A Network Architecture to Distribute Video on Demand based on Content Centric Networking

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***Abstract*—The usage pattern of today's Internet consists of research, production, and distribution of content. In this paper, we propose an efficient video on demand distribution architecture. The system relies on Content Centric Networking (CCN) over IP to distribute video in the core of Internet Service Provider's (ISPs) networks. Routers capable of transcoding IP to CCN placed in the network's edge grant the customers transparent access to the video content via IP. The usage of CCN reduces the overhead in the network core, while the proximity between customers and the transcoding points grant lower latency and thus better quality of service (QoS).**

I. Introduction

The Internet revolutionized telecommunications and computing like nothing before and is now part of many aspects of our daily lives. The Internet was first implemented as an experimental network used to connect trustful hosts and share resources. However, the usage pattern of today's Internet is far different from its initial purpose and is characterized by research, production and distribution of content. Despite adaptations made to adjust the Internet to changes in its usage pattern, today's Internet is not able to meet several performance requirements, such as security and quality of service. For this reason, there exists a real need for a Future Internet.

II. Content Centric Networking

One of the most promising proposals of Future Internet is the Content Centric Networking (CCN)[1], based on named data. In CCN, users no longer seek to connect to a host in order to get a content it holds, as it is made today: they ask the network directly for the data. CCN natively supports multi-source and multi-destination routing and has its performance based on distributed cache. CCN is very efficient in delivering popular content, granting low latency and reducing the traffic in the network. In spite of that, the CCN model is the object of severe criticisms, especially in what concerns its scalability.

III. Content Distribution Networks

The content distribution networks (CDNs) are a current solution to availability and quality of service problems. CDNs solve these problems by placing servers with replicas of the content to be distributed in the core of the Internet, close to the borders of the ISPs networks. The proximity of the replica servers and the clients reduces latency, which increases QoS. However, since CDNs are based on the host naming paradigm, the need for translation between "what content is sought " and "where to get it" persists, which limits the efficiency of content distribution.

IV. Architecture

The purpose of this work is to create a CDN that uses CCN to distribute video on demand juxtaposed to the networks of Internet service providers (ISPs). The use of CCN increases the efficiency of content distribution. In addition, the proposed network is to be implemented at ISP network level and and is restricted to distributing a fixed amount of content, which avoids the scalability problems inherent to the CCN architecture. The CDN based on CCN is to be implemented by adding a CCN capable routers in the ISPs networks. Points of transcoding installed in the network border grant to the customers access to the video content via IP based protocols. An experimental network nested in the Future Internet Testbed with Security (FITS)[2], an interuniversitary testbed for Future Internet proposals, was created to evaluate the performance of the proposed system by comparing its performance with a TCP/IP based video distribution.

V. Conclusion and Future Works

The results show that the proposed system is capable of significantly reducing network traffic, while being transparent to customers, if compared to a standard TCP/IP based distribution. The customers experienced similar data transfer rates independently of the distribution mechanism used. The network traffic in the core of the network, however, was significantly lower when the distribution was made via CCN.

As a future work, we expect to expand the network, using FITS nodes all around the world to nest the experimental network, in order to evaluate its scalability.

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References

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