrimination may be really worthwhile for network operators – such that the cost–benefit is at least in theory obvious to content suppliers, network operators and end-users. A solution may be to

require network operators to provide their service-level agreements on QoS to content providers and more transparently to the end-user via a regulatory or co-regulatory reporting requirement.

Regulators expecting a 'smoking gun' to present itself as in the Chapter 1 example of *Madison River* should be advised against such a reactive approach. A more proactive approach to monitoring and researching non-neutral behaviours will make network operators much more cognizant of their duties and obligations. Regulators can monitor both commercial transactions and traffic shaping by ISPs to detect potentially abusive discrimination. No matter what theoretical powers may exist, their usage in practice and the issue of forensic gathering of evidence may ultimately be more important. An ex ante requirement to demonstrate internal network QoS metrics to content provider customers and consumers may therefore be a more practical solution.

Currently, not only is it not a requirement for ISPs to notify customers when they block vital P2P-distributed applications, the security reasons given are outside the remit of typical economic telecoms regulators. Where the security reason given by ISPs for blocking traffic (which they claim carries malware and other harmful content) is typically the concern of the Ministry of the Interior (in the United Kingdom, the Home Office) and occasionally the Ministry of Trade and Industry, the regulator defers to these senior agencies and has little technically specific knowledge of data security.[47] In Ec 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.

Net neutrality is politically controversial in Canada,[48] where a celebrated breach took place in 2005, when an ISP allegedly censored communications within its own employees' union.[49] Since then, the argument has grown in scale and scope, not least because incumbent Bell Canada's wholesale operation was found to have throttled traffic for all its retail ISP customers. CRTC, the Canadian regulator, made a simple but entirely unsatisfactory ruling – Bell discriminated against everyone, including themselves. That meant they were not in breach of competition law, but breached net neutrality and rode over customer rights. This situation could not be maintained; therefore, on the same day that the CRTC announced Bell Canada's decision, it also announced that it would be making an evidence-based inquiry into net neutrality.[50] The CRTC has decided to hold open hearings on network neutrality and traffic management. A CRTC hearing was held at the University of Ottawa on 6 July 2009, following

a call for comments which states: 'The Commission invites parties to comment on Internet traffic management practices of ISPs.' As well as several empirical questions regarding traffic shaping and user traffic profiles over the past three years, it asks the vital questions of law and technology.

First, the law. It asks simply 'How should congestion be defined in an ISP's network?' This is a question that the European Commission and NRAs will also have to address in order to implement the new Package before 2011. CRTC explains that in Telecom Decision 2008-108, CRTC directed Bell Canada to file proposed notification requirements with the Commission, to address future QoS changes at wholesale level. It asks whether these requirements should be extended to other wholesale ISPs such as cable ISPs. Further, it addresses the question of whether all ISPs have incentives to discriminate against traffic types and whether they should be so permitted:

> Are similar requirements necessary and appropriate in relation to the provision of retail Internet services? If so, what kinds of practices, and/or changes to practices, should trigger these requirements and what information and how much notice should be provided to end-users?

It asks what types of traffic management represent the ISP controlling content rather than simply passing it over the network, and how the obligations not to discriminate can be squared off against specific practices. Further, it notes that it is required to operate in as pro-competitive and light-touch regulatory manner as possible. European and United States regulators should watch these proceedings carefully for best practice and the attempt to make evidence-based rulemaking.

The technology questions are more future-oriented. They include:

- What developments are under way with respect to traffic protocol (such as modifications to transmission control protocols) and/or application changes (such as changes to P2P file exchange) which could assist in addressing network congestion?
- What are the specific capabilities offered by the technical solutions? For example, would these technologies allow for throttling of individual users or groups of users; would they allow for the collection of information about persons and to what extent?
- How effective would these solutions be in addressing network congestion in the ISP networks?

- What impact could the implementation of technical solutions have on the standards upon which the operation of the Internet is based? Could these solutions create interoperability challenges for application developers?
- What, if any, Internet traffic management practices employed by ISPs would result in unjust discrimination, undue or unreasonable preference or advantage?
- What, if any, Internet traffic management practices employed by ISPs would result in controlling the content, or influencing the meaning or purpose of telecommunications?
- For any Internet traffic management practice identified as controlling content, what criteria should the Commission apply in determining whether to authorize such practice?

It states 'The issue of Internet traffic management practices is increasingly a global issue that is being raised in other jurisdictions' and asks for information on 'initiatives being examined or undertaken in other jurisdictions'.

As an early submission to the CRTC inquiry due for July, Canadian ISPs responded on the extent of their DPI deployment.[51] Not surprisingly given the various billing, cybercrime and anti-terrorist legislation requirements already imposed on ISPs in developed countries, the big incumbents have made the investment decision to deploy DPI. How much that reflects a business case based on charging priority traffic or deflecting Skype and other VoIP services, as discussed in Chapter 1, we will discover.

An interesting dialogue opportunity has recently arisen with the Internet Society (ISOC) announcement of the formation of the Internet Technical Advisory Committee.[52] This is an advisory group to an advisory group (OECD) to governments, so one should note that it is far removed from legislation, but its membership is extremely eminent in Internet standard setting and its recommendations therefore likely to be taken seriously as technocratic standards of excellence. It states: 'Through its commitment to the Internet's ethos of community, collaboration, and industry self-regulation, ITAC will provide counsel and the expertise of technically focused organizations to aid the OECD in its work on the Internet economy.' It is a Technical Stakeholder Forum, which:

> stressed the role of the open, collaborative, inclusive 'Internet Model' of development, and called upon the ministers to preserve and promote

the conditions that enable innovation and positive development on the Internet.

To summarize, for timely and evidence-based intervention, regulators will need to ensure that the network operators report more fully and publicly the levels of QoS that they provide between themselves, as well as to end-users. Internet architecture experts have explained that discrimination is most likely to occur at this level as it is close to undetectable by those not in the two networks concerned in the handover of content. It is very difficult (if not impossible) to monitor the former for any one other than the two network operators themselves, and therefore shedding light on QoS in this area will require a reporting requirement to be imposed. As this information is routinely collected by the network operators for internal purposes, this should not impose a substantial burden.

Regulator Training and Technological Research

The pace of change in the relation between architecture and content on the Internet requires continuous improvement in the regulator's research and technological training. This is in part a reflection of the complexity of the issue set, including security and Internet-peering issues, as well as more traditional telecoms and content issues. Dominant and entrenched market actors in regulated 'bottlenecks' play games with regulators in order to increase the sunk costs of market entry for other actors, and pass through costs to consumers and innovators.

Net neutrality has a rich influence – it distorts content competition, encourages certain applications while discourages others, etc. I have categorized net neutrality into positive (QoS) and negative (content discrimination) net neutrality, indicating the former as potentially beneficial while the latter as harmful. However, this categorization can be problematic, as the three major players involved in the net neutrality context – content suppliers, network operators and end-users – have different, often conflicting, interests and economic incentives.[53] Those incentives can either align or be at odds with the regulators' objective.

Very high entry barrier co-regulation and self-regulation can be as effective in curbing market entry as direct content regulation, especially where ISPs are incentivized to tier and charge for QoS, which raises doubts as to their desire to implement self-regulation. By and large, the greater the levels of

regulation, the more the market develops towards closed and concentrated structures, for three reasons:

1. larger companies are able to bear compliance costs much more easily than SMEs, and therefore it is important that such entry barriers – where necessary – are minimized;
2. larger companies have the resources and lobbying power to seek to influence regulation in a positive direction;
3. large ISPs in a concentrated market may offload costs upstream onto content providers and developers, or downstream onto consumers.

Therefore any solution needs to take note of the potential for larger companies to 'game' a co-regulatory scheme and create additional compliance costs for smaller companies (whether content or network operators), and the combination of sectors makes this a particularly complex regulatory 'game'.

The need for greater research towards understanding the nature of congestion problems on the Internet and their effect on content and innovation is clear.[54] Research that can inform net neutrality can be listed, from the particular to the general:

1. Internet-peering and distribution costs: Intensive and focused research is needed into the costs of local IPTV, VOD and multicast distribution. Further research on an ongoing basis is needed into user generated content creation and self-regulation.
2. Price discrimination and content regulation: The interplay between content regulation and pricing is an essential area for future research. Net neutrality policy needs to ascertain the investment options that can drive content and network investment in Web 2.0 and NGN futures.
3. QoS and NGNs: Data, voice, video and other applications have different 'legacy' QoS standards – at least implicitly in their technologies and consumer preference. The economics of these technical interactions require further clarification.
4. Venture capital flow analysis: Exploring the fluctuations in financing more accurately would help in real option analysis of the choices made by investors depending on policy choices made by regulators and telcos.
5. Switching costs, regulation and innovation: The impact of regulation on churn and the 'turbulent' impact of subscriber churn on market growth need to be considered. Regulation may, for instance, encourage price/feature competition or reduce firm survival.

6. Drivers for broadband penetration: Differences in broadband penetration and capacity utilization are explained by speed of deployment and pricing differences. Further research is necessary in this area, benefiting from discrete choice modelling using stated preference data.
7. Stated preference analysis: User demand for access and services is not wholly driven by current offerings, but reflects as well a 'real option' decision based on potential future goods, services and types of interaction (especially with regard to user generated content). This has powerful implications both for uptake and utilization.[55]
8. Quantitative assessment of harmonization and enforcement: Research is needed to model in quantitative rather than qualitative terms, and to shed light on the possible future shape and consequences of regulatory competition both within the European Union and between the European Union and other global regimes.
9. Game theory and regulatory impact assessment: Supposed 'unanticipated consequences' of network neutrality regulation can be estimated, and regulators can become more aware of these consequences by using regulatory games to simulate real market behaviour.
10. Fundamental rights and freedom of expression: The role of ISPs in Notice and Take Down, as we saw in Chapter 4, remains a 'black box' for regulators and users. There is a pressing need to assess current levels of filtering and censorship in order to shape regulation and align it with consumer and producer interests, though acknowledging that the former must prevail, as the regulator's statutory primary duty.

This book has been a partial attempt to remedy some of the issues, but in expressing the need to employ more technologists, financial analysts and game theorists, I am aware that these are gaps that traditional economics and legal analysis of communications can only point to. When writing with economists or technologists, I am reminded of the old African story about the elephant that crosses a rickety bridge over a riverbed with a mouse perched on his head. The mouse scampers down to the elephant's ear as he turns to survey the precariously swinging bridge after the successful crossing, and shouts: 'Woo, boy, we sure swung that bridge!' Law can only analyse with the benefit of the tools of these other specialisms, standing on the shoulder of giants – and indeed elephants.

Regulating For Net Neutrality 'Lite'

To summarize the argument, there are incentives for network providers to police the traffic by type, if not by content. It enables the network providers, many of whom also operate their own proprietary applications, to charge a different price to non-affiliated content owners than affiliated owners. This differential pricing could make the profitable operation of non-affiliated providers more difficult. On that basis, a 'walled garden' of ISP services and those of its 'preferred content partners' might become the more successful business model. That model makes regulation much easier to enforce, but also prevents some of the interoperability and open access for users that is held to lead to much 'Web 2.0' innovation for businesses. It is not the aim of this book to provide the 'right' answer in the complex trade-off between, on the one hand, regulated 'walled garden' networks and affiliated content providers, and on the other, open interoperable and self-regulated Internet access, as the answer must be contingent on political, market and technical developments.

In Chapter 2, I raised the issue of business cases for broadband filtering technologies to illustrate the main conclusion: it is not the speed of broadband which is a challenge, but the cost and quality of the applications and content provided over that broadband network. The issue of uncontrolled Internet flows versus engineered QoS solutions is central to the question of a 'free' versus regulated Internet.

I have been suggesting a consumer- and citizen-orientated intervention. Economic orthodoxy holds that consumers are in general better off, if they can get access to a product at a lower price, and have more product variety and better quality products. Lower price is a rather short-term welfare goal that can be achieved by more intensive competition, while variety and quality are long-term welfare enhancements dependent in this case on a step-change in technology. From a general economic perspective, long-term should weight more in regulation, also because it entails short-term enhancement in the future. This in itself suggests that ISPs be allowed to raise prices short-term to pay for improvements that led to greater innovation later. There are three absolutely critical conditions to this:

1. All benefits are passed through to consumers from the short-term price rises, via investment in new networks.
2. Greater bandwidth offers a greater innovation benefit than the lost openness of the network in the meantime.

3. The third, rather obviously, is that having moved away from net neutrality, the regulator can later wave a magic wand and rediscover the 'paradise lost' (if that's what it is).

That depends on passing regulations to undo the controls exerted over traffic via DPI equipment and the like – and that in the face of the entire burgeoning DPI 'espionage-industrial complex' that will have grown up around the issue.[56] End-user generated innovation often occurs as a result of intrinsic motivations (like democracy or game play) and non-monetary motivations (e.g. cooperative or own use benefit) of content developers. In the presence of economies of scale in NGNs for incumbents, 'positive' net neutrality (or price) discrimination is an economic argument for investment incentives. So reducing the 'fun' innovations in favour of the scale economies is the trade-off proposed. That's Disney, not Google.

These conclusions support a light-touch regulatory regime involving reporting requirements and co-regulation with, as far as is possible, market-based solutions. Regulatory monitoring of potential abuses, including strengthening investigatory capacity and transparency for end-users, is a solution that maintains maximum flexibility and policy choice, while ensuring that any abuses can be quickly detected and dealt with appropriately. Solutions may be international as well as local, and international coordination of best practice and knowledge through fora such as the OECD will enable national regulators to keep up with the technology 'arms race'.

In the 2009 discussions in the new E-Communications Framework, large well-resourced European incumbents saw the opportunity to make common cause with mobile operators, public service broadcasters and commercial television companies in an unholy alliance to prevent the open Internet video model emerging. The regulation of the Internet that is rapidly taking place is being driven – unquestionably – in Europe by politicians for public safety reasons. They are erecting entry barriers with the connivance of the incumbent players, with potentially enormous consequences for free speech, free competition and individual expression. This may be the correct policy option for a safer Internet policy, though it signals an abrupt change from the 'Generative Internet'. Claims by the European Commissioner that regulating the Internet is not the intention do not flatter the intelligence of the audience. That may be the intention of the paternalistic and oligopolistic interests represented in the new regulated Internet. It is therefore vital that regulators

address the question of the proper 'lite' approach to net neutrality to prevent harm to the current Internet, as well as beginning to address the heavier questions of positive – or tiered – breaches of network neutrality.

A simple truth lies behind the quotation from President (then-Senator) Obama which opened the first chapter. We should not entrench 'Lex Monopolium' at the expense of an open Internet, nor is the choice that drastic: innovation and investment can be encouraged by relatively light-touch co-regulatory transparency principles, backed up by a regulator with sufficient comprehension and research into the issues and sharp teeth to make a real political commitment to intervene where economic or social interests dictate. Network neutrality may be a slogan that covers many concerns about the future of the Internet, but it certainly provides an excellent platform to create this wider and better informed discussion. That was my aim in this provocation.

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 Oftel, 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 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 suicidaly – 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.

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).

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 ecomomics' 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 Pfleeger and Pfleeger (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-243556A1.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:SN02686:@@@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/ecomm/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/ecomm/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/i02_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.ectaportal.com/en/upload/File/Broadband%20Scorecards/Q306/FINALBBScQ306.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.

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_DOCUMENTDETRAVAIL.pdf.

61 See http://www.europarl.eu.int/omk/sipade3?PUBREF=-//EP//NONSGML+WQ+E-2006-1131+0+DOC+WORD+V0//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_spmin12.

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://eurotelcoblog.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://eurotelcoblog.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-strartup-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 Hutty, 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 freezed 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/ldeucom/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-pegi-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-fantasising-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/08/561, 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/08/473.

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/08/1661.

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-graduee-revue-et-corrigee-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/oeil/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 Murroni (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.offta.org.uk/vision.pdf.

18 http://www.ngnuk.org.uk/.

19 Ofcom (2006a).

20 http://www.ngnuk.org.uk/docs/Workstreams0806.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=ispsandtelcosmust1069270107&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/Classification Framework.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.terminatetherate.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.

Bibliography

Afergan, M. (2005), Using Game Theory to Develop Network Architecture, at <http://find.isi.edu/presentation_files/Mike_Afergan-FIND-preso.pdf> [accessed 20 June 2009].

Ahlert, C. Alexander, M. and Tambini, D. (2003), European 3G Mobile Industry Self-Regulation: IAPCODE Background Paper for World Telemedia Conference: see <http://www.selfregulation.info/iapcoda/031106-mobiles-revised-bckgrd.pdf> [accessed 20 June 2009].

Ahlert, C.M. Christopher, T. and Yung, C. (2004), How 'Liberty' Disappeared from Cyberspace: The Mystery Shopper Tests Internet Content Self-Regulation, at <http://pcmlp.socleg.ox.ac.uk/text/liberty.pdf> [accessed 20 June 2009].

Ahlert, C. Marsden, C. and Nash, V. (2005), Protecting Minors from Exposure to Harmful Content on Mobile Phones, for European Internet Coregulation Network, at <http://network.foruminternet.org/article.php3?id_article=24> [accessed 20 June 2009].

Alexander, M. and Tambini, D. (2003), European Mobile Industry Self-Regulation: IAPCODE Background Paper.

American Cable Association (2009), Submission to FCC Proceeding on its National Broadband Plan, at <http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6520220258> [accessed 20 June 2009].

American Civil Liberties Union v. Reno (1997), Supreme Court Case No. 96-511, 117 St. Ct. 2329.

American Recovery and Reinvestment Act (2009), HR1, 111th Congress at Division B, Title VII, Section 6001(k)2, A, D, E, see <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.txt.pdf> [accessed 20 June 2009].

Analysys (2006), *Sophisticated Broadband Services: Final Report for Department of Trade and Industry*, Cambridge: Analysys.

Analysys Masons (2008), Report on Delivering High-Quality Video Services Online for Ofcom – Ofcom Release March 2009, at <http://www.ofcom.org.uk/research/technology/research/emer_tech/hqvs/analysyshqvs.pdf> [accessed 20 June 2009].

