



iCDN: An NDN-based CDN

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What is Content Delivery Network (CDN)?

- An overlay content network on top of the Internet
- Handles requests based on the name of the solicited content (e.g., HTTP requests)
- Employs a third-party module to keep track of cached contents in the network
 - **Scalability issues**

What if CDNs could *cache, find, and serve* contents without a strong dependency on any controlling module.

- ICN/NDN seems to be able to realize such a network

Can *any* NDN network serve as a CDN?



Consider the NDN Testbed

- It strongly relies on a routing protocol to disseminate content availability information in the network

Issues:

- FIB explosion
- Inefficient use of in-network caches

iCDN is an attempt to address these two issues in a scalable, high-performance fashion

A scalable, high-performance NDN-based CDN

FIB explosion:

- Full-mesh overlay network topology
- *Caching hierarchy*

Inefficient use of in-network caches:

- *C-Strategy*

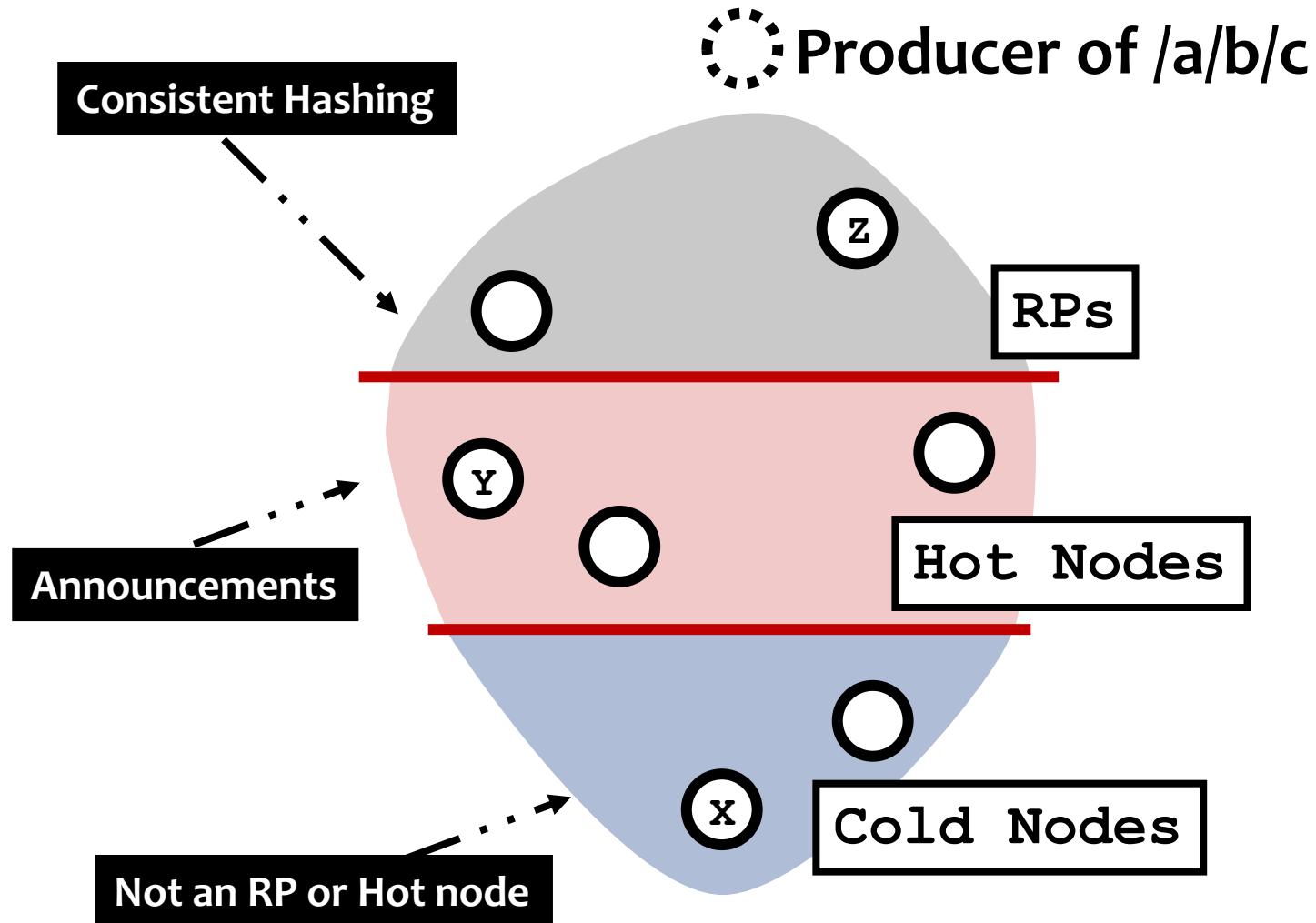
Note:

