# SCTP Send buffer Advertising

## CS4099 Project
## Final Evaluation

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# Outline

# Introduction

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

# Problem Statement

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

# Previous 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.

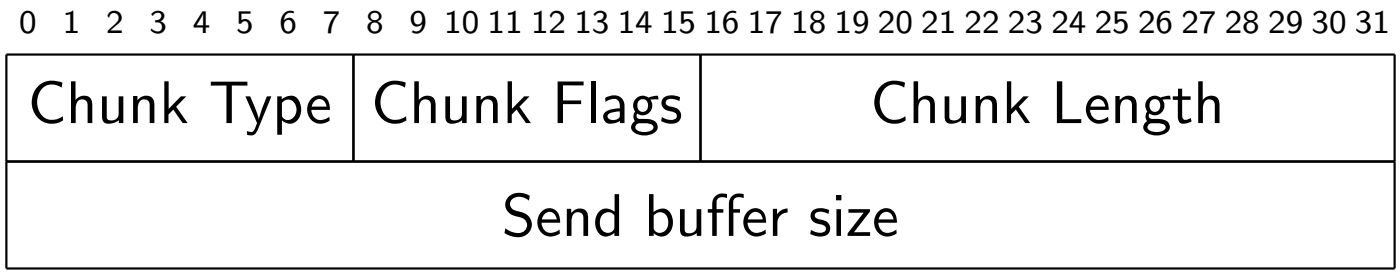



Figure: Proposed Chunk for send buffer advertisement

# Current Design

- Every SCTP packet having a DATA chunk contains the percentage send buffer occupancy chunk as the first chunk.
- Traffic controller classification required each packet to have the send buffer occupancy information.

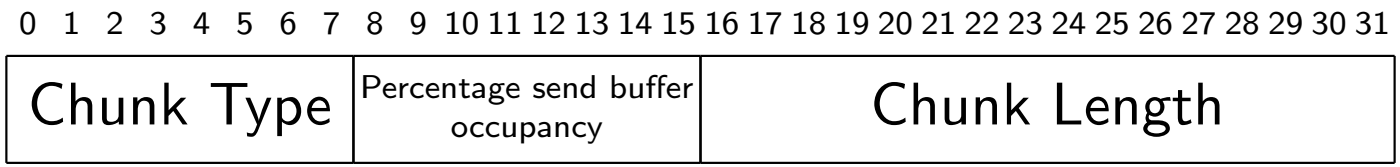



Figure: Proposed Chunk for send buffer advertisement

# Test bed Design

A dumbbell shaped network topology was created with two routers in the center, and multiple hosts connected to one end of each router via a switch. This ensures that we have a bottleneck link in all flows between end hosts on either side.