Andersen, J. (2005), Regulatory Challenges in a Converging and Liberal Telecoms World, at <http://www.ero.dk/42ACC9DD-B775-4948-8B63-CA7EA18B0329?frames=no&> [accessed 20 June 2009].

Antelope Consulting (2000, undated), Regulation and the Internet, available, at <www.communicationsact.gov.uk/responses/Antelope%20Consulting.doc> [accessed 20 June 2009].

Armstrong, M. and Porter, R. (eds) (2003), *Handbook of Industrial Organization*, vol. III, Amsterdam: Elsevier.

AT&T Inc. and BellSouth Corp. (2007), Application for Transfer of Control, 22 FCC Rcd 5562, Appendix F, slip op. p.154 ('AT&T/BellSouth').

Atkinson, R.D. and Weiser, P. (2006), *A 'Third Way' on Network Neutrality*, Washington D.C.: The Information Technology and Innovation Foundation. available, at SSRN: <http://ssrn.com/abstract=1004522> [accessed 20 June 2009].

Baistrocchi, P.A. (2002), 'Liability of Intermediary Service Providers in the EU Directive on Electronic Commerce', *Santa Clara Computer and High Technology Law Journal*, 130.

Baldwin, R. Hood, C. and Scott, C. (1998), *Socio-Legal Reader on Regulation*, Oxford: Oxford University Press.

Ballon, P., et al. (2006), Mapping European Wireless Trends and Drivers, for IPTS Seville, EUR Number: 22250 EN, at <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?prs=1428> [accessed 20 June 2009].

Bambauer, D.E. (2008), Filtering in Oz: Australia's Foray into Internet Censorship, Brooklyn Law School, Legal Studies Paper No. 125. Available at SSRN: <http://ssrn.com/abstract=1319466> [accessed 20 June 2009].

Banerjee, A. and Sirbu, M. (2005), 'Towards Technologically and Competitively Neutral Fiber to the Home (FTTH) Infrastructure', in I. Chlamtac, A. Gumaste and C. Czabo (eds), *Broadband Services: Business Models and Technologies for Community Networks*, New Jersey: John Wiley.

Bar, F. Borrus, M. and Steinberg, R. (1995), Islands in the Bit-Stream: Mapping the NII Interoperability Debate, Berkeley Roundtable on the International Economy Working Paper # 79, BRIE, Berkeley, CA. available at <www-rcf.usc.edu/fbar/Publications/islands-in-the-bitstream.pdf> [accessed 20 June 2009].

Bar, F. Cohen, S. Cowhey, P. DeLong, B. Kleeman, M. and Zysman, J. (2000), 'Access and Innovation Policy for the Third-Generation Internet', *Telecommunications Policy*, 24(6/7): 489–518.

Bartelsman, E. Haltiwanger, J. Jarmin, R. Scarpetta, S. and Schank, T. (2002), *The Spread of ICT and Productivity Growth: Is Europe Really Lagging Behind the New Economy?* Paris: OECD.

Barton, J.H. (1997), 'The Balance Between Intellectual Property Rights and Competition: Paradigms in the Information Sector', *European Competition Law Review Issue*, 7: 440–5.

Baumann, R. Heimlicher, S. Strasser, M. and Weibel, A. (2007), A Survey on Routing Metrics, TIK Report 262, Computer Engineering and Networks Laboratory, ETH-Zentrum, Switzerland.

Baumol, W.J., et al. (2007), Economists' Statement on Network Neutrality Policy. Working Paper, AEI-Brookings Joint Center for Regulatory Studies, AEI-Brookings Joint Center, 2007.

Bazelon, C. (2009), 'Too many goals: Problems with the 700MHz auction', *Information Economics and Policy*, 21(2): 115–127.

Beke, T. (1998), Fending off automated mass electronic mail: or, how to distinguish yourself from a computer, 3 First Monday 2, at <www.firstmonday.org/issues/issue3_2/beke/> [accessed 20 June 2009].

Bell Canada (2008), Application by the Canadian Association of Internet Providers Requesting Certain Orders Directing Bell Canada to Cease and Desist from "Throttling" its Wholesale ADSL Access Services. Canadian Radio-television Commission. 04 15, 2008. <http://www.crtc.gc.ca/public/partvii/2008/8622/c51_200805153/890988.zip> [accessed 20 June 2009].

Bender, G. (1998), *Bavaria v. Felix Somm*: The Pornography Conviction of the Former CompuServe Manager, at <http://www.digital-law.net/IJCLP/1_1998/ijclp_webdoc_14_1_1998> [accessed 20 June 2009].

Benkler, Y. (1998a), 'Communications Infrastructure Regulation and the Distribution of Control Over Content', *Telecommunications Policy*, 22(3): 183–196, at <http://www.benkler.org/PolTech.pdf> [accessed 20 June 2009].

Benkler, Y. (1998b), 'Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment', *Harvard Journal of Law and Technology*, 11: 287–400, at <http://www.law.nyu.edu/benklery/agoraphobia.pdf> [accessed 20 June 2009].

Benkler, Y. (1999), 'Free as the Air to Common Use: First Amendment Constraints on Enclosure of the Public domain', *New York University Law Review*, 74: 354–446, at <http://www.nyu.edu/pages/lawreview/74/2/benkler.pdf> [accessed 20 June 2009].

Benkler, Y. (2006), *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, New Haven and London: Yale University Press.

Bergman, M. (2000), 'The Bronner Case – A Turning Point for the Essential Facility Doctrine? *ECLR*, 59–61.

Berkeley Law and Technology Center (2001), Beyond Microsoft: Antitrust, Technology and Intellectual Property conference, Panel: Cable Open Access, March 3 Berkeley, Cal., at <http://www.law.berkeley.edu/institutes/bclt/events/antitrust/> [accessed 20 June 2009].

Berners Lee, T. (2006), Net Neutrality: This is serious, Wed, 2006-06-21 16:35, at <http://dig.csail.mit.edu/breadcrumbs/node/144> [accessed 20 June 2009].

Berners Lee, T. and Fischetti, M. (1999), *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by Its Inventor*, London: HarperCollins, at <http://www.harpercollins.com/catalog/redir.aspl?0062515861> [accessed 20 June 2009].

Besen, S.M. and Saloner, G. (1989), The Economics of Telecommunications Standards Setting, in R.W. Crandall and K. Flamm (eds), *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Washington D.C.: Brookings Institute, 177–220.

Bijker, W. (1997), *Of Bicycles, Bakelites, and Bulbs*, Cambridge MA: MIT Press.

Bijker, W. Hughes, T. and Pinch, T. (eds) (1987), *The Social Construction of Technological Systems*, Cambridge MA: MIT Press.

Birnhack, M.D. (2003), Acknowledging the Conflict Between Copyright Law and Freedom of Expression under the Human Rights Act, ENT L. REV. 24, 29.

Blackman, C., and Nihoul, P. (eds) (1998), *Special Issue – Convergence Between Telecommunications and Other Media: How Should Regulation Adapt? Telecommunications Policy*, 22(3): 163–170.

Bland, C. (2009), Carter's Old-Fashioned Tinkering With Matters that are Best Left to Markets, June 17, at <http://www.ft.com/cms/s/0/a504924c-5ad3-11de-8c14-00144feabdc0.html> [accessed 20 June 2009].

Boddewyn J.J. (1988), *Advertising Self-regulation and Outside Participation: A Multinational Comparison*, Westport CT: Quorum Books.

Bohlin, E., et al. (eds) (2000), *Convergence in Communications and Beyond*, Amsterdam: Elsevier Science.

Bohlin, E. Forge, S. and Blackman, C. (2006), Chapter 2, Telecoms Infrastructure to 2030, pp. 51–148 in OECD (2006) Infrastructure to 2030: Telecom, Land Transport, Water and Electricity, Paris: OECD.

Bohm, N. (2008), 'The Phorm "Webwise" System – a Legal Analysis', at <http://www.fipr.org/080423phormlegal.pdf> [accessed 20 June 2009].

Bollinger, L.C. (1976), 'Freedom of the Press and Public Access: Toward a Theory of Partial Regulation', *Michigan Law Review*, 75: 1.

Bonn Ministerial Declaration (1997), European Ministerial Conference on Global Information Networks Declaration of 8 July, at <http://merlin.obs.coe.int/iris/1997/8/article1.en.html> [accessed 20 June 2009].

Botterman, M. Anderson, A. van Binst, M. Cave, J. Libicki, M. Ligtvoet, A. te Velde, J. and de Vries, J. (2003), *Enabling the Information Society by Stimulating the Creation of a Broadband Environment in Europe: Analyses of Evolution Scenarios for Future Networking Technologies and Networks in Europe, DG Information Society* (*MR-1579*). Santa Monica: RAND.

Bouwman, H., et al. (2006), 'White Spots and Black Holes; Developing a Conceptual Model for Broadband Rollout', *INFO*, 8(1):72–90.

Bower, J. and Christensen, C. (1995), 'Disruptive Technologies: Catching the Wave', *Harvard Business Review*, January-February, 43–53.

Boyle, J. (2008), *The Public Domain: Enclosing the Commons of the Mind*, New Haven CT: Yale University Press.

Bradshaw, T. (2009), BT Seeks to End 'Free Ride' by Video Websites, June 11 2009, at <http://www.ft.com/cms/s/0/1c979154-5621-11de-ab7e-00144feabdc0.html?nclick_check=1> [accessed 20 June 2009].

Braman, S. and Roberts, S. (2003), 'Advantage ISP: Terms of Service as Media Law', *New Media & Society*, 5(3): 422–448.

British Institute of International and Comparative Law (2004), Effective Access and Procedure in Telecommunications Disputes in Europe BIICL, London, at <http://www.biicl.org/admin/files/BIICLTelecoms20Report202004.pdf> [accessed 20 June 2009].

Brousseau, E. Marzouki, M. and Meadel, C. (eds), (2009 forthcoming), *Governance, Regulations and Powers On The Internet*, Cambridge: Cambridge University Press.

Brown, I. (2006), Internet censorship: be careful what you ask for, Proc. International Conference on Communication, Mass Media and Culture, Istanbul, October 2006.

Brown, I. (2008), 'Internet Filtering – Be Careful What You Ask for, in Freedom And Prejudice: Approaches To Media And Culture', in S. Kirca and L. Hanson (eds), Istanbul: Bahcesehir University Press. Available at SSRN: <http://ssrn.com/abstract=1026597> [accessed 20 June 2009].

Brown, I. (2009), Regulation of Converged Communications Surveillance, in New Directions In Surveillance And Privacy, in D. Neyland and B. Goold (eds), Exeter: Willan, pp. 39–73. Available at SSRN: <http://ssrn.com/abstract=1261192> [accessed 20 June 2009].

Brown, I. and Marsden, C. (2007), Self-regulation and security: The London Action Plan against Spam, Paper presented at GIGANET, Internet Governance Forum, Rio, 17 November, at <http://giganet.igloogroups.org/publiclibr/papers/ianbrown.> [accessed 20 June 2009].

Brown, I. Edwards, L. and Marsden, C. (2006), Legal and institutional responses to Denial of Service Attacks, Communications Research Network/Department for Trade and Industry joint seminar on Spam/DDoS, 13 November, at <www.communicationsresearch.net/object/download/1846/doc/marsden-edwards.ppt> [accessed 20 June 2009].

Brunel for Department of Trade and Industry (2002), Investigating Broadband Technology Deployment in South Korea, Brunel University: Uxbridge, Midd, at <http://www.broadbanduk.org/reports/SKorea_report.pdf> [accessed 20 June 2009].

Brynjolfsson, E. (2003), The IT Productivity Gap, Optimize, July Issue 21, at <http://ebusiness.mit.edu/erik/Optimize/pr_roi.html> [accessed 20 June 2009].

Brynjolfsson, E. and Hitt, L.M. (2003), Computing Productivity: Firm-Level Evidence, June MIT Sloan Working Paper No. 4210-01, at <http://ssrn.com/abstract=290325.> [accessed 20 June 2009].

Buiges, P. and Rey, P. (eds) (2004), *The Economics of Antitrust and Regulation in Telecommunications*, Cheltenham: Edward Elgar.

Burk, D.L. (1999), 'Virtual Exit in the Global Information Economy', *Chicago Kent Law Review*, 73(4): 943–995.

Burri-Nenova, M. (2007), 'The New Audiovisual Media Services Directive: Television without Frontiers, Television without Cultural Diversity', *Common Market Law Review*, 44(6): 1689–1725. Available at SSRN: <http://ssrn.com/abstract=1299437> [accessed 20 June 2009].

Burstein, D. (2006), What Verizon FIOS Can Do: 250/125 GPON, 100/40 BPON, Promise of Open Set Tops, DSL Prime Newsletter, 27 September.

Burstein (2008), Open Fiber To 90% Of Greek Homes, 23 November, at <http://www.dslprime.com/fiber-news/175-d/926-open-fiber-greece> [accessed 20 June 2009].

Burstein, D. (2009), BT Does Not Have a Traffic Cost or Congestion Problem, DSL Prime Newsletter June 15, Together with Updates, at <http://fastnetnews.com/dslprime/42-d/888-bt-no-congestion-problem and <http://fastnetnews.com/dslprime/42-d/894-bt-cutting-high-volume-backhaul-rates-in-half> [accessed 20 June 2009].

Business Week International Online Extra (2005), At SBC, It's All About 'Scale and Scope', 7 November, at <http://www.businessweek.com/@@n34h*IUQu7KtOwgA/magazine/content/05_45/b3958092.htm> [accessed 20 June 2009].

Byron, T. (2008), Safer Children in a Digital World, at <http://www.dcsf.gov.uk/byronreview/> [accessed 20 June 2009].

C(2000)1059 Commission Recommendation on Unbundled Access to the Local Loop, 26 April 2000, Brussels: EC.

C(2004)900 final of 24.03.2004 (Case COMP/C-3/37.792 Microsoft) relating to a proceeding under Article 82 of the EC Treaty, Brussels: EC.

C-241/91P & C-242/91P, *Radio Telefis Eireann v. Commission* ("Magill"), (1995), ECR, I-743, 4 CMLR 718, Brussels: EC.

C-418/01 *IMS Health v. NDC Health* 29th of April 2004, ECR 2004, Brussels: EC.

C-7/97 *Oscar Bronner GmbH&Co. KG v. Mediaprint Zeitungs- und Zeitschriftenverlag GmbH&Co KG* (1999) 4 CMLR 112, Brussels: EC.

Cadman, R. and Dineen, C. (2005), Broadband Access Markets in Europe: Why Regulation should Promote Competition, at <http://www.spcnetwork.co.uk/uploads/20040315_investment_paper.pdf> [accessed 20 June 2009].

Caio Review (2008), <http://www.hm-treasury.gov.uk/caio_review_index.htm> [accessed 20 June 2009].

Cairncross, F. (1997), *The Death of Distance: How the Communications Revolution Will Change Our Lives*, Cambridge MA: Harvard Business School Press.

Camp, J. (ed) (2000), Special Issue, 2 Info 2.

Canadian Association of Internet Providers (2008), Application by the Canadian Association of Internet Providers Requesting Certain Orders Directing Bell Canada to Cease and Desist from "Throttling" its Wholesale ADSL Access Services. Canadian Radio-television and Telecommunications Commission. April 3, 2008. <http://www.crtc.gc.ca/public/partvii/2008/8622/c51_200805153/885770.PDF> [accessed 20 June 2009].

Canadian Radio-television and Telecommunications Commission (2008a), Review of the Internet Traffic Management Practices of Internet Service Providers, at <http://www.crtc.gc.ca/PartVII/eng/2008/8646/c12_200815400.htm> [accessed 20 June 2009].

Canadian Radio-television and Telecommunications Commission (2008b), The Canadian Association of Internet Providers' Application Regarding Bell Canada's Traffic Shaping of its Wholesale Gateway Access Service, at <http://www.crtc.gc.ca/eng/archive/2008/dt2008-108.htm> [accessed 20 June 2009].

Carnoy, M. Castells, M. Cohen, S.S. and Cardoso, F.H. (1993), *The New Global Economy in the Information Age; Reflections on Our Changing World*, New York: Macmillan.

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> [accessed 20 June 2009].

Carter, S. (2009), Britain Needs an Industrial Policy for a Digital Age, June 16, Financial Times, at <http://www.ft.com/cms/s/0/38756bbc-59dc-11de-b687-00144feabdc0.html> [accessed 20 June 2009].

Carter, K.R. Marcus, S. and Wernick, C. (2008), *Network Neutrality: Implications for Europe*, WIK Diskussionsbeitäge Nr. 314, <http://www.wik.org/content/diskus/Diskus_314.pdf> [accessed 20 June 2009].

Carter Donahue, H. (2001), 'Opening the Broadband Cable Market: A New Kingsbury Commitment?' *INFO*, 3(2): 111–136.

Case C-424/07 *Commission of the European Communities v. Federal Republic of Germany* (Official Journal 2007/C 283/35), at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2007:283:0019:0020:EN:PDF.> [accessed 20 June 2009].

Case COMP/M.1741, MCI WorldCom/Sprint, Commission decision of 28 June 2000, Brussels: EC.

Case IV/M.1069 WorldCom/MCI 99/287/EC: Commission Decision of 8 July 1998 declaring a concentration to be compatible with the common market and the functioning of the EEA Agreement, OJ L 116, 4.5.1999 p. 1–35, Brussels: EC.

Case T-310/00 *MCI, Inc. v. Commission*: Judgment of the CFI of 28 September 2004, Brussels: EC.

Castells, M. (1996), *The Rise of the Network Society*, Cambridge, MA: Blackwell Publishers.

Cave, M. (2002a), 'Is LoopCo the Answer?' *INFO* 4(4): 25–31.

Cave, M. (2002b), Radio Spectrum Management Review Consultation Paper, An Independent Review Led for DTI and HM Treasury, March (The Cave Report), at <http://www.spectrumreview.radio.gov.uk/2002review/1_whole_job.pdf> [accessed 20 June 2009].

Cave, M. and Cowie, C. (1996), 'Regulating Conditional Access in European Pay Broadcasting', *Communications and Strategies*, 23(3): 119–142.

