



Ref: Ofcom Traffic Management & 'net neutrality' – A Discussion Document

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Dear Ms Peat,

Thank you for offering us an opportunity to respond to Ofcom's Discussion Document on Traffic Management and Network Neutrality.

The GSMA represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem.

The GSMA welcomes the opportunity to engage with Ofcom in the consultation on Traffic Management and Network Neutrality and, with our UK Operator members, looks forward to continuing dialogue and interaction in building a successful wireless ecosystem supporting key joint objectives including universal broadband coverage, innovation and growth.

Background

The Internet has revolutionised the way business is conducted and individuals interact with each other and society as a whole. Mobile telephony has delivered a new age of connectivity to more than 4 billion people across the globe. These two revolutionary technologies are now being combined into the mobile internet.

The GSM ecosystem is now deploying mobile internet services, using High Speed Packet Access (HSPA)¹ technology, faster than any other mobile technology ever deployed. There were more than 295 networks live, with more than 1800 devices from 150 different suppliers and more than 200 million connections across 120 countries worldwide at the beginning of 2010. The next generation of mobile broadband, namely, LTE is being rolled out in the US, Asia and Scandinavia, and countries considering refarming of 900 MHz & 1800 MHz are allowing LTE to be deployed in a "technology neutral" approach to spectrum allocation.

¹ HSPA refers to High Speed Packet Access and encompasses HSDPA, HSUPA and HSPA+ (also referred to as HSPA Evolution)

Mobile broadband does much more than just provide faster access to online services, it can also bridge the “digital divide” and bring broadband to the people worldwide who have no access to cable or DSL services and are unlikely ever to do so. There are more than 4.5 billion mobile users, covered by GSM, compared with 1.1 billion fixed-line users.

Widespread mobile broadband coverage, coupled with innovative new devices, such as net/notebooks with integrated radio cards or dongles, advanced handheld smartphones such as the iPhone, Blackberry Bold, Android G1, and fixed wireless terminals connecting multiple devices has resulted in exponential growth in data traffic. The continued development of the GSM family of technologies is designed to ensure that the mobile industry can continue to meet this fast growing demand for secure, ubiquitous, always-available and easy-to-use broadband services.

The following section provides comment on Ofcom’s Discussion Document, following the discussion document structure and addressing the Ofcom questions where relevant.

Section 1.6 In Europe the revised European Framework for Electronic Communications Regulation (the Revised Framework) includes some specific changes to legislation designed to prevent the degradation of services and the hindering or slowing of traffic. The revisions, once implemented by the UK Government, will introduce more specific requirements for greater transparency. They will also provide for the UK Government to empower Ofcom to impose a ‘minimum quality of service on the internet’. The European Commission has announced that it will publish a consultation on net neutrality soon

As a general point we would like to point out that quality of service in the internet depends on various aspects which are influenced on different levels. Many of these aspects e.g. transit, content servers, distributed/root DNS and environmental influences are beyond the control of the access network operators and therefore also beyond the control of a national regulator. These different levels of influences on quality of service on the internet should be taken into account before considering an imposition of minimum quality standards.

ix) Under what circumstances do you think the imposition of a minimum quality of service would be appropriate and why?

- To justify intervention, GSMA takes the view that OFCOM would have to prove that:
 1. A degradation is significant and not only temporary,
 2. The market itself is not able to provide services in a sufficient quality, i.e. insufficient competition, and
 3. Less market distorting instruments such as enhanced transparency measures are not sufficient to solve the problem.

- Especially for mobile a minimum quality would be extremely hard to define, monitor and deliver. The capacity in mobile networks is finite and bandwidths have to be shared by all users of particular cells. The quality therefore varies due to the differences in usage and number of customers sharing the same cell. The quality of the radio link between a given end-users' terminal and the closest base station is affected by factors such as; interference from buildings and device limitations which are beyond an operator's control.
- Competitive networks will compete on QoS so the market (as it effectively did for mobile voice) will drive QoS through competition. In these circumstances it is possible that physical constraints (poor access devices, lack of spectrum, lack of backhaul or bottlenecks in other areas) will be the quality bottleneck.

