DRAFT
Video 2.0: Transition from Broadcast to the Internet
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Summary
As many Communications Service Providers (CSPs) role out broadcast or multicast IPTV offerings, are they solving the wrong problem? The proliferation of IP enabled devices with increased computing power and better display quality is rapidly changing how consumers access and experience video. Like many other areas, the Internet is changing our behavior from a "lean back" or push distribution model centered in the living room, to one in which we "lean forward" or pull content to a wide variety of devices to the location of our choice. This will fundamentally change how we experience video, the business models supporting the media and entertainment industry, and the networks that support the distribution of this content.

In this paper we discuss the trends of Internet video consumption, present areas where challenges exist, and where efforts are required by CSPs to support the search, delivery and mobility of content.
We additionally present some areas where Accenture is working with our clients to solve some of these challenges.

IP Video Trends – a point of view
My Parents Television
With increases in compute power, battery life, display technologies, and network connectivity, video is increasingly available on a wide and diverse range of IP enabled devices such as PCs and mobile phones, in addition to the traditional televisions (with the aid of an IP set-top box or STB). This proliferation of video beyond the set-top box, primarily to the PC and mobile device, has been coined "Three Screens" by the industry. The ubiquitous availability and significant growth in non-traditional video consumption is creating a number of challenges for Communication Service Providers on accessibility of video content and expectations on quality.

Despite IP and the Internet driving major cultural changes in how we experience video content (move from "push" to "pull"), most Communications Service Providers are focused on replicating traditional broadcast and VoD experiences over IP. While the representative CSPs on this list tend to get a lot of press for their IPTV programs, very few have innovated beyond "me too" offerings of existing broadcast distribution channels (over-the-air, cable, and satellite).
A majority of their focus remains on how they (a) offensively enter a new entertainment market to drive new revenue streams and compete with traditional offerings (broadcast, cable, satellite); and (b) defensively complete "triple and quadruple play" offerings to better secure customers.

One possible flaw in this approach is that they have been focused on replicating a "push" broadcast model. However the increasingly prevalent user preference is for an Internet or "pull" model. As a result, we are starting to see the emergence of disruptive competition from non-CSP sources, ranging from traditional media and entertainment players such as Stars' Vongo service, to completely new entrants such as Google's YouTube service .

"You've Got to Give the People What They Want"
Accenture research shows that IP Video users around the globe are looking for new ways to consume video.
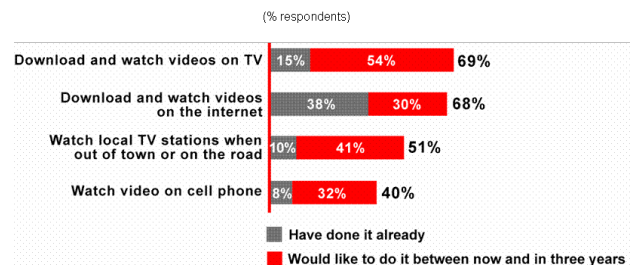

Figure 1. Consumer future interest in watching movies, TV shows and other videos [1]

With the combination of increased bandwidth, vastly increased endpoint processor and memory, increased battery life, ubiquitous wireless, and improved video codecs, we are now able to download videos over our home, office, and public Internet connections. Using inexpensive and pervasive consumer devices we can now download video titles on-demand to be viewed now or at a later time. Gone are the days of stuttering video and jumpy frame rates. The video is crisp and clear, and the audio is pristine and in stereo. Content in all forms are available from a number of internet based locations and range from user-generated content with no ratings, rights management or security, to recent Hollywood releases with stringent controls on availability and usage. This "over-the-top" or Internet approach poses a threat to existing broadcast and VOD providers, as well as emerging IPTV service providers. CSPs may be disintermediated to the status of providing the "pipe" while others harvest the value added content and advertising revenue. Net Neutrality may force CSPs to be fair to their over-the-top competitors, further leveling the playing field.