Cave, M. and Cowie, C. (1998), 'Not Only Conditional Access. Towards a Better Regulatory Approach to Digital TV', *Communications and Strategies*, (30), 2nd Quarter: 77–101.

Cave, M. and Mason, R. (2001), 'The Economics of the Internet: Infrastructure and Regulation', *Oxford Review of Economic Policy*, 17(2): 188–201.

Cave, M., et al. (2009), Statement by European Academics on the Inappropriateness of Imposing Increased Internet Regulation in the EU, 8 January 2009 by Martin Cave, Richard Collins, Nico van Eijk, Pierre Larouche, Luigi Prosperetti, Alexandre de Streel, Tommaso Valletti, at <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1329926> [accessed 20 June 2009].

Cave, M. Prosperetti, L. and Doyle, C. (2006), 'Where are We Going? Technologies, Markets and Long-Range Public Policy Issues in European Communications', *Information Economics and Policy*, 18(3): 242–255.

CDT v. Pappert, 337 F.Supp.2d 606 (E.D. Penn. 2004).

Cellular News (2009), Mobile Termination Rates Cut in India, 9 March, at <http://www.cellular-news.com/story/36431.php and <http://uk.reuters.com/article/allBreakingNews/idUKL5613720090205?pageNumber=1&virtualBrandChannel=0> [accessed 20 June 2009].

Center for Democracy and Technology (2008), ISP Traffic, at <http://www.cdt.org/privacy/20080708ISPtraffic.pdf> [accessed 20 June 2009].

Cerf, et al. (undated), Brief History of the Internet, Internet Society, at <http://www.isoc.org/internet/history/brief.shtml.> [accessed 20 June 2009].

Chandler, A.D. Hagström, P. and Sölvell, Ö. (eds) (1998), *The Dynamic Firm: The Role of Technology, Strategy, Organization and Regions*, Oxford: Oxford University Press.

Cheng, H.K. Bandyopadhyay, S. and Guo, H. (2008), The Debate on Net Neutrality: A Policy Perspective, February 26, 2008, at <http://ssrn.com/abstract=959944> [accessed 20 June 2009].

Cherry, B.A. (2006), 'Misusing Network Neutrality to Eliminate Common Carriage Threatens Free Speech and the Postal System', *N. KY. L. REV.*, 33: 483.

Cherry, B. and Wildman, S. (2000), 'Preventing Flawed Communications Policies by Addressing Constitutional Principles', *L.REV. M.S.U.-D.C.L.*, 1: 55–107, 96–99.

Chirico, F. Haar, I. v.d. and Larouche, P. (2007), Network Neutrality in the European Union, TILEC Discussion Paper No. 2007–030, available, at <http://ssrn.com/abstract=1018326> [accessed 20 June 2009].

Chlamtac, I. Gumaste, A. and Czabo, C. (eds) (2005), *Broadband Services: Business Models and Technologies for Community Networks*, New Jersey: John Wiley.

Christensen, C.M. (1997), *The Innovator's Dilemma*, Cambridge MA: Harvard Business School Press.

Cisco (2008), Cisco Visual Networking Index, 2007–2012, available, at <www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions> [accessed 20 June 2009].

Clark, D.D. and Blumenthal, M.S. (2007), The End-to-End Argument and Application Design: The Role of Trust Paper Presented to the 35th Telecommunications Policy Research Conference Arlington, VA, 28–29. September, 2007, at <http://web.si.umich.edu/tprc/papers/2007/748/End%202%20end%20and%20trust%2010%20final%20TPRC.pdf> [accessed 20 June 2009].

Clarke, D.D. (2005), FIND and Architecture: A New NSF Initiative, at <http://find.isi.edu/presentation_files/Clark_Arch_Security.pdf> [accessed 20 June 2009].

Clayton, R. (2005), Failures in a Hybrid Content Blocking System, at <http://www.cl.cam.ac.uk/~rnc1/cleanfeed.pdf> [accessed 20 June 2009].

Clayton, R. (2008), The Phorm\Webwise System, at <http://www.cl.cam.ac.uk/~rnc1/080404phorm.pdf and later version <http://www.cl.cam.ac.uk/~rnc1/080518-phorm.pdf> [accessed 20 June 2009].

Clayton, R. Murdoch, S.J. and Watson, R.N.M. (2006), Ignoring the Great Firewall of China', Paper Presented to the Sixth Workshop on Privacy Enhancing Technologies, Cambridge, UK, 28 June, at <http://www.cl.cam.ac.uk/~rnc1/ignoring.pdf> [accessed 20 June 2009].

Coase, R.H. (1937), 'The Nature of the Firm', *Economica*, 4: 386–405.

Coase, R.H. (1950), *The BBC: A Study in Monopoly*, London: Longmans Green Books, at <http://coase.org/coasepublications.htm> [accessed 20 June 2009].

Code Monkey Ramblings Blog (2006), Network Neutrality, posted May 20, 2006. <http://www.codemonkeyramblings.com/2006/05/network_neutrality.php> [accessed 20 June 2009].

Cohen, S.S. Bradford DeLong, J. and Zysman, J. (2000), *Tools for Thought: What Is New and Important about the 'E-conomy'?* Berkeley: BRIE, University of California.

Collins, R. (1998), *From Satellite to Single Market. The Europeanisation of Television 1982–1992*. London: LSE Books/Routledge.

Collins, R. (2000), 'Realising Social Goals in Connectivity and Content: The Challenge of Convergence', in C. Marsden (ed), *Regulating the Global Information Society*, London: Routledge, 108–115.

Collins, R. (2009), 'Misrecognitions: Positive and Negative Freedom in EU Media Policy and Regulation, From Television Without Frontiers to The Audiovisual Media Services Directive', in Ib Bondebjerg and P. Madsen (eds), *Media, Democracy and European Culture*, Bristol: Intellect, 334–361.

Collins, R. and Murroni, C. (1996), *New Media, New Policies*, Cambridge: Polity Press.

COM (2002a), 276 final Communication on Impact Assessment of 5 June 2002, Brussels: EC, at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0276:FIN:EN:PDF> and the Inter-Institutional Agreement on Better Lawmaking, at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2003:321:0001:0005:EN:PDF.> [accessed 20 June 2009].

COM (2002b), 278 final Better Regulation Action Plan, Brussels: EC, at <http://eur-lex.europa.eu/LexUriServ/LexUri> [accessed 20 June 2009].

COM (2002c), 695 Eighth Report on the Implementation of the Telecommunications Regulatory Package, Brussels: EC, December, at <http://europa.eu.int/information_society/topics/telecoms/implementation/annual_report/8threport/finalreport/annex2.pdf> [accessed 20 June 2009].

COM (2003a), 702 final 21.11.2003 First Report on the application of Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on Electronic Commerce) Brussels: EC.

COM (2003b), 776 final at 12: <http://europa.eu.int/comm/avpolicy/legis/reports/com2003_776final_en.pdf> [accessed 20 June 2009].

COM (2004), 0341 European Parliament legislative resolution on the proposal for a recommendation of the European Parliament and of the Council on the protection of minors and human dignity and the right of reply in relation to the competitiveness of the European audiovisual and information services industry– C6-0029/2004 – 2004/0117(COD) Brussels: EC.

COM (96) 483 Green Paper on the protection of minors and human dignity in audiovisual and information services, 16.10.97, Brussels: EC.

COM (97) 487 Communication on Illegal and Harmful content on the Internet, 16.10.97, Brussels: EC.

COM (97) 623 Green Paper on the regulatory implications of convergence between the telecommunications, media and information technology sectors: towards and Information Society approach: The Convergence Green Paper, Brussels: EC.

COM (99) 539 Review of the Telecommunications Regulatory Framework – A New Framework for Electronic Communications Infrastructures and Associated Services. The 1999 Communications Review, Brussels, Brussels: EC, at <http://europa.eu.int/ISPO/infosoc/telecompolicy/review99/review99en.pdf> [accessed 20 June 2009].

COM (2008), 723 final 2007/0248 (COD) Amended Proposal for a Directive of the European Parliament and of the Council Amending Directive 2002/22/EC on Universal Service and Users' Rights Relating to Electronic Communications Networks, Directive 2002/58/EC Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sectors, 6.11.2008 and Regulation (EC) No 2006/2004 on Consumer Protection Cooperation, Brussels: EC, at <http://ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/amendments/cr_en.pdf at 4–5.> [accessed 20 June 2009].

Commerce and Energy Committee (2008), Staff Report: Deception and Distrust: The FCC Under Chairman Kevin J. Martin, Majority Staff Report for Commerce and Energy Committee, December, at <http://energycommerce.house.gov/images/stories/Documents/PDF/Newsroom/fcc%20majority%20staff%20report%20081209.pdf> [accessed 20 June 2009].

Communications Act 2003, UK.

Communications Act of 1934 as amended by Communications (Deregulatory) Act of 1996, 47 U.S.C. §§.

Communications, Consumer's Choice, and Broadband Deployment Act of 2006, at <http://thomas.loc.gov/cgi-bin/bdquery/z?d109:SN02686:@@@L&summ2=m&> [accessed 20 June 2009].

COMP/C-3/37.792 Microsoft (24.03.2004), Brussels: EC.

COMP/M. 1845 AOL/Time-Warner, Brussels: EC.

COMP/M.1795 – Vodafone Airtouch/Mannesmann, 12.4.2000, Brussels: EC.

Compaine, B. (2001), *TV over Internet: Policies for Convergence*, Cambridge, MA: Massachusetts Instititue of Technology. Internet and Telecoms Convergence Consortium, Members Meeting, January 12, at <www.itel.mit.edu> [accessed 20 June 2009].

Competition Appeal Tribunal (2008), Case(s): 1092/3/3/07 *Cable & Wireless and others v. Office of Communications* (Termination Rate Dispute)1091/3/3/07 *Hutchison 3G UK Limited v. Office of Communications* (Termination Rate Dispute)1089/3/3/07 *T-Mobile (UK) Limited v. Office of Communications* (Termination Rate Dispute)1090/3/3/07 *British Telecommunications plc v. Office of Communications* (Termination Rate Dispute) [2008] CAT 12, 20 May 2008, at <http://www.catribunal.org.uk/238-1928/Judgment-%28Core-issues%29.html> [accessed 20 June 2009].

Competition Commission (2008), Anticipated Joint Venture Between The BBC Through BBC Worldwide Limited, Channel 4 Television Corporation and ITV Plc Relating to the Video On Demand Sector

Project Kangaroo Referral: Issues Statement, at <http://www.competition-commission.org.uk/inquiries/ref2008/kangaroo/pdf/issues_statement.pdf> [accessed 20 June 2009].

Competition Commission (2009), Anticipated Joint Venture Between BBC Worldwide Limited, Channel 4 Television Corporation and ITV Plc Relating to the Video On Demand Sector: Notice of proposal to accept final undertakings pursuant to section 82 of and Schedule 10 to the Enterprise Act 2002 and public consultation on the proposed undertakings, 22 May, at <http://www.competition-commission.org.uk/inquiries/ref2008/kangaroo/pdf/draft_final_undertakings.pdf> [accessed 20 June 2009].

Conseil Constitutionnel (2009), Decision No. 2009-580 DC of 10 June 2009, Bill passed on 13 May 2009 (TA No. 81).

Council of Europe (1950), Convention for the Protection of Human Rights and Fundamental Freedoms CETS No.: 005 entered into force 3 September 1953, at <http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=005&CM=8&DF=04/10/2005&CL=ENG> [accessed 20 June 2009].

Council of Europe (2007), Recommendation CM/Rec 11 on Promoting Freedom of Expression and Information in the New Information and Communications Environment, COE: Strasbourg.

Council of Europe: European Commission Against Racism and Intolerance CRI (2005), 'Third Report on the United Kingdom, Adopted on 17 December 2004 and made public on 14 June 2005', at <http://www.coe.int/t/e/human_rights/ecri/1-ECRI/2-Country-by-country_approach/United_Kingdom/United_Kingdom_CBC_3.asp#TopOfPage> [accessed 20 June 2009].

Cowie, C. and Marsden, C.T. (1999), Convergence: Navigating Through Digital Pay-TV Bottlenecks 1 Info 1 at 53–66.

Crandall, R.W. and Flamm, K. (eds) (1989), *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Washington D.C: Brookings Institute.

Crowcroft, J. (2007), Net Neutrality: the technical side of the debate. A white paper, 37 ACM SIGCOMM Computer Communication Review 1, at 49–56, at <http://portal.acm.org/citation.cfm?id=1198255.1198263&coll=ACM&dl=ACM&idx=J101&part=newsletter&WantType=Journals&title=ACM%20SIGCOMM%20Computer%20Communication%20Review&CFID=15151515&CFTOKEN=6184618> [accessed 20 June 2009].

Crawford, S. (2007), 'Network Rules', *Law and Contemporary Problems*, 70: 51–90.

Croxford, I. and Marsden, C.T. (2001 updated second edition 2002), I Want My WiFi: WLAN Standards and Regulation in Europe at <http://www.3gnewsroom.com/html/whitepapers/I_want_my_Wi-Fi.zip> [accessed 20 June 2009].

Currie, D. (2002), *Westminster Media Forum Speech*, 5 December, London: Ofcom, at <http://ofcom.org.uk/media/speeches/2002/12/currie_20021205> [accessed 20 June 2009].

Currie, D. (2005), Speech 21 September 2005, London: Ofcom, available at <http://www.ofcom.org.uk/media/speeches/2005/09/liverpool_conf> [accessed 20 June 2009].

Curwen, P. (2000), 'Next Generation Mobile: 2.5G or 3G'? INFO 2(5): 455–476.

Curwen, P. (2006), 'Fixed-Mobile Convergence', INFO 8(3): 8–11.

Dacko, S. and Hart, M. (2005), 'Critically Examining Theory and Practice: Implications for Coregulation and Coregulating Broadcast Advertising in the United Kingdom', *International Journal on Media Management*, 7(1&2): 2–15.

Danay, R.J. (2005), 'Copyright vs. Free Expression: The Case of Peer-to-Peer File-Sharing of Music in the United Kingdom', *International Journal of Communications Law & Policy*, at <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=847905> [accessed 20 June 2009].

David, P. (2000), 'Understanding Digital Technology's Evolution and the Path of Measured Productivity Growth: Present and Future in the Mirror of the Past, Chapter 4', in Brynjolfsson, E. *Understanding the Digital Economy: Data, Tools and Research*, Cambridge MA: MIT Press, 49–97.

Davies, S. and Banks, K. (eds) (2003), Silenced: an international report on censorship and control of the Internet, by Privacy International and the GreenNet Educational Trust, September 2003, at <www.privacyinternational.org/survey/censorship> [accessed 20 June 2009].

DB Research (2003), Digital Economy Research No.35 Germany's Broadband Networks – Innovation on Hold, at <http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000052187.pdf> [accessed 20 June 2009].

DB Research (2005, December 5), Promote Broadband – Prevent Lex Monopolium!, at <http://www.dbresearch.com/servlet/reweb2.ReWEB?rwkey=u3115698> [accessed 20 June 2009].

De Beer, J. (2009), Net Neutrality in the Great White North (and its impact on Canadian culture), *Telecommunications Journal of Australia,* 59(2) (July): 24.1–24.19.

De Beer, J. and Clemmer, C., 'Global Trends in Online Copyright Enforcement: The Role of Online Intermediaries. Working Paper, Unpublished, 2009.

Deborah, H. and Keller, J.H. (eds), (1999), *The First 100 Feet, Options for Internet and Broadband Access*, Cambridge MA: MIT Press.

De Sola Pool, I. (1983), *Technologies of Freedom*, Cambridge MA: Belknap.

Decision 89/205/EEC in Case IV/31.851 – Magill TV Guide/ITP, BBC and RTEOJ L 78, 21.3.1989, p. 43, Brussels: EC.

Decision No 1151/2003/EC of the European Parliament and of the Council of 16 June 2003 OJ L 162, 1.7.2003, Brussels: EC.

Decision No 276/1999/EC of the European Parliament and of the Council of 25 January 1999 adopting a Multiannual Community Action Plan on promoting safer use of the Internet and new online technologies by combating illegal and harmful content primarily in the area of the protection of children and minors OJ L 33, 6.2.1999, p. 1 as amended by Decision No 1151/2003/EC of the European Parliament and of the Council of 16 June 2003 OJ L 162, 1.7.2003, Brussels: EC.

Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a Regulatory Framework for Radio Spectrum Policy in the European Community ("Radio Spectrum Decision"); OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm> [accessed 20 June 2009].

Deibert, R.J. Palfrey, J.G. Rohozinski, R. and Zittrain, Jonathan (eds) (2008), *Access Denied: The Practice and Policy of Global Internet Filtering*, Cambridge MA: MIT Press.

Department of Business Innovation and Skills (2009), Consultation On Legislation To Address Illicit Peer-To-Peer (P2P) File-Sharing, 16 June, at <http://www.berr.gov.uk/files/file51703.pdf> [accessed 20 June 2009].

Department for Culture Media and Sport (2009), Digital Britain: The Final Report – 16 June 2009, Chapter 4: Creative Industries in the Digital World, at <http://www.dcms.gov.uk/images/publications/chpt4_digitalbritain-finalreport-jun09.pdf> [accessed 20 June 2009].

Directive 2002/19/EC of the European Parliament and of the Council on Access to, and Interconnection of, Electronic Communications Networks and Associated Facilities (Access Directive), OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm.> [accessed 20 June 2009].

Directive 2002/20/EC of the European Parliament and of the Council on the Authorisation of Electronic Communications Networks and Services, (Authorisation Directive), OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm> [accessed 20 June 2009].

Directive 2002/21/EC of the European Parliament and of the Council on a Common Regulatory Framework for Electronic Communications Networks and Services, (Framework Directive), OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm> [accessed 20 June 2009].

Directive 2002/22/EC of the European Parliament and of the Council on Universal Service and Users' Rights Relating to Electronic Communications Networks and Services (Universal Service Directive), OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm> [accessed 20 June 2009].

Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector (Directive on privacy and electronic communications), OJ L 108, 24th April, Brussels: EC at <http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm> [accessed 20 June 2009].

