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

- 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

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

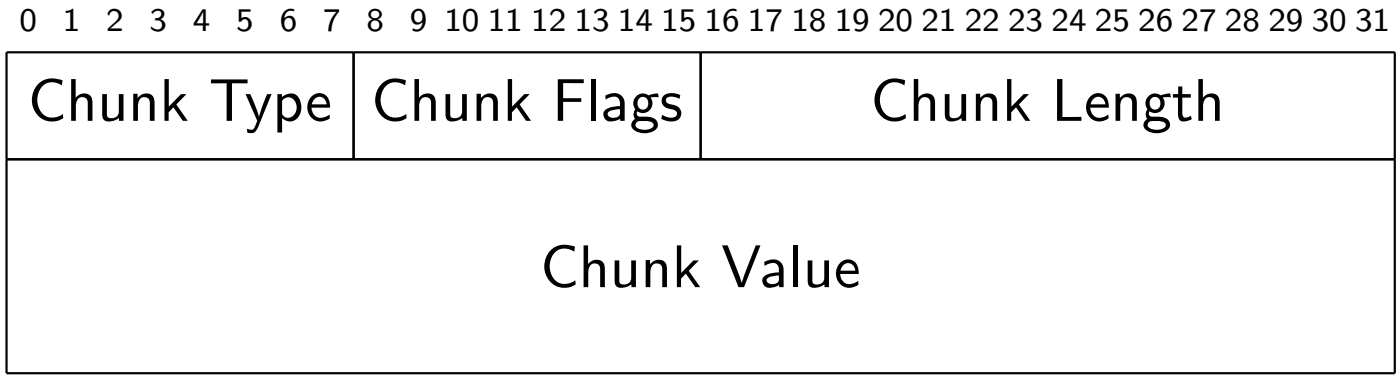

Figure: SCTP Chunk Format [6]

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

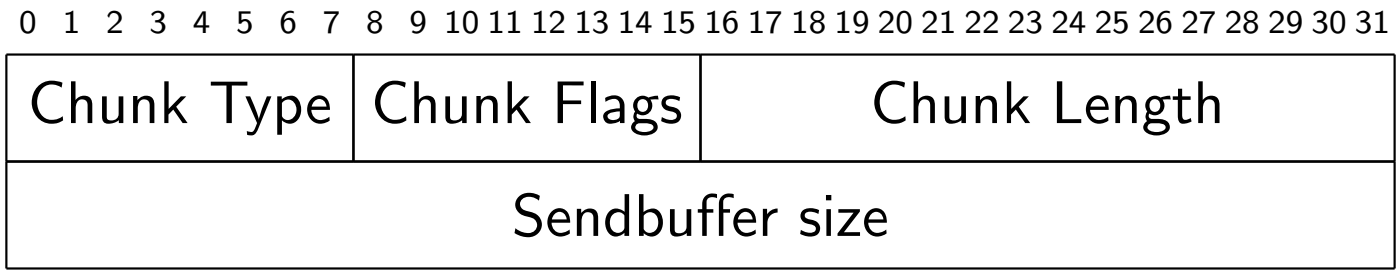

Figure: Proposed Chunk for sendbuffer advertisement

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.