It is difficult to determine quality of service requirements and how to measure them, for transparency to be effective metrics for monitoring QoS on a mobile broadband network need to be determined, as does a reference model to measure performance in a consistent way across networks. The GSMA and its members are actively investigating solutions to these challenges.

The GSMA has also recently produced a brochure on the need for network management to provide mobile access to the internet, which is available for download at http://www.gsmworld.com/documents/Internet_education_FINAL.pdf.

Question i and iii

iii) Can you provide any evidence of economic and or consumer value generated by traffic management?

- Child protection
- Control of SPAM and malicious content
- Emergency Call
- Mitigate congestion and assure connectivity for all users during peak load

Mobile operators use traffic management techniques to support efficient use of spectrum to support multiple users on a mobile network. Consumers benefit in various ways through the management of traffic. Not least by preventing unwanted traffic from reaching consumers (e.g. spam and malware) and allowing the effective and timely delivery of traffic that requires

priority or whose flow cannot be interrupted at any given time (e.g. emergency services, continuous remote health monitoring, HD videoconferencing, etc.).

Different services have different technical delivery requirements to make them work effectively and securely. Consumers and business have different expectations depending on the type of service. Just as content providers offer differentiated services such as standard and premium content for different prices, mobile network operators will offer different bandwidth-products for different consumer needs.

Customers are benefitting from these tailored solutions as only those who want to use special services with superior quality will have to pay for the associated extra costs. Not burdening all other customers with higher costs benefits those customers who are only interested in basic services.

Services in future are likely to be even more sophisticated. In order to deliver the right customer experience, the intelligence of the network will be essential. Innovation and customer satisfaction cannot be achieved through a one-size-fits-all solution.

Traffic management is required for supporting 112/999 calls and in the UK “clean feed” results in child abuse images being blocked by UK ISPs as mentioned in later sections of the Ofcom document. Mobile operators use traffic management techniques to support efficient use of spectrum to support multiple users on a mobile network. In addition the key elements of a data network such as routers require the use of network protocols such as OSPF and EIGRP to dynamically enable re-routing in response to transmission link failure, congestion, enable alternate routing paths for IP traffic & network intelligence techniques including dynamic memory caching and through TCP reassembly of data packets comprising a given traffic stream.

The mobile industry plays an important role as an enabler and creator of new digital applications, content and services that run over the internet including cloud computing and Software as a Service (SaaS). The continued emergence of new business models will preserve consumer choice and safeguard the internet as a rich source of innovation. This requires operators to manage services on their networks, in order to deal with dynamic traffic flows and congestion, and to tailor delivery to the specific individual service requirements, within the limits of finite capacity and network resources.

i) How enduring do you think congestion problems are likely to be on different networks and for different players?

- Will continue to be Enduring
- Data rising exponentially
- Capacity is fixed and finite in the short run (due to radio spectrum allocation)
- Additional spectrum will help but ultimately have to accept capacity issues will always be with us and will need managing

As demand for the mobile internet continues to grow at an exponential rate, mobile operators need to manage the traffic on their networks in order to deliver an optimum consumer experience. Many more devices are being equipped with mobile connectivity, such as

laptops, ebook readers, smart meters, environmental sensors, health monitors, and navigation systems all with differing requirements on data traffic capacity and speed. The traffic that can be carried at any one time on mobile networks is limited by the finite amount of spectrum available. Devices accessing the internet via a mobile base station have to share the available spectrum with other devices in the same area. Mobile operators also have to balance different types of traffic to give priority to certain services such as calls to the emergency services.

