Modifications to CCN for canonical names and sessions

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**ABSTRACT**

In this paper, we describe the formatting guidelines for ACM SIG Proceedings.

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# INTRODUCTION

CCN is a new network protocol that integrates load-balancing and caching. CCN falls short in providing protocol-level support for sessions, which are a necessary feature of some applications. Prior work resolves the problem of providing a service over CCN by addressing service endpoints as content but this feature depends on the client to know the precise content name for the correct service endpoint. Such techniques impose overhead in the form of unnecessarily-long content names. We propose protocol-level support for canonical names for services in the form of a one-to-many mapping between single content names and many possible service endpoints.

# EXTENT OF PROBLEM

If a client attempted to connect by CCN to a service offering indexed content (e.g. search, VOD, etc.) using the existing CCN protocol, it would not be possible to guarantee that the sender’s future connections would arrive consistently at the same server hosting the session. This would present a problem if the user wished to search the index, potentially having to page through cached search results. With the existing CCN protocol, such a problem could be solved by communication between the servers responding to interest packets for the service but such functionality may not be practical for all sessions. Significant overhead may be required to keep all application sessions up-to-date and available on all servers.

# SOLUTIONS

## Simple Load Balancing

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It is possible to serve requests for a service name at a single endpoint in a way that facilitates load-balancing. The single endpoint can respond with the name of another endpoint that will actually be used for the duration of the session. This method is very simple but creates the overhead of an additional transaction for finding an appropriate endpoint. Additionally, there is still an overhead in having a longer content name than a short canonical name, affecting packet size.

## Protocol-supported Load Balancing

The CCN protocol can be extended to support canonical names at the protocol level, which resolves some inefficiencies. First, responses to interest packets can contain an advisory bit that marks them as unsuitable for caching. Second, there should be functionality for servers to advertise their canonical service name and real endpoint name along with a capacity factor that advertises remaining capacity. Thus, routers receiving service advertisements can sum the capacity factors for services and send the service advertisements upstream as a routing advisory; and routers up to the domain level can sum the sums of round-robin advisory factors and use such factors to support QoS decisions internally; while domain-level routers can pass their capacity factors upstream to Internet routers.

With the existing protocol, the existence of the route back to the sender is consumed when the interest is answered; but there is a solution to this problem. While it may not be practical to have a more persistent routing state between every pair of hosts in every session, it may be feasible to keep more persistent states within domains for sessions; with servers having the responsibility to terminate intra-domain states by communicating with the appropriate upstream router. Then it would only be necessary for routers in the wider Internet to keep states between domains,

which are responsible for delivering interest and data packets to the correct endpoint, even if it is not explicitly named.



Figure 1. Insert caption to place caption below figure.

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To facilitate load-transferring, between endpoints serving the same prefix, there can be some discrimination based on the sender’s prefix to best distribute load, given capacity factors.

Through these means, sessions are maintained until terminated by the receiver.

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