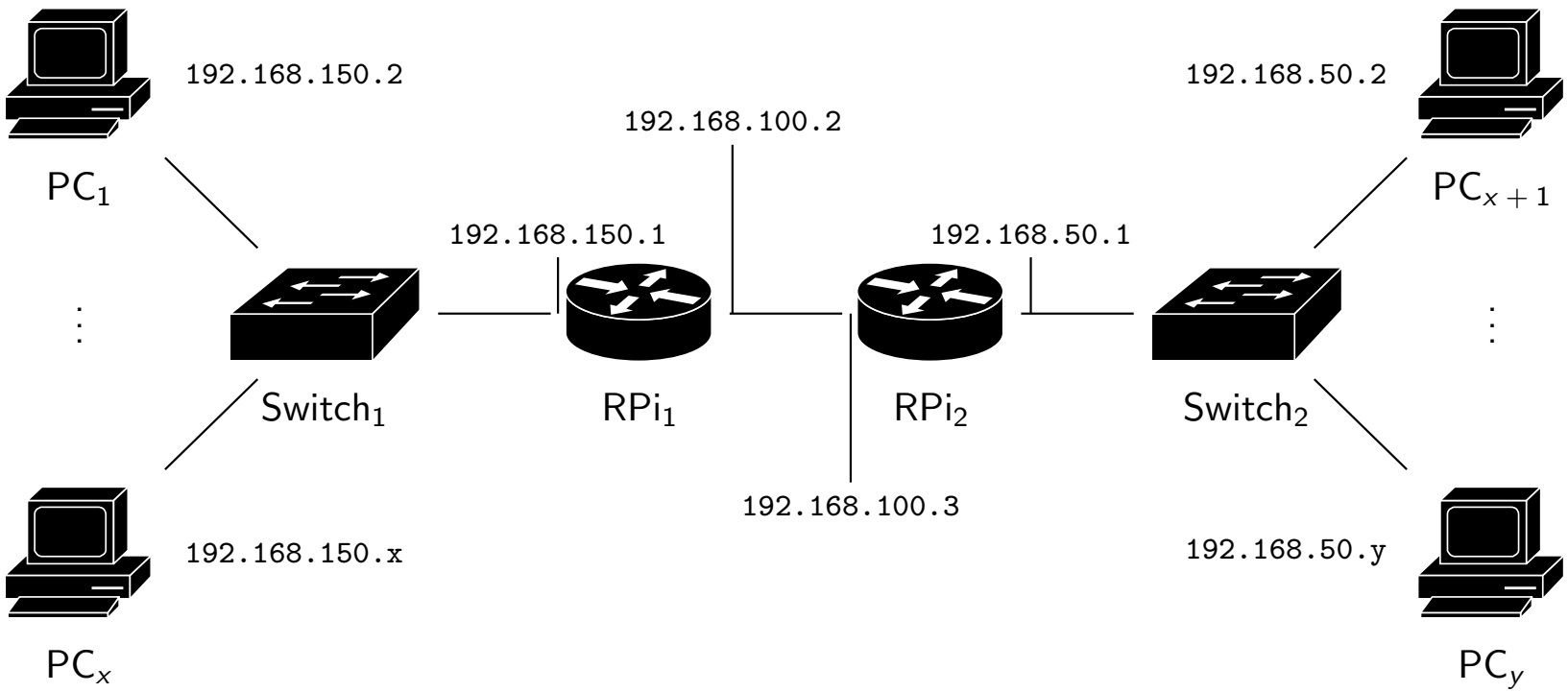



Figure: Test bed implementation

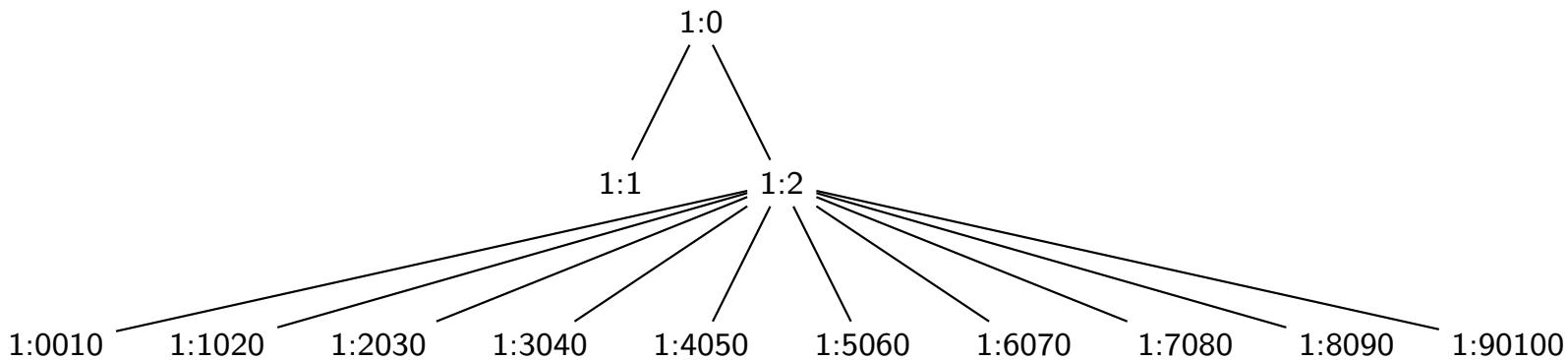
# Work Done

- Modified kernel module `sctp_probe` to measure send buffer.
- Explored Linux kernel SCTP implementation.
- Identified parameter to be advertised.
- A patch implementing the SCTP send buffer advertisement was created for Linux kernel `v4.6-rc4`.
- The send buffer advertisement chunk type value was set to 150.
- Previous design: A state table was created for this chunk, specifying the states in which the send buffer advertisement chunk should be generated and sent.

