Quick-Start for TCP and IP

Draft-amit-quick-start-03.txt

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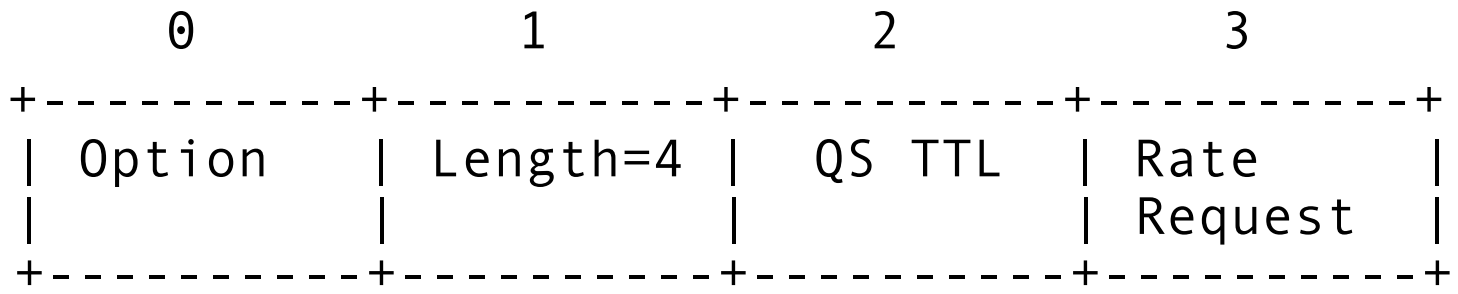
QuickStart with TCP, in the SYN exchange:

- 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

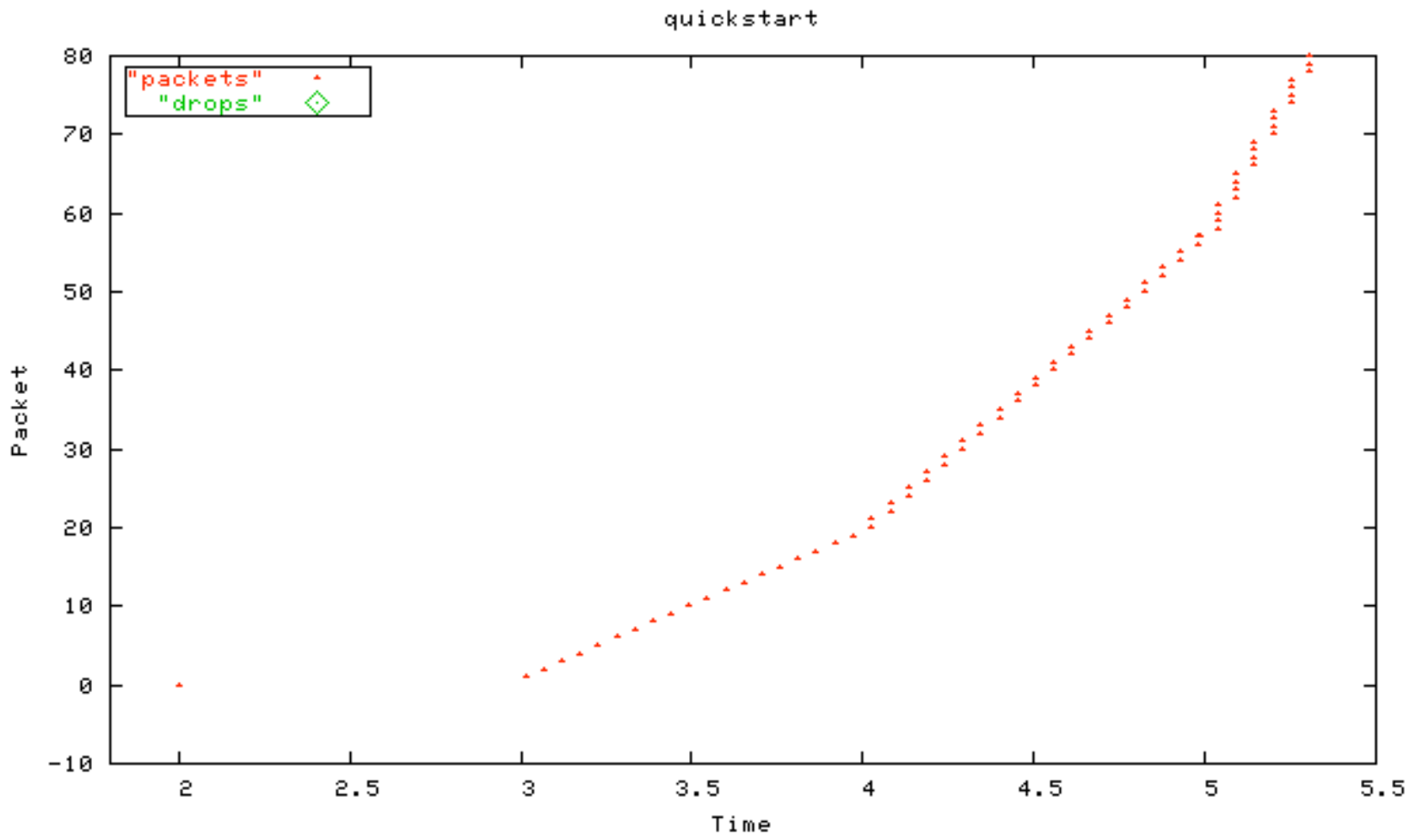
The Quick-Start Request Option for IPv4



- 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 Sundarrajan.



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?