A Wireless Strategy Layer for CCN

Gabriel M. de Brito, Pedro B. Velloso and Igor M. Moraes

Instituto de Computação, Universidade Federal Fluminense, Niterói, Brazil
{gbrito,velloso,igor}@ic.uff.br

I. INTRODUCTION

Information-Centric Networks (ICN) radically change the Internet communication paradigm. In this new approach, the focus is entirely on content delivery to users, regardless of the location of such content or users. In ICN, networking primitives are solely based on named content and the network infrastructure actively contributes to content storage and distribution. All content requests and forwarding decisions are based strictly on content names. Additionally, content may be stored by the cache-equipped network routers. The adoption of this new paradigm is justified by the changing profile of most of Internet applications that are currently content-centered, such as NetFlix, YouTube, PPStream, and BitTorrent. More than half of the current Internet traffic belongs to these content distribution applications.

Traditional mobility solutions are based on the TCP/IP stack, which basically apply adapted wired network protocols over the wireless MAC and physical layers. The ICN communication model does not require address allocation neither session establishment for data transfers. ICN has native mobility support because there is no association between identification and location of nodes. Nodes do not need to update addresses when changing location because no topological information is needed to exchange packets in ICN, leading to simpler network address management. Thus, ICN allows consumers and content providers to change their physical positions in the network topology without any impairment to both content name and data availability. Traditional Internet architecture, based on the overloaded semantic of the IP addresses, fails to manage such topological changes because it does not ensure the maintenance of ongoing TCP connections due to changes in node addresses. The benefits related to the use of the ICN paradigm are numerous, both for physical node mobility, when nodes move within the network, and logical content mobility, when in-network caching scatters content copies throughout nodes.

II. PROPOSITION

The present work is based on Content-Centric Networking (CCN) [2], one of the existing ICN architectures. Currently, CCN is a *de facto* standard in ICN research. To retrieve contents, CCN nodes broadcast interest packets over all available interfaces. These packets are then forwarded based on content names and can be responded by any node hearing them that stores the desired content. In this case, one data packet is only sent in response to a given interest, consuming it. Nodes can also store received data, acting as in-network caches. Our goal is to extend the standard CCN strategy layer to deploy an efficient wireless *ad hoc* CCN.

Wireless nodes usually have a single network interface since there is only one radio available to explore a predetermined radio channel. In the case of a single wireless transmitter per node, there is no way for nodes to forward packets to multiple interfaces and thus much of the basic model proposed for CCN[2] needs to be extended to fully provide wireless content-centric networking. We aim to introduce a new CCN strategy layer model that extends the standard CCN strategy layer in [1] to forward packets through a single interface. This extended strategy should not check whether the same interfaces are used as input and output interfaces because it relies on broadcast access to the wireless channel. Another behavior predicted by [2] is unwanted data disposal, i.e. discarding received data without a valid PIT entry. Wireless channel is broadcast in nature. Such characteristic can be exploited by nodes through promiscuous sensing of the wireless channel. Thus, nodes could proactively populate their caches with the most requested contents, carrying them to different regions of a dynamic topology. This content distribution mechanism may improve the quality perception, decrease content delivery delays and increase the hit rate of caches. This new CCN strategy layer will enable broadcast communication over a single wireless interface and extend CCN to opportunistically store overheard data.

III. NEXT STEPS

A wireless CCN simulation will be conducted with our broadcast-enabled strategy layer on *ndnSIM*[1]. For a number of mobility scenarios, traffic patterns and different consumer/producer ratios, we will measure delivery efficiency, delay, average number of tries and hops and expect to be able to determine the efficiency of our strategy layer model. Not only the broadcast communication model but the opportunistic caching policy will be evaluated as well.

IV. ACKNOWLEDGEMENTS

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