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# The Future of IPTV: Adding Social Networking and Mobility

(Invited Paper)

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**Abstract**—As more and more content migrates to the Internet, “personal” video choices are becoming the norm not the exception. The impact of Internet content and IP based business of video distribution is still difficult to evaluate. However, there is obviously no turning back as this content pervades the home and the community. Driven in large part by the near-ubiquitous IP-based communication services, the TV experience has been extended over the years to embrace many of the same ancillary services provided by web applications. This new TV promises to deliver a world of content and services to “any device, anytime, anywhere”. This paper addresses the architecture, the value chain and the technical and business challenges of implementing this new connected mobile and social TV experience.

## I. INTRODUCTION

These are exciting times for the TV viewers. Driven in large part by the deployment of broadband and the near-ubiquitous Internet access, the TV experience has been extended over the years to embrace many of the same services provided by web applications. IPTV promises to deliver a world of content and services to “any device, anytime, anywhere”.

A statement regarding this evolution was already found in an early (2004) Alliance for Telecommunications Industry Solutions (ATIS) IPTV Interoperability Forum (IIF) document [1]:

*“Going forward, IPTV is seen as a broader application than today’s definition encompasses. This view of IPTV extends beyond the home delivery model that is the focus of today’s IPTV and also includes additional options for distribution of IPTV to wherever the consumer may be.”*

This vision is now embodied in user devices, whether a Set-Top Box (STB), handset, PC, etc. Multi-service devices are the norm and they add multimedia communications and social networking to the traditional TV. Furthermore, these devices may be located on a wide range of access networks. What they share is a common delivery platform: IPTV and Internet Video are becoming the de facto platforms for content and converged services to PCs, STBs and smartphones alike. Inside the home, networking technologies enable the “whole home” ecosystem to communicate. Outside the home, high-speed links can move huge quantities of high definition (HD) TV around the globe and are changing the TV landscape. Figure 1 shows an IPTV setup as it can be found today.

Emerging over-the-top (OTT) networks expand the reach of the “home” everywhere in the community and the world with or without reliance on traditional core network infrastructure.

This paper intends to briefly cover the architecture, the value chain and the challenges of implementing this new connected and social TV fabric. In Section II, a definition of “IPTV” is necessary to differentiate it from the multiple “Internet video” offerings on the web even as they converge. The challenges of mobile and social IPTV should not be dismissed; hence, Section III presents standards and common middleware approaches that enable a diverse device ecosystem as well as a variety of network agnostic services. Section IV revisits the user interface with personalization and enhanced graphics and how in the age of the Wii and smartphones the remote control is evolving. This represents a major evolution that is yet to be fully understood. In Section V, mobility is redefined not in terms of devices but of people and content.

The “Internet of things” is becoming the “Internet of people” and the TV experience is moving with them. However, people are social and in Section VI a new approach to Social TV, combining Interactive TV and Enhanced TV is introduced. The conclusion presents a summary of this paper’s proposition: that the Future of IPTV is connected, mobile, personal and social.

## II. INTERNET VIDEO AND IPTV: CONVERGING?

The increasing availability of broadband inside and outside the home, the ever-growing richness of web services, the easier application development and the commoditization of disk space have enabled the current growth in video distribution over the Internet. The TV industry is experiencing a strong move from “TV network” to “Networked TV” [10]. However, it creates some confusion between what “IPTV” and “Internet Video” have in common and what makes them different.

For the purpose of this article, it will be agreed that IPTV is essentially “traditional TV” over IP protocols and broadband networks, most commonly VDSL. This means that the whole delivery chain of IPTV is similar to that of cable, satellite or terrestrial, and under the control of an operator (AT&T in the US for example) and of that operator’s middleware vendor(s) like Microsoft’s Mediaroom or Nokia Siemens Network Myrio. IPTV provides the “me too” list of services namely linear

