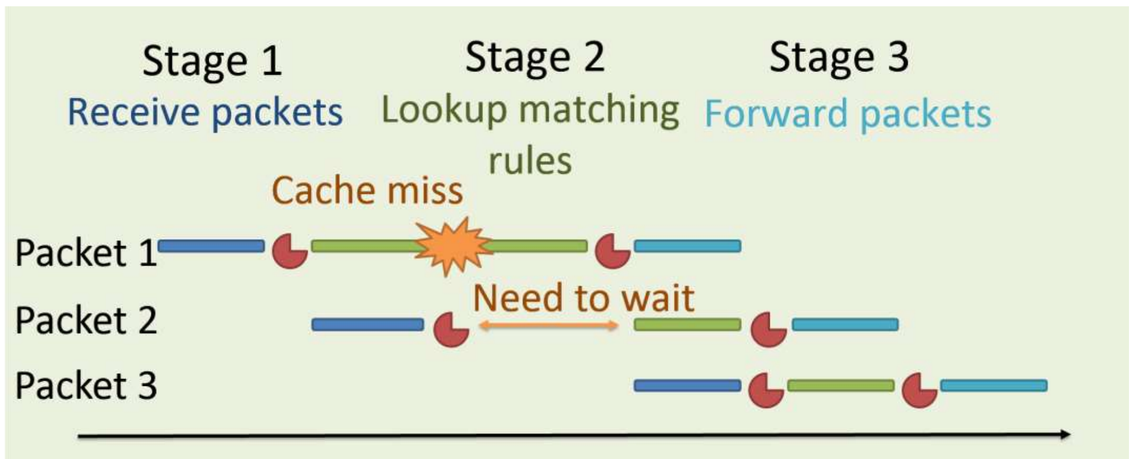
Performance-assured Network Function Virtualization for Open and Disaggregated Optical Transport Systems

A performance-assured Network Function Virtualization (NFV) method for software-based packet processing on an open and disaggregated optical transport systems is demonstrated. Our technique improves NFV operations by leveraging cache memory allocation and monitoring.

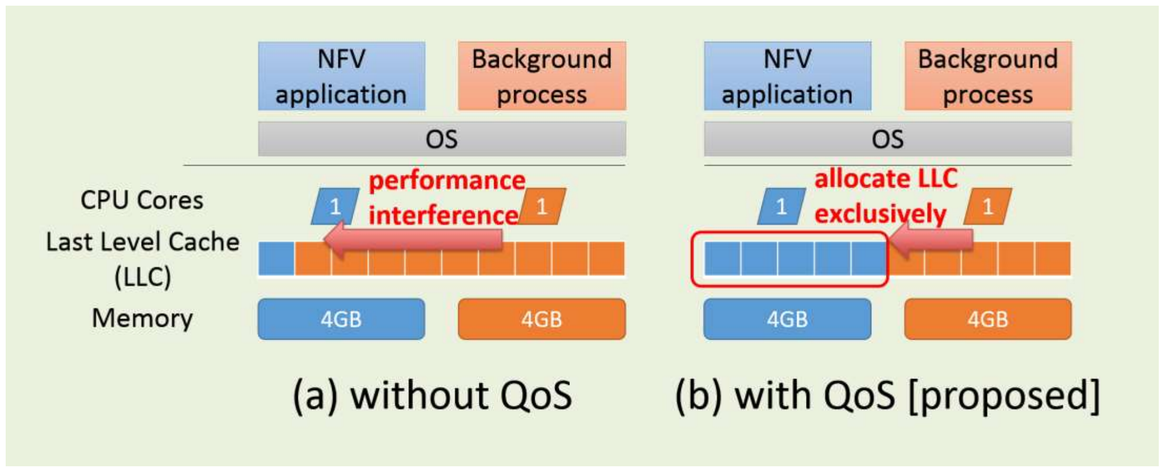
Why is software-based packet processing so challenging?

- Network softwarization like SDN/NFV brings cost optimizations and new service paradigms. However, software-based packet processing cannot achieve the same level of processing performance as in hardware-based.
- Typical packet processing is composed of multiple stages and leverages pipeline parallelism. Overlapped execution is the key to maximize the performance. However, it is not trivial because cache misses disrupt the pipeline execution.



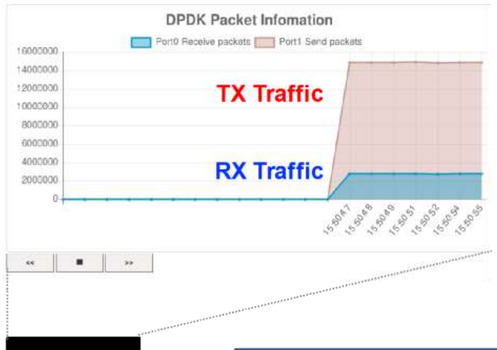
Cache Memory QoS control for software-based packet processing

- To reduce the such performance interference, we introduce cache memory QoS method.
- Our QoS method leverages Intel Cache Allocation Technology (CAT) and exclusively allocates portions of the last level cache to individual NFV applications.
- As a result, the throughput of a performance-assured application improves by 10 % because another application does not evict cache lines from reserved portions of the cache.



Demonstration

I. DPDK-pktgen generates a short packet stream at 10 Gigabit speed.
II. Lagopus processes packets and sends them back to Server A.
III. A cache jammer aggressively writes to memory and conflicts with Lagopus.
IV. A cache memory manager periodically turns on and off our cache QoS method.



Open and Disaggregated Optical Transport