CHAPTER 2

RELATED WORKS

2.1 Service Quality Quantification

The most important part of QoS is the satisfaction of end user. If we want to feedback QoS the satisfaction of user is the best choice. But we need to quantify satisfaction of user for computation. Two quantification methods are described below.

2.1.1 Subject Method

Subject method described in following section could represent the most close to user's satisfaction but is time consuming and expensive.

2.1.1.1 Mean Opinion Score (MOS)

In voice communications, particularly Internet telephony, the mean opinion score (MOS) provides a numerical measure of the quality of human speech at the destination end of the circuit. The scheme uses subjective tests (opinionated scores) that are mathematically averaged to obtain a quantitative indicator of the system performance.

To determine MOS, a number of listeners rate the quality of test sentences read aloud over the communications circuit by male and female speakers. A listener gives each sentence a rating as follows: (1) bad; (2) poor; (3) fair; (4) good; (5) excellent. The MOS is the arithmetic mean of all the individual scores, and can range from 1 (worst) to 5 (best).

MOS can precisely represent the user satisfaction of voice, but is time consuming and expensive, not suitable for dynamic quality control, and subject value hardly used for computation.

2.1.2 Object Method

Object method provide object model for computation and well design of object model could exactly represent satisfaction of end user.

2.1.2.1 Perceptual Evaluation of Speech Quality (PESQ)

The PESQ Algorithm is designed to predict subjective opinion scores of a degraded audio sample. PESQ returns a score from 4.5 to -0.5, with higher scores indicating better quality. PESQ is designed to analyze specific parameters of audio, including time warping, variable delays, transcoding, and noise. It is primarily intended for applications in codec evaluation and network testing. The idea of PESQ is very appealing because it would seem that it could provide a set of automated "golden ears" to evaluate any type of audio system and give a useful indication of the "quality" of the system. Make no mistake PESQ works very well when used as intended but some big surprises await those who attempt to replace traditional telephone evaluation methods with PESQ. PESQ is an object model and suitable for computation, but it only provides voice qualification.

2.1.2.2 Peak Signal to Noise Ratio (PSNR)

PSNR is an objective model which is very common in image processing. A sample use is in the comparison between an original image and a coded/decoded image. Typical quoted PSNR figures are in the range +25 to +35dB.

2.1.2.3 Generation of QoS Quantification

According to 【6】, the design of end requirements should apply to all applications. It lower the complexity of development of service and contain downward to the existent applications, but most proposed quantifying techniques don't support this requirement. Quality quantify techniques mentioned above provide quantification for specific service. So we need new quality quantify method the support all applications.

2.2 QoS Feedback

Feedback-based QoS control needs a new signaling technique. Mostly current QoS control framework lack support to QoS feedback. In UMTS which is a developing communication system, is suitable to construct a new signaling mechanism called QoS signaling system.

【1】 proposed QoS control architecture continuous convergence between the actual user preferences and expectations and the resource constraints of the underlying wireless system. The static QoS management approach (whose main phases are specification, negotiation, admission control, and resource reservation) has, thus, to be substituted by a dynamic QoS management approach, which is based on the concepts of QoS monitoring and renegotiation.

Their resource management is based on bandwidth which may not be the solution for everything. Because the un-stable wireless network and connection-less unreliable protocols, so even bandwidth is enough, the QoS of user could not still be satisfied. The power of user feedback which may reduce the effect of unstable wireless network and unreliable connectionless protocols is not bring up completely.

A middleware was proposed based on user profile for QoS control. User profile aims at describing the user characteristics and preference. But the perception of user is effected by not only the user characteristics but also the characteristics of application. The characteristic is more relevant to user's perception and easier to be used for computation and QoS control. Because one user may performs multiple applications and need different profile. While the growing of application and equipment power. The user profile may cause overhead. The specification of application and equipment is always stable for one user and should provide by service provider and equipment provider to QoS controller which can reduce the signaling loading. Separation for application and equipment also provide flexible service implement and QoS guarantee.

In this paper, they take as a reference a personal communications scenario, such as the Universal Mobile Telecommunications Systems (UMTS). It is in fact an example of environment in which the problem of the effective multimedia application transport at guaranteed QoS levels is strongly felt. UMTS also is a developing wireless network which is suitable to build our idea of QoS signaling technique.

【16】 proposed user-profile-based resource-management algorithm and User-Profile-Based Differentiated-Services Architecture. Two kind of user are defined. One is profiled users which pay more for expected better QoS. Another is non-profiled users which pay less and may receive the best-effort service from network. On-demand resource-reservation and dynamic resource allocation could be achieved by using user profiles. Resource management in mobility is the research focus of this paper.

Trigger conditions are described very much for resource management while handover in this paper. With the user profile which provided by this architecture proposed in this paper could achieve more exactly and suitable resource management.

【9】 has two contributions. First, they proposed a new QoS control scheme that combines the strengths of the adaptive rate control technique and speech priority marking to provide a superior QoS control performance than hitherto possible. Second they proposed the use of objective measure of perceived speech quality instead of network impairments to control sender behavior as this provides a direct link to user-perceived speech quality.

QoS control mechanisms for VoIP should aim to make optimum use of network resource and minimize the effects of network impairments on voice quality. An important class of QoS control technique is rate control which is adjusting send rate. Rate control could reduce the congestion of network. However, current rate control mechanisms are based only on network impairments such as packet loss and delay. This may be in-sufficient to provide optimum QoS.

Another class of QoS control technique is exploiting knowledge of the fact that different parts of speech have different perceptual importance and so do not contribute equally to the over quality. Each speech frame is marked according to its perceptual importance.

Rate control and priority marking should be base on perceptual importance and network status. This paper focus on perceptual importance and use objective mean opinion score to model user’s perception but lack consideration of network status. This may cause the QoS control unstable because network status is uncovered.

【5】propose F-PESQ, an output-based method of applying PESQ to received speech signals assumed to be coded in a frame format. It enables the application to feedback via PESQ of voice without requiring knowledge of the transmitted signals. Client-server architecture is presented for minimizing the computational requirements.

By output-based framed PESQ method, perception of QoS could be calculated. F-PESQ could represent the throughput of end point but it still need network status for fine QoS control. Feedback of F-PESQ helps dynamic QoS control. QoS control needs not only network parameters but also QoS evaluation of end point. QoS control based on only the network impairments lack fine QoS satisfaction. QoS control based on only the QoS feedback lack the adaptive resource management. Fine QoS control should base on two perspective of end point and network point.