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[TITLE]

Quality of service provisioning in advanced communication networks [The title is appropriate, I think. However, note that for some purposes this title is too general because there are many thousands of papers that deal with this subject.]

[MAIN BODY]

Communication networks are used for exchanging information between people and computers which are located at physically distant points. To enable rapid and accurate transmission of information in a network, it is important to ensure quality-of-service aspects such as transmission delay, delay differences, and loss of information. My research is focused on finding efficient ways to ensure quality of service in advanced communication networks.

Broad latitude in quality requirements

The quality of service required depends on the means and purpose of communication. For non-real-time transmission of data and e-mail, quality of service implies the assurance of accuracy of the information in the transmission, during which small delays will not cause serious problems. In the case of real-time conversations, such delays are more of an issue, but minor breaks in communication might not seriously affect the integrity of the information. This is because people are relatively sensitive to delays in voice communication, but they routinely compensate for short interruptions that may be caused by slight losses of information in the network. For advanced communications between computers such as in the latest grid computing technology, any loss of data will result in calculation errors, and even very small delays can cause serious performance degradation. This makes rigorous assurance

against data losses and delays an essential requirement for such communications.

When supporting different applications through a single network like the Internet, we have to allocate network resources such as bandwidth and buffers, as well as determine the priority of the information being transmitted based on the required communication quality. The purpose of my research is to develop efficient control methods and procedures (called protocols) for assuring quality of service on various kinds of communication networks.

Evolution of communication technologies requiring new control methods

The control methods for ensuring quality of service in communication networks are changing as a result of the rapid advance of communication technologies. In wireless communications, users can transmit and receive radio signals while they are moving. Such mobility results in constantly changing radio channel conditions that affect communication quality. Thus, wireless communications require quality control methods that can accommodate different situations and respond to fluctuating communication conditions. Furthermore, compared with wired communications, wireless communications have stricter limitations on network bandwidth and power consumption. This makes effective use of limited resources especially important for assuring high communication quality. On the other hand, quality of service in optical networks must be supported by means of bandwidth reservation or scheduling. This is because the current state of technology can not store light (or photons) within networks for store-and-forward transmission.

Providing quality of service in communication networks will remain a major issue of study in the communications field. Emerging communication technologies and new applications will continue to mandate development of efficient quality control methods.

(Summary of an interview by Asako Murakami)