Ray Corrigan[1] response to DG Information Society and Media public consultation on the open internet and net neutrality

4.1. The open internet and the end-to-end principle

Question 1: *Is there currently a problem of net neutrality and the openness of the internet in Europe? If so, illustrate with concrete examples. Where are the bottlenecks, if any? Is the problem such that it cannot be solved by the existing degree of competition in fixed and mobile access markets?*

Yes there is a problem in Europe and no it cannot and is not be solved by existing competition. The framing of the problem (or what Russell L. Ackoff[2] might describe as a systemic mess) and what to do about it will be heavily influenced by the way that policy makers define the issue of net neutrality and what is meant by widely used but ill-defined terms like 'competition' in this context.

The net neutrality or end to end principle classically described by Saltzer, Reed and Clark[3] was a technical description of one of the central principles of internet architecture: that the network should remain 'dumb' and the 'intelligence' should reside in the devices at the ends of the network. Network owners should not be able to control the flow of communications packets or as is sometimes said by purists – 'all bits are created equal'. What this means in real terms for internet users and policymakers is that the network was open to everyone – not just trusted or approved sources – and that there were four generic types of freedoms associated with it:

1. Net users should be entitled to access any legal internet content they choose to access
2. Net users should be able to run any applications on their general purpose computers or other devices or use any service they choose
3. Net users should be able to connect any legal devices to the network without having to ask anyone's permission – just as we can connect a toaster or a TV to the electricity network without requiring permission
4. The network and the regulatory environment should facilitate 'competition' between network providers, application providers, service providers, content providers, device providers, network infrastructure investors/builders. But we have to be careful to understand what we mean by 'competition' in each of these different contexts

Net neutrality could loosely be argued to be the current state of affairs. However, the network is already sustaining more users that it was built for and those users' effective demand for the facility of infinite bandwidth and zero latency is growing. Throttling and traffic management are standard practice (and given network congestion, necessarily so) amongst network operators and, for example, download speeds are up to 25 times higher than upload speeds. Changes in network and device architectures and information laws in a whole range of areas from anti-terrorism measures to intellectual property and ecommerce provisions mean items 1 to 3 above are under threat, if not already notably damaged. And although it is widely assumed that, for example, the UK broadband market is 'competitive', that supposed 'competition' is not leading to the widespread construction of superfast broadband infrastructure or

preventing the common and misleading advertising by service providers about broadband speeds.

The explosion of social and cultural creativity and commercial innovation on the internet in the wake of Tim Berners Lee's development of the World Wide Web was a function of the existence of

- general purpose computers – that could be programmed to do whatever the user wanted
- the open network

Because no one controlled the computers or what people could do on the network and no permission was required, a wave of creativity was released leading to enterprises like Amazon, Google, Napster, iTunes, Facebook, Wikipedia, Twitter, Yahoo pipes and (the main European contribution) Berners Lee's world wide web itself. It may be instructive – I couldn't say – that most of the commercial innovation success stories are US rather than EU based.

As we move increasingly into a world of locked down devices like the iPhone and an evolving oligopolistic/monopolistic environment of network operators with 'intelligent' networks, with the ability to discriminate built into the DNA of the network, policymakers in particular need to acutely alert to the potential impact of that concentrated level of control on

1. basic human rights like privacy and freedom of speech – these are increasingly important as more and more of people lives are tied up with and invested in our online personas, digital shadows and personal digital data litter.
2. social and cultural creativity
3. innovation in services, devices, content, infrastructure – we may never know we would use the next Google or Wikipedia because we never get to experience it, if an incumbent operator denies the innovator access to the network or discriminates in such a way as to kill their innovation

James Boyle eloquently describes the net neutrality as the open road of the internet – a public utility which enhances the value of the property connected to and by it.[4] He also suggests that we generally have a serious cognitive limitation which causes us to fail to recognise the value of free, open or commons' resources because the kind of freedom that leads to productive output on open networks is counter-intuitive. The success of non proprietary systems – ranging from open source software to Wikipedia and the open internet itself – fills us with surprise, a kind of collective "cultural agoraphobia."

