IETF 63 – DCCP WG
(Issues with)
Interactive Applications Using DCCP

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draft-burness-dccp-interactive-apps-00.txt
Preamble

- A presentation of the draft
  - Why the interest from BT?
  - TFRC Issues for Interactive Applications
  - Contribution to re-chartering of the DCCP WG
  - Pushing the protocols as far as they will go
The Interest to the Network Operator

- BT and others migrating to all-IP networks
- ~50% voice bits initially
- QoS and admission control
- DCCP for end-system driven QoS as an alternative
  - low cost users
  - new applications
  - wireless and mobile
Overview

Issues for Interactive Applications

• TFRC Rate Equation
• TFRC Loss Calculation
• Slow Start
• Silence Suppression
• Variable Bit Rate
• User Experience

Other Issues

• Interaction between CCIDs
• Application self-interest

Summary and suggestions
TFRC Rate Equation

• Handle small packets
• Adjust packet size not rate
• As suggested by
  – Floyd and Kohler
TFRC Loss Rate Calculation

- Incorrect for variable sized packets
  - Loss event = 1 or more pkt losses per RTT, flows with small packets therefore get too much bandwidth as multiple loss events are interpreted as one loss event

- RED in byte mode a problem = drop rate as fn(pkt size)
  - Unfair to TCP
  - Uncertain what’s out there – byte mode in the minority

- Use Virtual packet approach??
  - Widmer
  - Vasallo

- Needs investigation – don’t know how big the problem is
Initial Slow Start

• Link DCCP to management flows via Congestion Manager?
  – Revisit?
  – Balakrishnan, RFC3124

• Slow start within call set-up (Phelan)

• Will users tolerate a longer call set-up?
  – Can happen on mobile to mobile calls
Silence Suppression

• No data, eg silence suppression $\rightarrow$ no ACKs $\rightarrow$ assume severe congestion $\rightarrow$ slow start

• Longer RTT (400ms), less probability that silence suppression period $\rightarrow$ RTO
  – More of a problem for sub-continental networks

• Fast Restart in TFRC for VoIP, too long a gap allowed (up to 10min and interpolated up to 30 min)
  – Difficult for mobile and video (we know it’s not designed for that!)
    (but they are both important aspects for our future network!)

• Allow fast restart after 4 * 400ms?
Variable Bit Rate

• Video rate can vary by a factor of 10
  – But unlikely for interactive (conferencing style apps)

• Treat similar to silence suppression

• Use fast restart
  – if video was at a higher rate in a recent, limited time period (cf silence suppression)
  – And rate reduction was application controlled not congestion response
  – And application has received no indication of increased congestion

• Alternatively – use a Congestion Manager
User Experience

• Users intolerant of quality fluctuations
• Is there any point in running at higher bandwidth for short periods? (as perceived by user)
• Could congestion management between multiple flows help here too?
• Transport can go up and down but not the application.
  – Need media guide for application developers
Interaction Between CCIDs

• How do various CCIDs and TCP all interact together?
• Would a single CCID be better than individual ones tailored to different application types?
  – Does having >1 CCID allow too much room for cheating?
  – Could applications choose the “wrong” CCID to improve throughput?
  – Are there conditions when they are not fair to each other?
Self Interest

• Applications such as Media Player and Real do congestion control in order to offer better quality experience

• Congestion control not necessarily network friendly

• How much worse is it than DCCP?

• Will self-interest drive a switch?
What we want to happen

• How to do congestion management for real-time interactive applications such as telephony and video-conferencing?

• Output
  – Media guide for application developers
  – Defined congestion behaviour within DCCP

• Study
  – DCCP with congestion manager
    • Facilitate rate smoothing for key flows
    • Ease slow start, VBR problems
  – TFRC loss rate calculation for variable packet sizes
  – Fast restart for all apps

• Hope to contribute - with help