**Vesna Radonjic-Djogatovic[1)]**
**Aleksandra Kostic-Ljubisavljevic[1)]**
**Mirjana Stojanovic[1)]**

*1) Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia*
*{v.radonjic, a.kostic, m.stojanovic}@sf.bg.ac.rs*

# QUALITY OF BUSINESS CONSIDERATIONS IN TELECOMMUNICATION NETWORKS

***Abstract:*** *Quality of Business (QoBiz) deals with financial aspect of service provisioning. It can not be considered without taking into account tehnical parameters covered by the term Quality of Service (QoS). Main focus of this paper is to explain the connection between QoS and QoBiz in telecommunication networks. Therefore, general QoS model as well as new developments in quality concept is discussed. In addition we propose a model for mapping QoS parameters to QoBiz.*
***Keywords:*** *Quality of Service, Quality of Business, service price*

## 1. INTRODUCTION

Nowdays there is a need for clear separation of business and technical aspects of service. Business approach should provide a preview of the expected quality level and technical approach should cover a more detailed overview of Quality of Service (QoS). It is evident that Quality of Business (QoBiz) strongly depends on technical aspects of service. Hence, those aspects should not be observed separately.

In this paper we propose a QoBiz model based on several QoS parameters that significantly affect users' and providers' requirements from business perspective.

The rest of the paper is organized in the following way. In Section 2 quality concept in telecommunication networks is disscused. In Section 3 QoBiz requirements are considered and a new model is proposed. Conclusions are given in Section 4.

## 2. QUALITY CONCEPT IN TELECOMMUNICATION NETWORKS

QoS is mainly technical parameter that has significant role in ensuring appropriate support for many types of applications, which may have different QoS requirements. It is refered to service performances that can be measured and controlled. The formal definition of QoS is as follows: "the ability of a network or network portion to provide the functions related to communications between users" [1]. QoS presents an important framework for network provider, but it is not automatically usable in specifying performance requirements for certain network technology.

As shown in the Figure 1 there are three levels of QoS in the general model: intrinsic, perceived and assessed [2]. Intrinsic QoS includes all service features determined by network efficiency, resources, provisioning, etc [3]. It is referred to Network Performance (NP) (by ITU and ETSI) as a strictly technical issue

which is crucial for user's perceived and assessed quality. Intrinsic QoS parameters are usually related to the networking technology used. The most common intrinsic QoS parameters in IP networks are: IP packet Delay Variation (IPDV), IP packet Error Ratio (IPER), IP packet Loss Ratio (IPLR), and IP Packet Transfer Delay (IPTD) [4].

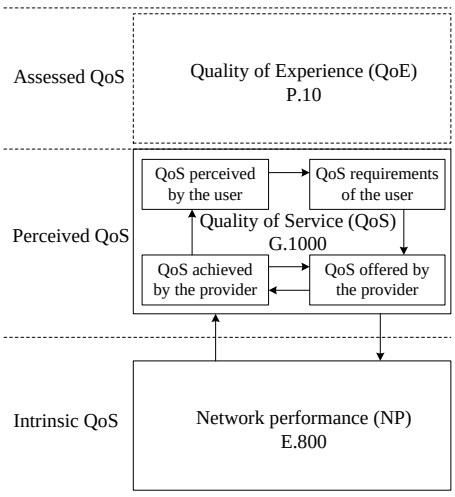


***Figure 1. ITU-T terminology and standards in relation to the general QoS model***

The perceived QoS is related to the user's experience with a certain service. It is frequently expressed in a non-technical way. Perceived QoS is influenced by many user-specified aspects, including their experience with a similar service and other users' opinions. In order to improve their position in NGN market, it is crucial for service providers to take into account user's expectations in process of designing business strategies and new services' offers. The effect of QoS offered by the provider (accomplished by using the appropriate network mechanisms and techniques) is observed as QoS achieved by the provider. Both are expressed in mostly technical terms. Finally, QoS perceived by the user can be determined (Figure 1) ([5],[6]). The assessed QoS reflects user's decision whether to continue using the service or not [2]. It depends on the perceived quality, price of the service, and provider's reaction to user's complaints. Those issues are covered by the term Quality of Experience (QoE), defined in [7].

Different sets of QoS parameters can be used according to the considered QoS level in the general model. Requirements from the users' perspective are defined in a way meaningful to them. They are specific to a particular service and are independent of the networking technology.

Quality concept in telecommunication networks can be observed by technical and non-technical characteristics. Service Level Agreement (SLA) between an end user and a provider encompasses definition of quality parameters and their assessment criteria. SLA can control a service price, as well as responsibilities and guarantees of all parties involved in providing and utilization of a service. It can cover many different aspects, from business and technical arrangements of related service to penalties that may occur if the level of service falls below previously settled.