- CDNs are profoundly complex ecosystem
 - Most common feature of CDNs: **content retrieval and sharing**

Network topology

- Full-mesh overlay topology
 - There is one-hop virtual link between any pair of nodes on an overlay network.
- Logical partitions
 - Nodes can still access the entire network beyond a partition

Cache Hierarchy

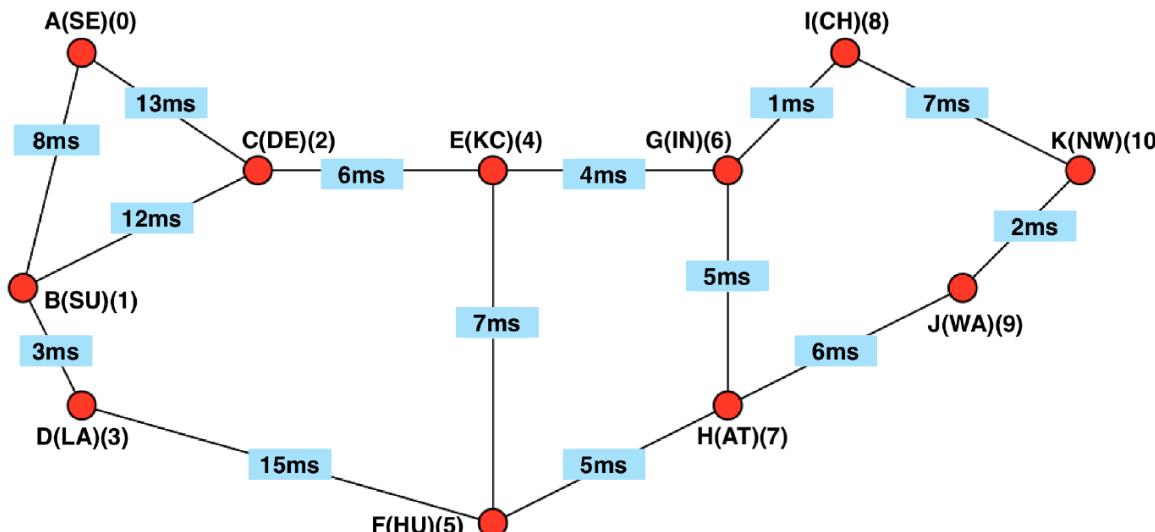


C-Strategy

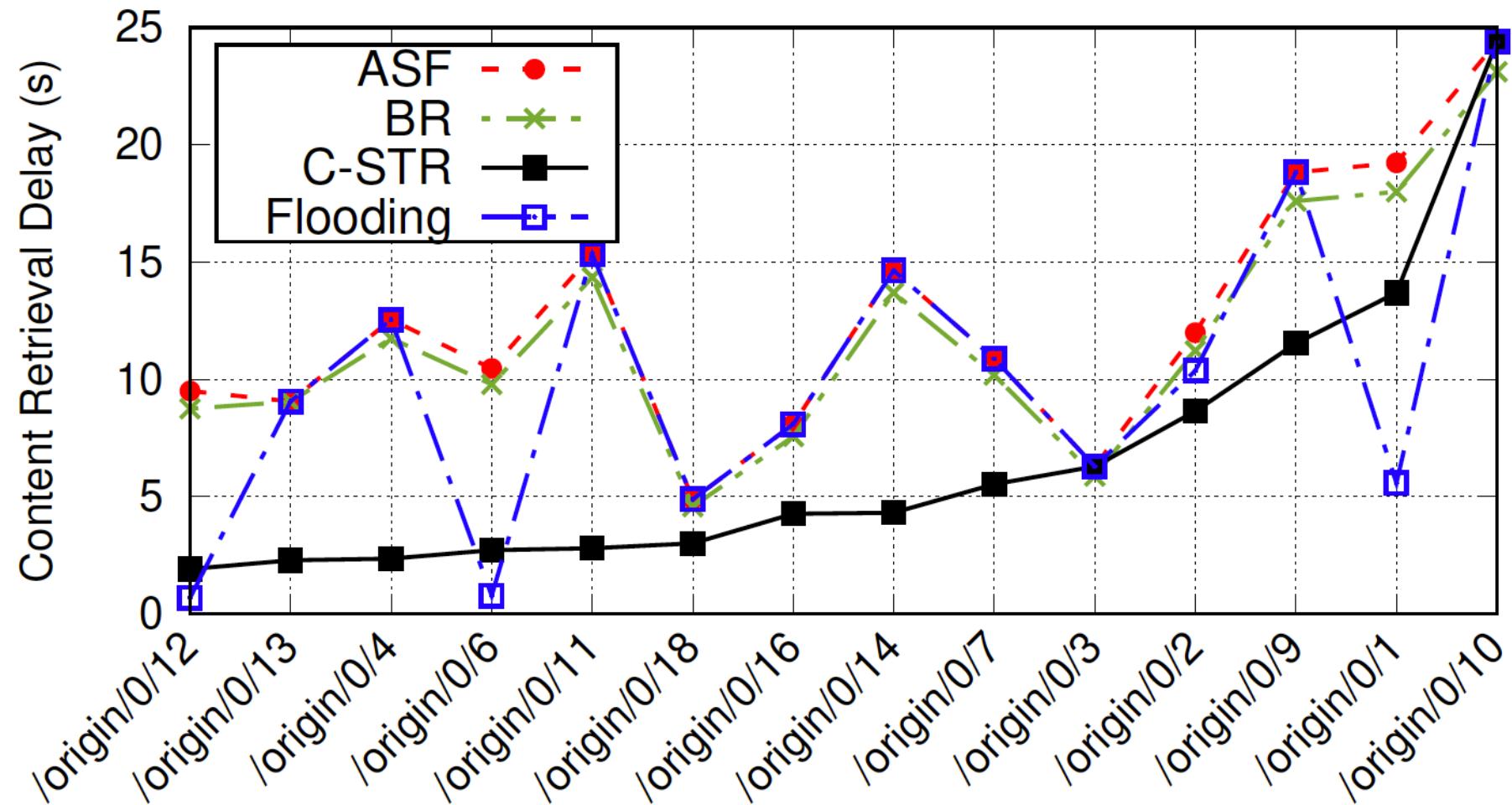
- Utilizing off-path and on-path caches in the cache hierarchy
- Always chooses nodes in higher tiers
 - E.g., Upon a cache miss at a hot node, c-strategy probes a group of RPs
- Metrics for our polynomial WMA :
 - Interest-Data Round-Trip Time
 - Number of Nacks
 - Number of Timeouts
 - Estimated Bandwidth
- To be responsive to network changes:
 - After choosing a node, C-Strategy still periodically probes other nodes