The danger in that cultural agoraphobia is that it will lead us to fail to protect the open network we have had; and perhaps kill off a future innovation that might provide the future equivalent of a gay, Iraqi blogger 'speaking' to an audience of millions. Hence the burden on policymakers to be vigilant in this context is a heavy one with the essential need to maintain a focus on Commissioner Kroes' key principles:

1. Freedom of expression but also privacy

2. Transparency
3. Infrastructure investment in efficient and open networks
4. Fair competition between network providers, application providers, service providers, content providers, device providers, network infrastructure investors/builders – competition that is clearly defined, properly regulated, monitored and enforced where necessary
5. Support for innovation and monitoring and prevention of discrimination against innovators

Question 2: *How might problems arise in future? Could these emerge in other parts of the internet value chain? What would the causes be?*

If the architecture of the network is such that discrimination is possible then discrimination will happen.

The fundamental incentive for discrimination, in this context, is the bottom line of the network operators. If network operators are considered to be rational economic actors then traffic that provides a decent proportionate return on costs will be favoured and traffic which shows insufficient financial returns or has a negative impact on the operators business will be discriminated against.

So, for example, the incentive will be to discriminate against high volume peer to peer traffic, competitors traffic where that can be identified as is possible with increasingly 'intelligent' networks, audio/video/gaming/VoIP on demand, high congestion inducing traffic of various kinds (e.g. high bandwidth, zero latency), and Net users engaging in communications which the network operator might disapprove off. This latter traffic spans the spectrum from nefarious criminal and cybervandalism activities at one end of the scale to legitimate political and other speech (e.g. perhaps simple criticism of telcos) at the other end of the scale. There is evidence from the US that some filter software companies, for example, blocked websites that were critical of filter software.[5] In addition there are obvious incentives for network operators to provide priority to traffic from partner/contractually linked organisations.

Question 3: *Is the regulatory framework capable of dealing with the issues identified, including in relation to monitoring/assessment and subsequent enforcement?*

That’s a difficult question. If you’re operating a typical EU co-regulatory approach including NRA monitoring and agreed industry codes, assessment of published documents, from the NRA or industry, pertaining to network operators' required operating procedures is relatively straightforward. Actually ensuring operators are following the letter and the spirit of the required standards is more difficult. Measurement of actual operations and net user harm is complex and the temptation would be for an independent auditor (NRA?) to measure metrics which are easy to measure rather than those that provide truly informative indicators of sector practice. The difficulty in measuring market/consumer/citizen/net user/societal harm, in ways that will provide valuable insights, is potentially intractable.

This consultation sensibly calls for evidence to provide guidance on how to move forward on the regulation of net neutrality and traffic management. Whilst that is an admirable approach - I'm all for evidence based policymaking, something which

seems all too rare in recent times - there is a remarkable lack of hard empirical evidence to guide policy on net neutrality. That tells us two things. Firstly we should be investing quickly in much more empirical research to inform policy. Secondly we should be making policy decisions only at a general principle level - e.g. an overriding principle to guarantee an open network for example – until we have gathered sufficient robust evidence to inform more detailed policy decisions.

4.2. Traffic management/discrimination

Question 4: *To what extent is traffic management necessary from an operators' point of view? How is it carried out in practice? What technologies are used to carry out such traffic management?*

Until we can cut the Gordian knot on large scale investment - from the public and private sectors – in universal super fast broadband infrastructure, congestion problems are going to be ever present and increasing; and traffic management will continue to be essential from an operator's point of view.

Independent empirical research is required on how this is done in practice and on the technologies involved.

Question 5: *To what extent will net neutrality concerns be allayed by the provision of transparent information to end users, which distinguishes between managed services on the one hand and services offering access to the public internet on a 'best efforts' basis, on the other?*

Transparency on traffic management whilst very important is never going to be enough on its own. Understanding their internet connection is being throttled during times of congestion does not give the internet user the power or the tools to do anything about it, particularly if there is no open network alternative available at a reasonable cost.

Question 6: *Should the principles governing traffic management be the same for fixed and mobile networks?*

Ultimately yes. There are significant technical challenges to overcome and congestion problems are acute, but if we ever get to a point where there is a universally accessible wired and wireless superfast broadband infrastructure, there is no reason to apply different principles dependant on mode of access.

Why did Google get accused recently of doing an apparent u-turn on their stance on net neutrality in reaching an agreement with Verizon? Well Google are betting on a big future for wireless as well as wired networks and in the wireless world. And in the wireless world where they are competing with the highly controlled architecture of the iPhone, the most important thing for Google is that the platforms stay open (i.e. Android based) and Verizon is an important partner to have in that endeavour.

