

SCTP Sendbuffer Advertising

CS4089 Project

End Semester Report

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Abstract

We propose to advertise sendbuffer occupancy in SCTP, i.e. the amount of backlogged data present in the sender's buffer.

1 Introduction

Stream Control Transport Protocol (SCTP) is a reliable transport protocol designed to transport Public Switched Telephone Network (PSTN) signaling messages over IP networks, but is capable of broader applications. Unlike TCP, SCTP offers sequenced delivery of user messages within multiple unidirectional logical channels called streams. Each SCTP endpoint is represented as a set of destination transport addresses, one of which is the primary address. If the primary address becomes unreachable SCTP finds another destination transport address to route the messages thereafter. This provides network-level fault tolerance and is called multi-homing. It also employs a security cookie mechanism during association initialization to provide resistance to flooding and masquerade attacks.

Advertising the amount of backlogged data present in the sender's buffer can help network operators evaluate the end-to-end performance of a connection in a better way than that with existing passive measurements. This information can also be used to infer whether a connection is limited by the network or by the application.

2 Problem Statement

To propose a scheme to advertise sendbuffer occupancy information, implement it in the Linux kernel and study the performance and security implications of the same.

3 Literature Survey

RFC 3286 [3] provides a high level introduction to the capabilities supported by SCTP, while RFC 4960 [4] describes the complete protocol. Agache and Raiciu [1] propose a scheme to advertise sendbuffer occupancy in TCP. [2] was used to study the state machine employed in the Linux SCTP implementation. It was also used to understand the SCTP packet flow within the kernel.

4 Work Done

Initially, we wrote a file transfer utility that uses SCTP as the transport protocol. We modified a kernel module called `sctp_probe` to measure and plot the sendbuffer size at regular intervals during a file transfer performed using our userspace program.

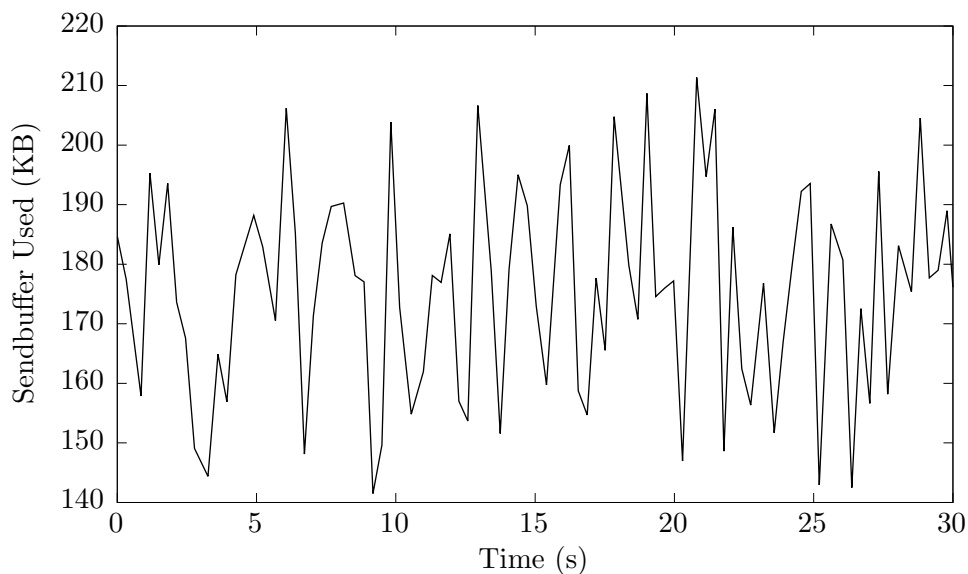


Figure 1: Sendbuffer variation with random size packets.

We explored the Linux kernel SCTP implementation to understand how the data from userspace is transformed into a SCTP packet and sent to the network layer. The data structures related to the state information, specifically the out queue were studied in detail. The parameter corresponding to the sendbuffer information, which is to be advertised was identified.

4.1 Design

5 Future Work

To design a working prototype of sendbuffer advertising for SCTP in the Linux kernel and test it in a simulated network. Security implications of the prototype will also be studied.

References

- [1] A. Agache and C. Raiciu. *TCP Sendbuffer Advertising*. Internet-Draft draft-agache-tcpm-sndbufadv-00.txt. IETF Secretariat, July 20, 2015.
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- [3] L. Ong and J. Yoakum. *An Introduction to the Stream Control Transmission Protocol (SCTP)*. RFC 3286. RFC Editor, May 2002, pp. 1–10. URL: <http://www.rfc-editor.org/rfc/rfc3286.txt>.
- [4] R. Stewart. *Stream Control Transmission Protocol*. RFC 4960. RFC Editor, Sept. 2007, pp. 1–152. URL: <http://www.rfc-editor.org/rfc/rfc4960.txt>.