# Tests conducted

- Queueing discipline - Classless & Classful.
- Classless - TBF, SFQ, etc.
- Classful - HTB, CBQ, etc.

AIM - create a classification hierarchy which works better than the existing qdiscs.



# Results I

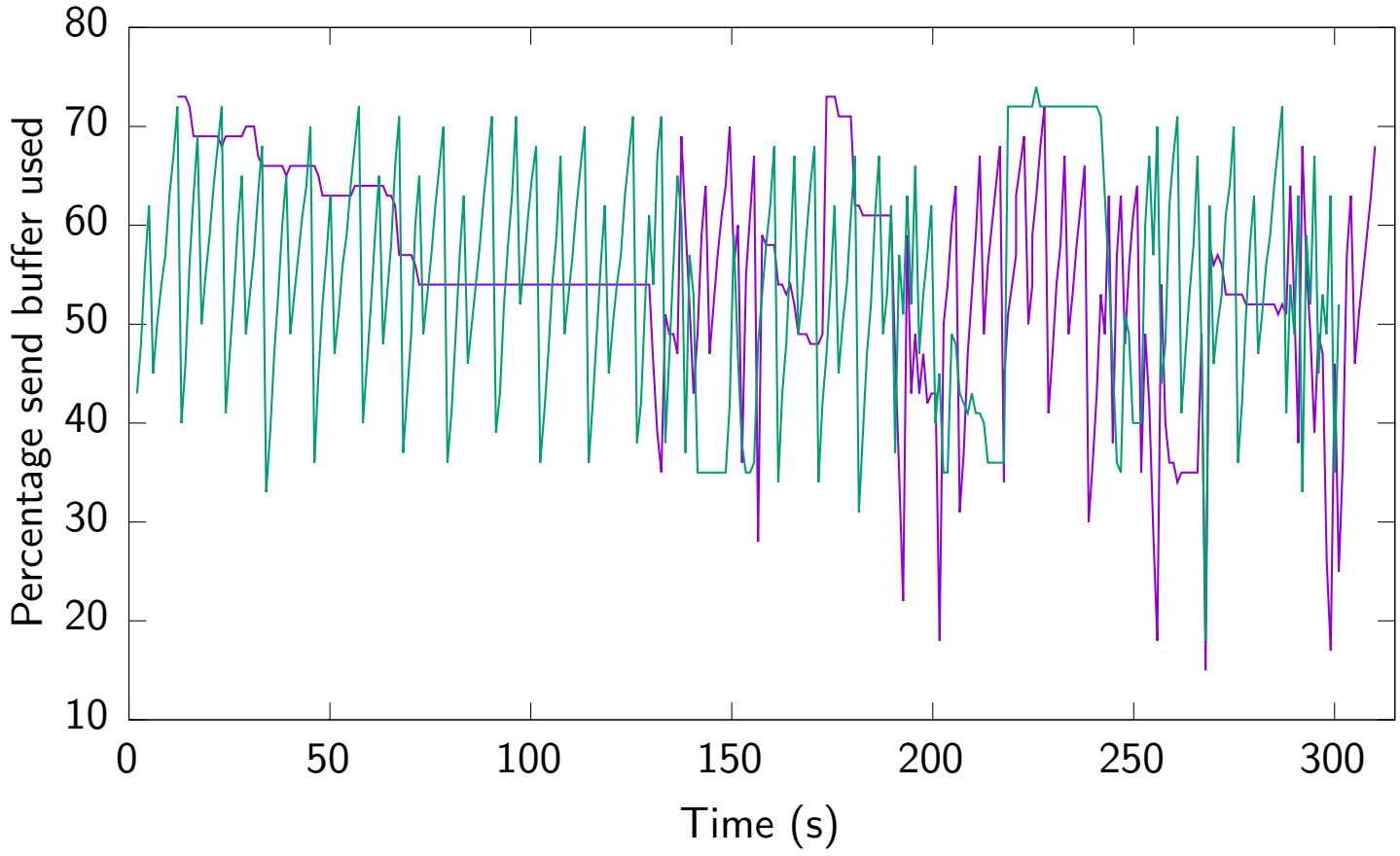



Figure: Percentage send buffer variation with 2 flows each having duration of 300 seconds using the Token Bucket Filter qdisc with rate limited to 1mbit/sec