Market forces will dictate that the large incumbents, as rational economic actors, will do deals in their own interests and those interests may or may not line up with the

interests of Net users generally, in relation to the four freedoms of net neutrality specified in my answer to question 1 above. The – admittedly complex – task for regulators is to create an environment where the economic externalities are such that the interests of the incumbents, as far as possible, can be made to line up with those of net users.

Question 7: *What other forms of prioritisation are taking place? Do content and application providers also try to prioritise their services? If so, how – and how does this prioritisation affect other players in the value chain?*

There is a desperate need for robust independent research on this and little or no direct empirical evidence on content and application providers practices at the moment.

Question 8: *In the case of managed services, should the same quality of service conditions and parameters be available to all content/application/online service providers which are in the same situation? May exclusive agreements between network operators and content/application/online service providers create problems for achieving that objective?*

Should the same QoS be available to all? Yes. Will it? No. Without a non-discrimination principle, exclusive agreements between network operators and content/application/online service providers and subsequent discrimination to the detriment of parties not included in such agreements will be a natural emergent property of market forces.

Question 9: *If the objective referred to in Question 8 is retained, are additional measures needed to achieve it? If so, should such measures have a voluntary nature (such as, for example, an industry code of conduct) or a regulatory one?*

The non discrimination principle requires regulatory authority if it is to have any effect.

4.3. Market structure

Question 10: *Are the commercial arrangements that currently govern the provision of access to the internet adequate, in order to ensure that the internet remains open and that infrastructure investment is maintained? If not, how should they change?*

Large scale investment in infrastructure construction is a potentially risky venture for any economic actor unless they have the subsequent power to control, monetise and derive a rapid payback and significant return on that investment once the superfast network has been built. Neelie Kroes asked, in her Net neutrality in Europe Address at the ARCEP Conference,

“Would the bottlenecks and other problems disappear if we manage to foster investment in new and open networks?”

And
“Would regulation promoting more infrastructure competition be reason enough to bring a lighter touch to net neutrality?”

We should also be asking how do we foster investment in infrastructure and what does “infrastructure competition mean?

There is little evidence of the universal construction of superfast broadband infrastructure. Likewise the use of words like 'competition' or 'competitive' also more often confuse rather than enlighten the debate as these words come with certain underlying assumptions and hide a raft of complexity beneath the surface. For example the UK broadband market (fixed and wireless) is considered competitive but what does that really mean? A ‘consumer’ can choose one of a range of ISPs who control the switch at their local exchange or alternatively a hybrid cable operator like Virgin, (if Virgin happens to have cable in that locality). So in reality the net services are still travelling down the same potentially noisy unreliable ISDN line whichever ISP the customer is paying; and switching in practice, if someone can brave that particular minefield (I have and it was painful), may have very little effect on quality of service. Regardless of the ISP claiming ‘up to 10M’ if you’re 2 miles from the exchange the best you’ll get on that line with any of the ISPs controlling the switch in the exchange is 3M. One of the assumptions flowing from the idea that the market is competitive is that consumers will make informed choices – a big assumption. Another big assumption, in a supposedly competitive market, is that incumbent suppliers will have an incentive to invest in high speed infrastructure to generate a competitive advantage. But the kind of competition we have in the UK is demonstrably not leading to universal superfast infrastructure construction, although companies like BT and Virgin are starting to make fibre optic infrastructure available in densely populated areas.

We cannot blame the network operators for engaging in rational economic actor behaviour in this respect, as David Isenberg and David Weinberger explain in ‘The Paradox of the Best Network’, http://netparadox.com/ Fundamentally it is too risky for a network operator to invest large amounts of capital in infrastructure if they are not going to be able to guarantee they have control of that infrastructure in a way that will facilitate a reasonably rapid payback period and a significant and durable return on investment and operations.

That issue of the construction of super fast broadband infrastructure is a key one. There is a serious need for private and public sector investment in broadband infrastructure. Yes the EU is experiencing some tough economic conditions but there is an argument to be made that in times of economic duress, (according to John Maynard Keynes in 'General Theory of Employment Interest and Money'), that is precisely the time we should be investing in further economic and society enhancing infrastructure. In simple terms, paying one person to dig a hole, another to stick fibre optic cable in it and yet another to fill it in could be one way to help the economy out of recession.

