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Load Balancing Approach for Adaptive Bitrate Streaming in ICN

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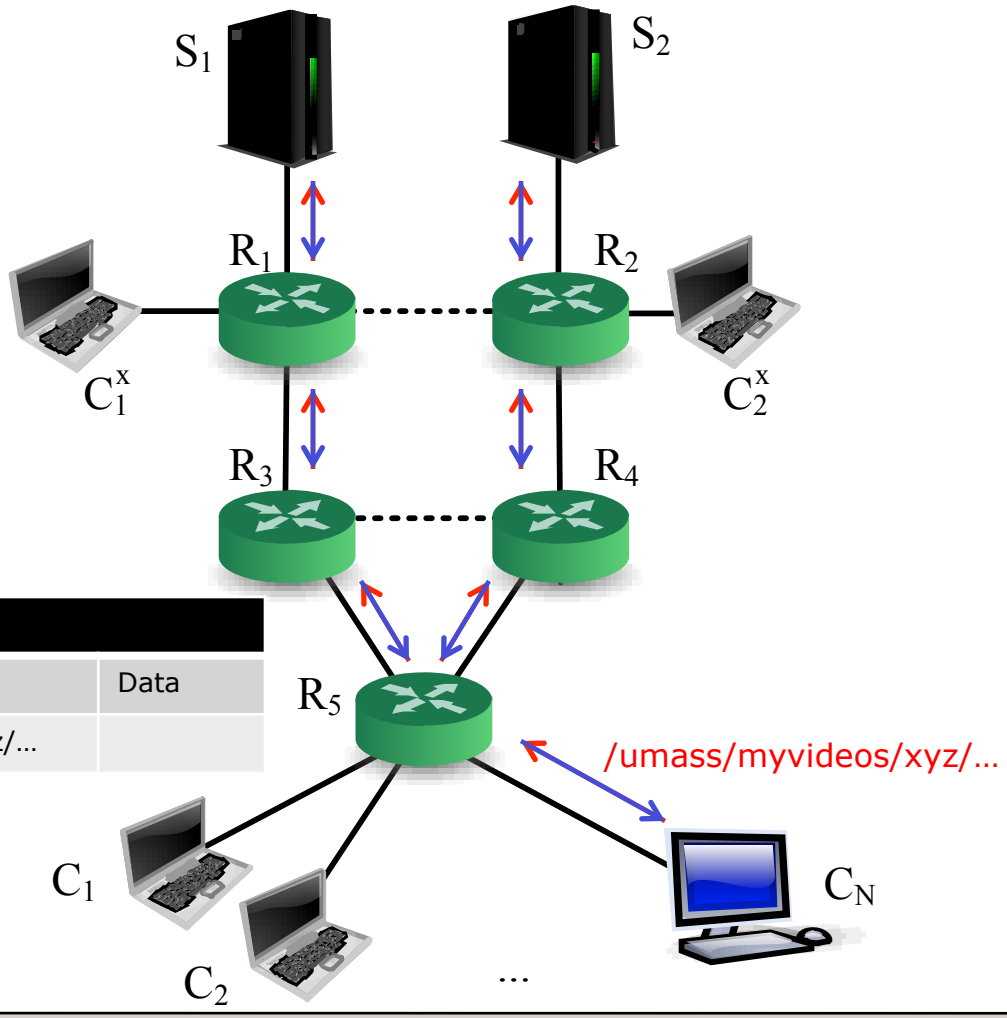
Motivation

