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Cloud TV: Toward the next generation of network policy debates

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ABSTRACT

We are entering the 4th generation of TV, based on the online transmission of video. This article explores the emerging media system, its policy issues, and a way to resolve them. It analyzes the beginning of a new version of the traditional telecom interconnection problem. The TV system will be diverse in the provision of technology, standards, devices, and content elements. For reasons of interoperation, financial settlements, etc., this diversity will be held together by intermediaries that are today called cloud providers, and through whom much of media content will flow. Based on their fundamental economic characteristics, the cloud operators will form a concentrated market structure. To protect pluralism and competition among clouds and of providers of specialized elements requires the protection of interoperation. This can be accomplished by a basic rule: by the principle of an a la carte offering of service elements.

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What will the regulation of television look like in the future? That question is on the minds of policymakers and media companies around the world. In the past, television was tightly controlled through restrictive licenses and other rules that do not exist for print media. Yet when these print media originally emerged centuries ago, they, too, were censored and licensed. This history raises expectations that television would follow a similar path. It would be set free when television would migrate from the limited over-the-air broadcasting to a delivery over the wide-open open internet. Is this indeed the scenario for the future?

This article will explore the emerging video media landscape that is due to such a migration of television to online platforms, and the policy consequences. It argues that this rapid evolution will not simply add still another form of distribution of familiar content operating under familiar rules, but that it will deeply transform the industry structure and the regulation of what we now call television. In particular, the article analyzes the likely emergence of a new version of the traditional telecom problem of interconnection. It proceeds in a step-wise fashion:

1. The fourth generation of TV is characterized by the technological rate of change of ICT rather than of traditional TV.
2. In this diverse environment of technology and content provision, the central integrators will be the cloud providers.
3. The cloud TV environment will be characterized by significant oligopolistic market power and fragmentation.
4. There are several ways to deal with this, and an a-la-carte system without price regulation would resolve the interconnection issue with the least intervention.

It may be early to discuss this scenario, but the issues will emerge soon enough. Already, at the end of 2012, during evening peak hours, entertainment usage on the internet in the US accounted for 68% of all internet data traffic. Netflix

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accounted for about half of that, i.e. 33%.[1] Together with other video use on the internet, the overall video percentage is over 2/3 of all internet traffic. Thus, the future is almost here.

1. The role of interconnection rules

For a hundred years, the main issue for telecom regulation had been *interoperation* and its cousin, *interconnection*. Telecom's biggest battles were fought over this issue (Brock, 1998). Typically, the largest networks seek to interoperate with non-rival international partners but to avoid doing so with direct domestic rivals. They have the advantages of scale and scope on the supply side, and of network effects on the demand side. Why share these advantages with a smaller rival? A second factor in the battle over interconnection was that large networks wielded a gatekeeping control over market access by providers of content and hardware, and thus were able to extract economic rents. A complex structure emerged to assure, through interoperation, a system with some diversity and competition. The elements included technical standards; regulatory agencies; numbering systems; common carriage; unbundling; and much more.

In America, the main chapter headings in the story of establishing interoperability were (Noam, 2001):

- Interconnection requirement (The "Kingsbury Commitment", 1913).
- Long-distance competition (MCI Execunet, 1975).
- End user equipment competition (Carterfone, 1968).
- Structural and functional separation of regulated and competitive network elements (Computer II Inquiry, 1980).
- The AT&T Divestiture (1982/4).
- Unbundling (ONA, 1986 and LLUs, 1996).

These steps and similar actions in other countries aimed to create a network of networks in which the users of one network could reach the users of rivals. And devices from different technology firms could connect and interoperate, giving users choices and encouraging innovation. The network effects of a large system would not overwhelm those of a small one. Even so, large networks still had the advantage of economies of scale.

But is this the end of history? Today, the next generation of interoperation is emerging under the radar, the interoperation of clouds. Clouds is the current term for server-based services to end-users. The basic idea has been around for decades, to move data processing and smart operations to big central servers, and to leave the periphery of end user "clients" that are relatively "skinny" and "dumb." Today, clouds are still mostly a storage and access system for text and media files, with some synching and sharing. But in the near future, this article argues, they will become the main players of the converged media world (Noam, working paper). And this will lead to yet another round of debates over interconnection and access.

Why is there a next generation of issues? Is not by now everything interconnected and interoperating? Not really. The rules for interoperability for telecommunications and for television were different from each other. Basically, they do not exist for television (including cable) networks. What exist are technical standards of transmission so that a user's TV set can receive several stations. There was also a mandated access to cable distribution platforms by over-the-air broadcasters, as well as by some community, government, and leased-access channels (US Senate, Cable Act, 1992). On the hardware end, the FCC established in the US rules for the interconnection of third-party-provided set tops, but several decades later few such devices were in actual operation (FCC 98–116, 1998). But otherwise, these transmission systems were closed operations and nobody had a right to interconnect or interoperate.

But now, these two network types – telecom and television – are converging, with powerful pipes for individual use, point-to-point, peer-to-peer, video communication. And the question is what the interoperation rules of this converged system will be.

2. Into the fourth generation of television

Television has gone through three generations. First there was over-the-air broadcasting. Thirty years ago, the second generation emerged: multichannel over cable, satellite, and now also over telecom networks. In the 1990s, all-digital forms of TV arrived (ACATS, 1995) that enabled high definition TV, but did not make much of a difference on industry structure or regulation (IDATE, 2011; Screen Digest, 2009). We are now entering the 4th generation of TV, based on the online transmission of broadband internet connectivity. This type of TV will include some of the following elements, in various combinations:

- 4 K and 8 K resolution, which sharpens the picture for large screens (Sugawara, 2008).
- 3-D in quality (Surman, Sexton, Bates, Lee, & Yow, 2004).
- Peer-interactivity (Smart, 2010).
- Person-to-computer interactivity.
- Computer-enhanced reality.

[1] Reisinger, Don. "Netflix gobbles a third of peak internet traffic in North America," *Cnet.* Nov 7, 2012.

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