Impact of Mobility on Performance of Caching Strategies in Information-centric Networks

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Information-centric networking (ICN) is a new networking paradigm that intends to evolve today's host-centric Internet to a content-centric one. Caching content within the network at storage-enabled nodes, one of the salient features of ICN, enables requests for content to be served from intermediate nodes rather than the origin servers. In recent years, many caching strategies have been proposed for ICN, the most popular ones being Leave Copy Everywhere (LCE) [2], Leave Copy Down (LCD) [3], Cache Less for More (CL4M) [1] and ProbCache [4]. *In contrast to existing work that have mainly been evaluated on static topologies, in this paper, we conduct a preliminary investigation on the performance impact of mobility on ICN caching policies.* Mobility can be considered to be a fundamental characteristic of most networks and investigating the performance of proposed caching algorithms in mobile scenarios is essential for widespread ICN adoption and deployment.

We conduct simulations on Icarus, a simulator designed exclusively for ICN research. We consider the WIDE network topology (Japanese Academic Network) consisting of 30 nodes. We assume that the content universe is 100000. To obtain steady state results, we first use 100000 requests to warm up the caches and then use an additional 100000 requests for performance measurement. We assume that content popularity follows a Zipfian distribution with skewness parameter $\alpha = 0.7$. Among the 30 nodes, there are 6 requesters, 1 origin server and 23 intermediate nodes with caches.

In our simulations, we compare the performance of LCE, LCD, CL4M and ProbCache for both stationary and mobile scenarios (Figures 1 and 2). We consider a simple mobile scenario where the network core nodes with the highest degrees move after every 5000 requests. As expected, LCE performs the worst in both scenarios. Interestingly, LCD, CL4M and ProbCache show almost similar performance in mobile scenario in comparison to the stationary case where LCD performs the best followed by ProbCache and then CL4M.

In future, we plan to extend our study to include other real world topologies such as GEANT, GARR and ROCKETFUEL. We will also evaluate the above strategies against realistic mobility models (e.g., Random Waypoint, Manhattan model) and real mobility traces (e.g, UMass DieselNet trace).

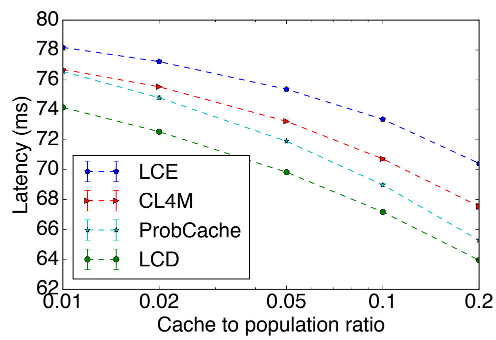

Figure 1: Latency for stationary network

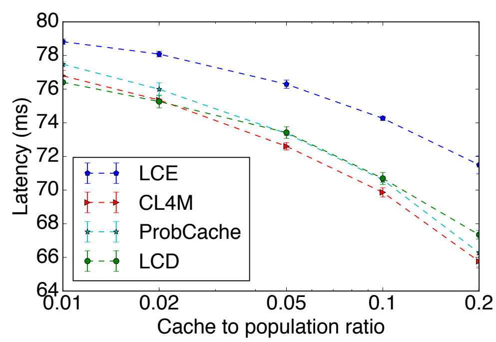

Figure 2: Latency for mobile network

1. REFERENCES

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