Directive 2007/65/EC (AVMS Directive) of the European Parliament and of the Council of 11 December 2007 Amending Council Directive 89/552/EEC on the Coordination of Certain Provisions Laid Down by Law, Regulation or Administrative Action in Member States concerning the pursuit of television

broadcasting activities OJ L332, Brussels: EC 18.12.2007, at <http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l_332/l_33220071218en00270045.pdf> [accessed 20 June 2009].

Directive 89/552/EEC of 3 October 1989 On the Coordination of Certain Provisions Laid Down by Law, Regulation or Administrative Action in Member States Concerning the Pursuit of Television Broadcasting Activities, Brussels: EC, at <http://europa.eu.int/eur-lex/en/consleg/main/1989/en_1989L0552_index.html (consolidated version with text of EC/97/33)> [accessed 20 June 2009].

Directive 96/19/EEC, full competition in telecommunications markets, OJ L 74/13, Brussels: EC.

Directive 98/34 /EC laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services as amended by Directive 98/48/EC, Brussels: EC.

Doctorow, C. (2009), We Must Ensure ISPs Don't Stop the Next Google Getting Out of the Garage, 19 May The Guardian, at <http://www.guardian.co.uk/technology/2009/may/19/we-must-ensure-google-garage> [accessed 20 June 2009].

Dornseif, M. (2003), Government Mandated Blocking of Foreign Web Content, in J. von Knop, W. Haverkamp and E. Jessen (eds), *Security,E-Learning,E-Services: Proceedings of the 17th DFN-Arbeitstagung Uber Kommunikationsnetze*, Dusseldorf 2003, ISBN 3-88579-373-3, Lecture Notes in Informatics. ISSN 1617-5468, 617—648, at <http://arxiv.org/pdf/cs.CY/0404005> [accessed 20 June 2009].

Drucker, P.F. (1997), The Global Economy and the Nation-State. *Foreign Affairs*, 76(5): 159.

Dunstone, C. (2006), Carphone Warehouse/TalkTalk CEO, at the 2006 Ofcom Conference: <http://www.ofcom.org.uk/event/2006conference/presentations/session3> [accessed 20 June 2009].

Easton, D. (1965), *A Systems Analysis of Political Life*, New York: Wiley & Sons.

EC (2009), 14th Annual Implementation Report, Appendix: United Kingdom, Brussels: EC, at <http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/14threport/uk.pdf> [accessed 20 June 2009].

Economides, N. (2007), Net Neutrality, Non-Discrimination and Digital Distribution of Content Through the Internet. Working Paper, Networks, Electronic Commerce, and Telecommunications Institute, New York: NYU Center for Law and Economics.

Economides, N. (2008), 'Net Neutrality,' Non-Discrimination and Digital Distribution of Content through the Internet', *A Journal of Law and Policy for the Information Society*, 4(2): 209–233.

Economides, N. and Tåg, J. (2007), *Net Neutrality on the Internet: A Two-Sided Market Analysis*. Working Paper, NYU Center for Law and Economics, New York: NYU Center for Law and Economics.

Economist (2009), Priming the Pipe: The Boom in Mobile Broadband, 5 March, at <http://www.economist.com/displayStory.cfm?story_id=13234973&mode=comment&intent=readBottom> [accessed 20 June 2009].

Economist (2009), What's Mine is Yours, 30 May at 84.

ECTA (2005a), Broadband Scorecard Q4, ECTA: Brussels, at <http://www.ectaportal.com/uploads/BroadbandScorecardQ42004.pdf> [accessed 20 June 2009].

ECTA (2005b), Comments on the DG Information Society's Issues Papers for the Liverpool Audiovisual Conference, at <http://www.europa.eu.int/comm/avpolicy/revision-tvwf2005/docs/ip1-3-4-5-ecta.pdf> [accessed 20 June 2009].

ECTA (2006), Regulatory Scorecard Q3, Brussels: ECTA, at <http://www.ectaportal.com/en/upload/File/Broadband%20Scorecards/Q306/FINALBBScQ306.xls> [accessed 20 June 2009].

EDRi-gram (2008), French Law On 'Graduate Response' Opposed by ISOC Europe (10.09.2008) <http://www.edri.org/edrigram/number6.17/3strikes-opposed-isoc-europe> [accessed 20 June 2009].

Edwards, L. (2008), *IWF v. Wikipedia and the Rest of the World* (except OUT-LAW) 15 December at <http://blogscript.blogspot.com/2008/12/iwf-v-wikipedia-and-rest-of-world.html> [accessed 20 June 2009].

Edwards, L. and Brown, I. (2009), 'Data Control and Social Networking: Irreconcilable Ideas?', in A. Matwyshyn (ed), *Harboring Data: Information Security, Law And The Corporation*, Stanford, CA: Stanford University Press. at SSRN: <http://ssrn.com/abstract=1148732> [accessed 20 June 2009].

Einhorn, M. (2004), *Media, Technology, and Copyright: Integrating Law and Economics*, Cheltenham: Edward Elgar.

Elkin-Koren, N. (1995), 'Copyright Law and Social Dialogue on the Information Superhighway: The Case Against Copyright Liability of Bulletin Board Operators', *CARDOZO ARTS & ENT. L.J.*, 13(345): 399–410.

Enck, J. (2006, March 13), What's the Dutch for 'My Pipes'? at <http://eurotelcoblog.blogspot.com/2006/03/whats-dutch-for-my-pipes-mega-handful.html> [accessed 20 June 2009].

Encyclopædia Britannica (2009), 30 May. 2009, 'Common Carrier', at <http://www.britannica.com/EBchecked/topic/128177/common-carrier> [accessed 20 June 2009].

EU Network of Independent Experts on Fundamental Rights (2005), 'Combating Racism and Xenophobia through Criminal Legislation: The Situation in the EU Member States', Opinion No. 5-2005, 28 November, Brussels: EC.

European Commission (1996), Green Paper on the protection of minors and human dignity in audiovisual and information services on 16 October 1996, Brussels: EC.

European Commission (2006a), *Definitions in the Proposal for an Audiovisual Media Services Directive*, Brussels: EC, February.

European Commission (2006b), *Staff Working Document*, 28 June, Brussels: EC, at <http://ec.europa.eu/comm/avpolicy/reg/tvwf/modernisation/consultation_2005/index_en.htm, at section 6.4, Net Neutrality> [accessed 20 June 2009].

European Commission (2007), 14 November, Proposal for a Directive of the European Parliament and of the Council Amending Directive 2002/22/EC on Universal Service and Users' Rights Relating to Electronic Communications Networks, Directive 2002/58/EC Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector and Regulation (EC) No 2006/2004 on Consumer Protection Cooperation, Brussels: EC, at <http://www.ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/dir_citizens_rights_en.pdf> [accessed 20 June 2009].

European Commission (2009), 14th Annual Implementation Report, Appendix: United Kingdom at p8 <http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/14threport/uk.pdf> [accessed 20 June 2009].

European Convention on Human Rights and Fundamental Freedoms (1950), Strasbourg: COE.

European Foundation for the Improvement of Living and Working Conditions (2005), EMCC Case Studies: Industrial Change in the Telecommunications Sector: FastWeb, at <http://www.emcc.eurofound.eu.int/publications/2005/ef0567enC5.pdf#search=%22fastweb%20milano%22> [accessed 20 June 2009].

European Parliament (2001), Final Report on the Existence of a Global System for the Interception of Private and Commercial Communications (ECHELON Interception System), Temporary Committee on the ECHELON Interception System, approved September 5, 2001, Brussels: EP, at <http://www.fas.org/irp/program/process/rapport_echelon_en.pdf> [accessed 20 June 2009].

European Parliament (2009a), Legislative Resolution of 6 May 2009 on the Council Common Position for Adopting a Regulation of the European Parliament and of the Council establishing the Group of European Regulators in Telecoms (GERT), Brussels: EP, 16498/1/2008 – C6-0067/2009 – 2007/0249(COD), at <http://www.europarl.europa.eu/oeil/FindByProcnum.do?lang=en&procnum=COD/2007/0249> [accessed 20 June 2009].

European Parliament (2009b), No Agreement on Reform of Telecom Legislation: Information Society 06-05-2009 – 16:01 REF.: 20090505IPR55085, at <http://www.europarl.europa.eu/news/expert/infopress_page/058-55086-124-05-19-909-20090505IPR55085-04-05-2009-2009-true/default_en.htm> [accessed 20 June 2009].

European Regulators Group (2007a), ERG Consultation Document on Regulatory Principles of NGA (07) 16, at <http://www.erg.eu.int/doc/publications/consult_regprinc_nga/erg_cons_doc_on_reg_princ_of_nga.pdf> [accessed 20 June 2009].

European Regulators Group (2007b), Working Programme for 2007 07(01), at <http://erg.eu.int/doc/work_progr_2007/erg_07_01_work_programme_2007.pdf> at p7 [accessed 20 June 2009].

European Telecommunications Platform (2006), (01) On the Technology, Business Models and Regulatory Aspects of NGN <http://www.etp-online.org/downloads/06_01_ETP%20public%20NGN%20final.pdf> [accessed 20 June 2009].

Evans, P. (2006), Beyond Startup: The Shifting Focus of Innovation, Presentation to Harvard Ruschlikon conference, June 12.

Evans, P. and Wuerster, T. (1999), *Blown to Bits*, Cambridge MA: Harvard Business School Press.

Fallenböck, M. (2003), 'On the Technical Protection of Copyright: The Digital Millennium Copyright Act, the European Community Copyright Directive and their Anticircumvention Provisions', *International Journal of Communications Law and Policy*, (7), at <http://www.ijclp.org/7_2003/ijclp_webdoc_4_7_2003.htm> [accessed 20 June 2009].

Faratin, P. Clark, D.D. Bauer, S. Lehr, W. Gilmore, P.W. and Berger, A. (2008), 'The Growing Complexity of Internet Interconnection', *Communications & Strategies*, (72): 51, 4th Quarter at SSRN: <http://ssrn.com/abstract=1374285> [accessed 20 June 2009].

Farrell, J. and Weiser, P. (2003), 'Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age', *Harvard Journal of Law and Technology*, 17(1): 85–134.

Federal Communications Commission (2002), Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities, Declaratory Ruling, Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; 17 FCC Rcd 4798.

Federal Communications Commission (2005a), Wireline Broadband Order; Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, 20 FCC Rcd 2533 ("Triennial Review Remand Order").

Federal Communications Commission (2005b), 31 October FCC APPROVES SBC/AT&T AND VERIZON/MCI MERGERS, at <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261936A1.pdf> [accessed 20 June 2009].

Federal Communications Commission (2005c), Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, CC Docket No. 02-33, 20 FCC Rcd 14986 (Internet Policy Statement) at <http://www.publicknowledge.org/pdf/FCC-05-151A1.pdf> [accessed 20 June 2009].

Federal Communications Commission (2005d), Wireline Broadband Order; Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, 20 FCC Rcd 2533 (Triennial Review Remand Order).

Federal Communications Commission (2008), Formal Complaint of Free Press and Public Knowledge Against Comcast Corp. for Secretly Degrading Peer-to-Peer Applications; Broadband Industry Practices; Petition of Free Press et al. for Declaratory Ruling that Degrading an Internet Application Violates the FCC's Internet Policy Statement and Does Not Meet an Exception for 'Reasonable Network Management' Memorandum Opinion and Order, 23 FCC Rcd 13028 ('ComcastOrder').

Federal Communications Commission (2009), Report on a Rural Broadband Strategy, 22 May, at <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf> [accessed 20 June 2009].

Federal Networking Council (1995), October 24: Resolution of the U.S. Federal Networking Council.

Federal Trade Commission (2009), FTC Shuts Down Notorious Rogue Internet Service Provider, 3FN Service Specializes in Hosting Spam-Spewing Botnets, Phishing Web sites, Child Pornography, and Other Illegal, Malicious Web Content, For Release: 06/04/2009, at <http://www.ftc.gov/opa/2009/06/3fn.shtm> [accessed 20 June 2009].

Federal Trade Commission v. Pricewert LLC (2009), also d/b/a 3FN.net, Triple Fiber Network, APS Communications, and APS Communication. (United States District Court Northern District of California San Jose Division) Civil Action No. 09-CV-2407, FTC File No. 092 3148> [accessed 20 June 2009].

Feintuck, M. (2003), 'Walking the High-Wire: The UK's Draft Communications Bill', *European Public Law*, 9(1): 105–124.

Feintuck, M. and Varney, C. (2006), *Media Regulation, Public Interest and the Law*, 2nd ed., Edinburgh: Edinburgh University Press.

Felten, E. (2006), Nuts and Bolts of Net Neutrality, 11 July, at <http://itpolicy.princeton.edu/pub/neutrality.pdf> [accessed 20 June 2009].

Fenwick, H. and Phillipson, G. (2006), *Media Freedom Under the Human Rights Act*, Oxford: Oxford University Press.

Financial Times Tech Blog (2008), UK Culture Minister 'Kidnapped' in Online Protest at Net Ratings Plan, 29 December, at <http://blogs.ft.com/techblog/2008/12/uk-culture-minister-kidnapped-in-online-protest-at-net-ratings-plan/> [accessed 20 June 2009].

Forfás (2005), *Broadband Benchmarking Study*, November 2005, Dublin: Forfas.

Forge, S. (2004), 'Is Fourth Generation Mobile Nirvana, Or... Nothing?', *Info*, 6(1): 12–23.

Foster, R. (2007), Future Broadcasting Regulation – An independent report by Robin Foster commissioned by the Department for Culture, Media and Sport, January, at <www.culture.gov.uk>, at section7.4.23, at p82 [accessed 20 June 2009].

Foundation for Information Policy Research (2008), Continuing Concerns about Phorm, 6 April, at <http://www.fipr.org/press/080406phorm.html> [accessed 20 June 2009].

Framework Convention for the Protection of National Minorities of 1 February 1995.

Free Press, et al. v. Comcast (2008), FCC 08-183 (Federal Communications Commission, 08 20, 2008), <http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-183A1.pdf> [accessed 20 June 2009].

Frieden, R. (2006), Internet 3.0: Identifying Problems and Solutions to the Network Neutrality Debate, <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=962181> and 1 INT'L J. OF COMM., 461 at <http://ijoc.org/ojs/index.php/ijoc/article/view/160/86> [accessed 20 June 2009].

Frieden, R. (2007a), Keeping the Internet Neutral? A Response to the Wu-Yoo Debate, 59 FED. COMM. L. J., Forum at <http://www.law.indiana.edu/fclj/pubs/forum/Frieden_v59i3_forum.pdf> [accessed 20 June 2009].

Frieden, R. (2007b), Neither Fish Nor Fowl: New Strategies for Selective Regulation of Information Services, paper presented to the 35th Telecommunications Policy Research Conference Arlington, VA, 28–29 September, 2007.

Frieden, R. (2007c), 'Network Neutrality or Bias? Handicapping the Odds for a Tiered and Branded Internet', *HASTINGS COMM. & ENT. L. J.*, 29(2): 171–216.

Frieden, R. (2008a), 'A Primer on Network Neutrality', *INTERECON. REV. OF EUR. ECON. POL'Y.*, 43(1, 4): (Jan./Feb).

Frieden, R. (2008b), 'Internet Packet Sniffing and Its Impact on the Network Neutrality Debate and the Balance of Power Between Intellectual Property Creators and Consumers', *Fordham Intel Prop. Media & Ent. L. J.*, 18(3): 633; draft available at <http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=102928> [accessed 20 June 2009].

Frigo, N.J. Iannone, P.P. Reichmann, K.C. (2004), 'A view of fiber to the home economics, IEEE Communications Magazine', 42(8): S16–S23.

Frischmann, B. and van Schewick, B. (2007), 'Yoo's Frame and What It Ignores: Network Neutrality and the Economics of an Information Superhighway', *JURIMETRICS J.*, 47: 383.

Frydman, B. and Rorive, I. (2002), Regulating Internet Content Through Intermediaries in Europe and the USA, Zeitschrift fur Rechtssoziologie Bd.23/H1, July 2002, Lucius et Lucius.

Frydman, B., Hennebel, L. and Lewkowicz, G. (2008), 'Public Strategies for Internet Co-Regulation in the United States, Europe and China(October 11)', in E. Brousseau M. Marzouki and C. Meadel (eds), (2009 forthcoming) *Governance, Regulations And Powers On The Internet*, Cambridge: Cambridge University Press. Available at SSRN: <http://ssrn.com/abstract=1282826> [accessed 20 June 2009].

Geradin, D. and O'Donoghue, R. (2005), The Concurrent Application of Competition Law and Regulation: The Case of Margin Squeeze Abuses in the Telecommunications Sector, GCLC Working Paper 04/05, College of Europe, Bruges.

Gibbons T. (2005), 'Competition Policy and Regulatory Style – Issues for OFCOM', *INFO*, 7(5): 42–51.

Gibbons, T. (1998), *Regulating the Media*, 2nd edn, London: Sweet & Maxwell.

Gibbons, T. (2000), 'Pluralism, Guidance and the New Media', in C.T. Marsden (ed.), *Regulating the Global Information Society*, Routledge London, 304–315.

Gibbons, T. (2009), 'The 'Future-proof' Communications Bill: Thinking Afresh', *Computers and Law*, 19(6) February/March, at <http://www.scl.org/site.aspx?i=is10631> [accessed 20 June 2009].

Gifford, D.J. and McGowan, D. (1999), A Microsoft Dialog, 44 Antitrust Bull 619.

Gilder, G. and Swanson, B. (2008), The Impact of Video and Rich Media on the Internet – A 'zettabyte' by 2015? Discovery Institute, at <http://www.discovery.org/scripts/viewDB/index.php?command=view&id=4444&program=Technology%20and%20Democracy%20-%20News> [accessed 20 June 2009].

Gillett, S.E. and Kapor, M. (1996), 'The Self-Governing Internet: Coordination by Design', in Kahin, B. and Keller, J.H. (eds), *Coordinating the Internet*, Cambridge MA: MIT Press.

Global Internet Statistics (undated), <http://www.glreach.com/globstats/index.php3> [accessed 20 June 2009].

Goldsmith, J. and Wu, T. (2006), *Who Controls the Internet? Illusions of a Borderless World*, Oxford: Oxford University Press.

