Chapter 1

Introduction to Quality of Service

Eva Ibarrola  
*University of the Basque Country, Spain*

Fidel Liberal  
*University of the Basque Country, Spain*

Armando Ferro  
*University of the Basque Country, Spain*

**ABSTRACT**

The advent and rise of broadband technologies and new applications and services have led to a complex heterogeneous scenario in which providing Quality of Service (QoS) has become a compelling issue. Furthermore, the competitive condition of the telecommunications environment has caused user’s perception of quality to become one of the most differential factors for service providers. Due to this fact, QoS must not only attend to specific technical metrics, but more important, QoS criteria should be defined to assure the level of quality to fulfil the users’ requirements. In this new context, the definition of effective user-oriented QoS management models and frameworks has become a matter of contention. This chapter aims to provide readers a comprehensive analysis of the entire significance of a user-centered approach for quality of service management. For this purpose, a review of the most important issues related to the subject is provided.

**INTRODUCTION**

A deep comprehension of Quality of Service (QoS) is essential before attempting to understand any QoS management model. Quality of service may be thought, at first sight, a simple and obvious notion. Nonetheless, an inspection in related literature emerges the complexity of the subject. This chapter analyzes the full significance of quality of service concept. First, a review of the most relevant standards and definitions of QoS is provided. Then, this analysis will be expanded to consider its implications in telecom environments. In summary, this chapter offers an overview about the terms, standards and issues that may be of interest when managing QoS in communications.
BACKGROUND

Quality of service (QoS) can be defined in many different ways. If we break the term down into its component parts, the word “service” can be understood as the provision of value in some domain. Therefore, the connotation of the term “service” will be tightly linked to the considered area: business, engineering, manufacturing, computer science. The meaning of “quality” has changed over time. Quality has been defined as the degree of excellence of a product (Abbott, 1955), bundle of characteristics desired by consumers (Lancaster, 1966), the degree to which a service conforms with specific requirements (Crosby, 1979; Juran, 1999) or the degree of user’s satisfaction with the service (Ishikawa, 1985; Kano, 1984; Parasuraman, Zeithaml, & Berry, 1996). The most progressive views of quality include most of the issues that have been referred in the above definitions: products, services, characteristics, user’s requirements and user’s satisfaction. One example is how the International Standard Organization (ISO) defines quality in ISO 8402 (1986, p.3.1): “The totality of features and characteristics of an entity (product or service) that bear on its ability to satisfy stated or implied needs”. Considering this extension, several quality general frameworks and models like ISO 9000 (ISO, 2005), TQM/EFQM (Dale & Cooper, 1994) and Six-Sigma (Harry & Schroeder, 2000) have been widely adopted and deployed in business and other general environments but, still, none of them has been found to be fully satisfactory for telecommunication environment.

Despite the fact the term “Quality of Service” has been traditionally linked to one specific domain (communications), QoS definition has also evolved over the time. ITU-T Recommendation E.800 (ITU-T, 1994, p.3) defines quality of service as “the collective effect of service performance which determines the degree of satisfaction of a user of the service”. Some authors (TMF, 2005b) find this definition excessively narrow and ITU-T seem to agree with a later revision of this Recommendation (ITU-T, 2008, p.4) which changes the QoS definition to one derived from the ISO 8402: “Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service”. The amended Recommendation adds importance to the user’s perception by remarking:

Of particular interest is QoS experienced by the user (expressed by QoSE or QoSP - QoS perceived). QoSE is influenced by the delivered QoS and the psychological factors influencing the perception of the user. Understanding of the QoSE is of primary importance to help to optimize revenue and resources of the service provider. (ITU-T, 2008, p.3)

This adjustment perfectly reflects the global transition of organizations and standardization bodies from the initial conception of the telecommunications quality of service, which was very much focused on network performance, to a more user-oriented approach. In addition, the increase of Internet use in all ranges of ages and domains has made QoS to become one of the most important differential factor between service providers. End-users are not passive users anymore since they have the opportunity to choose their own provider. Still, users may not know much about the technical aspects of the service and, therefore, they evaluate the level of QoS based on their own perception. This new context together with the current heterogeneous network environment makes it necessary to adopt practical QoS management models that may accomplish the difficult task of relating users’ perception of QoS (QoP) to both network performance and non-network performance parameters.

The following sections summarize the main topics that need to be considered in order to define a QoS model adequate to be adopted in any heterogeneous network and for any kind of service.