

NORDUnet response to Net Neutrality consultation questionnaire

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The below is a response to the public consultation "QUESTIONNAIRE: FOR THE PUBLIC CONSULTATION ON THE OPEN INTERNET AND NET NEUTRALITY IN EUROPE", published by EUROPEAN COMMISSION, Information Society and Media Directorate-General. The response is filed on behalf of NORDUnet (<http://www.nordu.net>).

NORDUnet is the research and education network of the Nordic countries (Denmark, Sweden, Norway, Finland, Iceland); NORDUnet was established as a collaboration of the national R&E networks of the five countries to enable community building, collaboration, and excellence in all areas of research and education. NORDUnet operates a world-class network and e-Infrastructure service for the Nordic research and educational community and participates widely in European and international collaborations.

NORDUnet will be happy to clarify any questions or extend on the contribution below. Please contact Lars Fischer, Chief Technology Officer, tel: +45 3246 2502, email: lars@nordu.net.

Introduction: NORDUnet is particularly concerned with ensuring access and options for collaboration and exchange for researchers and research groups, nationally and internationally. It is important to NORDUnet that researchers, students, and staff navigate in a pervasive, interconnected and coherent e-Infrastructure ecosystem. Connectivity and access to services must be available in all locations, and the internet in its entirety must be accessible as one system, allowing access and use of the full capability from any location. The research and education networks provide unique capabilities to meet the special demands of the community, but can never be an island; access to both large scientific instruments, collaboration tools, community services, social networking, and more are all important elements of the way ICT is used. Likewise, to fulfil its larger role, the research and education community must be able to interact with all sectors of society, and use the full capabilities when engaging in public-private partnerships.

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?*

The Internet will sometimes fragment, break into islands of connectivity, with sub-par connectivity or sub-optimal routes between the islands. Rather than a single, global Internet, we are increasingly seeing multiple global networks, each operated by competing entities or consortia, with a restricted interworking between the global entities. For the research and education community, it is important that while most resources are located and access on advanced

networks built for the community, the community is part of a much larger community and the members of the community move, both in terms of local network access and in terms of geography. Fragmentation of the Internet hurts applications.

A scientific community may need to access large instruments in south America or work with researchers in Asia. This is not always possible to accomplish this using only research and education networks. Research groups may enter into Public-Private Partnership and work on large datasets and state-of-the-art applications with teams based on commercial enterprises, using commercial networks. Researchers will work from home or from mobile units, using high-capacity collaborative applications with partners nationally, in Europe and abroad. In either of these cases, there's a risk that lack of openness will cause traffic to be slow, latency to be high, or access to be unstable.

If this happens, the work of the research teams is restricted; the benefit to society of large-scale investments in scientific instruments and communities is greatly reduced; and Europe is placed unfavorably in collaboration and competition with North America and Asia.

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

Fragmentation of networks may increase, e.g., due to a focus on content delivery inside closed communities of content providers and local access providers. The ability for applications and users to move freely between providers and networks may be limited. This can impact international collaborations, science applications, and advanced media and collaboration tools.

The research and education community is – like other communities – considering emerging cloud-based technologies. Some research and education applications may, e.g., use cloud-based storage services operated by commercial entities. The benefits, flexibility, and cost savings can be dramatic, but can be realized only if interworking of networks is in place.

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

It is important that the regulatory framework can both allow advanced applications on private networks – such as the data delivery network for the Large Hadron Collider (LHC) at CERN – and at the same time ensure the unity of a single Internet. Interworking and advanced collaborative applications are hurt equally by filtering and rate limiting inside networks and by fragmentation of connectivity among networks.

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?*

Traffic management is required to deal with issues of obvious abuse or other malicious activities, such as denial-of-service attacks, bot-networks, etc. In addition, traffic management can be required to deal with short-term events generating traffic surges. The technologies used to protect the network against attacks or malfunction is unfortunately also the technologies used to create islands.

Traffic management can also be required to give preferential treatment to latency-critical applications (i.e., audio) or to isolate demanding applications (i.e., large scale data transfers, scientific applications, large databases) in order to prevent disruption of service for others.

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?*

Where there is already a strong competition in a market, information to customers may help to strengthen those markets. However in many cases it is the lack of competition in networking in certain areas that enable ISPs to lock-in their customers.

In geographic areas where the basic infrastructure of fibers and right-of-way is well established there are often multiple ISP offerings and healthy competition.

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

Yes, for two reasons: 1) Mobile networks are growing in importance and are gradually coming to full more and more of the need for (data) communications. If net neutrality is not implemented for mobile networks, net neutrality will effectively be weakened over times. 2) there is no qualitative difference between mobile and fixed networks for (data) communications. The same protocols and the same applications can be used, with similar evolution in data rates, albeit with mobile trailing fixed networks by some years. Compared to fixed networks, the capacity of mobile networks is limited, but growing. As users shift more usage and more internet time to mobile access, it is important to ensure that the full capabilities and resources of the network remain available and the users are not limited to a subset of service offerings.

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?*

Prioritisation of services can be imagined for, e.g., cloud services. For an international and diverse community such as the research and education community this will lead to inefficiencies. It is the experience of the R&E networking community that over-provisioning is a simple, efficient, and sustainable method for handling resource-planning and providing dependable and robust services. In the long run, over-provisioning makes for predictable network performance, avoids unplanned side effects and inefficiencies, and enables full utilization of available resources, maximizing network value for all users.

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?*

Exclusive agreements and preferential service based on customer relationship with specific vendors or specific service providers will exacerbate the issues of fragmentation of the Internet and lead to a situation where, e.g., deployment of applications and large-scale datasets for Public-Private

Partnerships will require complex analysis of network and service provider relationships in order to achieve performance objectives.

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?*

Governments in Europe should ensure the equal and ubiquitous availability of fundamental network infrastructure: right-of-way and dark fiber connectivity to all players in the market. This will ensure competition in the areas where network neutrality is at risk today, i.e. higher up in the value chain.

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?*

Most commercial operators in the fixed networking in Europe are willing to work with the research and education community to reduce fragmentation and ensure good traffic routes. However, for mobile access and international routes, the connectivity is often indirect or through a limited set of connection points, increasing latency and reducing diversity of access. Some operators are willing to work directly with the research and education community to improve connectivity and ensure maximum benefits of infrastructure investments, while others will only do indirect traffic exchange, limiting connectivity in order to create additional revenue streams. The use of internet exchange points and bilateral peering for traffic exchange is critical to an efficient European and global network infrastructure.

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?*

Minimum quality of service requirements could be set to guarantee interworking between competing global networks, both fixed and mobile, ensuring interoperability of applications across networks. Quality of services requirements could also be set for access to cloud-based services across multiple global networks.

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

There are traditional network quality measures such as latency, jitter, packet drops, etc. that will cover most of the requirements. However, requirements can also be set on traffic routes and local interconnects. Such requirements can be measured with a combination of active and passive networking monitoring equipments.

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?*

The research and education community is by its nature international; large-scale research and education network collaboration exist between European countries. A major concern of this

collaboration is to overcome the digital divide and ensure that all regions of Europe have excellent network access. A shared approach to open access and service requirements would seem to point in this direction.

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

Transparency should ensure the ability to use the full capabilities of the Internet from any network connection, within the limits of that connection, ensuring interworking between organizations and individuals based on separate networks.

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?*

While these are important questions and considerations, this is beyond the scope of this document.