Goldstein, F.R. (2005), *The Great Telecom Meltdown*, Norwood MA: Artech House Publishers.

Gordon, R.J. (2003), Exploding Productivity Growth: Context, Causes and Implications, Brookings Papers on Economic Activity 2 p 252, at <http://faculty-web.at.northwestern.edu/economics/gordon/Productivity-Brookings.pdf> [accessed 20 June 2009].

Goth, G. (2007), 'Opening the Mobile Net', *IEEE Distributed Systems Online*, 8(11):, art. no. 0711-o3y004.

Government of the Kingdom of the Netherlands (2003), *The Broadband Paper: A Question of Pace and Better Utilisation*, Den Haag: Ministry of Economic Affairs.

Grant, M. (2008), Analysys Masons: Global Drivers for an Open Mobile Ecosystem, Open Mobile Summit, San Francisco, at <http://www.openmobilesummit.com/pastevent/OM-d11230-MikeGrant.pdf> [accessed 20 June 2009].

Grindley, P. Salant, D. and Waverman, L. (1999), 'Standards Wars: The Use of Standard Setting as a Means of Facilitating Cartels: Third Generation Wireless Telecommunications Standard Setting', *International Journal of Comms Law & Policy*, 3: at <http://www.ijclp.net/ijclp_web-doc_2-3-1999.html> [accessed 20 June 2009].

GSM Association (undated), <http://www.gsmworld.com/news/statistics/index.shtml> [accessed 20 June 2009].

Guardian, T. (2009), 'Make the Unfiltered Web Illegal', Says Children's Coalition, 15 June, at <http://www.guardian.co.uk/technology/blog/2009/jun/15/internet-file-sharing> [accessed 20 June 2009].

Hafner, K. and Lyon, M. (1996), *Where Wizards Stay Up Late*, Washington D.C.: Free Press.

Hahn, R.W. and Litan, R.E. (2006), The Myth of Network Neutrality and What We Should Do About It, AEI-Brookings Joint Center for Regulatory Studies Working Paper No. RP06-33, 2006, Washington, D.C.: AEI Brookings Joint Center for Regulatory Studies.

Hahn, R. and Wallsten, S. (2006), *The Economics of Net Neutrality*, Washington, D.C.: AEI Brookings Joint Center for Regulatory Studies:, at <www.aei-brookings.org/publications/abstract.php?pid=1067> [accessed 20 June 2009].

Harbour, M. (2009), Internet has to be free, but not regulation free (5.05.2009), at <http://www.europarl.europa.eu/elections2009/welcome/headlines.htm> [accessed 20 June 2009].

Hardy, T. (1994), 'The Proper Legal Regime for "Cyberspace"', 55 U. PITT. L. REV., 993:1042–1046.

Harrison, J. and Woods, L. (2001), 'Defining European Public Service Broadcasting', *European Journal of Communication*, 16(4): 477–504.

Harrison, J. and Woods, L. (2007), *European Broadcasting Law and Policy*, Cambridge: Cambridge University Press.

Hass, D.A. (2008), 'The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates', *Berkeley Technology Law Journal*, 22: 1563; Indiana Legal Studies Research Paper No. 82. Available at SSRN: <http://ssrn.com/abstract=957373> [accessed 20 June 2009].

Hazlett, T.W. (1997), 'Physical scarcity, rent seeking, and the First Amendment', *Columbia Law Review*, 97(4): 905–944.

Hazlett, T. W. and Bittlingmayer, G. (2001), *The Political Economy of Cable 'Open Access'*, Washington D.C.: AEI-Brookings Joint Center Working Paper No. 01-06, Brookings Institute, at SSRN: <http://ssrn.com/abstract=286652.> [accessed 20 June 2009].

Hazlett, T.W. and Caliskan, A. (2008), Natural Experiments in U.S. Broadband Regulation, George Mason Law & Economics Research Paper No. 08-04 at SSRN: <http://ssrn.com/abstract=1093393> [accessed 20 June 2009].

Held, T. and Scheuer, A. (2006), *Final Report: Study on Co-Regulation Measures in the Media Sector; Study for the European Commission, Directorate Information Society and Media Unit A1 Audiovisual and Media Policies*, Hamburg: Hans Bredow Institute.

Heronymi, R. (2006), Working Paper on AVMS Definitions, Brussels: EP, at <http://www.europarl.europa.eu/meetdocs/2004_2009/documents/dt/618/618091/618091en.pdf> [accessed 20 June 2009].

Holznagel, B. (1999), 'New Challenges: Convergence of Markets, Divergence of Laws?' *International Journal of Communications Law and Policy*, Issue 2 at: <http://www.ijclp.org/2_1999/pdf/ijclp_webdoc_5_2_1999.pdf> [accessed 20 June 2009].

Holznagel, B. (2000), 'Responsibility for Harmful and Illegal Content as Well as Free Speech on the Internet in the United States of America and Germany', in C. Engel and H. Keller (eds), *Governance of Global Networks in Light of Differing Local Values*, Baden Baden: Nomos.

Horlings, E., Botterman, M., Cave, J., Ligtvoet, A. and de Vries, J. (2002), Accelerated Broadband Roll-Out for the Netherlands: A Review of Economic Benefits, Directoraat Generaal Telecommunicatie en Post (MR-1654-NDGTP; September. Santa Monica: RAND.

Horlings, E., Marsden, C., Van Oranje, C. and Botterman, M. (2006), Contribution to Impact Assessment of the revision of the Television without Frontiers Directive, TR-334-EC DG, submitted 1 November 2005, published February 2006, Report Prepared for DG Information Society and Media of the European Commission, RAND Europe at <http://www.europa.eu.int/comm/dgs/information_society/evaluation/studies/> [accessed 20 June 2009].

House of Commons (2004), Development of The UK Market For Beer, 1989–2004, Select Committee on Trade and Industry Second Report, HC (Session 2004–05) HC 128-I, London: The Stationery Office Limited, S.2, at <http://www.publications.parliament.uk/pa/cm200405/cmselect/cmtrdind/128/12805.htm> [accessed 20 June 2009].

House of Commons (2008), Minutes of Evidence Taken Before Culture, Media and Sport Committee HC 353-iii 18 March 2008.

House of Commons (2008), Report: Harmful Content on the Internet and in Video Games, HC 353-I.

House of Commons (2009), Pub Companies, Business and Enterprise Committee Seventh Report of Session 2008–09, Volume I HC 26-I [Incorporating HC 1183-i, Session 2007-08] Published on 13 May 2009, London: The Stationery Office Limited, at <http://www.publications.parliament.uk/pa/cm200809/cmselect/cmberr/26/26i.pdf> [accessed 20 June 2009].

Hugenholtz, B. (2002), 'Copyright and Freedom of Expression in Europe', in N. Elkin-Koren and N.W. Netanel (eds), *The Commodification of Information*, Information Law Series, Vol. 11, Kluwer Law International, pp. 239–263.

Lisa, H.-J. (2009), <www.companiesandmarkets.com>: Japan – Telecoms, Mobile and Broadband Apr 13, 2009 (M2 PRESSWIRE via COMTEX) February <http://www.tmcnet.com/usubmit/2009/04/14/4129729.htm***> [accessed 20 June 2009].

Humphreys, P. (1996), *Mass Media and Media Policy in Western Europe*, Manchester: Manchester University Press.

i2010 High Level Group (2006), The challenges of convergence: draft discussion paper, at <http://ec.europa.eu/information_society/eeurope/i2010/i2010_high_level_group/index_en.htm> [accessed 20 June 2009].

Ibáñez Colomo, P. (2009), Ofcom's Proposal to Regulate Access to Premium Television Content: Some Thoughts, paper presented to TILEC Media Workshop on Competition Policy and Regulation in Media Markets: Bridging Law and Economics, 4–5 June.

ICSTIS (2005), Memorandum of Understanding of August 2005 between Ofcom and premium rate co-regulator ICSTIS, at <http://www.icstis.org.uk/pdfs_news/OfcomICSTISMoU05.pdf> [accessed 20 June 2009].

IETF (2006), MPLS Charter, at <http://www.ietf.org/html.charters/mpls-charter.html> [accessed 20 June 2009].

Impact Assessment (2007), Commission Staff Working Document Impact Assessment Accompanying document to the Commission proposal for a Directive of the European Parliament and the Council amending European Parliament and Council Directives 2002/19/EC, 2002/20/EC and 202/21/EC Commission proposal for a Directive of the European Parliament and the Council amending European Parliament and Council Directives 2002/22/EC and 2002/58/EC Commission proposal for a Regulation of the European Parliament and the Council establishing the European Electronic Communications Markets Authority {COM(2007)697, COM(2007)698, COM(2007)699, SEC(2007)1473}, at <http://www.ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/ia_en.pdf> [accessed 20 June 2009].

Ingram, P. (2006), Should Regulators be concerned with Net Neutrality? Communications Research Networks (CRN) Workshop, 14 December, at <http://www.ofcom.org.uk/media/speeches/2006/12/ and <http://www.cambridge-mit.org/object/download/1733/doc/Ingram%20P.pdf> [accessed 20 June 2009].

In re *State of New York et al. v. Microsoft Corporation*, Civil Action No. 98-1233 (CKK) Memorandum Opinion with Findings of Fact and Final Judgment of 1 November 2002.

In re *United States of America v. Microsoft Corporation*, Civil Action No. 98-1233 (CKK). United States District Court for the District of Columbia, Memorandum Opinion with Findings of Fact and Final Judgment of 1 November 2002.

International Covenant on Civil and Political Rights of 16 December 1966.

International Telecommunication Union (2006), What Rules for IP-enabled NGN? ITU: Geneva, March 23–24 Workshop available at: <http://www.itu.int/osg/spu/ngn/event-march-2006.phtml> [accessed 20 June 2009].

International Telecommunication Union (2009), *The ICT Development Index*, at <http://www.itu.int/ITU-D/ict/publications/idi/2009/index.html Geneva: ITU.> [accessed 20 June 2009].

Internet Governance Forum (2008), Co-Hosted Workshop 'Network Neutrality – Examining The Issues And Implications For Development', 4 December 2008, at <http://techpolicyinstitute.org/events/show/77.html and <http://www.intgovforum.org/cms/index.php/2008-igf-hyderabad/event-reports/72-workshops/370-workshop-58-network-neutrality-examining-the-issues-and-implications-for-development> [accessed 20 June 2009].

Internet Governance Forum (2009), Programme, Format and Schedule for the 2009 Meeting, Revision of 4 June 2009, at <http://www.intgovforum.org/cms/2009/postings/ProgrammePaper.04.06.2009.rtf> [accessed 20 June 2009].

Internet Platform for Innovation Act (2006), suggested wording, at <http://www.dpsproject.com/legislation.html> [accessed 20 June 2009].

Internet Watch Foundation (2002), Memorandum submitted to the Joint Committee on the Draft Communications Bill, 06.06.02 available: <http://www.iwf.org.uk/government/page.54.150.htm#Top> [accessed 20 June 2009].

IP/00/373 (2000), Commission clears merger between Vodafone Airtouch and Mannesmann AG with conditions, 12.4.2000, Brussels: EC.

IP/01/569 (2001), Microsoft agrees not to influence technology decisions of European digital cable operators, 18 April Brussels: EC, at <http://europa.eu.int/rapid/start/cgi/guesten.ksh> [accessed 20 June 2009].

IP/08/1661 (2008), Telecoms Reform: Commission presents new legislative texts to pave the way for compromise between Parliament and Council Reference, Brussels: EC, 7 November.

IP/09/570 (2009), Telecoms: Commission launches case against UK over privacy and personal data protection, Brussels: EC, 14 April, at <http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/infringements/ip09_570_en.pdf> [accessed 20 June 2009].

IP/09/710 (2009), Telecoms: Commission acts on termination rates to boost competition, 7 May Brussels: EC, at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/710&format=HTML&aged=0&language=EN&guiLanguage=en> [accessed 20 June 2009].

IP/98/213 (1998), Commission to Carry Out Detailed Inquiry into Proposed Merger between WorldCom and MCI, *4.3.1998*, Brussels: EC.

IP/98/639 (1998), Commission clears WorldCom and MCI merger subject to conditions 8.7.1998, Brussels: EC.

IP/98/707 (1998), Mobile Interconnect proceeding 27.7.1998, Brussels: EC.

IP/99/298 (1999), Commission successfully closes investigation into mobile and fixed telephony prices following significant reductions throughout the EU, 4.5.1999, Brussels: EC.

IP/99/413 (1999), Commission press release Telia/Telenor 13.10.1999, Brussels: EC.

IPSphere (2006), 'Creating a Commercially Sustainable Framework for IP Services Realizing Next Generation Revenues', IPsphere Forum Work Program Committee Version 1b.0, May, at: <http://www.ipsphereforum.org/home/IPsphere_CommercialPrimerExec050806.pdf> [accessed 20 June 2009].

IPTegrity (2009, various), at <http://www.iptegrity.com/index.php?option=com_content&task=view&id=328&Itemid=9> [accessed 20 June 2009].

ISPA (2007), UK Code of Practice Statement of Policy, as amended 2007, at <http://www.ispa.org.uk/about_us/page_16.html> [accessed 20 June 2009].

ITU (2009), The ICT Development Index, at <http://www.itu.int/ITU-D/ict/publications/idi/2009/index.html> [accessed 20 June 2009].

ITU Internet Reports (2005), The Internet of Things, ITU: Geneva, at <http://www.itu.int/osg/spu/publications/internetofthings/> [accessed 20 June 2009].

Jauk, W. (1999), 'The Application of EC Competition Rules to Telecommunications – Selected Aspects: The Case of Interconnection', *International Journal of Communications Law and Policy*, Issue 4 1999/2000, 57.

Kahn, R.E. and Cerf, V.G. (1999), What Is The Internet (And What Makes It Work) Internet Policy Institute, Washington D.C., at <http://www.internetpolicy.org/briefing/12_99.html> [accessed 20 June 2009].

Kalathil, S. and Boas, T.C. (2003), Open Networks, Closed Regimes: The Impact of the internet on Authoritarian Rule, Carnegie Endowment for International Peace, Washington DC.

Kaplinsky, R. and Morris, M. (2001). A Handbook for Value Chain Research, at: <http://www.ids.ac.uk/ids/global/pdfs/VchNov01.pdf; [accessed 20 June 2009].

Karagiannis, T., Rodriguez, P. and Papagiannaki, D. (2005), *Should Internet Service Providers Fear Peer-Assisted Content Distribution*? Berkeley, CA, USA: Internet Measurement Conference (IMC).

Karpinski, R. (2009), Comcast's Congestion Catch-22, Jan 23, at <http://telephonyonline.com/residential_services/news/comcast-congestion-0123/index1.html> [accessed 20 June 2009].

Katagiri, Y. (2006), Japanese interconnection policy on NGN, at <http://www.oecd.org/dataoecd/6/52/37503176.pdf> [accessed 20 June 2009].

Katz, M. and Shapiro, C. (1986), 'Technology Adoption in the Presence of Network Externalities', *Journal of Political Economy,* 94(4): 822–841.

Kelly, F. (2003), Fairness and stability of end-to-end congestion control, paper prepared for a plenary address to the European Control Conference, Cambridge, September 2003, version corrected from European Journal of Control 2003; 9: 159–176, at <http://www.statslab.cam.ac.uk/~frank/PAPERS/fse2ecc.pdf> [accessed 20 June 2009].

Kende, M. (2007), Which party pays: the impact on mobile markets, 1 August, AnalysysMasons, at <http://www.analysysmason.com/About-Us/News/Newsletter/Previous-news-articles/Which-party-pays-the-impact-on-mobile-markets/> [accessed 20 June 2009].

Kerry, J. (2009), Kerry, Wicker, Dorgan, Klobuchar Call for Increased Choice for Wireless Consumers, Letter to FCC 15 June, at <http://kerry.senate.gov/cfm/record.cfm?id=314462> [accessed 20 June 2009].

Kocsis V. and d. Bijl, P.W.J. (2007), 'Network Neutrality and the Nature of Competition between Network Operators', *International Economics and Economic Policy*, 4(2): 159–184.> [accessed 20 June 2009].

Kogut, B. (ed), (2003), *The Global Internet Economy*, Cambridge MA: MIT Press.

KPMG (1996), *Public Policy Issues Arising From Telecommunications and Audiovisual Convergence*, A Report for the European Commission, Brussels: EC.

Kushnick, B. (2006), The $200Billion Broadband Scandal, at <http://www.newnetworks.com/BroadbandScandalIntro.htm> [accessed 20 June 2009].

La Quadrature du Net (2009), Amendment 138/46 Adopted Again. Internet is a Fundamental right in Europe (6.05.2009) at <http://www.laquadrature.net/en/amendment-138-46-adopted-again> [accessed 20 June 2009].

Labbe, M. (2005), Laying the Fibre: A Detailed Cost Analysis, Broadband Properties, April at <www.broadband properties.com> see analysis posted at <www.europeftthcouncil.com> [accessed 20 June 2009].

Laffont, J.J. and Tirole, J. (2000), *Competition in Telecommunications*, Cambridge MA: MIT Press.

Larouche, P. (1998), 'EC Competition Law and the Convergence of the Telecommunications and Broadcasting Sectors', *Telecommunications Policy*, 22(3): 219–242.

Larouche, P. (2000), *Competition Law and Regulation in European Telecommunications*, Oxford: Hart.

Lasar, M. (2009), Cable Group Turns Net Neutrality Around Over ISP Access Fees, June 11, at <http:// arstechnica.com/tech-policy/news/2009/06/cable-group -turns-net-neutrality-around-over-isp-access-fees.ars> [accessed 20 June 2009].

LeGates, J.C.B. (2000), Open Access in the Local Telephone Loop: A Grand Tour of the Entangled Issues, Program on Information Resources Policy, Center for Information Policy Research, Harvard University (April, Incidental Paper).

Lehr, W.S., Gillett, M., Sirbu and Peha, J. (2006), Scenarios for the Network Neutrality Arms Race, Presented at the 34th Research Conference on Communication, Information, and Internet Policy (TPRC).