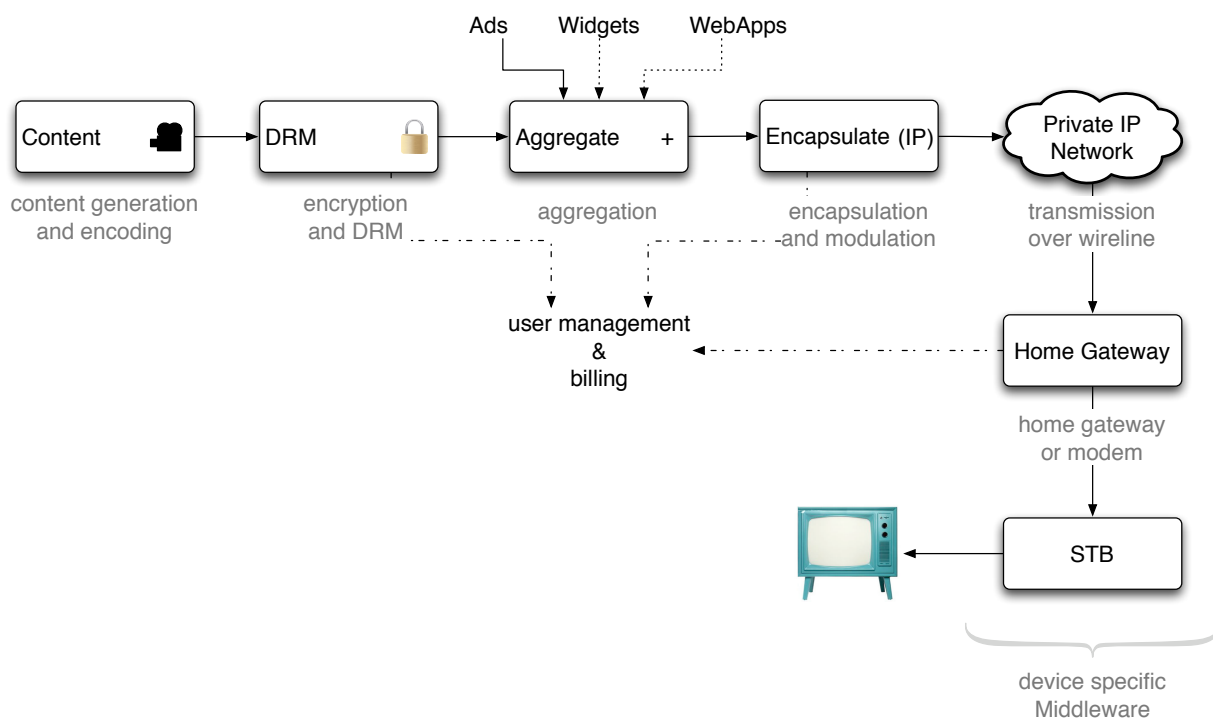


Figure 1. Current IPTV deployments.

TV, video on demand (VOD) and Pay-per-view (PPV), Electronic Program Guides (EPGs), as well as added services like traffic and weather delivered via widgets. These services keep IPTV a “lean back” experience like traditional TV.

Internet Video is any video delivered over the public Internet to PCs and some dedicated boxes. It consists mainly of on-demand content but increasingly also contains some real-time offerings (like sports and political events). It, of course, contains a large proportion of User Generated Content (UGC) made popular by sites like YouTube. Internet Video delivery is mostly under the control of content producers and aggregators and OTT operators. It is a “lean forward” experience in the PC tradition.

So in essence, IPTV and Internet Video are very different but the question is: for how long? The appearance on the market in the last years of Internet Video STBs like Roku or Apple TV that are linked to content websites (Netflix and iTunes respectively) and more recently of TV sites like Boxee and hulu transform Internet Video into a “lean back” living room experience with a TV-centric UI and advanced remotes. Content and quality is central to these competing offerings. Many of them now include live offerings (Joost for example) and “high definition” (hulu and others). Moreover, of course Slingbox has allowed any traditional TV show to be watched online on a PC or smartphone.

Operators and IPTV vendors are taking notice. The largest cable operator in the US, Comcast has its own OTT site, Fancast. Microsoft, which developed the popular Mediaroom IPTV software, is also providing Silverlight for Internet Video sites etc.

IPTV could seem to be doomed and calls of “TV is dead” are common in the web punditry. However, TV is obviously not dead but evolving. The infrastructure operators now are competing with content producers with direct access to the consumers. Traditional operators will most likely change their business models to keep their customers. Many people “trust” the operators and are not capable or not willing to setup channels and aggregate content offerings. Managing and repairing large networks of mobiles, PCs and STBs is a daunting task. Failures can interfere with the 24x7 TV experience many consumers have come to expect. For them an operator is a trusted entity that guarantees the TV service. What will change is that now the service will go to other devices than the house STB.

Networks to support IPTV as well as other IP services are also evolving to carry more capacity to more places. There is a need for more collaboration between those who develop the experience and those who will transport it and the development of new business model to support both. IPTV and Internet video will be competing for “eyeshare” but may end up being flavors of the same shared experience on many devices, mainly because of the availability of third party applications.

### III. WILL STANDARDS ENABLE THIRD PARTY DEVELOPMENT?

The “many boxes” and more and more “many friends” evolution of TV create an intricate mesh of different platforms, codecs, devices and interfaces, not to mention policies. Who is responsible for integration and management of this complex system? Even for telco IPTV operators, unless supported by strong open standards and

middleware, this complex mix limits the audience (and market) to those sharing similar devices and platforms. For third party developers and end users alike this maze of platforms and devices can be overwhelming. A lack of standards limits application innovation: the “develop once, deploy many” is confined to a small set of end devices.

