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 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"

Block Diagram of Conex & Additional Mechanism
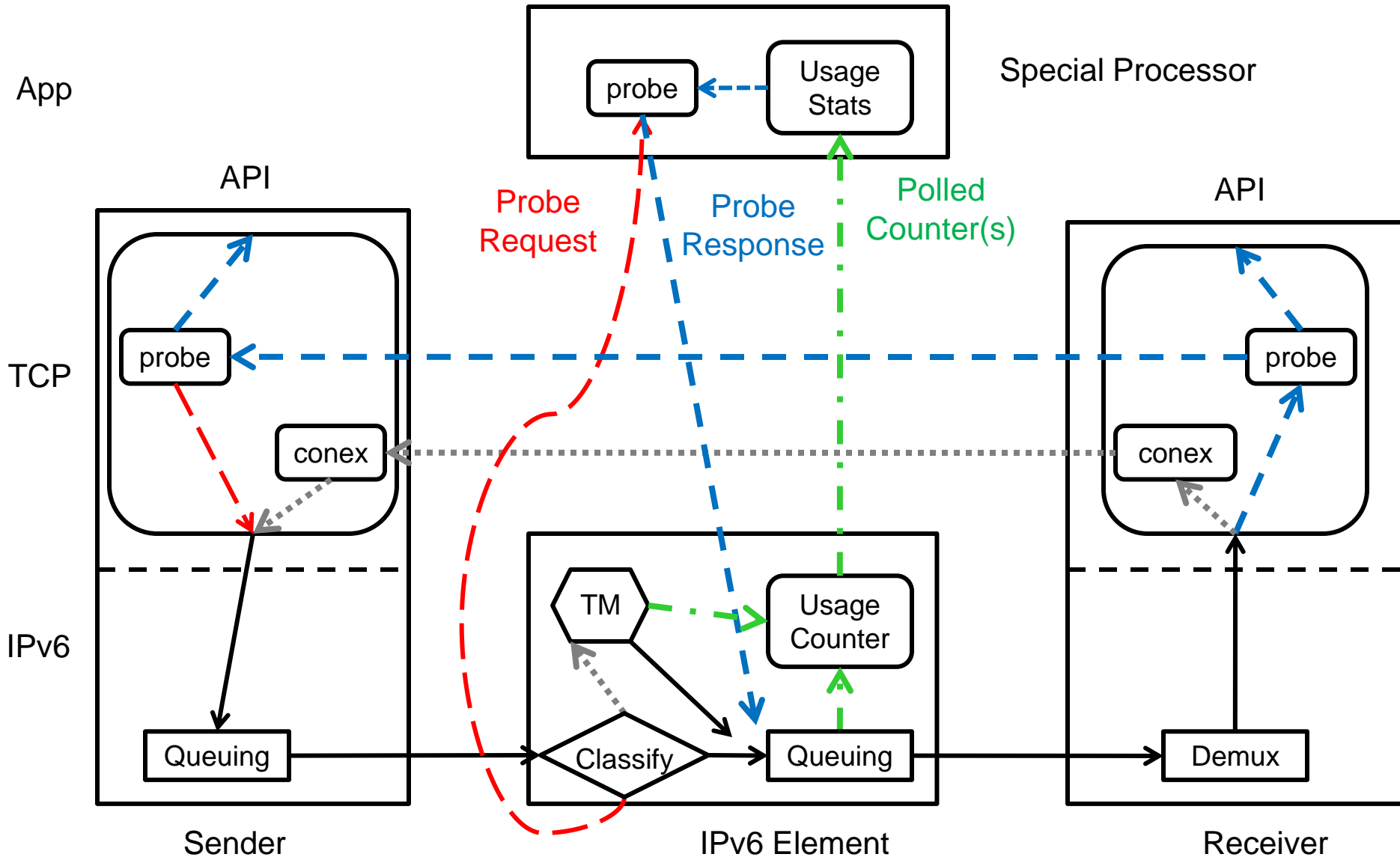
Probe Request Packet

- 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)