In order to cover different areas related to quality in NGN, numerous key terms can be distinguished: NP, QoS, Class of Service (CoS), Grade of Service (GoS), Quality of Resilience (QoR), QoE and QoBiz. There is a tendency to use the term Qo*X* with the aim of covering some of the previously mentioned aspects of quality [3]. In this paper the focus is set on QoS and QoBiz and mapping between them.

## 3. QUALITY OF BUSINESS

For providers, besides technical quality and users' opinion regarding it, profitability is the most important. QoBiz especially covers the service provider profitability. It deals with the economical

aspect of service provisioning such as service price, service provisioning costs, revenue from the service provisioning, revenue per transaction, lost transactions etc. In general, QoBiz parameters represent all those parameters that are expressed in financial units. QoBiz can be tightly connected to the SLA. As users' needs are constantly evolving, as well as competition between service providers, SLA becomes more complex. According to the more precise interpretation, it as a monetary value that matches the quality of delivered service. The connection between them should be defined within the SLA [8].

QoBiz must be related to both cost and revenue. For an efficient service provider it is very important to identify those quality categories that affect its QoBiz. Besides those categories are related to QoS categories, they are not automatically identical. Several categories can be notable: performance, security, regulatory and interoperability and business suitability ([3],[9]).

Performances that refer to the efficiency of the service provided by the term of business activities include response and processing times, throughput rates and resource utilization.

Security refers to the ability of information protection. It emphasizes necessity to provide protection from unauthorized persons or systems. Security encompasses different actions, such as identification, authorisation and tracing.

Regulatory and interoperability are related to availability of services to support the existing regulations. Also it refers to the degree of service's ability to interoperate with other services. Supported standards are related to service capability to support other regulations that may be significant within the domain.

Interoperability concerns the question of whether a new service is capable to interoperate with the existing services. This is assessed based on the interoperability of the organizational roles and responsibilities and the interoperability in terms of the information structure.

Business suitability can be described throughout business domain adequacy, effect on collaborative practices and reputation within the sector. Business domain adequacy refers to how well the service corresponds to the defined problematic of the domain, in terms of the domain coverage (applicable area of services), and flexibility to major changes that may occur in the collaborative context. Effect on collaborative practices refers to which extent the collaborative practices (for which the service provides support) are supported and to which extent they would have to be aligned if the service would be used. Reputation within the sector refers to how well the service is perceived by others business actors inside the sector or within relevant communities.

Business function of a service provider in NGN relies on features such as pricing, market modelling, cost and risk consideration as well as network design. In order to provide appropriate encouragement for providers, as well as end-users, appropriate business and pricing models need to be designed.

In related literature, for the development of QoBiz model usually a bottom-up approach was applied [9].

### 3.1 New QoBiz Model

In the proposed model, at each stage of the model development, attention was paid to collect and formalize only the relevant requirements regarding QoS from the business perspective. Steps preceding development of the model include:

1. Selection of QoS parameters that significantly affect QoBiz requirements.
2. Identification of key QoBiz parameters.
3. Finding the most appropriate solution for mapping QoS to QoBiz.

