A Network Model of Internet Television Distribution

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Introduction

Historically, television has been based on the distribution of video signals sent to a large number of recipients, commonly known as viewers. This model of distribution has become known as "broadcasting". Although the technologies used to distribute television have changed since the advent of the medium, the broadcasting model has flourished throughout the decades. Currently, television in the US is dominated by three distribution technologies: over the air broadcast, cable, and satellite[1]. These technologies have become almost ubiquitous, as nearly all homes are able to receive over air broadcasts and 87% of US households have either cable or satellite subscriptions[2].

It is because of the technical constraints of these technologies that broadcasting remains the dominant model for distribution. However, a small fraction of television content is now being distributed through a new medium: the internet.

Although the internet is a network of interconnected nodes, television distribution over the internet still mimics that of over air, cable, and satellite distribution, that is, a broadcast model. It is the aim of this article to propose a network model for television distribution. Discussed will be the advantages of the network model for content creators, traditional broadcast companies, advertisers, and end-users (viewers).

Broadcast Model vs. Network Model

The traditional model of television distribution is broadcasting. The broadcast model reflects a one-to-many relationship between the broadcaster and the consumers of the content (viewers) in which only the broadcaster can send a signal and only the viewers can receive it. This differs from the model that the internet is based on, which is a many-to-many relationship in which signal is transferred in both directions (see figure 1).

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[1] "IPTV – The Revolution is Here" www.eecs.berkeley.edu/~binetude/course/eng298a_2/IPTV.pdf

[2] Consumer Affairs "Satellite TV Penetration Up Significantly" http://www.consumeraffairs.com/news04/2005/jdpower_satellite.html

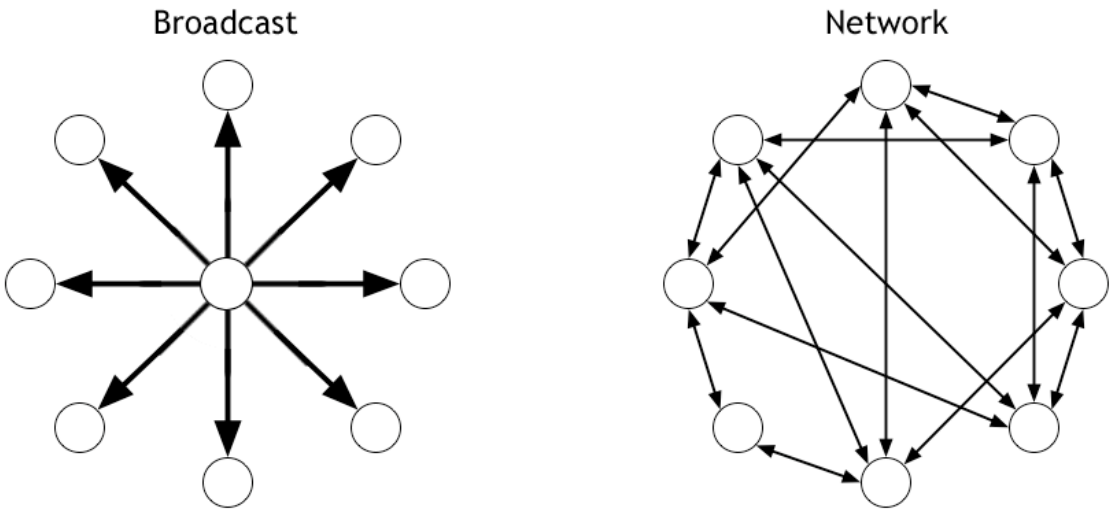

Figure 1: *This diagram shows the difference between a broadcasting model and a networking model. The nodes in the broadcast model have a one-to-many relationship in which signal can only travel from the sending node to the receiving nodes. In the network model the nodes have a many-to-many relationship in which signal is transferred in both directions.*

The major implications of these topologies for television distribution have to do with feedback. The broadcast model does not support direct feedback from viewers to the distributor and business models of the television industry reflect that. The Nielsen ratings[3], for example, are based on a very small percentage of viewers and require viewers to self-report viewing habits. These ratings influence everything from the price for an advertising time slot to whether a show is renewed for another season.

This type of archaic feedback is a reflection of the lack of an accurate feedback mechanism in the broadcast model. This is not true, however, of the network model that the internet is based upon. The internet allows every node to be interconnected with every other available node allowing for a robust feedback loop. Taking advantage of this interconnectivity will give broadcasters a more accurate picture of their audiences' viewing habits.

