Panel: Charging for QoS

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Abstract. Commercial provisioning of QoS enhanced IP services is not yet reality on a per-user basis. This panel plans to identify open issues that need to be resolved for commercial QoS offerings. Open issues include: Charging in multi-provider scenarios, Authentication, Authorization and Accounting, Tariff dimensioning, scalable metering of resource-usage. How to address the open issues significantly depends on the selected approach on charging for QoS. The following, to a large extend opposing positions can be identified for suitable approaches to charge for Internet services.

1 Arguments for QoS-Insensitive Charging of Internet Transport

According to the viewpoint advocated by Odlyzko [1], QoS will not play a significant role in charging for Internet transport. One reason is the trend towards low network utilisation [2]. In such a situation, the possible improvement of QoS mechanisms is low, while their complexity adds significantly to network costs. Therefore, it is likely that the Internet transport will be dominated by best-effort services. As a consequence, charging schemes can be kept very simple. Odlyzko sees cases for QoS mechanisms, together with possible success of QoS-sensitive charging, only for access the access part of the network. For access networks, resource constraints may be unavoidable (in particular for wireless access), and the market is likely to allow for price discrimination.

2 Differentiation of Network-to-Network Charging and End User Charging - The Dual Charge Approach

According to the Dual-Charge viewpoint, as advocated by Wolisz [3], completely different charging approaches have to be selected for the cases of (a) charging between different providers, and (b) charging of end users [4]. Charging between differ-
ent network service providers can be kept simple and based on network metrics. Volume based charging, where the price of different QoS classes would vary according to the QoS level, would satisfy the requirement for network-to-network charging. On the other hand, end user charging should not be based on network level metrics, but on application metrics of which users are aware of. End user charging schemata must reflect application service semantics. This avoids that end users get charged based on usage data such as byte volume that is highly dependent on specifics of lower layers.

3 Subjective Assessment of Audio and Video Quality

The work of Sasse [5] focuses on the factors that influence the subjective assessment of audio and video quality. As previous research has shown there exists no direct relationship between subjective assessment of audio and video quality, and objective QoS parameters. Therefore, the factors that affect subjective quality assessment have to be considered for end user charging. Recent work on the subjective assessment of audio and video quality [6] has shown that factors such as users’ task and level of experience and whether users are required to pay for that quality significantly influence subjective ratings of the same objective quality. The work by Sasse establishes a relationship between the media quality experienced by users of networked multimedia applications and user cost, which is defined as stress. Advantages can be expected if charging schemes for audio and video take this relationship into account.

4 Lightweight Policing and Charging

According to the viewpoint of Briscoe [7] et al., QoS differentiation may be achieved by combining a lightweight, packet-granularity based charging of end users with a simple network that provides classification and scheduling at routers, but no policing [8]. In this approach, the charging functionality emulates policing. It has the advantages that the charging functionality can be implemented mostly within the end system, and can be separated from the data path. Functions that can be implemented within customer systems include metering, accounting and billing and also per-packet or per-flow policing and admission control. The resulting simplicity of the provider network allows for lower costs. As shown in [8], the approach is suitable for inter-provider charging, multicast charging and open bundling of network charges with those for higher class services.

5 Relation of Tariffs and Network Dimensioning

In the viewpoint of Roberts [9], the most important element for providing QoS is admission control. A number of difficulties arise when a providers offers different quality levels on a per packet level as e.g. according to the DiffServ approach. Moti-