Simulation Results for VBR+ABR Traffic

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Overview

- Effect of VBR
- VBR Model
- ERICA
- Simulation Results
ERICA

- ERICA = Explicit Rate Indication for Congestion Avoidance
- ERICA is the switch algorithm part of EPRCA++ presented in the November’94 meeting.
- Fully compatible with source/switch/destination behaviors as agreed in the November’94, February’95, and April’95 meetings.
- Fully compatible with current RM Cell format. No new bits, no new fields
ABR-Only Systems

- Most simulations have assumed
  - Infinite sources
  - ABR only

- With ABR only:
  - Link capacity is known
  - Link capacity is fixed
  - Only traffic is random
  - Only traffic has to be measured, predicted, and allocated fairly
VBR+ABR Systems

- VBR gets a preferential treatment
- ABR gets only left-overs
- ABR capacity is a random variable
  It has to be measured, forecasted, and allocated
- Sometimes, there may not be any left-overs
- Sometimes, even VBR may be overbooked
A Simple VBR Model

- On for $x$ ms and off for $y$ ms
- When on, VBR uses up $C_{vbr}$ bandwidth
- In practice, $x$, $y$, $C_{vbr}$ are random variables. We assumed constants.

$$C_{vbr}$$

$1$

$y x y x y x y x$

Time

$$C_{abr}$$

$1$

$y x y x y x y x$

Time
Simulation Parameters

- **Source:**
  - Nrm = 16
  - ICR = PCR/20 or PCR
  - AIR = PCR
  - RDF = ∞

- **Switch:**
  - Target Utilization = 90%
  - Averaging interval = 30 cells
  - Uses BECN option during first round-trip on WAN

- **Traffic:** $C_{vbr} = 80\%$
  - $x = y = 2$ ms (LAN)
  - $x = y = \text{max round trip (WAN)}$
Two-Source Configuration

- All links 155 Mbps
- Goal: To check efficiency and fairness in the presence of VBR
Parking Lot Configuration

- All links 155.52 Mbps, 1 km (LAN) or 1000 km (WAN)
- Goal: Test fairness in the presence of VBR
Simulation Results

- ERICA converges fast
- ABR uses up all the left-over capacity
- ABR comes down fast during VBR-on periods
- ABR comes up fast during VBR-off periods
- Link is not underutilized
- Queues are small
Summary

- Switch schemes that work with ABR-only may or may not work with VBR+ABR
- With VBR+ABR:
  - ERICA converges fast
  - ABR comes down/up very fast filling up all left-over capacity
  - Queues are small