Evaluation setup

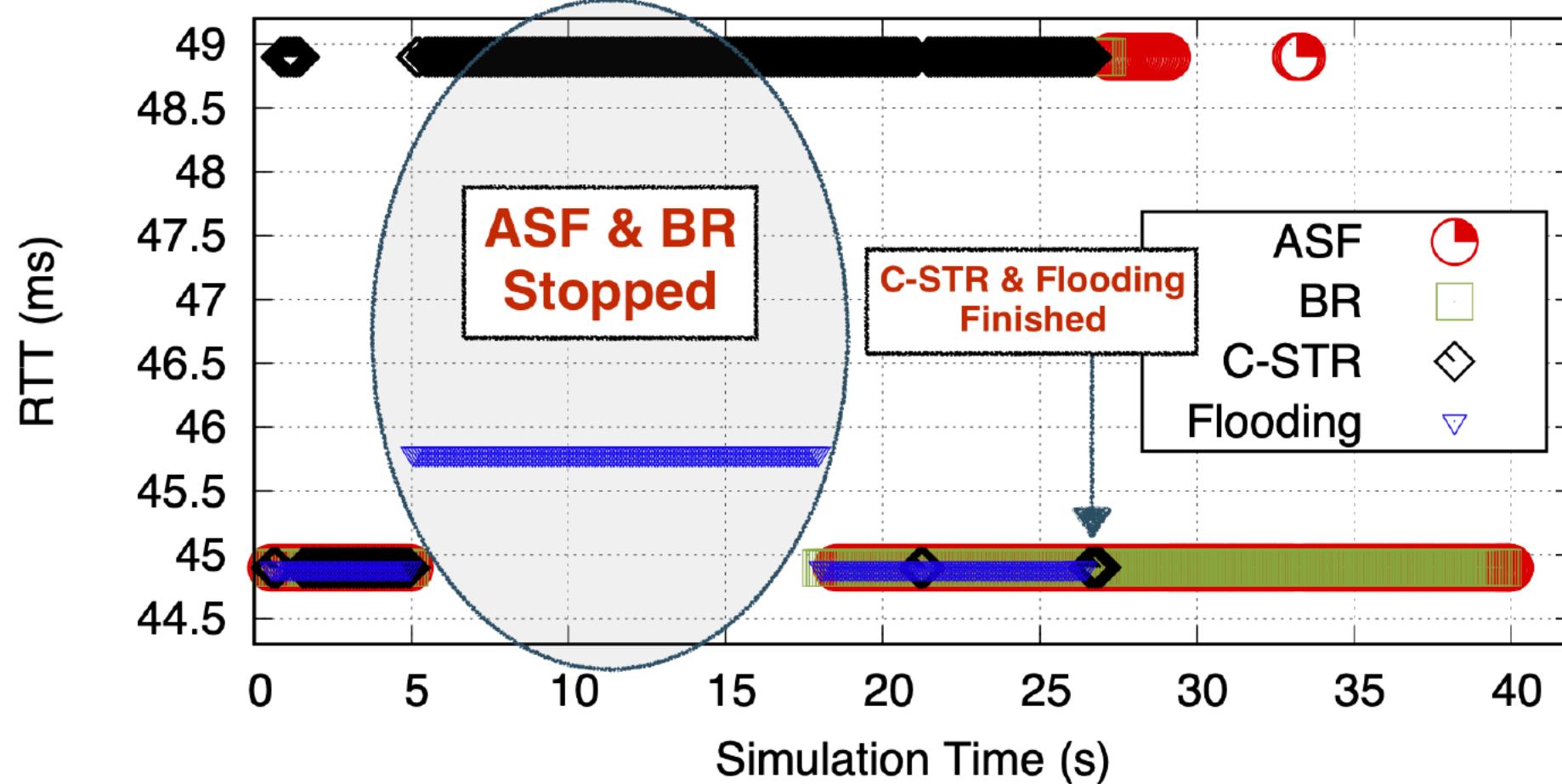
- Compare iCDN with a routing-based solution (i.e., NDN testbed solution)
- Compare C-Strategy with different forwarding strategies (ASF, Best Route, Flooding)
- ndnSIM for simulations
- Content popularity in the network follows Zipf Dist.
- Consumers are connected to nodes 0, 3, and 5
- The producer is connected to node 10



