

UDP Usage Guidelines for Application Designers

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Lars Eggert

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Background

- some discussions recently with APP area document authors on UDP usage
- there are some caveats of using UDP that are obvious to TSV folks, but maybe not to others
- this document attempts to capture these guidelines for easy reference
- nothing in this document is new (to TSV folks)

Content

- guidelines to the designers of applications and application-layer protocols that use unicast UDP
- topics:
 - (1) congestion control
 - (2) message sizes
 - (3) reliability

Baseline Guideline

- apps should use TCP, SCTP or DCCP whenever they can
- congestion control, message size determination and reliability are difficult to get right
- if used correctly, more featureful transports aren't as heavyweight as often claimed
- if you can't use those transports, use UDP according to the rest of these guidelines

Congestion Control Guidelines

- apps doing UDP bulk transfers →
should use TFRC or TCP-like windowing
- apps that send a small number of messages →
should maintain an RTT estimate and limit
themselves to 1 outstanding message per RTT
 - loss looks like long RTT sample

Congestion Control Guidelines (2)

- apps that can't maintain an RTT estimate → should use a conservative fixed timer and exponentially back it off under loss
 - e.g., 500ms, such as SIP & GIST
- apps that can't detect loss → should use a more conservative fixed timer
 - e.g., 3 seconds, such as TCP SYN retransmit

Message Size Guidelines

- apps should not send messages larger than the path MTU
- either implement pathMTU discovery
- or use IP-layer path MTU information
- or don't send anything larger than the minimum path MTU
 - IPv6 → 1280 bytes
 - IPv4 → $\min(\text{1st-hop-MTU}, 576 \text{ bytes})$

Reliability Guidelines

- apps should be aware that UDP does not provide
 - reliability
 - duplication protection
 - reordering protection
- apps should be robust in the presence of such events

Status

- -00 discussed on the list
- comments from a number of folks will be rolled into a revision
- next: cross-area review (esp. from APP area)
- adopt as WG item?