Quick-Start for TCP and IP

Draft-amit-quick-start-03.txt

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QuickStart with TCP, in the SYN exchange:

• In an IP option in the SYN packet, the sender's desired sending rate:
  – Routers on the path decrement a TTL counter,
  – and decrease the allowed sending rate, if necessary.

• The receiver sends feedback to the sender in the SYN/ACK packet:
  – The sender knows if all routers on the path participated.
  – The sender has an RTT measurement.
  – The sender can set the initial congestion window.
  – The TCP sender continues using normal congestion control..

• From an initial proposal by Amit Jain
The Quick-Start Request Option for IPv4

<table>
<thead>
<tr>
<th>Option</th>
<th>Length=4</th>
<th>QS</th>
<th>TTL</th>
<th>Rate Request</th>
</tr>
</thead>
</table>

- Explicit feedback from all of the routers along the path would be required.

- This option will only be approved by routers that are significantly underutilized.

- No per-flow state is kept at the router.
Quick-Start in the NS Simulator

- Added to NS by Srikanth Sundararajan.
Changes from draft-amit-quick-start-02.txt:

• Using Quick-Start in the Middle of a Connection.
  – The request would be on the total rate, not on the additional rate.
• The request is now in bytes per second, not packets per second.
• New sections include:
  – When to use Quick-Start
  – TCP: Responding to a Loss of a Quick-Start Packet
  – TCP: A Quick-Start Request after an Idle Period
  – Quick-Start with DCCP
  – Quick-Start in IP Tunnels
  – …
Possible Deployment Scenarios:

• **Intranets?**
  – Centralized control over end nodes and routers.
  – Could include high-bandwidth, high-delay paths to remote sites.

• **Paths over satellite links?**
  – High bandwidth, high delay.
Design Issues: IP Options, ICMP, or RSVP?

• IP Options:
  – Blocked by some middleboxes
  – Takes the slow path in routers?

• ICMP:
  – Blocked by some middleboxes.
  – Mechanisms would be needed to address all routers along the path, and get one answer.

• RSVP:
  – Soft state in routers is not needed.
Design issues: the encoding of the Rate Request

• Linear function:
  – Minimum request of 80 Kbps, maximum request of 20.5 Mbps.
  – 80-Kbps increments

• Powers of two:
  – Use 4 bits of the 8-bit field.
  – Minimum request of 80 Kbps, maximum request of 1.3 Gbps.
  – Doubling the request from one to the next.
Questions:

- Would the benefits of Quick-Start be worth the added complexity?
  - Quick-Start Request packets would not take the fast path in routers.

- Is there a compelling need to add some form of congestion-related feedback from routers such as this (in addition to ECN)?

- Is there a compelling need for more fine-grained or more frequent feedback than Quick-Start?

- Are there other mechanisms that would be preferable to Quick-Start?