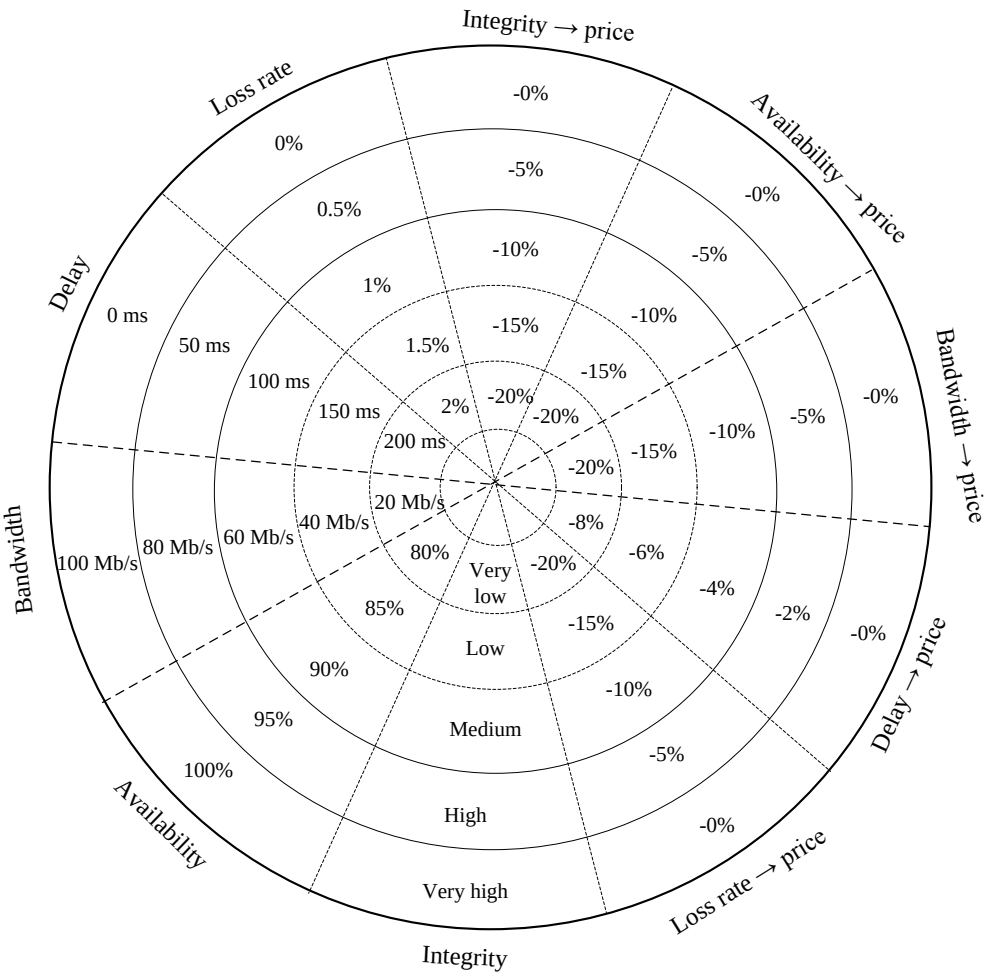


***Figure 2. Mapping QoS to QoBiz***

In the first stage, we have considered which QoS parameters would be most appropriate for mapping to QoBiz. Beside traditional QoS parameters, such as delay, loss rate and bandwidth, we chose two additional parameters, availability and integrity. Hence, the following set of QoS parameters is considered:

1) Delay refers to the delay in response and processing times under stated conditions.
2) Loss rate, meaning average percentage of lost packets during specified time period.
3) Bandwidth is interpreted as available bit rate.
4) Availability refers to a percentage of time the service is able to perform its required function.
5) Integrity is defined as the degree of protection from unauthorized access of data or its modification.

In the second stage, we have considered several QoBiz parameters, such as service price, cost, service provider's profit etc. In this research, we focus on a single QoBiz parameter, service price. Finally, in the third stage, for the purpose of this research, we propose the spiral solution for mapping QoS to QoBiz

(Figure 2). We defined different settings for each QoS parameter: loss rate (0%, 0.5%, 1%, 1.5% and 2%), delay (0ms, 50ms, 100ms, 150ms and 200ms), bandwidth (20Mb/s, 40Mb/s, 60Mb/s, 80Mb/s and 100Mb/s), availability (80%, 85%, 90%, 95% and 100%) and integrity (very low, low, medium, high and very high). Each of these values corresponds to specific price reduction, as it is illustrated in Figure 2. Price reduction is cumulative, which implies that a service with the worst performances by all QoS parameters would have 88% price reduction compared to service with the best performances (full price, i.e. 0% price reduction).

## 5. CONCLUSION

In last decade there are certain tendencies towards movement from conventional QoS to specific quality concepts that cover different issues such as users' perception of quality and business aspects of quality in telecommunication networks. QoBiz, as an indicator of a service provider's business performances, requires special considerations. It has a significant role in provisioning service quality in telecommunication networks.

In this paper, we have addressed basic requirements regarding QoS from the business perspective. We have proposed a QoBiz model based on several QoS parameters that significantly affect service price, defined as a QoBiz parameter. The main innovation of the proposed model is that it performes transparent mapping from QoS to QoBiz parameters. Moreover, it allows business stakeholders to define non-technical aspects of service and to associate them with tehnical aspects of service.

## REFERENCES:


[1] ITU-T Recommendation E.800. Definitions of terms related to quality of services, Geneva, 2008.

[2] Hardy, W. C. (2001). *QoS, Measurement and Evaluation of Telecommunications Quality of Service*. John Wiley & Sons. Ltd.

[3] Stankiewicz, R., Cholda, P., & Jajszczyk, A. (2011). QoX: What is It Really? *IEEE Communications Magazine*, 148-158.

[4] ITU-T Recommendation Y.1541. *Network Performance Objectives for IP-based Services*, Geneva, 2002.

[5] Gozdecki, J., Stankiewicz, R., & Jajszczyk, A. (2003). Quality of Service Terminology in IP Networks. *IEEE Communications Magazine, 41*(3), 153-59.

[6] Handbook: *Quality of Service and Network Performance*. ITU-T, 2004.

[7] ITU-T Recommendation P.10, *Vocabulary for performance and quality of service*. Geneva, 2006.

[8] Teh, A. (2009). *Providing Quality of Service for Realtime Traffic in Heterogeneous Wireless Infrastructure Networks* (Doctoral dissertation, University of South Australia).

[9] Bjeković, M., & Kubicki, S. (2011). *Service quality description – a business perspective*. Proceedings of the Federated Conference on Computer Science and Information Systems, 513-520.

**Acknowledgment**: Research presented in this paper was supported by Ministry of Education and Science Republic of Serbia, Grant TR 32025.