Improving Quality of Business in Next Generation Telecom Networks

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INTRODUCTION

Business processes in telecommunication sector have evolved from rigid structures to a highly competitive environment due to the dynamics of the open market. Future telecommunications infrastructure are expected to be built upon the concept of next generation network (NGN) referring to an architecture of telecommunication core and access networks, which assumes transport of all information and services over a common network, typically built around the Internet Protocol (IP).

Many service providers (SPs) are looking to NGN services as a means to attract and/or retain the most gainful users. In NGN users are expected to choose the SP offering the best price and quality of service (QoS) combination. As a result, SPs operating in the same telecommunication market will end up competing for users by adjusting QoS they offer and the price they charge for their services.

Quality of NGN services can be estimated based on the three aspects: QoS, quality of experience (QoE) and quality of business (QoBiz). The main goal for SP is to maximize his revenue while providing users the required QoS at the acceptable price. QoS can be defined as a set of characteristics of a telecommunications service that bear on its ability to satisfy users' requirements (ITU-T E.800, 2008). While QoS is related to the service performances that can be measured and controlled, QoE relates to the experience realized by a user when using the service and it depends upon users' actions and subjective opinions. In addition to SPs' aspirations to ensure the required QoS to their users, profitability is of the most impor-

tance to them. QoBiz in particular covers service providers' profitability. It deals with the financial aspects of service provisioning and refers to all those parameters that are expressed in monetary units. QoS, QoE and QoBiz are integral parts of a service level agreement (SLA) which can be contracted between two SPs or a SP and a user.

This chapter aims to provide new possibilities for SPs to enhance their revenues using the appropriate pricing scheme. Features and applicability of responsive pricing scheme for charging end users in NGN are discussed. Game theory is used as an underlying concept for the implementation of pricing.

BACKGROUND

Pricing with QoS guarantees has gained a strong momentum in telecommunication networks in past decade. It has led to a new interdisciplinary research area of "Telecommunication Economics", which investigates telecommunication networks from an economical rather than from a technical perspective and allows innovative solutions in network management, control and pricing (Courcoubetis & Weber, 2003).

QoS describes the ability of a network to provide a service with an assured service level but it appears that in NGN QoS differentiation will not provide a suitable economic framework for the trade-off between quality delivered by SPs and willingness to pay from users' side. QoE is an alternative framework for pricing service quality according to the user perception (ITU-T G.1011, 2013). It is affected not only by technical (i.e. QoS)

aspects, but on non-technical aspects of service too, such as service set-up, content, price and customer support, which are essential for both QoE and QoBiz evaluation. The distinction between QoS, QoE and QoBiz metrics in case of Internet services are first emphasized by Moorsel (2001). In Wolter and Moorsel (2001) possible relationships between QoS and QoBiz metrics are pointed out, particularly the effects of QoS degradations on the profitability of e-services. This research considers dynamic relationship between QoS and QoBiz metrics with pricing as an important tool for balancing users' behaviour. Further, for the purpose of evaluating the impact of service composition and utility computing on QoBiz aspects of SPs, a distributed architecture of control systems that manages SLAs is proposed in Machiraju et al. (2002). Yu and Bouguettaya (2007) proposed the model for supporting optimized access of web services through service-oriented queries. Besides QoBiz parameters, this model captures functionality and users' behaviour, as the key features of web services. Bjekovic and Kubicki (2011) address the need for an integration of non-functional aspects of service from the business perspective with aim of improving cooperation among business enterprises. In Radonjic Djogatovic et al. (2013) the model performing transparent mapping from QoS to QoBiz parameters is proposed. This QoBiz model is based on several QoS parameters that significantly affect both users' demand and a SP's requirements from the business perspective.

Telecom provider's QoBiz is tightly related to the selection of the appropriate network pricing method. Price based bandwidth allocation has been the focus of many research efforts that aimed to guarantee an appropriate QoS to users. Some methods allow congestion which results in blocking of the lower-priced traffic classes and the acceptance of the higher-priced traffic classes in case of congestion (Marbach, 2004). The concept of responsive pricing was proposed with the aim to incorporate a feedback generated by the network. When the network announces a price based on the cost of using network resources

price-sensitive users adjust their traffic in accordance of their own network service valuation (MacKie-Mason, Murphy, L. & Murphy, J., 1997). Chod and Rudi (2005) considered responsive pricing with resource flexibility as well as effects of demands variability and correlation, assuming normally distributed demand curve. In Ninan and Devetsikiotis (2005) a model for incorporating pricing in NGNs with users sharing bandwidth under a fixed charge per bandwidth amount was presented. Optimal resource allocation of NGN services under a flat pricing scheme and QoS policies were considered by Kallitsis et al. (2007). Congestion pricing with various user demands over time was analyzed by Hande et al. (2010). With the goal of maximization SPs' revenue the same authors applied the optimal combination of flat-rate and usage-based access price components. The importance of selection of the appropriate pricing method for a business model framework in case of providing assured quality services is emphasized in Ghezzi et al. (2014). An overview of usage-based pricing schemes and accounting protocols that can be used in NGN are given in Radonjic Djogatovic and Kostic-Ljubisavljevic (2015).

PRICING AND QUALITY ISSUES IN NGN

The evolution of networks to NGNs must allow the continuity of, and interoperability with, existing networks while enabling the implementation of new capabilities (ITU-T Y.2012, 2010). Suitable pricing and business models need to be designed which is expected to provide the appropriate incentives for both SPs and users.

Generally, the concept of pricing implies the process of determining prices which should be based on the appropriate pricing model and controlled by a pricing policy. It is expected that competition will force SPs to rapidly create and deploy different pricing concepts with aim of fulfilment a trade-off between providing satisfying

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