Measuring Interactions Between Packet Size and Network Dynamics

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Abstract

In this short note we report on measurements on the interactions between packet size and network dynamics such as reording and packet drops.

1 Interactions Between Packet Size and Network Dynamics

Usually each end in a TCP connection specifies the maximum segment size that host wants to receive using the Maximum Segment Size (MSS) option in the SYN and SYN/ACK packets. One purpose of the MSS option is to avoid packet fragmentation in the network. If one end does not receive an MSS option from the other end, a default of 536-bytes is assumed.

In these measurements we explore the relationship between packet size and packet drop rate, and between packet size and reordering. These tests use the TCP Behavior Interence Tool [2]; more information can be found in [1] . The tests were run in XXX, and involve download web pages from a list of YYY web servers.

Figure 1 shows packet reordering as a function of the MSS value used.

Alberto - How did we decide what packet size to use for each connection? For each web server, did we use a range of MSS values?

In the case of reordering, the fraction of packets experiencing reordering decreases as the MSS value increases. This can be expected not only due to the fact that there are more packets and consequently more opportunities for reordering to take place at devices such as load balancers, but also due to the fact that smaller packets increase the chance of packets being reordered inside the fabrics of routers.

Figure 2 shows packet drops as a function of the MSS value used. The packet drop rates are relatively similar for all MSS values evaluated except for the largest MSS of 1460 bytes.

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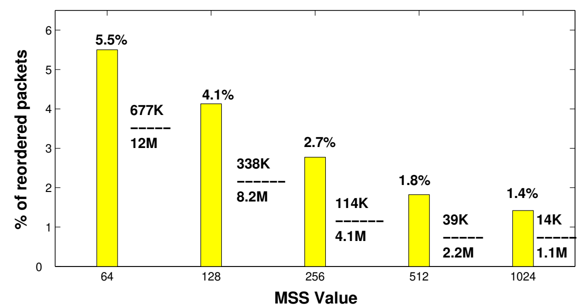

Figure 1: Reordering vs MSS

This may also be due to the increased aggressiveness of TCP at higher packet sizes, thereby increasing the packet loss rates.

Alberto - it would be *really* nice to run these with a fixed small receive window in bytes, so that changing the MSS did not change the load that the TCP connection placed on the network.

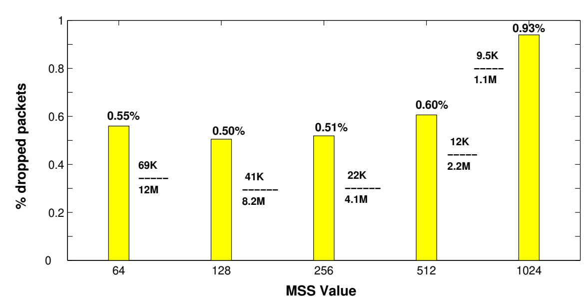

Figure 2: Drops vs MSS

References

[1] Alberto Medina, Mark Allman, and Sally Floyd. Measuring the Evolution of Transport Protocols in the Internet. *Computer Communications Review*, April 2005.

[2] Jitendra Padhye and Sally Floyd. Identifying the TCP Behavior of Web Servers. In *ACM SIGCOMM*, August 2001.