Faster Restart for TCP Friendly Rate Control (TFRC)
draft-ietf-dccp-tfrc-faster-restart-02.txt

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Limitations of TFRC

- **Idle period:**
  - Sending rate reduces down to 4 packets per RTT.
  - Slowstart takes long for long delay paths/high rates.

- **Sending rate limit**
  - Can be at most twice receiver rate.
  - Not sufficient for when application is bursty.

- Not suitable for “bursty” applications that are data-limited or occasionally idle.
Faster Restart

- Rapidly increasing rate to a previously achieved rate after idle or data-limited periods can be justified.

- FR modifies TFRC
  - Idle period:
    - Sending rate reduces down to 8 packets per RTT (for small packets) or 4 packets per RTT for large packets.
    - Quadruple the sending rate in absence of congestion.

- Sending rate limit:
  - Allows four times the receiver rate.
Updates in draft FR-02

- Significantly updated Introduction to reflect FR's general applicability to idle and data-limited periods.

- Section 3.1 on min sending rate during *idle periods*
  - transport layer MUST send a minimum of $X_{ping}/s$,
    - $X_{ping} = \min(X, s/4R)$
    - Must send a packet every 4 RTTs.
  - Provides endpoint RTT samples.
  - These packets are not reported to the application by the transport layer.
  - MUST use DCCP-Data or DCCP-DataAck packets with zero-length application data.

Notes: When feedback is received for these packets, sender should take the RTT samples, but should not use that to calculate sending rate?
Section 3.2 on Receive Rate Length

- RRL became an option.
- Revised definition: "Receive Rate Length reports the number of packets used to calculate the Receive Rate, minus one."
- Added Send Receive Rate Length Feature Negotiation.

Added new variable X_active_min_rate

- The minimum restart rate allowed by Faster Restart in the presence of idle and/or data-limited periods.
  - \( X_{\text{active\_min\_rate}} := \min(8 \times s, \max(4 \times s, 8760 \text{ bytes})) \).

Updated the pseudocode in section 3.3

- Added a new phase to make sure \( X_{\text{recv}} \) does not drop too low as the result of a slow send rate.
Section 3.4 on *nofeedback* timer expiry

- Sending rate never drops below 4 packets per RTT, or 8 packets per RTT for small packets, as the result of an idle period.

Changes Step 1 in Section 4.4 of RFC 3448:

- If the sender has sent no data whatsoever since the time the nofeedback timer was set, and
- \( \frac{X_{\text{active min rate}}}{2} \leq X_{\text{recv}} \leq X_{\text{active min rate}} \)
  - \( X_{\text{recv}} := X_{\text{active min rate}}/2 \).
  
Else if \( X_{\text{calc}} > 2 \times X_{\text{recv}} \), then
  - \( X_{\text{recv}} := \max(X_{\text{recv}}/2, s/(2 \times t_{\text{mbi}})) \)

Else
  - \( X_{\text{recv}} := X_{\text{calc}}/4. \)

Added simulation scenarios in Appendix.
- Definitions for *data-limited* and *idle periods*.
- Fix NiTs in wording

Simulations to be performed based on revised draft.

>>>Other issues to be added...