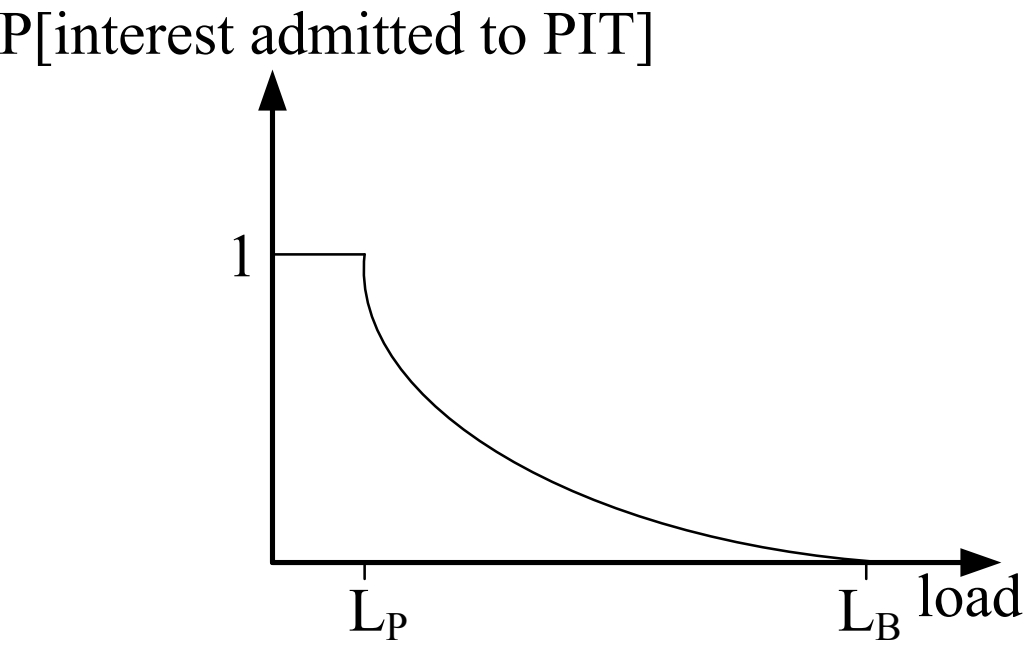
- Load balancing is inherent in the NDN paradigm as content is populated and cached on router nodes across the network.
- In contrast, load balancing in TCP/IP networks is often carried out using dedicated infrastructure in the sense of TCP termination points and load balancing schedulers.
- NDN comes with organic load balancing

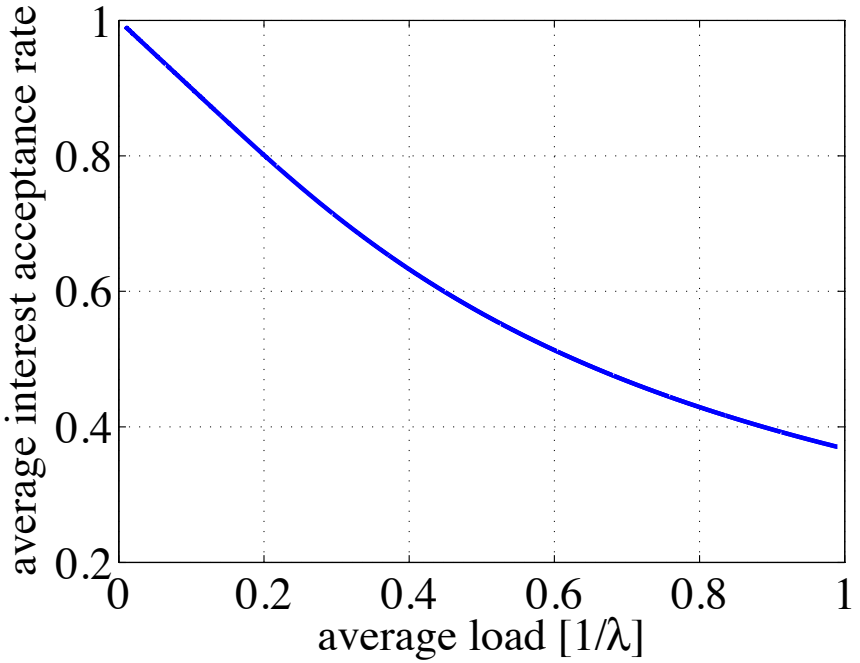
Motivation



CS	
Name	Data
/umass/myvideos/xyz/...	