Operators do not support an un-managed approach, whereby all services have to be provided on a best-effort basis only. Operators strive to fulfill diverse customer expectations in a very dynamic and innovative market this cannot be achieved through a one-size-fits-all solution. Services in the future are likely to be more sophisticated. In order to deliver the right customer experience, network intelligence will be required and essential.

Section 3: In this chapter we look at why the debate is escalating and why it is therefore timely for Ofcom to examine its position on traffic management and 'network neutrality'. This section provides a brief overview of the evolving structure of the internet and its associated value chain and considers:

- the impact of market developments and changing consumer behaviour; and
- the way in which the debate is evolving internationally and in the UK.

The term "net neutrality" does not yet have a single definition, but overall refers to the relationship between the access providers (fixed and mobile networks) and content providers: websites, applications, services plus terminals (telephones, connected PCs, e-book readers, connected TVs) and the end user or consumers.

The telecommunications sector

It should be noted that mobile networks providing internet access are not exactly the same as fixed-line internet networks. There are key differences which exist between the two types of network used for accessing the internet. First of all, the physical structure of the two types of networks leads to a very large capacity difference in access, backhaul and transmission. Second of all, the usage types are not the same, mobile networks provide ubiquitous nationwide coverage across the UK and are used in different way to fixed line taking advantage of the mobile network capabilities.

Mobile data services, including internet access, are still in their infancy and subject to technological challenges. In order to continue to develop, those services have to be able to continue to grow despite the limited spectrum capacity allocated. It is recognised that any regulatory construct should support operator investment for coverage and necessary

capacity; facilitate the development of new technologies by industries and take into account the operator's need to source and distribute innovative terminals suited to the network's evolutions that allow new applications and usage. Finally an operator must tailor its products/services to the differing needs and expectations of the consumers, establish transparency on the conditions of usage, and keep competing in price and quality to ensure a market based on a choice of competitive offerings and prices.

On fixed networks, congestion already exists and is well documented with the network effects felt by the launch and continued success of the BBC iPlayer. With the commercial launch of other IPTV services (SD, HD, super HD & soon 3D), the rise in usage in fixed broadband will lead to new challenges, especially an expected massive rise in users' average consumption. Consumers are likely to avail themselves of new bandwidth intensive services (e.g. high definition TV) resulting in increase in video traffic streams. Therefore network congestion is likely to become a generalised phenomenon across all types of IP networks and its effects should continue to be highlighted and discussed in any ongoing debate.

Development of traffic management technologies

3.13 There are a number of technical and non-technical ways in which internet traffic is or could be managed in the future. Some of these are outlined below:

- The Transmission Control Protocol is one of main internet protocols and it is used to manage end-to-end connections across the internet in a bit neutral way. It remains the most important means of managing congestion on the internet by moderating individual flows of traffic.
- Using DPI internet traffic can be analysed and classified according to the type of service it is delivering. This can then be used to limit different classes of traffic that are believed to create congestion, or to block illegal content.

Use of DPI:

- Mobile network operators respect customer privacy and data is secured using industry standard encryption techniques preventing eavesdropping and fraudulent use of network resources.

There is rarely a need to deploy DPI which usually refers to the analysing of content. This is not carried out routinely by UK ISPs. P2P traffic and illegal content in the UK can be identified by use of specific protocol numbers and in the latter case by use of proxy filters which block content based on a list of URLs provided by the IWF. Operators do take steps to

meet cyber security objectives in particular to mitigate against malware and trojans distributed by phishing or other attacks such as SPAM, binary SMS or DDoS.

TCP not only can be used to moderate traffic flows by reducing TCP byte window size and forcing re-transmission, but also acts in the opposite way when detecting underutilised links. Many applications and services are designed to increase their flow until saturation or to multiply their flow when saturation occurs in order to continue the connection. It is essential to have a global view of TCP/IP based application behaviour encompassing networks and application and content server behaviour

Effective investment in Internet access can only take place if there is an economic environment that incentivises a rationale and efficient level of network usage. Without such an environment, investment in capacity has a high risk of being fruitless as additional capacity will simply be immediately consumed (default TCP behaviour). Investment efficiency in Internet access is enhanced by establishing transparent, policy based Internet traffic management mechanisms. Such mechanisms may improve quality to services which require it, and imply reasonable steering during busy periods, of the applications which exceed reasonable usage of available resources.

