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Presentation Title: Preemptive Two-Stage Update Mechanism for Software-Defined Networks

Research focus: Using switch localization concept and explicit acknowledgement to schedule timed or untimed updates in Software-Defined Networks.

School: University of Colorado Colorado Springs (UCCS)

Student Level: Ph.D. Candidate

Presentation Type: Poster Presentation

Abstract:

Preemptive Two-Stage Update Mechanism for Software-Defined Networks
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Network configurations and policy updates are common operations carried out by the network operating system. However, the frequency of these network updates may lead to inconsistent network operations if not properly monitored. In this paper, we propose UpdateShim, a fast, efficient two-stage mechanism that collaboratively handles update processes with the control plane to update forwarding rules in Software-Defined Networks. Our technique uses a greedy approach at the initial stage to ensure fast update deployment on reference switches by means of a localization concept. We show that a full update can be dynamically timed to deploy during the off-peak period in order to reduce the communication overhead and eliminate packet collision. Our prototype implementation of UpdateShim increases the efficiency of the update process while enforcing update consistency as a result of the two-stage hybrid process of untimed and timed network updates. Experiments show that UpdateShim enforces blackhole and congestion freedom during updates without incurring significant latency in the network. The results show that UpdateShim achieved an average of 39.26% reduction for guaranteed update duration across three different real-world topologies.