RTT Measurement on OC48 Traces

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1 Introduction

During one week short trip to CAIDA, some passive measurement of the distribution of Round-Trip Time is made on some OC48 traces. The measurement methodology is either based on the three way handshake messages (SA estimate), or based on the slow-start phase of TCP (SS estimate) [1]. The massiveness of OC48 traces requires the measurement algorithm to make efficient use of memory and to run fast enough. Unlike those NLANR traces, the OC48 traces have real IP addresses of source host and destination host present, instead of encrypted ones.

2 RTT variations in different timescales

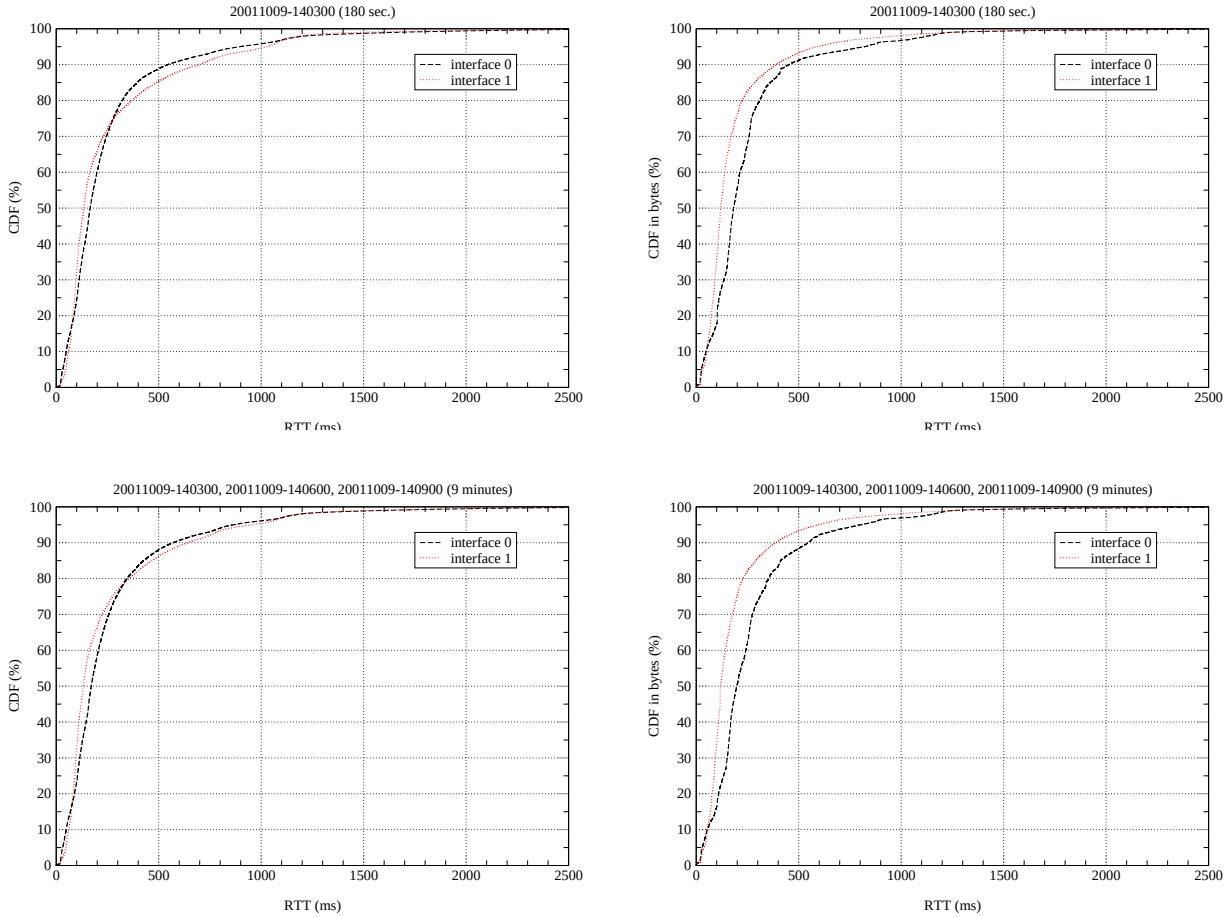
The traces were takes on Oct. 29th, 2001 by MFN at San Jose. RTT measurement is performed on traces with different timescales. Fig.1(a) shows two resulting RTT distributions, over 9 minutes and over 3 minute, for both interfaces. Visually, RTT distributions do not change significantly in the timescale of minutes by comparison of the distribution lasting for 3 minutes and 9 minutes. The distribution of two interfaces are quite similar. As shown in Fig.1(b), the distribution of two interfaces, in terms of bytes, shows difference in some extent. The difference distribution between the SA and SS estimates is shown in Fig.2. From the scatter plot, there are some amount of SS underestimates.

3 Possible future work

RTT is a simple Internet performance metric whose value depends on the geographic and topological position of source host and destination host. The distance between end hosts of communication is a major component of RTT. Since traces in CAIDA have real IP addresses, we may be able to utilize this luxury. We can use CAIDA's tool, IPMapper/NetGeo, which are based on database, to determine the geographical location of a host from its IP addresses (although currently it is nontrivial and imprecise). The distance (great circle distance or longitude coordinate distance) can tell us the lower bound of RTT between a pair of end hosts. If some RTT values appear in geographic locatons that would require packet transmission faster than the speed of light, then either the database is not accurate or the RTT estimate is wrong. The possibility of correlating improvement of the accuracy of database and RTT estimation may deserve to be exploited in the future.

References

[1] Hao Jiang, and Constantinos Dovrolis, "Passive Estimation of TCP Round-Trip Times"



(a) in terms of connections (b) in terms of bytes

Figure 1: RTT distributions in different time scales

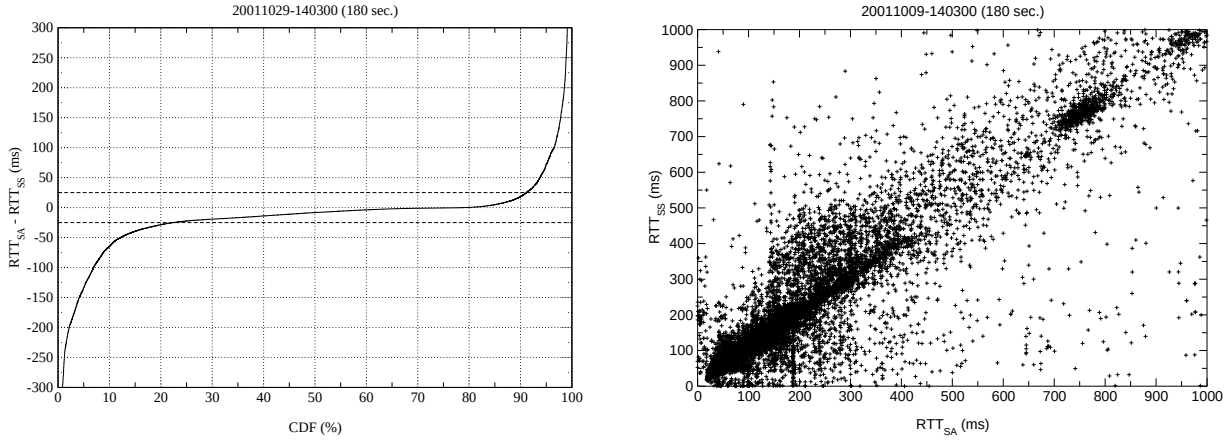


Figure 2: Difference between the SA and SS RTT estimates and the corresponding scatter plot