4.4. Consumers – quality of service

Question 11: *What instances could trigger intervention by national regulatory authorities in setting minimum quality of service requirements on an undertaking or undertakings providing public communications services?*

It is difficult to see how NRAs can specify, monitor or enforce minimum QoS requirements prior to the deployment of a universally accessible, open, superfast broadband infrastructure. Until then minimum QoS will have to be so low as to be useless or a minimum standard that network operators can't meet in practice during congested periods, unless specific forms of traffic are allocated regulatory priority which is probably unrealistic.

It is possible that until we can get a decent universal broadband infrastructure in place it may be incumbent on the regulator to find some way of guaranteeing minimum QoS in relation to the operation of and access to essential services. But how that might be done in practice is a difficult question to answer. As I said in answer to question 3 above - measurement of actual operations and net user harm is complex and the temptation would be for an independent auditor (NRA?) to measure metrics which are easy to measure rather than those that provide truly informative indicators of sector practice. Then enforcement of minimum standards absent adequate knowledge of actual service levels becomes extremely problematic.

Question 12: *How should quality of service requirements be determined, and how could they be monitored?*

This is something of a moot point for the reasons outlined in my answer to the previous question but monitoring and ensuring operators comply with minimum QoS standards is extremely difficult in practice.

Question 13: *In the case where NRAs find it necessary to intervene to impose minimum quality of service requirements, what form should they take, and to what extent should there be co-operation between NRAs to arrive at a common approach?*

There is no easy answer to this question. I would say that should an NRA find a pragmatic way forward on this in the context of their own member state then the need for cooperation between NRAs to arrive at a common approach should be a secondary consideration.

Question 14: *What should transparency for consumers consist of? Should the standards currently applied be further improved?*

One simple first step is the banning of advertising promising “unlimited” downloads and “up to” speeds. In addition, before thinking about further improving current standards on transparency more work is needed in enforcing current standards. Customers should be made clearly aware of maximum achievable speeds, capacity limits, minimum QoS and traffic management practices. Serious thought is required on how to communicate these to consumers in a way which is clear and accessible. The facility to act on that information, however, is dependent on the network user having access to an effective range of affordable competitive options including

network operators who offer a neutral (or open) network facility, something not currently available in the UK (despite the fact that the UK is perceived as having a 'competitive' market)

Question 15: *Besides the traffic management issues discussed above, are there any other concerns affecting freedom of expression, media pluralism and cultural diversity on the internet? If so, what further measures would be needed to safeguard those values?*

There are serious concerns about freedom of expression, media pluralism and cultural diversity on the internet when the environment is such that the controls of the information flows on the net fall into the hands of an evolving oligopolistic marketplace; and when governments of all hues are concerned with monitoring and controlling such information flows. Parallel monopolistic and/or oligopolistic market environments, combined with network architectures facilitating control, will make censorship more likely and media pluralism and cultural diversity on the internet less so. It is easy enough to identify regimes like Iran, China and Saudi Arabia which have shown a propensity to engage in censorship by building the tools of censorship into their networks. However, laws in the UK, EU, US and a range of other Western democracies require surveillance capability to be built into our communications networks, large scale data retention and the construction of large databases of personal information, all in the name of combating terrorism, crime or protecting children and intellectual property. Wide scale censorship of the Net takes place not just in China and Saudi Arabia but in the UK, parts of the US, Canada, Spain, France, Australia, Germany and many other countries in an attempt to block such horrors as child pornography or Nazi propaganda. Arguably the censorship provisions of the UK's Digital Economy Act 2010 facilitate the building of a great firewall of the UK every bit as intimidating as the great firewall of China. Net neutrality is crucially important in the context of media pluralism and cultural diversity but arguably a greater threat to both is the current and evolving state of intellectual property laws.

4.6. Any other issues

Although I have responded to all the questions in the consultation it doesn't seem as if I've even scratched the surface of the complexities involved in this issue. So there were just a number of extra short points I would wish to make.

Firstly for anyone involved in net neutrality policy, Chris Marsden's book, *Net Neutrality: Towards a Co-regulatory Solution* (Bloomsbury Academic, 2010) is essential reading. It is a coherent book-length argument about a generic regulatory approach to net neutrality which encompasses many of the nuances and complexities of the subject matter it is impossible to include in a short consultation response.

