Usage/Volume Tier Feedback Use Case for Congestion Exposure

draft-mcdysan-conex-volumetier-usecase-00

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Outline

• Background
  – Submitted/presented as part of draft-mcdysan-conex-other-usecases-00 in Beijing
  – From minutes
    • Some people expressed interest, but others
      – believed out of scope since it was not part of mechanism draft
      – could potentially be built of the conex abstract mechanism
    • Request made to submit individual draft

• Problem Statement & Objectives
• Potential Support using Abstract Mechanism
• Additional Support with other Mechanisms
• Next Steps
Problem Statement/ Objectives

• Problem Statement
  – Complex for users to track/manage volume usage
  – Volume counting doesn’t discriminate between heavy usage when congestion occurs or doesn’t
  – Need better incentive for LEDBAT style and/or lower effort transport

• Objectives
  – Inform receiver of cumulative volume and tier crossing trend
  – Inform receiver whether congestion counting is occurring
  – Standardize on means to indicate to receiver sets of packets not subject to congestion counting
  – Enable a means for recharging
Potential Support using Abstract Mechanism

• WG Charter item for standardization of feedback from receiver to sender
  – If made extensible, then many sub-experiments could be performed

• Local implementation functions
  – Counting usage/volume differently based upon abstract mechanism signaled congestion experienced
  – Lower effort marked packet counting

• What is missing is feed forward information that meets objectives
  – operating over a longer timescale
Additional Support with other Mechanisms

• Usage/volume counter similar to a forwarding queue, but operates over much longer timescale

• Since timescale is large, no need to feed forward information in each packet
  - Most benefit occurs for long-lived, heavy volume flows
    • e.g., video streaming or large file transfer

• Use experimental TCP and IPv6 hop-by-hop options header to implement feed forward “probe” packets from sender to receiver
  - Requires cooperation between TCP sender and receiver similar to that assumed in Conex
  - Needs to be part of TCP flow (e.g., possible experimental use of urgent pointer)
  - “Probe” packets at IPv6 nodes don’t require fast path processing
    • these packets could be handled by a “special processor”
Probe Request Packet

• Periodically transmitted by sender
• Intercepted by IPv6 element supporting experimental codepoints and forwarded to Special Processor

• Probe Request Contents
  – Request information on the users usage/volume tier
  – Request statistics on usage
  – Request threshold trend report
  – Request not counting this flow since it is lower effort
Probe Response Packet

- Generated by Special Processor from Polled Usage Counters and IPv6 Element config
- Delivered to receiver (and API) and relayed back to sender (and API)
- Contents
  - Duration and cap for the volume measurement tier
  - Packets and octets received/sent
    - Total, conex marked, dropped, lower effort
  - Fraction of the usage tier already used
  - Tier crossing alert if current trend persists
  - A pointer (e.g., URL) and identification of authentication method that for queries
    - alternative charging methods (e.g., recharging)
    - secure method for accessing counters, configuration data
  - Other congestion measures (e.g., Shapley value)
Next Steps

• Inviting others interested in concept to discuss on the list or privately
• Potentially submit to iccrg as a research topic
  – For example, investigation of other measures of congestion (e.g., Shapley value)