Leiner, B.M. Cerf, V.G., Clark, D.D., Kahn, R.E., Kleinrock, L., Lynch, D.C., Postel, J., Roberts, L.G. and Wolff, S. (undated) "A Brief History of the Internet," <www.isoc.org/internet/history/brief.html> [accessed 20 June 2009].

Lemley, M.A. (1999), 'Standardizing Government Standard Setting Policy for Electronic Commerce', *Berkeley Technology Law Journal*, 14(2): 745–758.

Lemley, M.A. (2000), 'Will the Internet remake antitrust law?', Chapter 12 in C. Marsden (ed), *Regulating the Global Information Society*, New York: Routledge.

Lemley, K.M. (2003), 'Comment: Protecting Consumers from Themselves: Alleviation the Market Inequalities Created by Online Copyright Infringement in the entertainment industry', *Albany Law Journal of Science & Technology*, 13: 613–624.

Lemley, M.A. and Lessig, L. (1999), Ex Parte Declaration Of Professor Mark A. Lemley And Professor Lawrence Lessig In The Matter Of: Application For Consent To The Transfer Of Control Of Licensest Mediaone Group, Inc. To AT&T Corp CS Docket No. 99-251 Before The Federal Communications Commission, Washington, D.C. 20554.

Lemley, M. A. and Lessig, L. (2000), The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era, Working Paper, John M. Olin Program in Law and Economics, Stanford Law School, 2000.

Lemley, M.A. and Lessig, L. (2001), 'The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era', *UCLA Law Review*, 48: 925–972.

Lemley, M.A. and McGowan, D. (1998), 'Legal Implications of Network Economic Effects', *California Law Review*, 86: 479–611.

Lemley, M.A. and Reese, A. (2004), 'Reducing Digital Copyright Infringement Without Restricting Innovation', *Stanford Law Review*, 56: 1345.

Lessig, L. (1999a), Brief as *Amicus Curiae U.S. v. Microsoft*, 65 F.Supp.2d 1 (DDC. 1999), at <http://cyber. law.harvard.edu/works/lessig/AB/abd9.doc.html> [accessed 20 June 2009].

Lessig, L. (1999b), '*Code and Other Laws of Cyberspace*', New York Basic Books.

Lessig, L. (1999c), The Limits in Open Code: Regulatory Standards and the Future of the Net, *Berkeley Technology Law Journal*, 14(2): 759–770.

Lessig, L. (1999d), Architecting Innovation, November 14 at <http://www.thestandard.com/article/ display/0,1151,7430,00.html> [accessed 20 June 2009].

Lessig, L. (2001), '*The Future of Ideas: The Fate of the Commons in a Connected World*', New York Penguin Press.

Lessig, L. (Spring 2007), 'In Support of Network Neutrality', *I/S: A Journal of Law & Policy for the Information Society*, 3: 185–196.

Lessig, L. (2008), '*Remix*', Making art and commerce thrive are Hybrid Economy London: Bloomsbury Academic, at <http://www.bloomsburyacademic.com/pdf%20files/Remix.pdf> [accessed 20 June 2009].

Lessig, L. and Wu T. (2003), Letter to the FCC Ex parte, 22 August 2003, at <www.timwu.org/wu_lessig_fcc.pdf> [accessed 20 June 2009].

Lessig, L., Wendell, C. and Carlsmith, E.M. (2006), *Testimony of Lawrence Lessig, C. Wendell, and Edith M. Carlsmith in Hearing on 'Network Neutrality'*, Washington, DC: US Senate Committee on Commerce, Science, and Transportation. Available at <http://commerce.senate.gov/pdf/lessig-020706.pdf> [accessed 20 June 2009].

Levy, D.A. (1997), 'Regulating Digital Broadcasting in Europe: The Limits of Policy Convergence', *West European Politics*, 20(4): 24–42.

Levy, D.A. (1999), *Europe's Digital Revolution. Broadcasting Regulation, the EU and the Nation State*, London: Routledge.

Levy, B. and Spiller P. (1994), 'The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation', *Journal of Law, Economics and Organization*, 10(2): 201–246.

Lewin, D., Williamson, B. and Cave, M. (2009), 'Regulating Next-Generation Fixed Access to Telecommunications Services', *INFO*, 11(4): 3–18.

Liebowitz, S.J. (1999), 'Review of Winners, Losers & Microsoft: Competition and Antitrust in High Technology', in [J.A. Eisenach and T.M., Lenard (eds), *Managerial and Decision Economics* (Vol. 20(7)), Boston, MA: Kluwer Academic Publishers], pp. 397–398.

Litan, R.E. (Spring 2007), 'Unintended Consequences of Net Neutrality Regulation', *Journal of Telecom and High Technology Law*, 5: 533.

Litan, R.E. and Singer, H.J. (2007), 'Unintended Consequences of Net Neutrality Regulation', *Journal on Telecom and High Technology Law*, 5(3): 553.

Loney, M. (2002), ISPs Buckle Under Copyright Cases, 10th December 2002 at ZDNET <http://news.zdnet.co.uk/story/0,t269-s2127279,00.html> [accessed 20 June 2009].

Longley, H.N. (1967), *Common Carriage of Cargo*, New York: Matthew Bender & Co.

Machill, M. and Welp, C. (2003), *Wegweiser im Netz. Qualität und Nutzung von Suchmaschinen*. Gütersloh: Verlag Bertelsmann Stiftung.

MacInnes, I., Moneta, J., Caraballo, J. and Sarni, D. (2002), 'Business Models for Mobile Content: The Case of M-Games', *Electronic Markets*, 12(4): 218–27.

Mackaay E. (2006), 'What's so Special About Cyberspace – Reflexions on Elkin Koren and Salzberger', *Lex Electronica*, 10(3), Winter 2006, <http://www.lex-electronica.org/articles/v10-3/mackaay.htm> [accessed 20 June 2009].

Madison River Communications, LLC, Order, DA 05-543, 20 FCC Rcd 4295 (2005), available at <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-05-543A1.pdf.> [accessed 20 June 2009].

Maggiore, M. (2008), BBC Response: Communication From The Commission On Creative Content Online In The Single Market, at p10, <http://ec.europa.eu/avpolicy/docs/other_actions/col_2008/comp/bbc_en.pdf> [accessed 20 June 2009].

Marcus, J.S. (2002), The Potential Relevance to the United States of the European Union's Newly Adopted Regulatory Framework for Telecommunications, Federal Communications Commission, Office of Plans and Policy Working Paper Series No. 36. <http://www.fcc.gov/osp/workingp.html [accessed 20 June 2009].

Marcus, J.S. (2005), 'Is the US Dancing to a Different Drummer?,' *Communications and Strategies*, 60: 39–58.

Marsden, C.T. (1999), 'Pluralism in the Multi-Channel Market. Suggestions for Regulatory Scrutiny', *International Journal of Communications Law and Policy*, issue 4, at <http://www.ijclp.org/4_2000/pdf/ijclp_webdoc_5_4_2000.pdf> [accessed 20 June 2009].

Marsden, C.T. (ed.) (2000), *Regulating the Global Information Society*, London: Routledge.

Marsden, C.T. (2000a), 'The European Digital Convergence Paradigm: From Structural Regulation to Behavioural Competition Law?, chapter 20 in E. Bohlin et al. (eds.), *Convergence in Communications and Beyond*, Elsevier Science. Amsterdam.

Marsden, C.T. (2000b), 'Not So Special? Merging Media Pluralism with Competition and Industrial Policy', *INFO*, 2(1): 5–13.

Marsden, C.T. (2001a), 'Cyberlaw and International Political Economy: Towards Regulation of the Global Information Society', 2 *Law Review of Michigan State University-Detroit College of Law*, 355–421.

Marsden, C.T. (2001b), 'Hollywood Helping Napster to Help Broadband', *Communications Week International*, May 7 at 32 <http://findarticles.com/p/articles/mi_m0UKG/is_2001_May_7/ai_74991270/> [accessed 20 June 2009].

Marsden, C.T. (2001c), 'Property Rights in the Broadband Space', 6 *International Journal of Communications, Law and Policy*, at pp. 1–6 <www.ijclp.org> [accessed 20 June 2009].

Marsden, C.T. (2000c), 'The Open Internet and Its Discontents: Living in the Age of the Ostrich, the Gildered, or the Military-Intellectual Property Complex?', *International Journal of Communications, Law and Policy*, (5) pp. 1–5: at <www.ijclp.org> [accessed 20 June 2009].

Marsden, C.T. (2001e), 'The Start of End-to-End? Internet Protocol Television', *Intermedia*, 29: 4—8.

Marsden, C.T. (2002), 'Wireless LANs and the European 3G Tragedy', *Intermedia*, 30(December): pp. 22–25.

Marsden, C.T. (2003a), 'Getting Out of the Great (Telecoms-Media-Technology) Depression', Intermedia, 31(2): 38–42 reprinted in Intermedia, 31(4/5): 32–37.

Marsden, C.T. (2003b), 'Video over IP, the Challenges of Standardisation: Towards the Next-Generation Internet Chapter 8', in Eli Noam et al. (eds), *Internet Television, Lawrence Erlbaum*, New Jersey: Mahwah, pp. 113–142.

Marsden, C.T. (2004a), 'Broadband All Round?!', *INFO*, 6(1): 57–58.

Marsden, C.T. (2004b), 'Co- and Self-regulation in European Media and Internet Sectors', *Tolley's Communications Law*, 9(5): 187—195.

Marsden, C.T. (2004c), Protecting Rights Holders Without Criminalizing Our Children SCL Bulletin, "Question Time – Future Gazing about the Internet and the Web" Tuesday 15th June 2004 in Computers and Law.

Marsden, C.T. (2005a), 'Free, Open or Closed – Approaches to the Information Ecology', *INFO*, 7(5): 6—19.

Marsden, C.T. (2005b), Regulating European Broadband Internet Content: Medium Law? Paper Presented to Wharton Business School Media Law Workshop, 28 October 2005, 61pp.

Marsden, C.T. (2007), 'Net Neutrality and Consumer Access to Content', *SCRIPTed*, September:: 407–435.

Marsden, C.T. (2008), 'Beyond Europe: The Internet, Regulation and Multistakeholder Governance – Representing the Consumer Interest?', *Journal of Consumer Policy*, 31(1), ISSN 0342-5843, Online ISSN: 0168–7034, Springer.

Marsden, C.T., and Verhulst, S.G. (1999) *Convergence in European Digital TV Regulation*, London: Blackstone Press.

Marsden, C., Cave, J., Nason, E., Parkinson, A., Blackman, C., Forge, S. and Rutter, J. (2006), Assessing Indirect Impacts of the EC Proposals for Video Regulation, Report Prepared for the United Kingdom Office of Communications, TR-414-Ofcom RAND Europe: Cambridge.

Marsden, C.T., Simmons, S., Brown, I., Woods, L., Peake, A., Robinson, N., Hoorens, S. and Klautzer, L. (2008), Options for and Effectiveness of Internet Self- and Co-Regulation Phase 2: Case Study Report(January 15, 2008). Prepared for European Commission DG Information Society & Media. Available at SSRN: <http://ssrn.com/abstract=1281374> [accessed 20 June 2009].

Matwyshyn A.M. (2009), Behavioural Targeting of Online Advertisements and the Future of Data Protection 27/01/2009 Computers and Law at <http://www.scl.org/site.aspx?i=ed9953> [accessed 20 June 2009].

Matwyshyn A.M. (ed)(2009), *Harboring Data: Information Security, Law And The Corporation*, Stanford: Stanford University Press.

May, R.J. (2007) 'Net Neutrality Mandates: Neutering the First Amendment in the Digital Age', *I/S: A Journal of Law and Policy for the Information Society*, 3(1): 197–210.

Mayer-Schonberger, V. (2008), 'Demystifying Lessig', *Wisconsin law Review*, 4: 713–746.

McAdams, A., Camp, J. and Divakaruni, S. (2000), 'The Evolution of US Telecommunications Infrastructure', *INFO*, 2(2): 107–110.

McGowan, D. (2000), 'The Problems of the Third Way: A Java Case Study', Chapter 13 in C. Marsden (ed), *Regulating the Global Information Society*, New York: Routledge.

MCI WorldCom/Sprint, D.Comm. June 28, 2000, 2003 OJL 300/1.

McKeown Nick (2005), How Emerging Optical Technologies will affect the Future Internet, NSF Meeting, 5 Dec at <http://find.isi.edu/presentation_files/Nick_McKeown-FIND%20Mtg%20Dec%202005.pdf> [accessed 20 June 2009].

McTaggart, C. (2006), Was The Internet Ever Neutral?, paper presented at the 34th Research Conference on Communication, Information and Internet Policy, George Mason University School of Law, Arlington, Virginia; available at <http://web.si.umich.edu/tprc/papers/2006/593/mctaggart-tprc06rev.pdf.> [accessed 20 June 2009].

McTaggart, C. (2008), Net Neutrality and Canada's Telecommunications Act, Fourteenth Biennial National Conference on New Developments in Communications Law and Policy. Ottawa: Law Society of Upper Canada, 2008.

Meisel, J. (2007), 'The Emergence of the Internet to Deliver Video Programming: Economic and Regulatory Issues;', *INFO*, 9(1): 52–64.

Meyer, D. (2007), BT says no to traffic shaping, ZDNet, Apr. 12, 2007, <http://uk.news.yahoo.com/zdnet/20070412/ttc-bt-says-no-to-traffic-shaping-20a87fa.htm.> [accessed 20 June 2009].

mGain (2003), Mobile Entertainment Industry and Culture Deliverable D5.2.1, at <http://www.knowledge.hut.fi/projects/mgain/mgain-wp5-d521-delivered.pdf.> [accessed 20 June 2009].

Mill, J.S. (1869), *On Liberty*, London: Longman.

Minges, M., Mannisto, L. and Kelly, T. (1999), 'The Future is Bright, the Future is Mobile', *INFO*, 1(6): 485–496.

Mobile Broadband Group (2009), Principles of Good Practice for selling and promoting Mobile Broadband, 1 June at <http://www.mobilebroadbandgroup.com/documents/mbg_mobile_broadband_gpp_010609.pdf> [accessed 20 June 2009].

Monopolies and Mergers Commission (1989), *The Supply of Beer, Command 651*, London: Stationery Office Limited.

Mueller, M. (2007), "Net Neutrality as Global Principle for Internet Governance, Internet Governance Project Paper IGP07-003 at <http://internetgovernance.org/pdf/NetNeutralityGlobalPrinciple.pdf> [accessed 20 June 2009].

Municipal Wireless (2006), Dutch telecoms Regulator to Force Cable Companies to Open Their Networks, 1 March at <http://muniwireless.com/municipal/watch/1078/ and in Dutch <http://www.debeurs.nl/news/details.asp?nid=MVOL&iid=0&mid=615847> [accessed 20 June 2009].

Munkhammer, J. (2009), Let the Internet Flourish: Why overregulation of the Internet is wrong for Europe, EEI Policy Papers 2009-1, European Enterprise Institute, Brussels.

Nas, S. (2003), 'The Future of Freedom of Expression Online: Why ISP Self-Regulation is a Bad Idea', in C. Hardy and C. Moller (eds), *Spreading the Word on the Internet: 16 Answers to 4 Questions*, Vienna: OSCE, 165–172.

National Cable & Telecommunications Ass'n v. Brand X Internet Services (2005), 545 U.S. 967.

Naughton, J. (2000), *A Brief History of the Future: Origins of the Internet*, London: Phoenix.

Negroponte Nicholas (1995), *Being Digital*, London: Hodder and Stoughton.

Network Advisory Committee (2002), *Commodity Network Bandwidth: Problems and Recommendations*, Berkeley, CA: University of California, September, available at <http://nac.berkeley.edu/bandwidth/> [accessed 20 June 2009].

Neuman, W.R., McKnight, L. and Solomon, R.J. (1997), *The Gordian Knot: Political Gridlock on the Information Highway*, Cambridge, MA: MIT Press.

Noam, E.M. (1989), 'International Telecommunications in Transition', in R.W. Crandall and K. Flamm (eds), *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Washington D.C.: Brookings Institute, 257–297.

Noam, E.M. (1994), 'Beyond Liberalization II: The Impending Doom of Common Carriage', *Telecommunications Policy*, 18(6): 435–452.

Noam, E.M. (2000), 'Future Cyber Trade Wars', chapter 24 in E. Bohlin, et al. (eds), *Convergence in Communications and Beyond*, NY: Elsevier Science.

Noam, E.M. (2003), *Issue Brief No. 1 The Internet: Still Wide Open and Competitive?* Oxford: Oxford Internet Institute.

Noam, E.M. (2008), Beyond Net Neutrality: Enduser Sovereignty at p2, Columbia University draft paper for 34th TPRC, August 14, 2008.

Noam, E.M., et al. (ed) (2003), *Television Over the Internet: Implications for Networks, Infrastructures, Strategy, Policy and Content*, Mahwah NJ: Lawrence Erlbaum.

Nolan, D. (1997), 'Bottlenecks in Pay TV: Impact on Market Development in Europe', *Telecommunications Policy*, 21(7): 597–610.

Norwegian Parliament (2007), Study Group on Internet Filtering Law Proposal, at NOU-2007-2: <http://www.regjeringen.no/nb/dep/jd/dok/NOUer/2007/NOU-2007-2/6/13.html> [accessed 20 June 2009].

Obama, B. (2006), Net Neutrality, MP3 released 8 June 2006, at <http://obama.senate.gov/podcast/060608_Sen.Barack_Obama_Podcast_Network_Neutrality_31.mp3> [accessed 20 June 2009].

Odlyzko, A. (2003a), 'Internet Traffic Growth: Sources and Implications, Optical Transmission Systems and Equipment for WDM Networking II', B.B. Dingel, et al. (eds), Proc. SPIE, vol. 5247, 2003, pp. 1–15 at <http://www.dtc.umn.edu/»odlyzko/doc/recent.html> [accessed 20 June 2009].

Odlyzko, A. (2003b), Pricing and Architecture of the Internet: Historical Perspectives from Telecommunications and Transportation, Preliminary version, December 29, 2003 <http://www.dtc.umn.edu/»odlyzko> [accessed 20 June 2009].