Secondly I am concerned at the degree to which standard terms like 'consumer', 'competition' and 'transparency' often get misunderstood, unintentionally mislead and obscure some of the complexities underlying the whole area of net neutrality. Achieving transparency or consumer satisfaction can often be seen as ends in themselves in the debate; when they can't come anywhere close to addressing the wider needs society or the marketplace might have in relation to the Net. In an information society, the default rules of the road are the information laws and the

architectures of our information technologies and networks. That makes network operators potentially the key chokepoints for the implementation, operation and some would argue (though I would fundamentally disagree) policing and enforcement of those information rules of the road. So the debate is much more important than whether BT or TalkTalk can provide cheaper and transparent access to a 'consumer' to the same local loop.

So instead of terms like 'consumer' which can hide a huge range of varying stakeholder interests we should probably use terms like 'net users' which more clearly imply a range of stakeholders which spans the spectrum of consumers, citizens, creators, artists, innovators, businesses etc. - the whole gamut of the economy and society.

Thirdly and surprisingly given Neelie Kroes emphasis on the need to support innovation, there are no explicit questions in the consultation relating to innovation and the internet; and in particular whether traffic management might have a detrimental impact on innovation. It can be presumed that in the case of innovations that might be perceived to threaten network operators' positions the network operators will act to inhibit that innovation.

As Jack Osterman of AT&T said in the 1960s regarding Paul Baran's packet switching ideas: "First it can't possibly work, and if it did, damned if we are going to allow the creation of a competitor to ourselves."

Though direct independent empirical evidence that traffic management will have a negative impact on innovation is in short supply, there is evidence, across a range of sectors, however, that incumbents will act to protect their market position from competition and new entrants.[6]

And whilst I don't really wish to focus on or particularly criticise AT&T, the Hush a Phone case[7] is the classic illustration in the telecoms sector that even when an innovator provides no threat to the incumbent monopoly that incumbent may well be prepared to act in a way that crushes innovation.

Fourthly there is a dearth of independent empirical evidence generally informing the debate on net neutrality. The whole question of the impact of congestion, traffic management, investment (or lack of it) in infrastructure, QoS on net users and the whole value chain would be complicated enough if we did have the evidence to begin to make some rational judgements on balancing the needs of the various stakeholders. Without comprehensive, solid, independent, empirical data on industry practices and their real impacts, we can only guess at the necessary policies and the temptation might be to operate a light touch on net neutrality. Some stakeholders and commentators will approve of such a light touch. Others (eg Lessig[8]) would suggest that net neutrality may be doomed in the absence of appropriate regulatory framework. In the absence of a market environment encouraging the competitive construction of superfast infrastructure I lean towards Lessig's perspective but without robust empirical research it is difficult to be confident.

Finally, we should be looking, as a matter of policy principle, at guaranteeing, in the long term, universal access to an open or neutral internet. Internet access, in the EU, is

a fundamental part of access to education, essential services, employment, business operations, as well as simple entertainment or online retailing. The regulatory principles governing the internet therefore become crucial to the future of our society and economy in ways that we would not have conceived of a mere 20 years ago. Given its importance now, though, the key priorities for the EU Commission should be:

1) in creating (and investing in) an environment that will create incentives for the construction of a superfast broadband infrastructure and

2) in ensuring that there is universal access to via that infrastructure to an open or neutral internet.

---

[1] Senior Lecturer in Maths, Computing & Technology, The Open University, UK.
[2] Ackoff, R.L. (1999) *Ackoff's Best: His Classic Writings on Management* Wiley, New York
[3] J.H. Saltzer, D.P. Reed and D.D. Clark (1981, 1984) *End to end arguments in system design* Second International Conference on Distributed Computing Systems, pages 509-512, April 1981. ACM Transactions on Computer Systems, 2(4), pages 277-288, 1984
[4] Boyle, J (2010) The Public Domain: Enclosing the Commons of the Mind. Yale University Press. New Haven & London
[5] See for example Wallace, J and Mangan, M. (1997) *Sex Laws and Cyberspace: Freedom and Censorship on the Frontiers of the Online Revolution*. Henry Holt and Company, New York.
See also http://www.peacefire.org/censorware/ and http://sethf.com/anticensorware/
[6] See for example, Clayton, C. (1997) *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press, Boston. Also Jaffe, A and Lerner, J. (2006) *Innovation and Its Discontents*, Princeton University Press, New Jersey, Oxford
[7] Hush-A-Phone v. United States, 238 F.2d 266 (DC Cir. 1956)
[8] Lessig, L (2006) *Code and Other Laws of Cyberspace Version 2.0* Basic Books, New York