The most difficult question corresponds to the case where traffic management is operated for resource allocation when all the demand exceeds the available capacity:

- Investment in ever increasing capacity can be a solution only if the economic signals for network usage are well signposted, otherwise, investing in new capacity would be useless as any additional capacity may be consumed by applications which waste capacities or are inefficient in network usage
- The network is not always dimensioned to an exceptional circumstance (such as a four yearly FIFA World Cup, since these traffic patterns only last for four weeks, (or In England's case in the first phase of the knockout round); traffic management is always required to ensure that regular applications have decent quality even if the network is overloaded as a result of any specific event
- If traffic management is prohibited and no relevant economic signal is sent to (large) originators of traffic the only solution left to operators is to reject congestion outside their network by limiting interconnection capacity.

Traffic management and discrimination

Questions iv, v, vi

iv) Conversely, do you think that unconstrained traffic management has the potential for (or is already causing) consumer/citizen harm? Please include any relevant evidence.

v) Can you provide any evidence that allowing traffic management has a negative impact on innovation?

vi) Ofcom's preliminary view is that there is currently insufficient evidence to justify ex ante regulation to prohibit certain forms of traffic management. Are you aware of evidence that supports or contradicts this view?

- Traffic management brings consumer benefits as per answer to iii) above
- Innovation continues to flourish in mobile networks
- Prohibition of traffic management through ex ante regulation is not warranted

The GSMA believes there is no evidence that traffic management cause consumer harm rather our answer above in the response to question iii) demonstrates real value of existing traffic management used across UK mobile networks. We support the view that there is currently no need for ex-ante regulation to prohibit traffic management and innovation is alive and well in the mobile eco-system as witnessed by the success of application downloads which have grown exponentially over the last two years.

It is important that mobile operators continue to have flexibility to experiment with new and different service offerings and business models just like all the other players in the internet value chain. Just as content providers offer differentiated services such as standard and premium content for different prices, mobile network operators should be able to offer different bandwidth-products for different consumer needs. The GSMA's view is that all the players should fairly contribute to the funding of the network capacities used.

The mobile industry plays an important role as an enabler and creator of digital applications, content and services that run across the Internet. The continued emergence of new business models will preserve consumer choice and safeguard the Internet as a rich source of innovation. This requires operators to manage services on their networks, in order to deal with dynamic traffic flows and congestion, and to tailor delivery to the specific individual service requirements, within the limits of finite capacity and network resources.

Consumer information and transparency

Ofcom Question vii, viii, ix, x

vii) Ofcom's preliminary view is that more should be done to increase consumer transparency around traffic management. Do you think doing so would sufficiently address any potential concerns and why?

viii) Are you aware of any evidence that sheds light on peoples' ability to understand and act upon information they are given regarding traffic management?

ix) How can information on traffic management be presented so that it is accessible and meaningful to consumers, both in understanding any restrictions on their existing offering, and in choosing between rival offerings? Can you give examples of useful approaches to informing consumers about complex issues, including from other sectors

x) How can compliance with transparency obligations best be verified?

Transparency is important and will address concerns raised when combined with a robust and competitive market

- Transparency allows informed choice by consumers
- Consumers protected under consumer protection law for mis-sale etc
- Existing regulatory action is possible through general conditions applying to public telecommunications services

Transparency is the key to consumers being able to exercise informed choice. Mobile operators are committed to providing consumers with clear explanations of how their mobile internet connection is managed in order to deal with congestion, the efficient operation of services and the quality of the end user experience. Any limitations, restrictions or conditions will also be clearly and proactively communicated.