Odlyzko, A. (2004), The Many Paradoxes of Broadband, at <http://firstmonday.org/issues/issue8_9/odlyzko> [accessed 20 June 2009].

Odlyzko, A. (2009), 'Network Neutrality, Search Neutrality, and the Never-Ending Conflict between Efficiency and Fairness in Markets', *Review of Network Economics*, 8(1) – March 2009, <http://www.rnejournal.com/artman2/uploads/1/odlyzko_RNE_mar09.pdf at pp40-60. Available at SSRN: <http://ssrn.com/abstract=1095350> [accessed 20 June 2009].

Odlyzko, A. and Levinson, D. (2007), Too Expensive to Meter: The Influence of Transaction Costs in Transportation and Communication, draft at <http://www.dtc.umn.edu/~odlyzko/doc/meteringexpensive.pdf> [accessed 20 June 2009].

OECD (2006a), DSTI/ICCP/TISP(2005)6/FINAL January 11: 'Telecommunication Regulatory Institutional Structures And Responsibilities' at <http://www.oecd.org/dataoecd/56/11/35954786.pdf Paris: OECD> [accessed 20 June 2009].

OECD (2006b), *Infrastructure to 2030: Telecom, Land Transport, Water and Electricity*, Paris: OECD.

OECD (2007), *Internet Traffic Prioritisation*, Paris: OECD, at <http://www.oecd.org/dataoecd/43/63/38405781.pdf> [accessed 20 June 2009].

OECD (2008), Developments in Fibre Technologies and Investment, DSTI/ICCP/CISP(2007)4/FINAL, 3 April Paris: OECD.

OECD Foresight Forum (2006), Next Generation Networks: Evolution and Policy Considerations, 3 October 2006, at <http://www.oecd.org/document/12/0,2340,en_2649_33703_37392780_1_1_1_1,00.html> Paris: OECD. [accessed 20 June 2009].

Ofcom (2004), Consultation Document 'Criteria for Transferring Functions to co-Regulatory Bodies' <http://www.ofcom.org.uk/consultations/past/co-reg/?a=87101>, London: Ofcom. [accessed 20 June 2009].

OfCom (2006a), Next Generation Networks: Developing the regulatory framework, March, at <http://www.ofcom.org.uk/consult/condocs/nxgnfc/statement/ngnstatement.pdf>, London: Ofcom. [accessed 20 June 2009].

Ofcom (2006b), Online Protection: A Survey of Consumer, Industry and Regulatory Mechanisms and Systems, 21 June, at <http://www.ofcom.org.uk/research/telecoms/reports/onlineprotection/report.pdf>, London: Ofcom. [accessed 20 June 2009].

Ofcom (2006c), Ofcom Response to the European Commission Consultation on Content Online in the Single Market, 20 October, at <http://ec.europa.eu/avpolicy/docs/other_actions/contributions/ofcom_col_en.pdf> [accessed 20 June 2009].

Ofcom (2007), CW/00946/02/07 Own-Initiative Enforcement Programme to Give Effect to General Condition 22 (Service Migrations) at <http://www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ocases/open_all/cw_946/> [accessed 20 June 2009].

Ofcom (2008a), Voluntary Code of Practice: Broadband Speeds at <http://ofcom.org.uk/telecoms/ioi/copbb/copbb/> [accessed 20 June 2009].

Ofcom (2008b), Mobile Citizens, Mobile Consumers Consultation published: 28|08|2008 closes: 06|11|2008 at <http://www.ofcom.org.uk/consult/condocs/msa08/> [accessed 20 June 2009].

Ofcom (2009a), Accessing the Internet at Home: A Quantitative and Qualitative Study Among People Without the Internet at home by Ipsos Mori, at <http://www.ofcom.org.uk/research/telecoms/reports/bbresearch/bbathome.pdf>, London: Ofcom. [accessed 20 June 2009].

Ofcom (2009b), Mobile Broadband, 1 June at <http://www.ofcom.org.uk/media/features/mobbroadguide> [accessed 20 June 2009].

Office of Fair Trading (2000), *The Supply of Beer, December 2000*, London: OFT.

Oftel (2000), Direction of May 2000: FRIACO, at <http://www.ofcom.org.uk/static/archive/oftel/publications/internet/fria0400.htm> [accessed 20 June 2009].

Ohm, P. (2008), 'The Myth of the Superuser: Fear, Risk, and Harm Online', *UC Davis Law Review*, 41(4): 327, April 2008. Available at SSRN: <http://ssrn.com/abstract=967372> [accessed 20 June 2009].

OpenNet Initiative (2005), Telus Blocks Consumer Access to Labour Union Web Site and Filters an Additional 766 Unrelated Sites, OpenNet Initiative Bulletin, available at <www.opennetinitiative.net/bulletins/010/>, No.10.> [accessed 20 June 2009].

Orlowski, A. (2007), BBC Tech Chief: You Freetards don't Matter: And no one Gives a Toss about DRM. So there, at <http://www.theregister.co.uk/2007/11/06/highfield_tactics/> [accessed 20 June 2009].

Owen, B.M. (2007), 'The Net Neutrality Debate: Twenty Five Years after *United States v. AT&T* and 120 Years after the Act to Regulate Commerce'. Working Paper, John M. Olin Program in Law and Economics, Stanford Law School, 2007.

P6_TA-PROV(2005)0322 European Parliament resolution on the application of Articles 4 and 5 of Directive 89/552/EEC ("Television without Frontiers"), as amended by Directive 97/36/EC, for the period 2001-2002 (2004/2236(INI).

Palfrey, J. and Gasser, U. (2008), *Born Digital: Understanding the First Generation of Digital Natives*, Basic Books: New York.

Paltridge, S. (2006), *Internet Traffic Exchange, DSTI/ICCP/TISP(2005)11/FINAL*, Paris: OECD.

Paris conference (2007), 'Workshop on Network Neutrality: American and European Perspectives' 29 May 2007 <http://www.telecom-paristech.fr/chair-innovation-regulation/Agenda.html> [accessed 20 June 2009].

PCMLP (2004), Self-Regulation of Digital Media Converging on the Internet: Industry Codes of Conduct in Sectoral Analysis, Final Report of IAPCODE Project for European Commission DG Information Society Safer Internet Action Plan, 30 April at <www.selfregulation.info> [accessed 20 June 2009].

Peers, S. (2009), Strengthening Security and Fundamental Freedoms on the Internet – an EU Policy on the Fight Against Cyber Crime, European Parliament Directorate General Internal Policies Policy Department C: Citizens' Rights and Constitutional Affairs, at <http://www.europarl.europa.eu/img/struct/languages/lg_en_up.gif> [accessed 20 June 2009].

Peha, J.M. (2007), 'The Benefits and Risks of Mandating Network Neutrality, and the Quest for a Balanced Policy', *International Economics and Economic Policy*, 1: 644–668.

Peha, J.M., Lehr, W.H. and Wilkie, S. (2007), The State of the Debate on Network Neutrality, *International Jouranl of Communication,* 1: 709–716.

Perry Barlow, J. and others (2009), Comment on a National Broadband Plan for Our Future, Notice of Inquiry, FCC GN Docket No. 09-51, at <http://itstheinternetstupid.com/ further signatories added at web page> [accessed 20 June 2009].

Pfleeger, C. and Pfleeger, S.L. (2006), *Security in Computing*, 4th edn, Prentice Hall Pearson Upper saddle.

River, New Jersey.

Pirate Party (undated) Information, at <http://www2.piratpartiet.se/international/english> [accessed 20 June 2009].

Porter, M.E. (1985), *Competitive Advantage – Creating and Sustaining Superior Performance*, New York: Free Press.

Post, D. (2009), *In Search of Jefferson's Moose: Notes on the State of Cyberspace*, NY: Oxford University Press.

Powell, M.K. (2004), Speech at Symposium, February 8, "The Digital Broadband Migration: Toward a Regulatory Regime for the Internet Age" held at the University of Colorado School of Law at <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243556A1.pdf.> [accessed 20 June 2009].

Presidency (2009), Press Statement on the state of play regarding the 'telecoms package', 11 June at <http://www.eu2009.cz/en/news-and-documents/news/presidency-press-statement-on-the-state-of-play-regarding-the-_telecoms-package_-25123/> [accessed 20 June 2009].

Price, M. (1995), *Television, The Public Sphere and National Identity*, Oxford: Oxford University Press.

Price, M. and Verhulst, S. (2000), 'In Search of the Self: Charting the Course of Self-Regulation on the Internet in a Global Environment', Chapter 3 in C. Marsden (ed), *Regulating the Global Information Society*, London: Routledge.

PriceWaterhouseCoopers (2004), *Economic Analysis of the TV Advertising Market, report commissioned by Ofcom*, London: PriceWaterhouseCoopers.

PriceWaterhouseCoopers (2006), *Global Entertainment and Media Outlook 2006–2010*. London: PriceWaterhouseCoopers.

Privacy Commissioner of Canada (2009), Letter to Robert A. Morin, Secretary General, Canadian Radio-television and Telecommunications Commission, Re: Telecom Public Notice CRTC 2008-19 – Review of the Internet traffic management practices of Internet service providers, Canadian Radio-television and Telecommunications Commission. February 18, 2009. <http://www.crtc.gc.ca/public/partvii/2008/8646/c12_200815400/1027577.PDF> [accessed 20 June 2009].

Promusicae v. Telefonica, Case C-275/06.

Python, M. (2008), <http://www.youtube.com/user/montypython?blend=1&ob=4> [accessed 20 June 2009].

Quinn, Jr., R.W. (2006), Re: In the matter of review of AT&T Inc., and BellSouth Inc. Application for Consent to Transfer Control, WC Docket No. 06-74, from AT&T Sr. Vice President, Federal Regulatory, to Marlene Dortch, Secretary, U.S. Federal Communications Commission, 28 December, 2006, at <http://www.fcc.gov/ATT_FINALMergerCommitments12-28.pdf> [accessed 20 June 2009].

Recommendation (2006), of the European Parliament and of the Council of 20 December 2006 on the protection of minors and human dignity and on the right of reply in relation to the competitiveness of the European audiovisual and on-line information services industry, OJ L378, 27.12.2006, p. 72.

Recommendation 2005/698/EC of 19 September 2005 on accounting separation and cost accounting OJ L 266, 11.1.2005, p. 64.

Recommendation 98/560/EC on the development of the competitiveness of the European audiovisual and information services industry by promoting national frameworks aimed at achieving a comparable and effective level of protection of minors and human dignity OJ L 270, 7.10.1998.

Recommendation EC (2009), 3359 final on the Regulatory Treatment of Fixed and Mobile Termination Rates in the European Union of 7.5.2009 at <http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/article_7/recom_term_rates_en.pdf> [accessed 20 June 2009].

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).

Reding V. (2005), 'Mobile Communications: A Key Driver to Make Lisbon Succeed' delivered to the 3GSM World Congress, Cannes, 14th February 2005 Brussels: EC.

Reding, V. (2009 undated), Four Elements in the Telecoms Package, untitled remarks, European Parliament 6 May at <http://www.europarl.europa.eu/sce/data/cre/doc/S0006346.doc> [accessed 20 June 2009].

Reding, V. (2009), Freedom of Speech: ICT must Help, not Hinder, Event on the Idea of an EU "GOFA" (US Global Online Freedom Act), EP Plenary Session, Strasbourg, 3 February 2009 Brussels: EC, at <http://ec.europa.eu/commission_barroso/reding/docs/speeches/2009/strasbourg-20090203.pdf> [accessed 20 June 2009].

Reidenberg, J. (2005), Technology and Internet Jurisdiction, 153 UNIV. OF PENN. L. REV. 1951 <http://ssrn.com/abstract=691501> [accessed 20 June 2009].

Renda, A. (2008), I own the pipes, you call the tune: The net neutrality debate and its (ir)relevance for Europe, CEPS Special Reports, Centre for European Policy Studies: Brussels.

Resnick, P. and Miller, J. (1996), PICS: Internet Access Controls Without Censorship, *Association for Computing Machinery*, 39(10), 87–93 at <http://www.w3.org.PICS.iacwcv2.htm> [accessed 20 June 2009].

Reuters (2004), March 18: Central Filter Against Web Hate for French Schools at <http://www.reuters.com/newsArticle.jhtml;?storyID=4599516> [accessed 20 June 2009].

Rey, P. and Tirole, J. (2003), 'A Primer on Foreclosure', in M. Armstrong and R. Porter (eds), *Handbook of Industrial Organization*, vol. III, Amsterdam: Elsevier.

Richards, E. (2008), Institution of Engineering and Technology Speech, Broadband Britain – Towards the Next Generation, Wednesday 16 April 2008 at <http://www.ofcom.org.uk/media/speeches/2008/04/ietspeech> [accessed 20 June 2009].

Richards, E. (2009a), 3 March: Ofcom CEO Ed Richards Answers Your Questions, The Telegraph at <http://www.telegraph.co.uk/scienceandtechnology/4926958/Ed-Richards-of-Ofcom-answers-your-questions.html> [accessed 20 June 2009].

Richards, E. (2009b), 9 March: Ofcom Answers Your Broadband Questions at <http://news.bbc.co.uk/2/hi/technology/7932028.stm> [accessed 20 June 2009].

Richards, E. (2009c), Telecoms at the Crossroads – Speech to London School of Economics and Political Science/Polis, 16 March at <http://ofcom.org.uk/media/speeches/2009/mar/telecoms_crossroads> [accessed 20 June 2009].

Ridley, J. and Whitehead, G. (1982), *The Law of the Carriage of Goods by Land, Sea and Air*, 6th ed., Crayford, Kent: Shaw.

Riley, M.C. and Scott, B. (2009), Deep Packet Inspection: The End of the Internet as We Know It? Free Press, March, at <http://www.freepress.net/files/Deep_Packet_Inspection_The_End_of_the_Internet_As_We_Know_It.pdf> [accessed 20 June 2009].

Robinson, C. (ed) (2004), *Successes and Failures in Regulating and Deregulating Utilities*, Cheltenham: Edward Elgar.

Rokkas, T. (2009), On the Economics of Fixed-Mobile Convergence, 11 info 3 at pp. 75–86.

Rome Statute of the International Criminal Court of 17 July 1998, at <http://www.icc-cpi.int/NR/rdonlyres/EA9AEFF7-5752-4F84-BE94-0A655EB30E16/0/Rome_Statute_English.pdf> [accessed 20 June 2009].

SABAM v. Scarlet (2007), District Court of Brussels, No. 04/8975/A, Decision of 29 June, Brussels: EC.

Saltzer, J.W., Reed, D.P. and Clark, D.D. (1984), 'End-to-End Arguments in System Design, *ACM Transactions in Computer Systems,* 2(4): 277—288.

Samuelson, P. (2000), 'Five Challenges for Regulating the Global Information Society', in T.M. Christopher (ed), *Regulating the Global Information Society*, London: Routledge, 316–330.

Sandbach, J. (2001), Levering Open the Local Loop: Shaping BT for Competition 3 info 3 at pp. 195–202.

Sandvig, C. (2003), 'An Initial Assessment of Cooperative Action in Wi-Fi Networking', *Telecommunications Policy*, 28(7/8):579–602.

Sandvig, C. (2007), Network Neutrality is the New Common Carriage, 9 info 2/3 pp. 136–147.

SBC Communications Inc. and AT&T Corp. (2005), Applications for Approval of Transfer of Control, 20 FCC Rcd 18290, Appendix F, slip op. p. 125 (SBC/AT&T).

SCF Associates (2006), *Economic Impacts of Spectrum Allocation Methods*, mimeo, Bedford.

Schejter, A.M. and Yemini, M. (2007), 'Justice, and Only Justice, You Shall Pursue': Network Neutrality, the First Amendment and John Rawls's Theory of Justice', *Michigan Telecommunications Law Review,* 14: 137–174.

Schmidt, H. (2002), Article 82's 'Exceptional Circumstances' that Restrict Intellectual Property Rights, ECLR 210-16.

Schrage Michael. (2000), The Debriefing: John Seely Brown, Wired Issue August S.8.08.

Schulz, W. and Held, T. (2001), *Regulated Self-Regulation as a Form of Modern Government, Study commissioned by the German Federal Commissioner for Cultural and Media Affairs*, Hamburg: Hans Bredow Institute for Media Research.

Schulz, W., Held, T. and Laudien, A. (2005), 'Search Engines as Gatekeepers of Public Communication: Analysis of the German Framework Applicable to Internet Search Engines Including Media Law and Anti-trust Law', *German Law Journal*, 6(10): S.1419–S.1431.

Schwartz, M. and Weiser, P. (2009), 'Introduction to a Special Issue on Network Neutrality', *Review of Network Economics,* 8(1), at <http://www.rnejournal.com/artman2/publish/vol8_issue1/index.shtml> [accessed 20 June 2009].

Scott, D. (2007), *Speech at Westminster eForum*, London: Ofcom, at <http://www.radioauthority.org.uk/media/speeches/2007/03/regulate> [accessed 20 June 2009].

Sea Containers v. Stena Sealink (1994), Commission Decision 94/19 OJ No L 15/8, Brussels: EC.

SEC (2002), 1333 Staff Working Paper: Barriers to Widespread Access to New Services and Applications of the Information Society Through Open Platforms in Digital Television and Third Generation Mobile Communications, Brussels: EC, at <http://register.consilium.europa.eu/pdf/en/02/st15/15220en2.pdf> [accessed 20 June 2009].

SEC (2005), 717 European Commission Communication, i2010 – A European Information Society for Growth and Employment, Brussels: EC, <at <http://eur-ex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0229:FIN:EN:PDF> [accessed 20 June 2009].

Seely B.J. and Duguid, P. (2000), *The Social Life of Information*, Cambridge, MA: Harvard Business School Press.

Shapiro, C. and Varian, H.R. (1999), *Information Rules: A Strategic Guide to the Network Economy*, Cambridge MA: Harvard Business School Press.

Shelanski, H. (1999), 'The Speed Gap: Broadband Infrastructure and Electronic Commerce', *Berkeley Technology Law Journal*, 14(2): 721—744.

Shelanski, H.A. (2007), 'Network Neutrality: Regulating With More Questions Than Answers', *Journal on Telecommunications and High Technology Law*, 6: 23.