Load Balancing

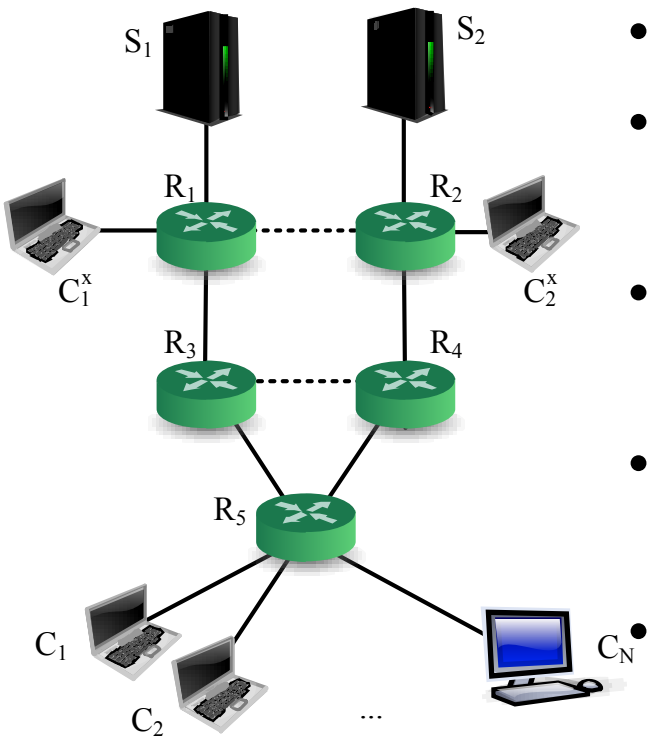




- L_p – Dropping interests is viable
- L_B – Interests will be dropped

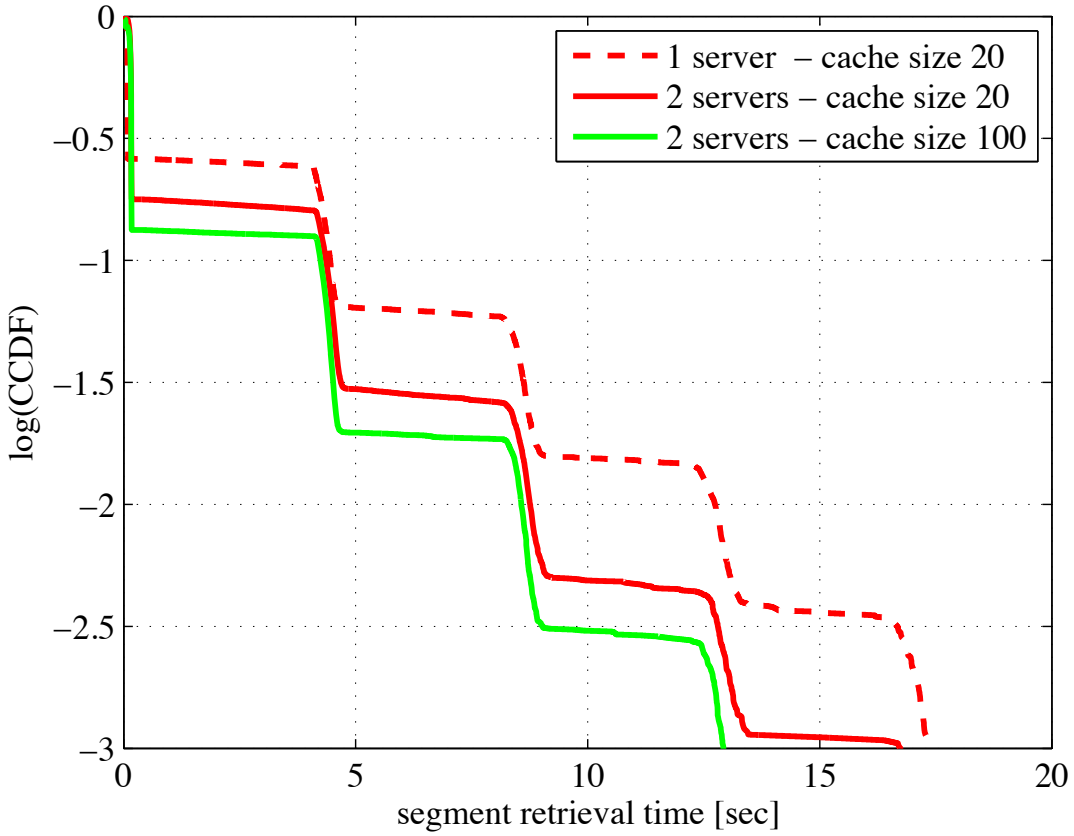
- Average acceptance rate = $(1-e^{-\lambda})$, $\lambda=4$

