[redacted]

Answers to the open questions

I. What kind of application-agnostic traffic management techniques is used for e.g. congestion management?

[redacted]

One could also argue that over-provisioning best effort is a form of application agnostic traffic management. However, the traditional over-provisioning approach is no longer economically sustainable, i.e. investment in capacity extension cannot be justified when faced with exponentially growing traffic volumes and ever decreasing price levels at the same time.

Introducing QoS-differentiation and traffic prioritization would allow for a more cost effective approach to satisfy demand than over-provisioning. The increasing quality of transmission requirements of the new applications mentioned, require additional investments from the ISP side. Whether the same quality of service has to be provided to all applications has a huge impact on the scope of the investment. Economic research finds that, to provide the same level of quality to new and traditional applications, ISPs would need to invest 60% more into infrastructure capacity than if differentiation in quality of service is allowed.[2]

[redacted]. Due to limited spectrum availability, resources within mobile access networks will always be limited (i.e. economically scarce). These scarce resources have to be allocated in the most efficient way. This requires a distinction between specific traffic "types" and traffic management based on policies that reflect customer choice with regard to chosen tariff plans (e.g. Faire Use Policy).

The GSMA specifications have featured the following functions from the very beginning: performance management, security management, subscriber and equipment tracing, subscriber and equipment administration and charging administration, Bandwidth management (as implemented in the Home Location Register, HLR), QoS

1 [redacted]

2 ESMT CA, Assessment of a sustainable Internet model for the near future, p. 4

steering and Radio Access Network (RAN) selection. Without such traffic management techniques, an operator is neither in a position to use the limited network resources efficiently (to guarantee an appropriate quality of service to the benefit of all customers), nor to protect the network infrastructure against congestion or outage. Consequently, the key functions of traffic management in mobile networks are necessary prerequisites and had to be agreed upon before launching the first mobile services. As far as mobile IP traffic is concerned, these very basic specifications are application agnostic by design.

II. What technologies (e.g. DPI) are used in the network to differentiate between packets?

[redacted]

i) [redacted];

ii) [redacted];

iii) [redacted];

iv) [redacted].

[redacted]

[redacted].

III. Where are these techniques implemented in the network? (e.g. close to interconnection points)

Please see above.

IV. Are there some plans for implementing additional traffic management practices in the future?

There is a clear need to test new business models in the market. Therefore, forward looking policies that best promote an open and innovative Internet should not get side tracked by discussing "if" network management should be allowed or not. Traffic management remains indispensable to enable the development of new and innovative services. If mechanisms for prioritization were no longer allowed, so-called quality insensitive services that require a relatively large bandwidth would crowd out quality sensitive services.

Traffic management is also an essential mechanism to enable the differentiation of products and services. Different services have specific quality requirements that go well beyond mere bandwidth[4]. Some new services like e-Health even depend on guaranteed levels of quality (QoS). In this respect, traffic management is an enabler for an increased variety of products and services as well as for further innovation on the Internet.

The ongoing discussions revealed that it will be necessary to further develop QoS-mechanisms in order to meet customer demand and ensure true interoperability across network borders. In doing so, players have to be most careful to not restrict future innovation (technologically as well as economically) on the networks themselves as well as on their edge, e.g. in services. To the contrary, the aim is to enable the development of new and innovative services by evolving our traffic management best practices to the benefit of the consumers and the whole internet ecosystem.

[3] [redacted]:
[redacted]

[4] The most relevant parameters today are delay, jitter and packet loss.