Shinoda, Y. (2004), *Broadband Access Network Deployment in Japan Past Present and Future: Reasons and Issues*, Presentation to INET 2004, Barcelona, May: mimeo.

Sidak, J.G. (2006), 'A Consumer-Welfare Approach to Network Neutrality Regulation of the Internet', *Journal of Competition Law & Economics,* 2(3):349.

Sidak, J.G. (2007), What is the Network Neutrality Debate Really About'? *International Economics and Economic Policy,* 1: 377–388.

Sieradzki, D.L. and Maxwell, W.J. (2008), The FCC's Network Neutrality Ruling in the Comcast Case: Towards a Consensus with Europe? 72 Communications & Strategies 4 at p. 73, at <http://www.idate.fr/fic/revue_telech/953/CS72_MAXWELL_SIERADSKI.pdf> [accessed 20 June 2009].

Sirbu, M. (2007), What is the Network Neutrality Debate About? presentation at conference A Workshop on Network Neutrality: American and European Perspectives, Paris, 29 May 2007, see <http://www.andrew.cmu.edu/user/sirbu/> [accessed 20 June 2009].

Speech 05/532 (2005), *Reding, V. Better Regulation for Europe's Media Industry: The Commission's approach*, Brussels: EC.

SPEECH/06/773 (2006), *Reding, V. The Disruptive Force of Web2.0: How the New Generation will Define the Future*, Brussels: EC. <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/06/773&format=PDF&aged=0&language=EN&guiLanguage=en> [accessed 20 June 2009].

SPEECH/08/473 (2008), Reding, Viviane: Net Neutrality and Open Networks – Towards a European Approach, Copenhagen 30 September Conference 'Network Neutrality – Implications for Innovation and Business Online', Brussels: EC, at <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/473> [accessed 20 June 2009].

SPEECH/08/561 (2008), Reding, Viviane: Europe's Telecoms Incumbents: Friends or Foes of a Single Telecoms Market? CEO Summit of the European Telecommunications Networks' Operators Associations, Venice, 25 October 2008, Brussels: EC, at <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/561&format=HTML&aged=0&language=EN&guiLanguage=en> [accessed 20 June 2009].

SPEECH/08/70 (2008). Reding, Viviane: Mobile goes Internet: Key Challenges for Mobile Ubiquity in Europe's Single Market, GSMA Mobile World Congress, Barcelona, 11 February 2008, Brussels: EC, at <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/70> [accessed 20 June 2009].

SPEECH/09/222 (2009), Reding, Viviane: Ending the Fixed-Mobile-Subsidy: The New Commission Recommendation on Termination Rates in the EU, Press conference on Termination Rates, Brussels, 7 May 2009, Brussels: EC, at <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/09/222&format=HTML&aged=0&language=EN&guiLanguage=nl> [accessed 20 June 2009].

SPEECH/09/46 (2009), First European Agreement of Social Networks – a Step Forward to Child Safety Online, Safer Internet Day, Luxembourg, 10 February 2009, Brussels: EC,. <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/09/46> [accessed 20 June 2009].

Speta, J.B. (2000), 'Handicapping the Race for the Last Mile? A Critique of Open Access Rules for Broadband Platforms', *Yale Journal on Regulation,* 17: 39, 77–90.

Speta, J.B. (2004), 'FCC Authority to Regulate the Internet: Creating it and Limiting it', Loyola University Chicago Law Journal, 35(15). <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=490122> [accessed 20 June 2009].

Srivastava, L. (2001). '3G Mobile Policy: The Case of Japan', *INFO,* 3(6), 459–484.

Stephanie Lenz v. Universal Music Corp. (2008), Universal Music Publishing, Inc., And Universal Music Publishing Group, Case Number C 07-3783 Jf In The United States District Court For The Northern District Of California San Jose Division, Order Denying Motion To Dismiss.

Stigler, G.J. (1971), 'The Theory of Economic Regulation', *RAND Journal of Economics,* 2(1): 3–21.

Sutherland, E. (2009), 'Counting Customers, Subscribers and Mobile Phone Numbers', *INFO* 11(2): 6–23.

Sutter, G. (2000), 'Nothing New Under the Sun': Old Fears and New Media', *International Journal of Law and IT,* 8(388).

Swanson, B. (2007), The Coming Exaflood, *Wall St Journal Opinion*, January 20. <http://online.wsj.com/article/SB116925820512582318.html> [accessed 20 June 2009].

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).

Talbot, D. (2006), 'Toward a High-Definition YouTube', *MIT Technology Review,* 26 October, at <http://www.technologyreview.com/read_article.aspx?id=17654&ch=biztech&sc=&pg=2> [accessed 20 June 2009].

Tambini, D., Leonardi, D. and Marsden, C.T. (2008), *Codifying Cyberspace: Communications Self-Regulation in the Age of Internet Convergence*, London: Routledge.

Tapscott, D. (1999), *Growing Up Digital: The Rise of the Net Generation*, NY: McGraw Hill.

Tapscott, D. (2008), *Grown Up Digital: How the Net Generation is Changing Your World*, NY: McGraw Hill.

Telecommunications Act, Statutes of Canada. Vol. c. 38. Canada, 1993.

Teligen (2009), Report on Telecoms Price Developments from 1998 to 2008, 02 April at <http://ec.europa.eu/information_society/policy/ecomm/doc/library/ext_studies/price_developments_1998_2008/tariff_trends_report_1998_2008.pdf> [accessed 20 June 2009].

The Supply of Beer (Loan Ties, Licensed Premises and Wholesale Prices) Order 1989, SI 1989/2258.

The Supply of Beer (Loan Ties, Licensed Premises and Wholesale Prices)(Revocation) Order 2003, SI 2003/52.

The Supply of Beer (Tied Estate) (Amendment) Order 1997, SI 1997/1740.

The Supply of Beer (Tied Estate) Order 1989, SI 1989/2390.

The Supply of Beer (Tied Estate)(Revocation) Order 2002, SI 2002/3204.

Thierer, A. (2004). 'Net Neutrality: Digital Discrimination or Regulatory Gamesmanship in Cyberspace'? *Policy Analysis,* 507.

Thierer, A. (2005), 'Are 'Dumb Pipe' Mandates Smart Public Policy? Vertical Integration, Net Neutrality, and the Network Layers Model', *Journal on Telecommunications & High Technology Law,* 3: 275.

Thinkbroadband (2009), Average Mobile Broadband Speed Clocks in at 0.9 meg, 10 June, at <http://www.thinkbroadband.com/news/p/2.html> [accessed 20 June 2009].

Tickle, K. (1995). Comment, the Vicarious Liability of Electronic Bulletin Board Operators for the Copyright Infringement Occurring on Their Bulletin Boards, 80 IOWA L. REV. 391, 416 .

Time Warner Telecom, Inc. v. FCC (2007) 507 F.3d 205 (3d Cir.).

Tongue, C. (1999), Chapter 5 in C. Marsden and S. Verhulst (eds), *Convergence in European Digital TV Regulation*.

Treacy, P. (1998), 'Essential Facilities – Is the Tide Turning'? *ECLR*, 501.

Trope, K.L. (2005), 'Voice Over Internet Protocol: The Revolution in America's Telecommunications Infrastructure', *Computer and Internet Lawyer,* 22(1): 12.

Ungerer, H. (1996a), EC Competition Law in the Telecommunications, Media, and Information Technology Sectors, International Antitrust Law & Policy, Fordham University School of Law, 1995 Fordham Corp. L. Inst. Proceedings (B. Hawk ed.).

Ungerer, H. (1996b), Multimedia, European Multimedia Forum, 19 November Brussels: EC, at <http://ec.europa.eu/competition/speeches/text/sp1996_056_en.html> [accessed 20 June 2009].

Ungerer, H. (1998), Ensuring Efficient Access to Bottleneck Essential Facilities: The Case of Telecommunicat ions in the European Union – Competition Workshop, Florence 13/11/98, Brussels: EC, at <http://ec.europa.eu/competition/speeches/text/sp1998_056_en.html> [accessed 20 June 2009].

Ungerer, H. (2000), Access Issues Under EU Regulation and Antitrust Law: The Case of Telecommunications and Internet Markets, July 2000/Incidental Paper, ISBN 1-979716-65-8 I-00-3, at <http://pirp.harvard.edu/pdf-blurb.asp?id=479> [accessed 20 June 2009].

Ungerer, H. (2002), 'Converging Technologies and Regulations: Broadcasting, Datacasting, Communications', speech at 23rd ETP Plenary Session, Brussels: EC, 19th September, at <http://europa.eu.int/comm/competition/speeches/text/sp2002_031_en.pdf> [accessed 20 June 2009].

United States v. Microsoft Corporation (2000), Civil Action No. 98-1232 and 1232 (TPJ), United States District Court for the District of Columbia, Conclusions of Law of 3 April 2000.

Van de Woude, D. (2007) An overview of Fiber: European (Muni and other) Fiber to the Home and Fiber backbone projects, at http://www.citynet.nl/upload/FttX-in-Europe-29june2007.pdf [last accessed 20 June 2009].

Van Der Berg, R. (2007), Developments in Fibre Technologies and Investment, OECD draft, DSTI/ICcontent provider/CISP(2007)4, of 3 May, Paris: OECD.

van Eijk, N.A.N.M. (2009), 'A Converged Regulatory Model for Search Engines'? *Computers and Law,* 6: 1–3.

Van Heesvelde, E. (2000), 'Convergence Between Fixed and Mobile Communications', *INFO,* 2(3): 271–275.

Van Oranje, C., Simmons, S., Kahan, J., Botterman, M. and Lundin, P. (2005), *The Spring Council Review: Implications for Information Society Policy Options*, Report for the European Commission, DG Information Society.

Van Schewick, B. (2005), Architecture & Innovation: The Role of the End-to-End Arguments in the Original Internet. PhD, TUB Berlin.

Van Schewick, B. (2007), 'Towards an Economic Framework for Network Neutrality Regulation', *Journal on Telecommunications and High Technology Law,* 5(2): 329–391.

Verizon Communications Inc. and MCI, Inc. (2005), Applications for Approval of Transfer of Control, 20FCC Rcd 18433, Appendix F, slip op. p. 130 (Verizon/MCI).

Vickers, J. (2009), Competition Policy and Intellectual Property Rights, Working Paper 436, May, at economics.ox.ac.uk/research/wp/pdf/paper436.pdf> [accessed 20 June 2009].

Von Finckenstein, K. (2008), Notes for a Speech by Konrad von Finckenstein. The 2008 Canadian Telecom Summit. Toronto, 2008, Ottawa: CRTC, at <http://www.crtc.gc.ca/eng/news/speeches/2008/s080617.htm> [accessed 20 June 2009].

Waclawsky, J. (2005), 'IMS 101: What You Need to Know Now', at: <http://www.bcr.com/carriers/public_networks/ims_101_what_need_know_now_2005061514.htm> [accessed 20 June 2009].

Walden, I. (2009), *Telecommunications Law and Regulation*, 3rd ed., Oxford: Oxford University Press.

Walker, A.M.T. and Read, V. (2007), *Pipe Dreams? Prospects for Next Generation Broadband Deployment in the UK*, London: Broadband Stakeholder Group.

Wallsten, S. (2007), Wireless Net Neutrality? Progress & Freedom Foundation Progress Snapshot Paper No. 3.2. Available at SSRN: <http://ssrn.com/abstract=976749> [accessed 20 June 2009].

Weeds, H. (2009), TV Wars: Exclusive Content and Platform Competition in Pay TV, paper presented to TILEC Media Workshop on Competition Policy and Regulation in Media Markets: Bridging Law and Economics, 4–5 June.

Weiser, P. (2000), 'Paradigm Changes in Telecommunications Regulation', *U. COLO. L. REV.*, 71: 819.

Weiser, P. (2004), 'Toward a Next Generation Regulatory Strategy', *Loyola University Law Journal*, 35: 41–85 at SSRN: <http://ssrn.com/abstract=454380 or DOI: 10.2139/ssrn.454380.> [accessed 20 June 2009].

Weiser, P. (2008), 'The Next Frontier for Network Neutrality', *Administration Law Review*, 60: 273.

Weitzner, D.J. (2006), The Neutral Internet: An Information Architecture for Open Societies., available at <http://dig.csail.mit.edu/2006/06/neutralnet.html> [accessed 20 June 2009].

Werbach, K. (1999), The Architecture Of Internet 2.0, Release 1.0, February at p1: <http://cachefly.oreilly.com/radar/r1/02-99.pdf> [accessed 20 June 2009].

Werbach, K. (2002), 'A Layers Model for Internet Policy', *Journal on Telecommunications & High Technology Law,* 1: 37.

Werbach, K. (2010), Off the Hook, Cornell Law Review, forthcoming, draft at <http://ssrn.com/abstract=1371222> [accessed 20 June 2009].

Whitehead, P. (1997), Draft Report on the Commission Green Paper on The Protection of Minors and Human Dignity in Audiovisual and Information Services (COM [96] 483 – C4-0621/96) PE 221.804 of 24 April 1997.

Williams, K.S. (2003), 'Child Pornography and Regulation on the Internet in the United Kingdom: The Impact on Fundamental Rights and International Relations', *Brandeis Law Journal,* 41: 463.

Williams, C. (2007), Virgin Throttles National Cable Network, The Register, 8 May, at <http://www.theregister.co.uk/2007/05/08/vigin_nationwide_throttling/> [accessed 20 June 2009].

Williams, C. (2009), UK.gov to Spend £2bn on ISP tracking: Uberdatabase ditched, but IMP is go, The Register 27th April, at <http://www.theregister.co.uk/2009/04/27/imp_consultation/> [accessed 20 June 2009].

Wirtz, B.W. (2001), 'Reconfiguration of Value Chains in Converging Media and Communications Markets', *Long Range Planning,* 34: 489–506.

Woods, L. (2005), 'Broadcasting, Universal Service and the Communications Package', *INFO,* 7(5): 29–41.

Woods, L. (2009), The 'Future-proof' Communications Bill: Platform Regulation in a New Age, 16 Computers and Law 6 February/March, at <http://www.scl.org/site.aspx?i=is10631> [accessed 20 June 2009].

Woroch, G.A. (2002), 'Open Access Rules and the Broadband Race', *L. REV. MICH. ST. U. DET. C.L.*, 719.

Woroch, G.A. (2004), 'Open Access Rules and Equilibrium Broadband Deployment', in R. Cooper and G. Madden (eds), *Frontiers of Broadband, Electronic and Mobile Commerce*, NY: Springer Verlag.

Wray, R. (2009), The Pirates will Always Win, Says Carphone's Dunstone: Charles Dunstone says Illegal Downloading Cannot be stopped, 5 June 2009, The Guardian, at <http://www.guardian.co.uk/business/2009/jun/05/dunstone-carphone-warehouse-results-pirates> [accessed 20 June 2009].

Wright, T. (2006), Next Generation Networks – the Interconnect Challenges, 13th CEPT Conference, 11–12 October 2006.

Wu, T. (2003). 'Network Neutrality, Broadband Discrimination', *Journal of Telecommunications and High Technology Law*, 2: 141–172. available at <http://ssrn.com/abstract=388863> [accessed 20 June 2009].

Wu, T. (2004), 'The Broadband Debate: A User's Guide', *Journal of Telecommunications and High Technology Law,* 69: 3.

Wu, T. (2006), *Why have a Telecommunications Law? Anti-Discrimination Norms in Communications*, Columbia Public Law Research Paper No. 06-115.

Wu, T. (2007), Wireless Net Neutrality: Cellular Carterfone And Consumer Choice In Mobile Broadband, New America Foundation Wireless Future Program Working Paper #17 February.

Wu, T. (2009), Network Neutrality FAQs. <http://www.timwu.org/network_neutrality.html> [accessed 20 June 2009].

Wu, T. and Yoo, C.S. (2007), '"Keeping the Internet Neutral": Tim Wu and Christopher Yoo Debate', *Federal Communications Law Journal,* 59(3): 575–592.

Yardley, M. (2006), Fibre, Fibre Everywhere? Analysys, February, at <http://www.analysys.com/default_acl.asp?Mode=article&iLeftArticle=2061&m=&n=> [accessed 20 June 2009].

Yemini, M. (2008), 'Mandated Network Neutrality and the First Amendment: Lessons from Turner and a New Approach', *Virginia Journal of Law and Technology,* 1: 38.

Yen, A. (2000), Internet Service Provider Liability for Subscriber Copyright Infringement, Enterprise Liability and the First Amendment 88 Georgetown L.J. at <http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID236478_code000726304.pdf?abstractid=236478> [accessed 20 June 2009].

Yoo, C.S. (2004), 'Would Mandating Broadband Network Neutrality Help or Hurt Competition? A Comment on the End-to-End Debate', *Journal of Telecommunications and High Technology Law,* 13: 23.

Yoo, C.S. (2005a), 'Beyond Network Neutrality', *Harvard Journal of Law and Technology* 19: 20.

Yoo, C.S. (2005b), Network Neutrality and the Economics of Congestion, Vanderbilt Law and Economics Research Paper No. 05–28, Vanderbilt Public Law Research Paper No. 05–33.

Yoo, C.S. (2006), 'Network Neutrality and the Economics of Congestion', *Georgetown Law Journal*, 94: 1847.

Zheng, W. and Crowcroft J. (1996), 'Quality-of-Service Routing for Supporting Multimedia Applications', *IEEE Journal on Selected Areas in Communications* 14(7): 1228–1234.

Zittrain, J. (2003), *Internet Points of Control*, Cambridge MA: Berkman Center for Internet & Society. <http://cyber.law.harvard.edu/publications> [accessed 20 June 2009].

Zittrain, J. (2006), 'The Generative Internet', *Harvard Law Review,* 119: 1974–2040.

Zittrain, J. (2008), *The Future of the Internet and How to Stop it*, New Haven, CT: Yale University Press.

Zittrain, J. and Edelman, B. (2003), 'Documentation of Internet Filtering Worldwide', in C. Hardy and C. Moller (eds), *Spreading the Word on the Internet: 16 Answers to 4 Questions*, Vienna: OSCE, 137–148.

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