Simulation



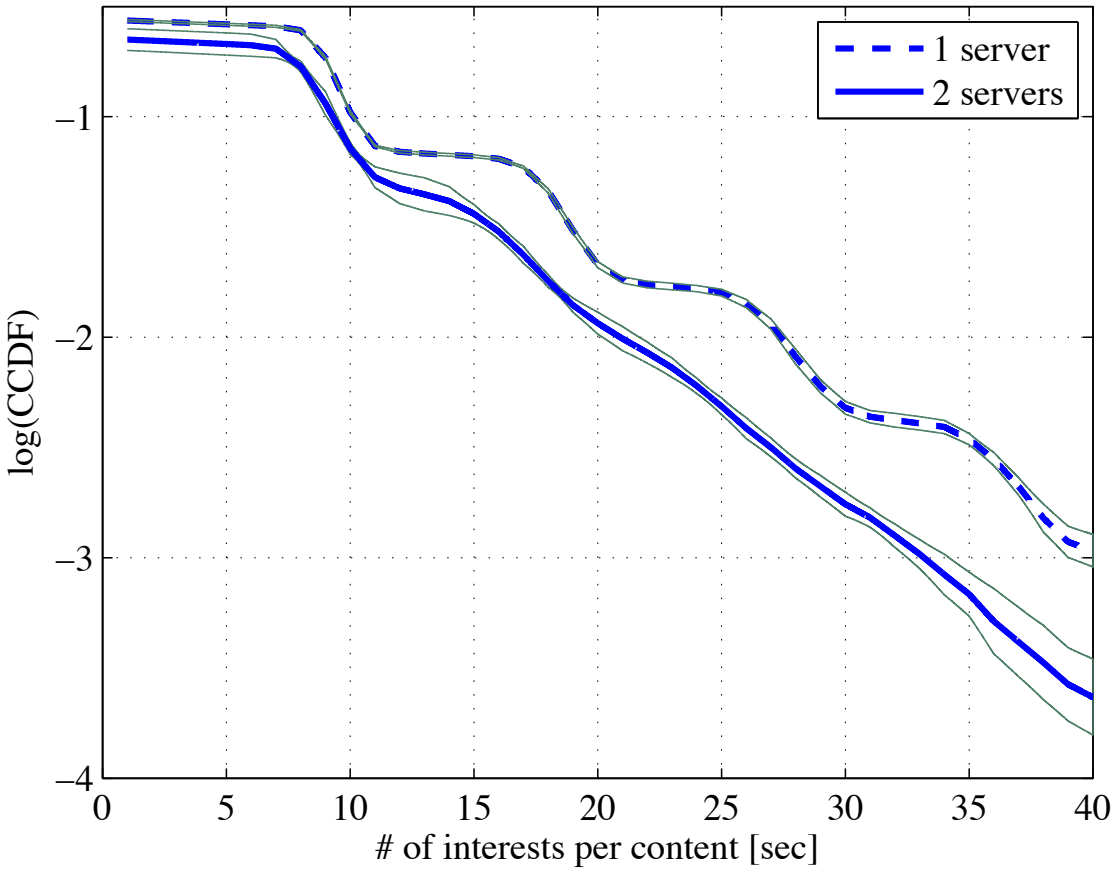
- ndnSIM 2.0, based on NS-3
- Delay=10ms, capacity=10Mbps for all links besides R_i–S_i.
- R_i–S_i capacity=5Mbps, output queue=50 frames
- Default LRU cache (20 contents max.)
- 10 independent clients on R_5, 100 interests per second
- $L_p=0$, $L_B=1$
- Crosstraffic C_1,C_2, Poisson process, 500pps

