PERFORMANCE TARGETS AND QoS REQUIREMENTS FOR THE SERVICE PROVIDED TO USERS/SUBSCRIBERS OF PUBLIC IP NETWORKS

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ABSTRACT :

The networks created on the basis of the IP protocol have become more and more interesting for users and network operators / service providers, in terms of their possibilities to support the most diverse communications applications. This perspective is also reinforced by the experience gained over the long period of use of the most widespread public IP network, the Internet, which has proven that it can successfully support/implement/develop the most diverse applications through this technology. Thus, in addition to the traditional, native applications of IP-based networks, those supporting data transmission of any kind, this kind of networks have started to be used more and more often for voice communications (VoIP), IP-based telephony) and video (videophone, video conference, etc.). More than that, IP networks have started to implement remote control and control applications, and the development of communication security technologies has even allowed the realization of transactional applications that involve the transmission of secrets through the environment represented by public IP-based networks (electronic trade, online banking applications, electronic voting through public IP networks, etc.).

1. INTRODUCTION

The four distinct points of view on the quality of service can be related as in a diagram shown in figure 1. In situations where the service provider is also a network provider, in the latter position he also assumes responsibilities regarding the quality of the service. The entities "service provider" and "network provider" were separated in figure 1, to make it easier to illustrate all possible relationships.

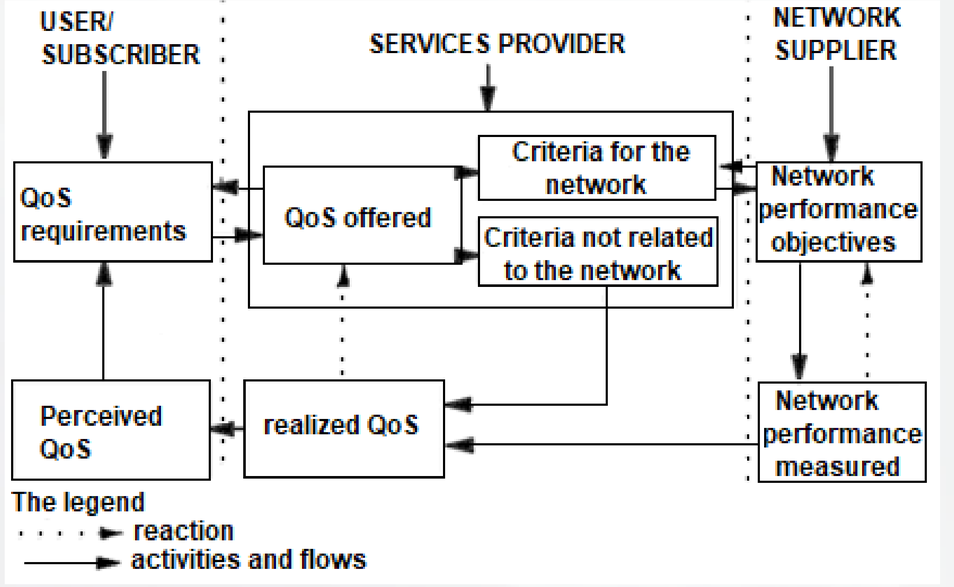

Figure 1: Relations between the different points of view on the quality of service

2.FACTORS THAT INFLUENCE THE QUALITY OF SERVICE PERCEIVED BY THE USER

The parameters that determine the degree of satisfaction of the users of these applications will be stated and a very general classification of the QoS categories will be made. These categories of QoS can be used, later, to define real classes of QoS and service quality control mechanisms, mechanisms that can be implemented in the transport layer.
The key parameters [2] that have an impact on how the user perceives the level of quality of the service offered through IP networks are: • delay; •delay variation; •loss of information

3. PERFORMANCE REQUIREMENTS OF VARIOUS COMMUNICATION APPLICATIONS

3.1 Audio applications

The performance requirements of voice conversations are strongly influenced by the delay that occurs in a transmission direction. In fact, can be distinguished two effects of this delay. The first effect is to create an echo (induced by conversions from 2 to 4 wires or by the acoustic coupling within the terminal). The second effect occurs when the delay increases to a point where it begins to have an impact on the dynamics of the conversation, that is, when the response delay from the correspondent becomes annoying.

3.2 Video applications

In the case of video telephony, a complete duplex system is used, which carries both audio and video streams and there is an intention to use this system in a conversational environment. In principle, the same delay requirements apply here as in the case of voice communications, that is, it requires the lowest possible echo and a minimal effect on the dynamics of the conversation. In addition, requirements are added for audio and video streams to be synchronized within certain limits to ensure "lip synchronization".

