****

ATM Forum Document Number: ATM Forum/96-1760

****

Title: Real-Time ABR: Proposal for a New Work Item

****

Abstract:

Real-time ABR service class, which is useful for many video applications, is proposed.

****

Source:

Raj Jain, Shivkumar Kalyanaraman, Rohit Goyal, Sonia Fahmy
The Ohio State University (and NASA)
Department of CIS

Raj Jain is now at Washington University in Saint Louis, jain@cse.wustl.edu http://www.cse.wustl.edu/~jain/

Seong-Cheol Kim
Samsung Electronics Co. Ltd.
Chung-Ang Newspaper Bldg.
8-2, Karak-Dong, Songpa-Ku
Seoul, Korea 138-160
Email: kimsc@metro.telecom.samsung.co.kr

Deepak Kataria, T. V. Lakshman, Albert Wong
Lucent Technologies
200 Laurel Avenue
Middletown, NJ 07748
Email: Kataria@lucent.com, lakshman@research.bell-labs.com, albertwong@lucent.com

****

Date: December 1996

****

Distribution: ATM Forum Technical Working Group Members (TM, TEST)

****

****

Motion: Include the following item in the living list for the TM group.

Title: Real-time ABR

Problem Statement:

Currently video is supported by the CBR, rt-VBR, and nrt-VBR service classes in TM4.0. This requires the sources to estimate their sustained cell rate (SCR) and/or peak cell rate (PCR) before making a connection. If the requested capacity is not available, the connection is refused.

There are a number of applications, particularly, in the defense and military environments, where a user will prefer a lower quality video to no video at all. In other words, "available quaility" video is preferable to a "given quality" video. The codecs, today, are capable of dynamically adjusting the compression parameters to make the best use of available rates. Similar applications occur in real-time manufacturing environments.

rt-ABR is the service designed for such applications. (Current ABR can be renamed as nrt-ABR.) We can use the inherent negotiation capability of ABR (provided continuously via RM cells without the need for signaling over short intervals) for the switches to indicate the available rate.

ABR as currently defined allocates available cell rate to contending flows. Such flows are allocated a rate on a best effort basis and do not have any delay guarantees. However, it is possible to design switch algorithms such that once a flow is given an ACR, its delay can also be guaranteed on a best effort basis. In general, any algorithm with a fast transient response and queue control can guarantee the delay through the switch.

Weighted max-min fairness criterion can be used to provide rate allocation to flows in proportion to their weights. Higher rate sources, whose quality is more likely to be affected, can be treated preferentially (instead of all sources experiencing the same rate reduction).

If the sources are willing to adapt only minimally, we can operate in a VBR-like mode, by setting their MCR values to an effective bandwidth calculated using buffering at the sources and acceptable loss at that buffer.

We can use the minimum cell rate (MCR) guarantee of ABR to ensure that a transported video stream gets a minimum acceptable service quality. Each source at call set up time may decide for itself what this minimum acceptable level is. This use of minimum cell rate distinguishes this approach (rt-ABR) from completely rate-adaptive video such as those used in Internet video tools.

We, therefore, propose that TM group should explore this new service for the next generation of traffic management specifications.

Solution Requirements: Must provide loose end-to-end delay bounds. Other parameters TBD.

Last Update: December 1996

Status: Under study.

Date of Introduction: December 1996