There are a number of trends that characterize the move to the Internet video model. These include:
- Searching and cataloguing of digital content
- Time shifting
- Place shifting
- Rip-and-go and syncing

Search of Google. Recommendation of Amazon

The growth of the amount of video content available presets us with a new set of trends and associated challenges which require focus in order to support the consumer experience demands. These trends include Content search and recommendation (easy access to large content libraries of data, searching for content, with community oriented recommendations), time shifting (support for on-demand models) and place shifting (support for mobility of content).

With commercial video service offerings the ability to browse or search for specific content is quite difficult, especially when trying to find what you want to watch with 100s of channels and today's electronic program guides. Some search capabilities are available and are typically on specific fields and limited to CSP's content offerings and do not span in-home content stores or Internet content sources.

Internet content presents challenges of being able to scale as the content libraries grow exponentially, with long-tail and user generated content. This content discovery challenge multiples exponentially as the catalogue grows to include obscure content, the back catalogue of commercial content, and user generated content. Discovery can be deductive (string matching searches, like Google) or inductive (relationship based, like Pandora). The value add in this case is the ability to find "what you *didn't know* you wanted to watch".

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Metadata formats are well defined and are being developed by a number of standardization bodies, however have not been applied consistently to the various sources – especially user generated content.

The metadata specification in use today typically define content details for a particular type of content (e.g., DVB SI specs for CSP offerings; and CableLabs ADI Specs on describing VOD); and a number of ongoing programs are in place and looking to provide a description which can be used for multiple content types and multiple uses (DVB, ATIS). Indexing within video itself is also available with the MPEG-4pt2 and MPEG-21 specifications – but not widely employed or deployed. The creation of a new specification would not likely be a fruitful exercise given the breadth of content types, applications and magnitude of content available today. Locating content will hence be an on-going issue, and increasingly more difficult, especially if we include Internet video. As this is a pioneering phase of the video S-curve, we expect that many of the most effective early mechanisms will be proprietary rather than standards based, as vendors vie for dominance. Over time, the newly dominant players and the marketplace will ratify the broader standards.

Google is likely to leverage their dominance in Internet search to enter the video market are now starting to index and catalogue video content.

Initially through use of "subtitles", these approaches may later move to more advanced decoding indexing. Google possesses two huge advantages over others for video search in that they are well known by consumers for searching Internet content, and their wide adoption of Google Desktop which provides harnesses local computing power and provides ties to the user and their content beyond the web.

A global content search play is a scale game and requires immense investment and infrastructure to be operational efficient – CSPs will need to address capabilities for content search.

Time Shifting
Perhaps the most disruptive force we have seen to date in undermining the existing linear broadcast model is time shifting.
TiVo first popularized a Digital or Personal Video Recorder (DVR or PVR), however market adoption has been relatively slow, however experiences increasing growth.

Whether PVR or VoD, the user experience is essentially the same; the user can choose what they want to watch, and when they want to watch it.

Given years of watching broadcast TV, users initially had a tough time in understanding the benefits of PVR. Adoption is almost always a highly positive experience for the user; once someone actually tries and starts using a PVR, they almost categorically say that "it changes the way that they watch TV". The following demonstrate the benefits of PVR:
• The ability to record an entire season of a show and watch at will is the simplest benefit
• Ability to fast forward through commercials
• Pausing a show during its broadcast time and resume from that point at a later time
• Watch a replay of live sports at your own speed to see if they really scored

As the Cable and Satellite operators start to offer their own (non-TiVo) boxes, we are very quickly seeing PVRs becoming mainstream and fundamentally undermining the business model of the broadcast industry.

Advertisers are now looking into more complex rating models to judge popularity of shows.

Advertisement sales on broadcast channels rely on ratings, which provide an indication of how many viewers watched a show airing at a certain time and channel. Ratings are now available for shows which provide a three day window of viewers, that is, indicating how many viewers watched a show on its original airing date/time, and over the next few days as viewers watch the PVR version. More complex rating mechanisms are needed to incorporate internet viewing of shows. Cable and Satellite operator-provided PVR devices may offer finely grained insights into user behaviour, within the bounds of consumer privacy regulations.