Cable and satellite companies, along with third parties vendors such as Akimbo[4], Brightcove[5], and DaveTV[6], are beginning to build infrastructures that will be able to distribute content via internet proto-

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3 www.nielsenmedia.com/

4 www.akimbo.com

5 www.brightcove.com

6 www.davetv.com

cols[7]. Furthermore, many traditional television networks such as CBS, MTV, ABC, and FOX are beginning to offer their content for download via the web. All these ventures, however, share one thing in common: they are based on the broadcast model. Although distribution is conducted over the interconnected network that is the internet, no attempt has been made to take advantage of the many-to-many topology that is inherent to it.

Advantages of Network Model

The major difference between the broadcast model and the network model of distribution is the interconnectivity of the nodes, but the implications of these connections are more far reaching for the stakeholders involved. This includes richer experiences for the end-users (viewers), more accurate viewership statistics for broadcasters, support for niche content, and the ability for advertisers to reach a more targeted audience.

As previously mentioned, allowing a feedback loop between the broadcaster and the end-users means having more accurate statistics regarding the viewing habits of ALL users, not just a representative sample. This difference alone may be the most powerful advantage of the network model. Advertisers will be able to gain powerful, in-depth information about how their messages are being received. Furthermore, advertisers who would not be able to afford to show a commercial during prime time hours, can now target a smaller, more targeted audience and have assurances that their message is received by the right viewers.

Not to be ignored is the end-user involvement in television that can manifest itself in many useful ways, many of which can currently be seen in other forms of media that have moved to internet distribution. These are secondary effects of the feedback loop and are generally driven by the community of end-users.

Tagging, for example, is the practice of attaching metadata to content. Similar to keywords, tags are used for the creation of metadata. However, unlike keywords, tags are far more powerful because the end-user population is responsible for creating them. Generally, keywords are generated by content creators themselves. With a large enough group of end-users involved in tagging, emergent categorization can occur. This kind of bottom-up grouping can be more powerful than predetermined genre-based categorization because it reflects the culture of the viewers. Ontological schemes based on user-created tags can be seen with such online communities as Flickr[8] (photo sharing) and Wikipedia[9] (online encyclopedia).

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[7] Converge! Network Digest. SBC "Project Lightspeed" Targets Rapid Fiber to Node Deployment.
http://www.convergedigest.com/Bandwidth/newnetworksarticle.asp?ID=12617

[8] www.flickr.com

[9] www.wikipedia.org

Grassroots categorization and metadata creation can also help television companies learn what kinds of content are in demand and therefore which shows to fund. A network model of distribution can therefore put the power into the hands of the viewers. As the picture and sound quality of television shows continue to increase, so too do the costs of distributing this content to the end-users. Ultimately these costs are being shared with viewers who subscribe to cable and satellite networks[10].

By taking advantage of the interconnected nodes of subscribers and distributors, bandwidth needs can be shared amongst end-users. This kind of dilution of distribution is unique to internet-based distribution and it should be taken advantage of by television companies. New technologies such as BitTorrent provide promising solutions to the increasing cost of distribution by allowing users to download or stream multimedia files across multiple peers[11].

Privacy Concerns

It should be noted that there are privacy issues related to the network model not associated with the broadcast model. Because all users have a constant feedback loop to the content provider, personal information about each viewer is being shared via the network. Upon implementation of the network model, network administrators need to place a high priority on network security to protect against intercepted signals. Furthermore, the Digital Millennium Copyright Act of 1998[12] states that consumers of should be presented with the opportunity not to share information about their viewing habits.

Conclusion

It is clear that television distribution over the internet is the future of the industry. It is not clear, however, if those responsible for such distribution will take full advantage of the inherent topology of this powerful network, which is based on multidirectional, interconnected nodes. It is the goal of this article to inform broadcasters about the advantages of involving end-users in every step of the process when adopting internet-based distribution systems. This kind of relationship has flourished in other forms of media and it is the belief of the author that such effects can be seen in television as well.

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[10] CBS News Online. Major Cable Comapanies Raising Rates. http://www.cbsnews.com/stories/2005/12/02/ap/business/mainD8E861K0I.shtml

[11] I, Cringly. Peering into the future: Why P2P Is the Future of Media Distribution Even If ISPs Have Yet to Figure That Out.

[12] www.copyright.gov/legislation/dmca.pdf