Interval-Based Internet Reservation Techniques In Which a Message with a Deadline is Either not Accepted, or Delivered by the Deadline

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I. Messages With a Deadline: A Problem

The main goal of the Internet is to send messages. In many cases a user wants to send a message and he has a deadline by which this message has to be sent. For example, a user may have a 5 minutes time interval during which he wants to download a Web page. It is possible that due to the fact that many users use Internet, he will not get his message in time. In the existing Internet setup, there is no way for a user to inform the Internet about his deadline. If he does have a deadline, the only thing he can do is to start the process and wait. If by the deadline the message hasn't arrived, the user will abort the process.

This undelivered message makes the network more congested, which might prevent other messages from reaching their destination before deadline. As a result, the efficiency, i.e., the number of messages reaching the destination before deadline, can be very small.

An important case where deadlines are very important is when the computations distributed over several geographically distant computers are used in real time systems, e.g., in space vehicle and aerospace systems in general.

It is therefore desirable to create a system in which a user could communicate his deadline to the network. The network would then act as a "travel agent" for this message:

- first, it will find the route for this message;
- second, it will check if all nodes on this route have enough unreserved resources (bandwidth and buffer space) to carry this message;
- third, it will reserve the necessary bandwidth and buffer size.

If there are not enough unreserved resources to carry this message before the deadline, the user will be informed that the deadline can't be met.

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II. The Proposed Solution

In this project, we propose an Internet reservation techniques in which a message with a deadline is either not accepted, or delivered by the deadline. We describe the results of the computer simulation of this algorithm.

This algorithm not only helps the users to guarantee the deadlines, but it also eases the congestion because for a congested network, messages with a deadline that cannot be guaranteed to make it are simply not sent into the Internet, and therefore, unlike the existing Internet techniques, these doomed-to-failure messages do not worsen the congestion problem.

III. Intervals

In addition to making reservations for individual messages, it is reasonable to make reservations for the *flow* of messages. To make guaranteed reservations, we must have guaranteed (*interval*) bounds on the number of messages that we intend to send. In this case, we make reservations for the maximum, but if one of the messages does not arrive, we will be able to use the freed part of buffer space and bandwidth for messages without deadlines.

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