Place-shifting
In addition to measuring the popularity of shows, advertisers are also interested in how popular the show was in particular regions. Ad sales are at a premium when able to target an advertisement campaign at a particular market.

The content that is stored on a PVR device or routed through a Place-Shifting device can be redirected to the user over the internet, or moved to mobile consumer electronic devices for viewing on the go.

Complications are introduced to measuring ratings due to video viewing from more than one location – this may redefine the concept of this demographic metric over time. What matters more, your billing address or the GPS coordinates of the location where you eventually watched the content?

Control of Set-top boxes and video outputs are now available over the internet using place shifting devices. Sling Media, a small startup, introduced the Slingbox as a way of watching TV in the next room, in a cafe, at the office, or the other side of the world Sony introduced a similar solution with LocationFree. Other video viewing trends are enabled by distribution of video within the home, and by portable media players.

Rip-and-go and sycing
(SECTION NEEDS MORE WORK)
In home video distribution allows for content that was once intended for use on the web, is now able to be viewed from the television set. A range of software is available which allows content from the web or STB PVR to be ripped and synced onto the memory of Portable media players. This model,

pioneered by early MP3 players, and popularized by Apple's iTunes, has already started to dominate the music industry. We are already seeing a similar trend for video.

New challenges
While time and place shifting change the way we experience TV, they raise a number of important economic and legal issues
- time shifting may allow the ability to skip commercials and breaks existing broadcast advertising models
- Exploitation rights-licensing issues may be created when content is moved and replayed on other devices, in other geographies

Giving the user control of their experience
(SECTION NEEDS WORK)
With the flexibility that new video capable devices and Internet distribution provide the consumer, also comes significant complexity. The proliferation of devices, time and place shifting, ability to download, rip, and sync such a wide range of pay for, subscription, and user generated content, transfer the content and display it on so many devices, makes the difficulty we saw getting and organizing content on the original MP3 players look simple. Consumers will clearly struggle to figure out how to easily locate content from an ever increasing number of locations, move it and transcode it to the devices that they desire to watch it on, over a variety of network connections. This complexity and the desire for the user to control and manage their content represents both a challenge and an opportunity for the industry.
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A global solution to the problem may be difficult to put in to practice globally given the personalization of solutions and offerings by many content service providers and internet companies.

Competition is driving the need for these services to be part of offerings and Accenture has been helping provide control and traceability while enabling flexibility of offerings across multiple channels. Solutions have been developed to provide the ability to offer common services across the different offerings a CSP provides (web, TV and mobile).

At the heart of the solutions is the Service Delivery Platform (SDP). The SDP provides a common set of services which are exposed for video applications. These services can be combined and allow the creation of multiple functions that enable video applications to leverage multiple functions from the SDP. As the services provide common functions used by all applications, it provides the service provider to control aspects of the video service across devices, applications and users.

Presentation, Provisioning, User preferences, and the ability to tie the content delivery service to a broader user identity and authentication platform are examples of some common services provided within the SDPs that have been deployed and in use in multiple operators today. The ability to orchestrate services allows these operators to include business models and content rights easily, and allows for extensibility to multiple video devices.

Using the SDP, an operator can easily provide a common user interface, common rights management, and common parental controls, across not just video, but also web surfing, voice calling, messaging, and other services. Digital Rights Management will be available between all channels in which their users have access to video content. This allows greater control over the content that subscribers have access to (internet-sourced or CSP provided), what they can do with that content, how it is used across the various devices with common tracking capabilities to better support changing advertisement sales models.

New paradigm for distributing content
(SECTION NEEDS WORK)
The SDP provides the ability to enable a CSP in offering content to their customers, and for that content to be used in a manner which allows some time and place shifting features. We see this as a first, required, step on the road to supporting additional digital media content available from other non-CSP sources. CSPs need to address the ability to incorporate content from these *other* sources and allow for increased functionality with respect to search, access and playback of content. Moreover, control over how content is delivered from various sources is critical for a CSP to avoid huge infrastructure and operational costs associated with

supporting the delivery of large amounts of over-the-top traffic.