Caching

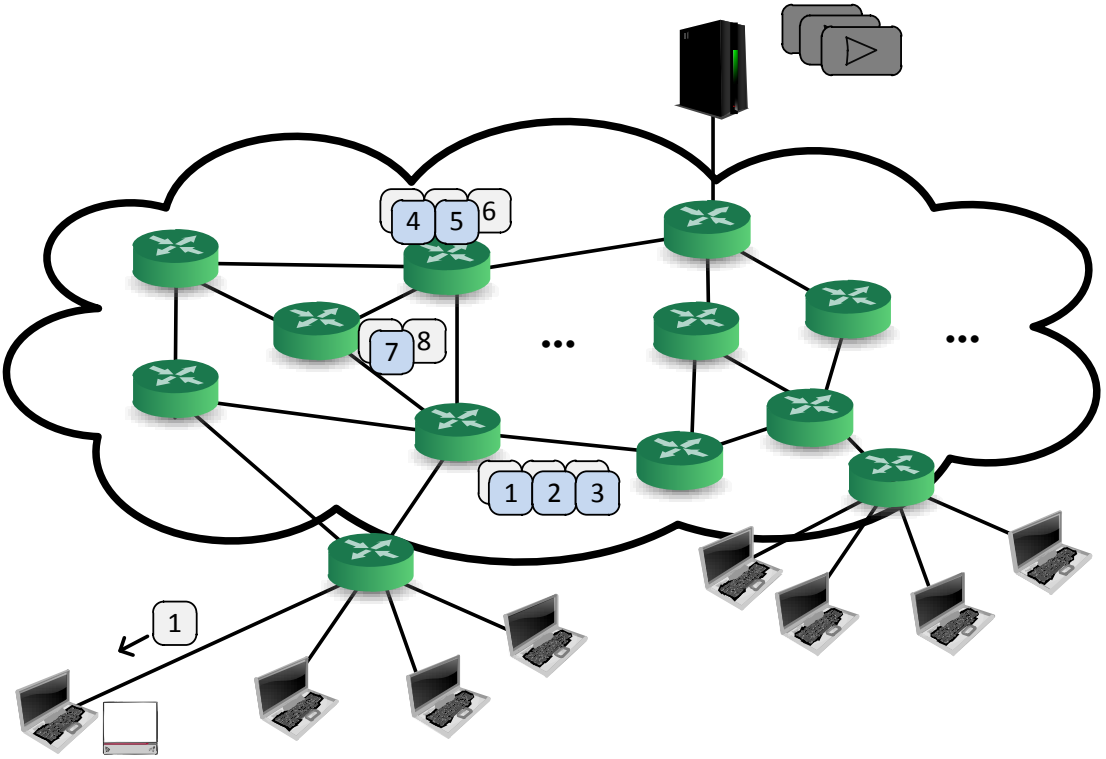


- Remove right branch for 1 server case
- R_1–S_1 capacity 10 Mbps
- Segment retrieval time = reception of content – send of interest request

