

Information Centric Networking for Media Distribution: Will it Blend?

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ABSTRACT

Information Centric Networking's natural "sweet spot" is the distribution of content. One of the largest sources of content is entertainment media, which is today processed, published and delivered using conventional file processing tools and content distribution networks. This talk looks at the entire media production and distribution process and tries to assess whether, and if so where, ICN architectures have the potential to make major improvements over the solutions available today

Categories and Subject Descriptors

C.2.1 [Network Architectures and Design]: new network architectures; information-centric networking

Keywords: network architectures, network operations, network protocols, multimedia

1. INTRODUCTION

In this talk, I explore how the emerging Information Centric Networking (ICN) designs can be applied to the field of entertainment media distribution. ICN approaches differ from classic Internet protocols in a number of ways:

- Focus on access to and exchange of information objects rather than communication among hosts
- Make storage a "first class" component of networking, along with communication and computation
- Secure the data, not the channel

When applying these principles to media distribution, what are the opportunities, if any, to obtain significant improvements in capability, application simplification, or performance?

2. MEDIA DISTRIBUTION

Media distribution comprises a number of processes, each of which might exploit ICN approaches. They are as follows: (a) **Media Preparation Pipeline** (aka Production), (b) **Media Management** (metadata, search, asset management), (c) **Publishing**, (d) **Content Distribution** (e.g. CDNs, Video Stores), (e) **Playout**

There are minimal opportunities to make big changes in some of these. For production, there may be possibilities in media capture, but otherwise today's media production applications don't have

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problems that are obviously solved by ICN. For media management, metadata is a swamp – switching to ICN doesn't change the dynamic. For publishing, the hard parts have nothing to do with networking or storage. There is a possible play as an alternative to IP multicast for real-time distribution, but HTTP adaptive streaming is rapidly invading this space. The same seems to be happening rapidly for play-out.

This leaves CDNs and streaming. Today's systems are complex and expensive, with many warts that could be minimized or eliminated by switching to an ICN approach.

3. CDNs AND STREAMING WITH ICN

There are a number of ways ICN designs might improve or even allow us to eliminate today's CDNs.

- **Routing** – ICNs unify naming and routing, allowing more flexible and simpler routing with multi-homing of content
- **Security** – ICNs have built in object integrity, but content owners care a lot more about leakage than integrity and hence need watermarking and encryption, neither of which is part of basic ICNs today.
- **Caching** – ICNs have inherent caching capabilities "built-in" so naïvely this should make them highly attractive. However, the state of the art in caching is quite mature, and recent work has convincingly argued that the performance gains achievable over existing solutions are modest. There may however be substantial benefit in simplicity and auto-tuning.
- **Streaming** – ICNs allow us to rethink streaming from the ground-up - one is no longer wedded to HTTP/TCP as the substrate. However, this is an area of active research and it's too soon to tell if the purported benefits will work out in practice.
- **Mobility** – Here is one area where ICN approaches might shine. Some ICN designs are extremely mobile friendly, allowing both clients and servers to move without needing complex rendezvous techniques as in existing IP-based approaches.

4. CONCLUSION

Can we do better for media distribution using ICN approaches? The scorecard seems to look like this, at least at the moment:

Naming/Routing: Looks promising but too soon to tell (hard to do worse than today's mess though)

Security: Mixed bag – specifics of media industry get in the way

Caching: Not likely to help much

Streaming: Way too soon to tell

Mobility: Could be the winner but also way too soon to tell