We see six main trends that deal with delivering digital media from the internet to consumers:

1. <u>Proliferation of digital content</u>: increased activity with large studios in digitizing content catalogs, video production costs declining, and large acceleration of user generated content
2. <u>Growth of intelligent devices</u>: Increasing device specialization and IP enablement; increased Cross platform/device video support (e.g. PSP); Emergence of wireless Broadband/ Mobile Video
3. Shift towards On-demand: Non-real time nature of most content; Timeshifting orientation and success of PVRs; On-demand/Search orientation of large Internet Search portals
4. Broadening of media retail / over-the-top: Success of OTT pioneers (e.g. iTunes, YouTube); Microsegmentation/Long Tail; increased usage of New Portal formats (e.g. MySpace, Facebook, SecondLife)
5. Too many bills; consumers face an increasing proliferation of billing charges for bandwidth, communications, and content services, driving a desire to consolidate as the market matures
6. Inability to determine the identity of the user in a non-repudiable, federated manner across services, thus making the over-the-top competitors into an "either or" choice for the consumer. With appropriate authentication, such services would open the door to additive business smodels where consumers could choose CSP services AND over-the-top services and be billed appropriates in a unified way

These trends, fueled by the success of the over-the-top community, are creating inefficiencies for key members of the content delivery value chain, including the network operators.

The value chain consists of three large players, Media Retailers; network operators and Consumers. Specifically their challenges are around managing inefficiencies:

- Media Retailers are required to build and operate large data centers, storage arrays, internet connections, DRM and CDN infrastructures, etc. and need to overcome multi-hour download times (particularly for HD) which discourage customer purchases.
- Network Operators are increasingly finding that they deliver redundant content from multiple retailers; which leads to increased network congestion and capacity cost; and the need for increased ability to provide technical support to consumers
- Consumers are being constrained by network download times; and often need to manage multiple service offerings with limited ability to move content between devices, formats, portals, etc.

Network Operators are seeing rapidly growing bandwidth needs [2] which create a cost-centric rationale for more actively working with the over-the-top community on efficient delivery of content. The invocation of a net neutrality statute would further force them to collaborate with these forces as it will make it difficult or impossible for them to create QOS barriers to entry. An ideal approach is to allow for a scalable network-enabled solution which enables multiple over-the-top service providers.

Efficient network-based enablers
Network operators can aim to leverage Content Delivery Network concepts to enable more efficient delivery of content such as edge caching; Peer-to-peer; use of Multicast and extending the network storage in the consumer premises; however significant scalability benefits can be achieved if the network operator is able to define a network-based solution which will alleviate inefficiencies throughout the value chain and provide support for features that are required as video grows on the web.

Hosting content in the network provides over-the-top operators to leverage common infrastructure to store and manage large content files, being closer to the customer to facilitate faster download times. Commonality between content stores then provides the ability to make content indexing easier, allow for common metadata formats to be more easily applied and allow over-the-top providers to offer content to consumers with use of efficient techniques like

multicast of Peer-to-peer (or hybrids thereof) to avoid large parallel downloads of common content.

Summary

For a Content Service Provider the need to include content search, time and place shifting is very important with respect to meeting the consumer's needs. These features need to be offered across the various sources that consumers obtain content and requires advanced functions to be able to control user actions on content and track usage to support advertisement business models.

The delivery of content over CSP platforms requires focus to avoid huge costs in network equipment and ultimately costs to the consumer.

Accenture provides services and products that a CSP can employ to drive flexible offerings to consumers and efficient, scalable delivery mechanisms.

References

[1] Accenture Global Digital Home Consumer Survey (www.accenture.com), April-May 2006

[2] What is the Exaflood? - Internet Innovation Alliance (http://www.internetinnovation.org/AboutUs/QuestionAnswers/tabid/60/Default.aspx)