# Results II

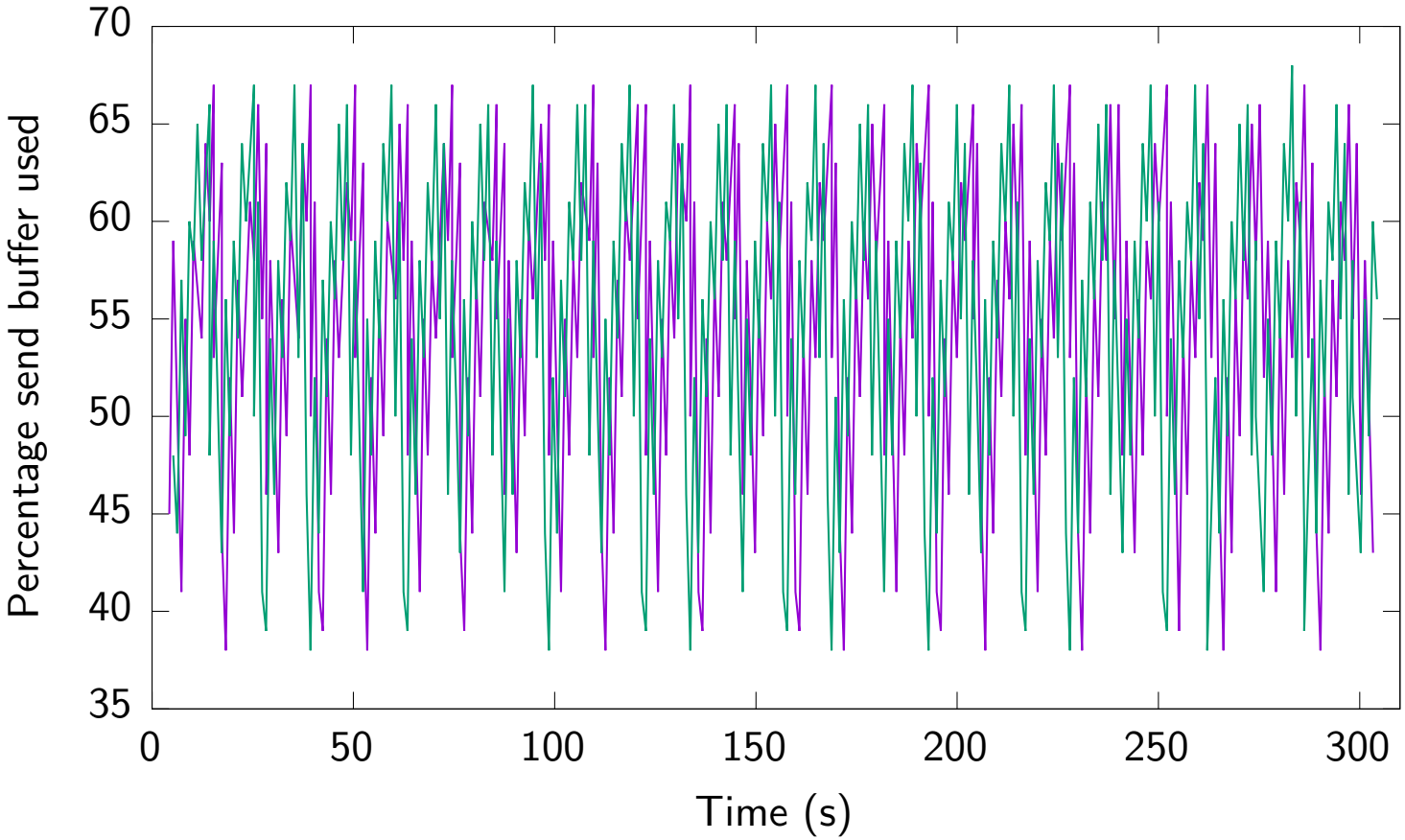



Figure: Percentage send buffer variation with 2 flows each having duration of 300 seconds using Stochastic Fair Queuing qdisc with rate limited to 1mbit/sec

# Work yet to be done

- Debugging the Linux kernel implementation of the current design.
- Testing the implementation with the proposed classification hierarchy.

# References I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[5] M. Tim Jones. *Better networking with SCTP*. Feb. 28, 2006. URL: http://www.ibm.com/developerworks/library/l-sctp/.

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