Interests Sent

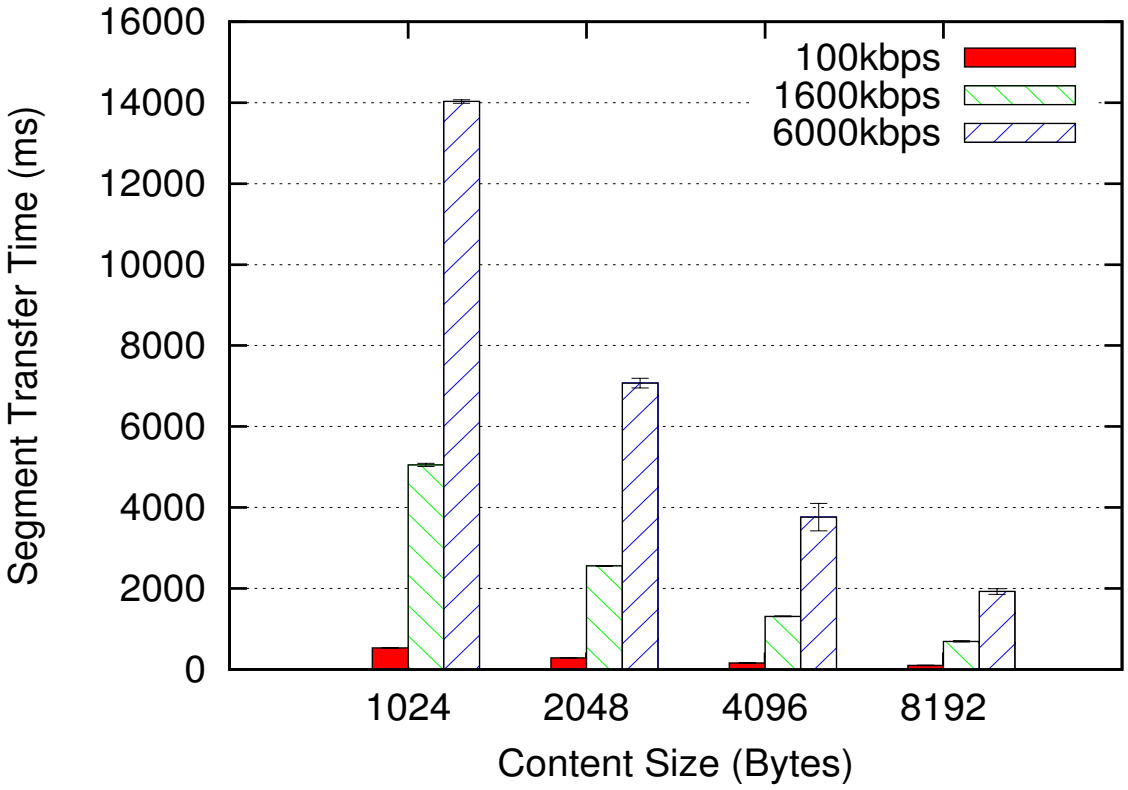


MM Streaming Performance over NDN



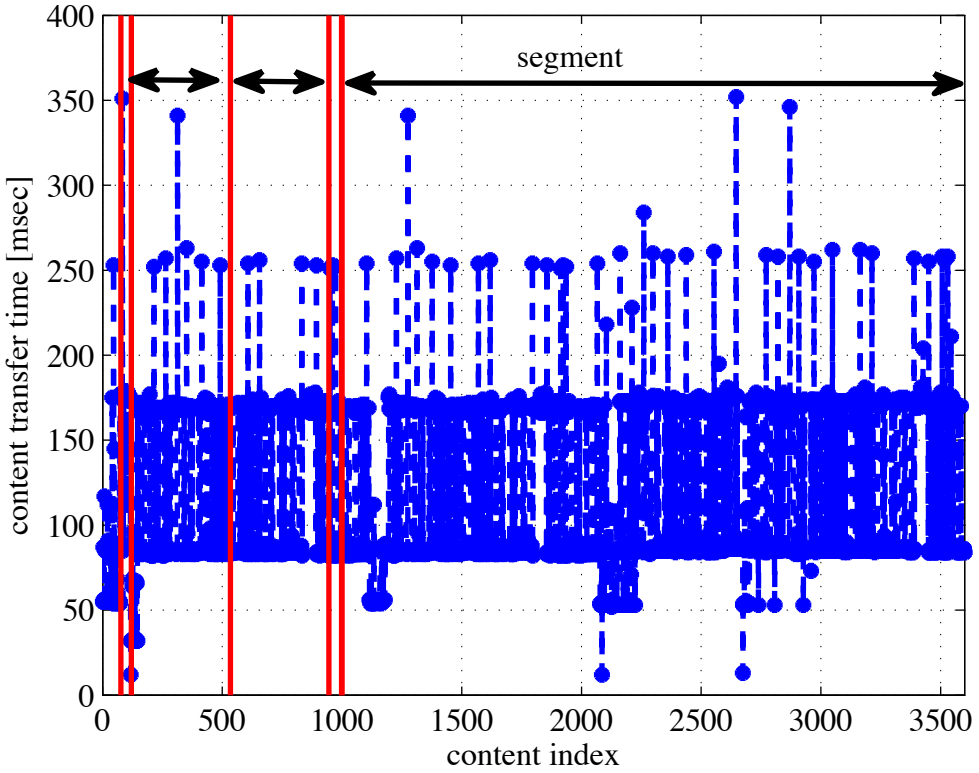
- Measurements performed in actual GENI testbed
- Impact of content size
- Estimating available bandwidth
- NDN over Ethernet

Segment Transfer Time



- Segment transfer time decreases with increasing content size
- Affect of multiple coexisting content sizes?

Oscillation



- Multi-sourcing content
- Disjoint paths
- *Cache size = 80 contents*
- *Segment = 167 contents*
- Segment transfer times are smeared average of oscillating content transfer times

Conclusion

- Investigated load balancing in NDN
- Substantially reduces segment retrieval time
- Real-world testbed experiments of native NDN over Ethernet
- Two-layered version of oscillation problem in case of multi-sourcing