Media	Applications	Degree of symmetry	Typical data rates	Key performance parameters and target values			
				One-way delay	Delay variation	Information loss	Other
Audio	Conversational voice	Two-way	4-64 Kbit/s	Preferred: <150ms; Limit: <400ms	< 1ms	< 3%, packet loss ratio(PLR)	-
Audio	Voice messaging	Primarily one-way	4-32 Kbit/s	< 1s for playback; < 2s for record	< 1ms	< 3% PLR	-
Audio	High quality streaming audio	Primarily one-way	16-128 kbit/s	< 10s	<< 1ms	< 1% PLR	-
Video	Videophone	Two-way	16-384 Kbit/s	< 150ms, preferred; < 400ms, limit.	-	< 1% PLR	-
Video	One-way	One-way	16-384 Kbit/s	< 10s	-	< 1% PLR	Lip synchronization: <80ms

Table 3.1: Performance targets for audio and video applications

3.3 Data applications

From the user's point of view, a first requirement that can be addressed to any type of data transfer is to guarantee zero information loss. At the same time, the delay variation is not generally annoying for the user, however there are some requirements for imposing limits on synchronization between media streams in a multimedia session (for example, an audio message used in conjunction with a "on-board" presentation). As a result, applications involving data transfer begin to differentiate according to the delay that can be tolerated by the end user, delay occurred between the time when the user requests the informational content and when this informational content is actually presented to the user.

4.CLASSIFICATION OF PERFORMANCE REQUIREMENTS INTO QoS CATEGORIES

According to the identified performance, a classification of the various applications can be made according to the criteria regarding the packet losses and the delay in one direction of transmission (Figure 2).

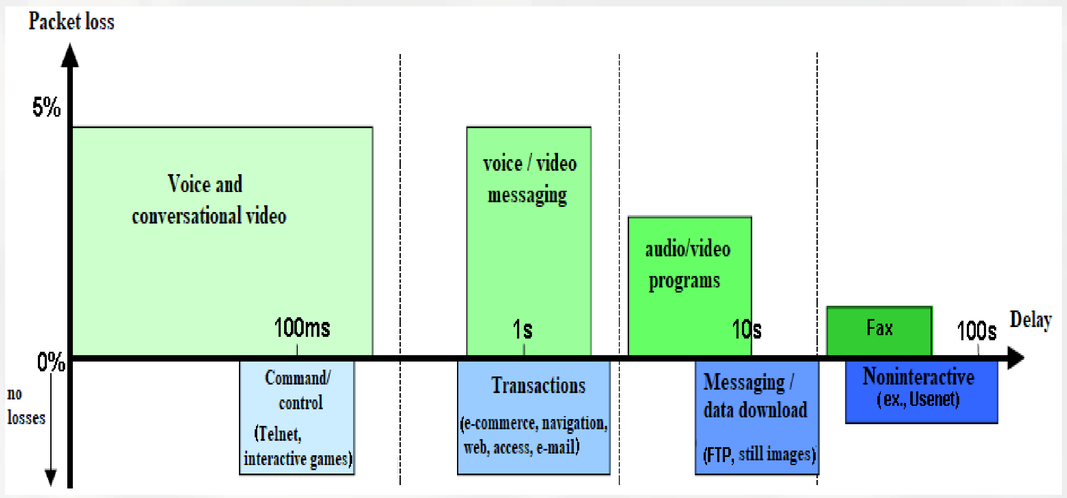

Figure.2: QoS requirements of users

5. CONCLUSIONS:

Table 3.5 shows some measured values for delays, delay variations and packet losses, in various regions of the world, for the most widespread public IP-based network, the Internet

The region	Delay (ms)	Delay variation (ms)	Loss of packages (%)
Finland	18	10	0,5
Western Europe	58	12	2
Russia	275	30	17
Asia	260	25	22
China	2930	170	20
Japan	250	16	20
Australia	356	16	15
SUA	115	10	6
Africa	**585**	60	18

Table 3.5: Average delay and packet loss for various regions of the Internet (measured values)

Based on these measurements, some conclusions can be drawn about the possibility of public IP networks connected to the Internet (and forming part of the Internet) to support various types of applications, especially regarding the possibility to support voice transmission applications. and video (the study shows that VoIP systems can only operate over the Internet for Western Europe and the United States. Also, from such practical measurements one can draw conclusions regarding the delay variation of IP packets (for high values of delay variations it is necessary to install buffers, in order to minimize these variations, which leads to additional costs, for a higher level of quality).

REFERENCES

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