Network quality of service is merely one link in the internet access chain – A customer's quality of experience (QoE) depends to the same degree on the level of QoS of all the networks gone through, on the servers hosting the services which customers chose to access, the terminal type, its operating system, browser and the type of application used. An alternative approach could be an economics based approach reflecting the amount of bandwidth resources used that encourages network users to work towards efficient usage and so allow a relevant dimension of the network resources. The quality of the internet access also depends on the behaviour of the information society service vendors (ISV) in terms of efficiency, responsibility and non-discrimination.

Are you aware of any evidence that sheds light on peoples' ability to understand and act upon information they are given regarding traffic management?

- Traffic management is highly complex technically and hence difficult to communicate. The GSMA and its operator members are working on how to provide consumers with a clear explanation of how their mobile internet connection is managed in order to deal with congestion, the efficient operation of services and the quality of the end user experience.

How can information on traffic management be presented so that it is accessible and meaningful to consumers, both in understanding any restrictions on their existing offering, and in choosing between rival offerings? Can you give examples of useful approaches to informing consumers about complex issues, including from other sectors

- Simplify the presentation by outlining common definitions and terminology of techniques used
- Simplify by outlining common reasons for traffic management and a common nomenclature

GSMA operator members are firm believers in the notion of the consumer dictating the success of any service or product. That is why mobile operators are committed to giving consumers access to any legal applications, content and services in line with contractually agreed terms and conditions, provided they do no cause harm to the network.

High speed mobile broadband is a relatively new offering and requires continuing investments by operators; it is our contention that operators are free to build a service mix of voice and data at a tariff that reflects these investments. Therefore, operators may choose to offer and build tariffs which include certain applications and services together; others may be optional. It is ultimately up to the consumer to make a decision on which tariff best suits his/her requirements according to clear and transparent information.

The GSMA is of the opinion that consumers' literacy concerning the functioning of the internet and traffic management should be enhanced. We would support the establishment of stakeholder working groups bringing together public authorities, consumers associations, operators and industry associations in order to define a way of effectively delivering information about Internet products and services to consumers. Anecdotal evidence suggests that consumers appreciate the limitations of coverage in wireless networks and that the speed performance limitation in xDSL is constrained by the distance from the 'exchange'. Ofcom in its recent consultation document (section 5.41) considers commissioning of a behavioural economics study on consumer information and transparency. The GSMA would support these efforts and welcome the opportunity to work with the regulator on any research activity.

General Comments and GSMA position on Network Neutrality

1. *Competition is the best way to deliver the choice that consumers and businesses want.*

The GSMA supports an open internet that enables consumers and business customers to access the content, applications and services of their choice, in ways that provide them with the best possible experiences and services. Competition is the key to ensuring that consumers and business customers have as much choice as possible. In a highly competitive mobile services market consumers are able to choose from a wide range of providers and options to access the internet and select offers that best suit their needs. It is consumers that dictate the success of any given service or product. That is why mobile operators are committed to giving consumers access to any legal applications, content and services that are available. Operators may choose to provide packages that included certain applications and services and others that do not. Ultimately it is the consumer that decides which tariff or package best suits his or her requirements.

Transparency is the key to consumers being able to exercise informed choice. Mobile operators are committed to providing consumers with clear explanations of how their mobile internet connection is managed in order to deal with congestion, the efficient operation of services and the quality of the end user experience. Any limitations, restrictions or conditions will also be clearly and proactively communicated.

