Chapter IX
Quality Assurance in the IMS-Based NGN Environment

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ABSTRACT

Commonly understood as the next generation networks (NGN), a composite environment of proven telecommunications and Internet-oriented mechanisms has become generally recognized as the telecommunications environment of the future. However, the nature of the NGN environment presents several complex issues regarding quality assurance that have not existed in the legacy environments (e.g., multi-network, multi-vendor, and multi-operator IP-based telecommunications environment, distributed intelligence, third-party provisioning, fixed-wireless and mobile access, etc.). In this chapter, a service-aware policy-based approach to NGN quality assurance is presented, taking into account both perceptual quality of experience and technology-dependant quality of service issues. The respective procedures, entities, mechanisms, and profiles are discussed. The purpose of the presented approach is in research, development, and discussion of pursuing the end-to-end controllability of the quality of the multimedia NGN-based communications in an environment that is best effort in its nature and promotes end user's access agnosticism, service agility, and global mobility.

INTRODUCTION

In the past decade, the value of information and communication has grown beyond all expectations. The ability to communicate in general is no longer limited to the time-critical transfer of vital information but has become an overall life-

style, tightly interlaced within the social system of mankind.

The communications are no longer limited to the choice of voice, data, or video: their multimedia nature presumes an enhanced end user's experience engaging various services and contents within a single convergent session. Commonly understood as the next generation networks (NGN), a composite environment of proven telecommunications and Internet-oriented mechanisms is established, enabling agile service creation, access agnosticism, and global mobility of end users. The NGN environment is based on the Internet protocol (IP) transport platform and adopts a model of a transparently separated service provisioning platform above a heterogeneous transport and access platform, employing various technologies to accomplish the IP connectivity. Unlike legacy solutions, the NGN tends to be access agnostic; from the functional viewpoint it consists of subsystems—logical groupings of entities that perform precisely defined functionalities—which originate from both fixed and wireless domains and promote unlimited choice of access possibilities (e.g., fixed—DSL, cable—or wireless —UMTS, WiMAX, WiFi). The key objective of the NGN environment is to converge and turn to advantage the benefits of the two communications worlds by combining the controllability, reliability, and quality of telecoms with the flexibility, ease of operation, creativeness, and end users' involvement of the Internet.

Throughout the evolution of communications systems, the issue of quality assurance has been a key measure of successful system operation in order to meet the end user's expectations. However, the nature of the NGN environment presents several complex issues regarding quality assurance that have not existed in the legacy environments (e.g., multi-network, multi-vendor, and multi-operator IP-based telecommunications environment, distributed intelligence, third-party provisioning, fixed-wireless and mobile access, etc.). The existence of multiple separately operated and interconnected domains requires intelligent interconnection mechanisms. On the other hand, the real-time personalized interactive multimedia NGN services require end-to-end quality assurance regardless of the traversed domains. Meeting these two requirements is a complex task and involves careful quality-related planning in each separate domain and harmonization of these on a service-aware end-to-end basis.

QUALITY MECHANISMS

The measure of system performance represents one of the basic evaluation criteria of a successful network, solution or a service from nearly all viewpoints: deployment, operation, and customer satisfaction. In general referred to as the quality, there are basically two approaches to defining, measuring and assessing the success of meeting a specific set of requirements or an expected behaviour (DSL Forum, TR-126, 2006).

The measure of performance from the network perspective is known as the quality of service (QoS) and involves a range of QoS mechanisms that are implemented for the purpose of meeting the defined conditions in the network. Typically, QoS metrics include network operation parameters (i.e., bandwidth, packet loss, delay, and jitter). On the other hand, the measure of performance as perceived from the end user is known as the quality of experience (QoE) and addresses the overall satisfaction of the end user and the ability to meet their expectations.

While the QoS is rather objective approach to assessing the success of performing within a specified network subsection, the QoE is subjective, measured on an end-to-end basis, and involves human-related criteria, based on which certain descriptive indexes of performance are set. Some examples of QoE metrics are the mean opinion score (MOS), degraded seconds, errored seconds, unavailable seconds, etc.