

SCTP Sendbuffer Advertising

CS4089 Project
End Semester Evaluation

Arpan Kapoor, Deepak Sirone J, K Prasad Krishnan

Guided By:

Dr. Vinod Pathari

Mr. V Anil Kumar, Principal Scientist, CSIR, Bengaluru

November 18, 2015

Outline

Introduction

Problem Statement

Prerequisite Terms

Work Done

Attempted Solution

Design

Future Work

References

Introduction

- ▶ Stream Control Transmission Protocol (SCTP):
 - ▶ Supports multiple logical channels called streams
 - ▶ Multi-homing
- ▶ Sendbuffer Advertising:
 - ▶ each segment will carry the amount of backlogged data present in the sender's buffer.

Problem Statement

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

Prerequisite Terms I

- ▶ **SCTP Packet** consists of a common header followed by one or more chunks.

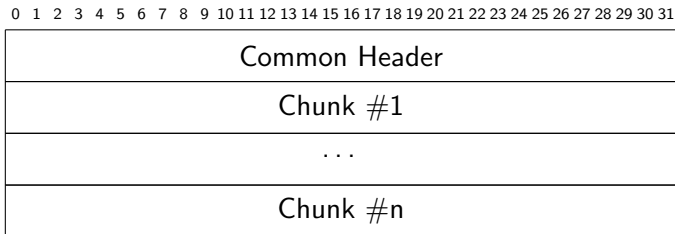


Figure: SCTP Packet Format [6]

Prerequisite Terms II

- **SCTP Chunk** is a unit of information within an SCTP packet, consisting of a chunk header and chunk-specific content.

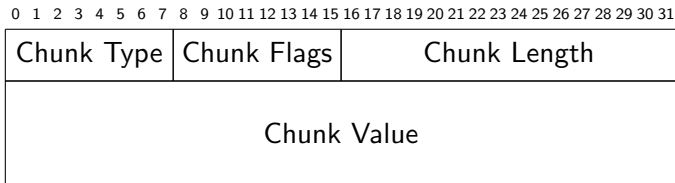


Figure: SCTP Chunk Format [6]

- **Heartbeat Chunk** is used to probe the reachability of a particular destination transport address.

Work Done

- ▶ Modified kernel module `sctp_probe` to measure sendbuffer.
- ▶ Explored Linux kernel SCTP implementation.
- ▶ Identified parameter to be advertised.

Attempted Solution

- ▶ Encode the sendbuffer information as a variable length parameter in the Heartbeat chunk.
- ▶ Problems:
 - ▶ Can be disabled by upper layer.
 - ▶ Is only sent to idle destination addresses.

Design

- ▶ New chunk type with Chunk Type value between 128 to 190.
- ▶ Highest order 2 bits determine action to be taken if Chunk Type is unknown.
- ▶ This ensures that unmodified hosts won't send a Unrecognized Chunk Type Error chunk upon reception.

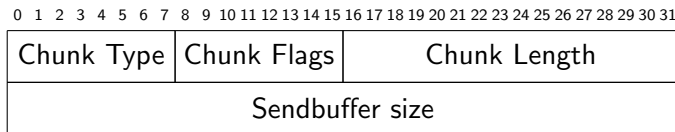


Figure: Proposed Chunk for sendbuffer advertisement

Future Work

- ▶ Working prototype in Linux kernel.
- ▶ To build a small testbed with few nodes and SDN routers.
- ▶ Analyze the network performance using the testbed.

References I

- [1] A. Agache and C. Raiciu. *TCP Sendbuffer Advertising*. Internet-Draft draft-agache-tcpm-sndbufadv-00.txt. IETF Secretariat, July 2015.
- [2] Alexandru Agache and Costin Raiciu. “Oh Flow, Are Thou Happy? TCP Sendbuffer Advertising for Make Benefit of Clouds and Tenants”. In: *7th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud 15)*. Santa Clara, CA: USENIX Association, July 2015. URL: <https://www.usenix.org/conference/hotcloud15/workshop-program/presentation/agache>.
- [3] Karthik Budigere. “Linux Implementation Study of Stream Control Transmission Protocol”. In: *Proceedings of Seminar on Network Protocols in Operating Systems*, p. 22.

References II

- [4] 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>.
- [5] Jon Postel. *Transmission Control Protocol*. RFC 793. RFC Editor, Sept. 1981, pp. 1–85. URL:
<http://www.rfc-editor.org/rfc/rfc793.txt>.
- [6] R. Stewart. *Stream Control Transmission Protocol*. RFC 4960. RFC Editor, Sept. 2007, pp. 1–152. URL:
<http://www.rfc-editor.org/rfc/rfc4960.txt>.
- [7] R. Stewart et al. *Sockets API Extensions for the Stream Control Transmission Protocol (SCTP)*. RFC 6458. RFC Editor, Dec. 2011, pp. 1–115. URL:
<http://www.rfc-editor.org/rfc/rfc4960.txt>.