2. *Operators need to manage traffic to deliver the choice, innovation and customer experiences we all want.*

The mobile industry plays an important role as an enabler and creator of digital applications, content and services that run across the internet. The continued emergence of new business models will preserve consumer choice and safeguard the internet as a rich source of innovation. This requires operators to manage services on their networks, in order to deal with dynamic traffic flows and congestion, and to tailor delivery to the specific individual service requirements, within the limits of finite capacity and network resources. As demand for the mobile internet continues to grow at an exponential rate, mobile operators need to manage the traffic on their networks in order to deliver an optimum consumer experience. Many more devices are being equipped with mobile connectivity, such as laptops, smart meters, environmental sensors, health monitors, and navigation systems. However, the traffic that can be carried at any one time on mobile networks is limited by the finite amount of spectrum available. Devices accessing the internet via a mobile base station have to share the available spectrum with other devices in the same area. Mobile operators also have to balance different types of traffic to give priority to certain services such as emergency services.

Operators do not support an un-managed approach, whereby all services have to be provided on a best-effort basis only. Operators strive to fulfil diverse customer expectations in a very dynamic and innovative market, which cannot be achieved through one-size-fits-all solutions. Services in the future will be ever more sophisticated. In order to deliver the right customer experience, the 'intelligence' of the network will be essential.

3. *The internet is a powerful force for innovation and should remain free to develop. Digital networks and services are a dynamic, progressive part of modern societies.*

The internet is all about democracy, freedom of access to information and continuous innovation and improvement. Its power and adaptability to deliver this has been central to its continuous progression.

Operators will continue to create innovation opportunities for all by ensuring that differentiated services, sustainable business models and innovative devices can be developed, trialed and tested in the market.

The internet stimulates and enriches modern societies. Its uses are as varied and as individual as the citizens and organisations who access it. Operators want to apply open principles to deliver choice, innovation and differentiation. Operators don't want the potential of the internet to be stifled by an indeterminate openness concept.

In order for consumers to continue to benefit from mobile broadband services, ongoing investment is needed in efficient and open networks. Mobile operators will continue to support and invest in the evolution of new internet-based services, networks and infrastructure. However, we require flexibility at every level of the broadband market so that service providers and content providers can negotiate commercial arrangements regarding network operation and content distribution.

Provided there is sufficient transparency to consumers regarding their ability to access or use internet services, applications and content, allowing this commercial flexibility is the best way to develop innovative new business models and expand consumer choice, while at the same time developing efficient uses of network resources. In order to find innovative revenue streams that will support further network investment and lower prices for consumers, network operators need continued flexibility to experiment with different service offerings and business models as all participants in the internet ecosystem.

Network technologies and the resulting digital services that run across them, all need an open, flexible environment to work, evolve, improve and innovate in. Differentiation is driving innovation and enabling new services to emerge that in a 'best-effort' environment could not be successfully provided.

Services in the future will be ever more sophisticated. In order to deliver the right customer experience, the 'intelligence' of the network will be essential.

4. *The European Union's competition law and electronic communications regulatory frameworks underpin openness and transparency while allowing continued innovation in networks, services and business models*

The European Union has robust regulatory and competition law frameworks that protect consumers against anti-competitive behaviour. The revised EU framework for electronic communications includes additional transparency measures that further enhance consumers' ability to make informed choices regarding their internet service. In addition, NRAs dispose of a new reserve competence to prevent a possible degradation of service quality for consumers.

In summary the GSMA position is that there exists in the UK and Europe highly competitive markets for fixed and mobile broadband, pre-emptive regulation that would restrict traffic management² and service differentiation would undermine the digital economy by excluding new business models, locking in today's technologies, and hampering necessary innovation.

We look forward to further engagement with Ofcom in the key areas of network neutrality, traffic management and transparency.

Yours sincerely,

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² GSMA Brochure on Traffic Management; The Internet working for consumers
http://www.gsmworld.com/our-work/public-policy/regulatory-affairs/net_neutrality.htm

Glossary of terms:

DNS – Domain Name System

LTE – Long Term Evolution

HBP – Higgs boson Particle

HSPA – High Speed Packet Access

OSPF – Open Shortest Path First

EIGRP – Enhanced Interior Gateway Routing Protocol

IWF – Internet Watch Foundation

URL – Uniform Resource Locator

SD- Standard Definition

HD- High Definition