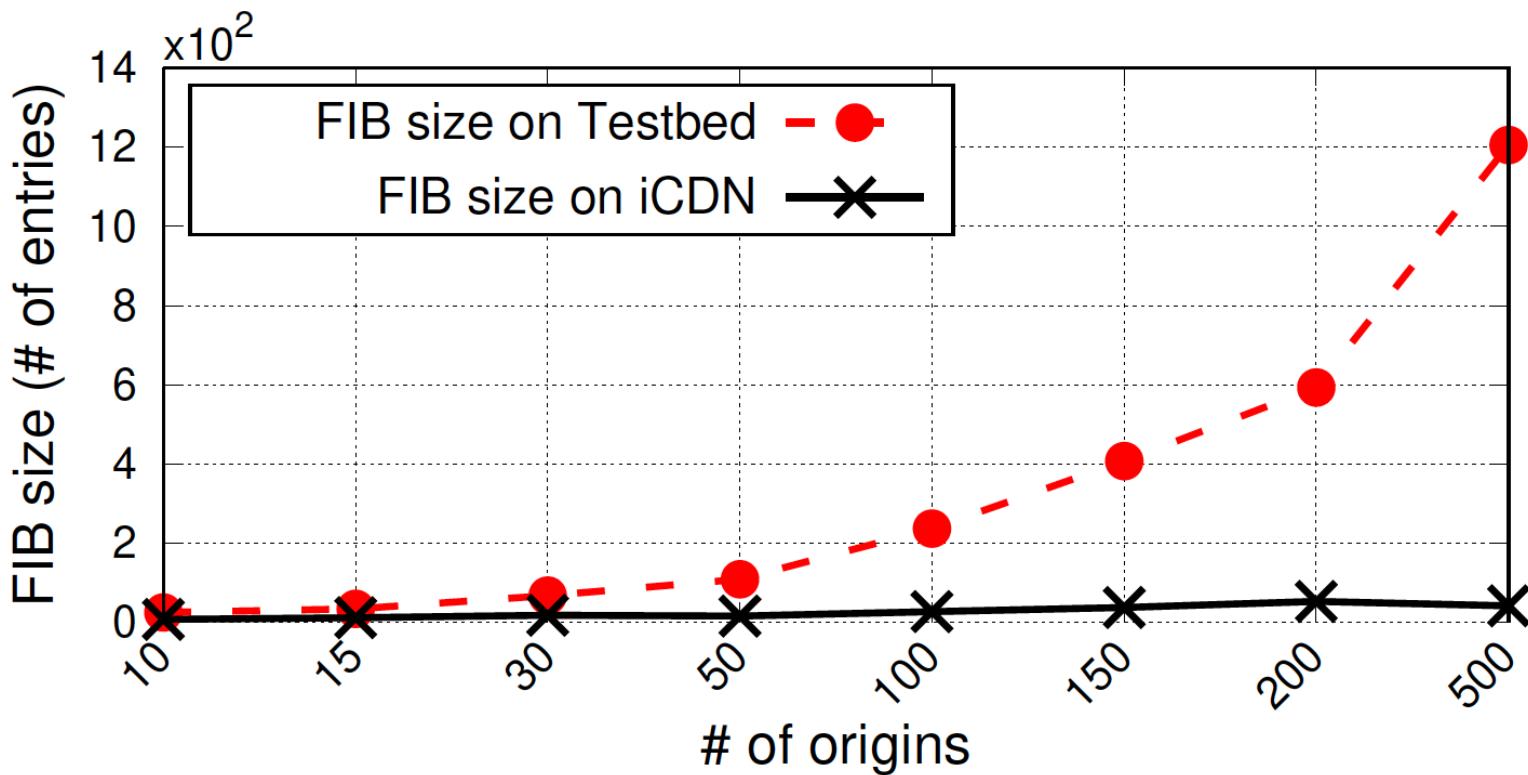
Content Retrieval Delay



Responsiveness



Scalability



Conclusion

- Using NDN technology for large-scale content distribution needs an **exclusive** network design
- iCDN proposes a ***cache hierarchy*** and a new ***forwarding strategy***:
 - iCDN scales as it has no strong dependency on routing/controlling information
 - iCDN addresses FIB explosion and fully utilizes on-path and off-path caches
- A foundation towards a complete NDN-based CDN design and performance evaluation



Thank You