IPTV Standard Defining Organizations (SDOs) have approved two main architectures for IPTV delivery [2], [5], [11]. The first one is the “webapp” architecture and is based on the well-known client-server architecture with the addition of service delivery platforms, digital rights management (DRM) and TV services like EPGs and trick-play management. The other defines IPTV as a Next Generation Network (NGN) service and utilizes the Internet Multimedia Subsystem (IMS). This architecture can connect to legacy networks via gateways that form part of the IMS or other SIP-based infrastructure. Both architectures want to enable not only the traditional broadcast (multicast) linear TV and VOD (unicast) but also converged services delivered via widgets for example. This range from caller ID to targeted content to peer-to-peer distribution and allow co-existence and interoperability with other deployments via gateways and application servers. Interoperability with the PacketCable Multimedia services is also a feature of the NGN architecture [8].

The standardization of the architectures is a major step forward for technology providers. However, the fragmentation of the development platforms and middleware is still a challenge for application development.

The Digital Video Broadcasting (DVB) Multimedia Home Platform (MHP) [4] has defined a Java based middleware for IPTV that is interoperable with some proprietary IPTV middleware. And MHP, via a core set of APIs (Globally Executable MHP or GEM) has been a major contribution in the development of the Open Cable Application Platform (OCAP now True2Way) for advanced cable applications in the US as well as Japanese standards and even the Bluray disc software. Nevertheless, MHP and OCAP are still focused on the STB. How about the other screens?

Of course, most platforms support some browser and JavaScript for web interaction with potentially performance impacts. But a true multi-device open or at least “open-ish” platform still needs to emerge to enable “develop once, deploy multiple”. Or does it?

The availability of iTunes on AppleTV, Mac, PCs, iPhones and iPods shows that at least for some content there is commonality across platforms. In addition, the Android-everywhere movement may give rise to this universal platform beyond the current platform of browser and various media players. Figure 2 depicts such an IPTV system as it could be deployed in the near future: it includes a device independent middleware for easy content migration, as well as an emphasis of more and more devices connected within a home network. The universal TV application and content store is still in this future but that future is near.

#### IV. NEW USER INTERFACES: THE NEXT LEVEL

Personalized television is reinventing and enriching the TV experience on all “screens”. Where everyone had to deal with a pre-packaged user experience and a myriad of different TV channels, customization and personalization comes into play, providing a unique user experience tailored for each and every user. This includes user interfaces that reflect a person’s taste by listing their favorites and customizing the content by filtering and preparing it for consumption in and out of the house.

However, user interaction with the TV also depends on their viewing behavior. In the book “Convergence Culture” [6] viewers are characterized as Zappers, Loyals and Casuals. Zappers constantly shift channels and essentially only watch snippets of shows. For them the fast transition from one channel to another or from one type of content to another is essential. Loyals cherry pick content and spend more time socializing about their shows. They are the series watchers and are more likely record shows on Digital Video Recorders (DVRs). Hence, the capability to easily record and navigate through recorded content may have high value. The Casuals have elements of both: they wander away from boring shows and will have a tendency to multitask until they find some show to attract their attention. So how will the UI and remote address these different requirements?

One answer could be widgets. Having emerged in the PC world not too long ago, they have migrated to the TV to deliver customized information through small and specialized display applications. Widgets can be used for both bound applications (linked to the watched content) and unbound applications (e.g., the EPG). For Zappers the widgets summarize what is on other channels. The Loyals will get other information about their favorite shows by clicking the widget. The Casuals may interact on IM, get traffic and weather information or exchange pictures with friends.

Personalization of the UI and content is also achieved via “skins”, advanced graphics and favorites embedded in the EPG. Personalization opens the door to a whole new world of targeted advertising for example, improving the satisfaction on both sides of the value chain. Nevertheless, advertising is not the only benefit of personalization: health care and other lifestyle applications and social TV (see Section VI) are also enabled.

The remote control is also evolving. The standard remote with its complex set of (mostly unused buttons) is becoming obsolete. Onscreen interfaces and the remote are now developed together and integrated into a simple solution that optimizes the user experience. The remote control itself can be personalized and become a personal asset. Moreover, smartphones can be used as personal universal remotes for PCs and STBs alike as well as the third screen for direct consumption.

Finally, personalized content and widgets require the identification of “who is watching”. A PIN for example can be entered via a traditional remote control device and is currently the model of choice. However, the remote can be used to identify the user with technologies as diverse

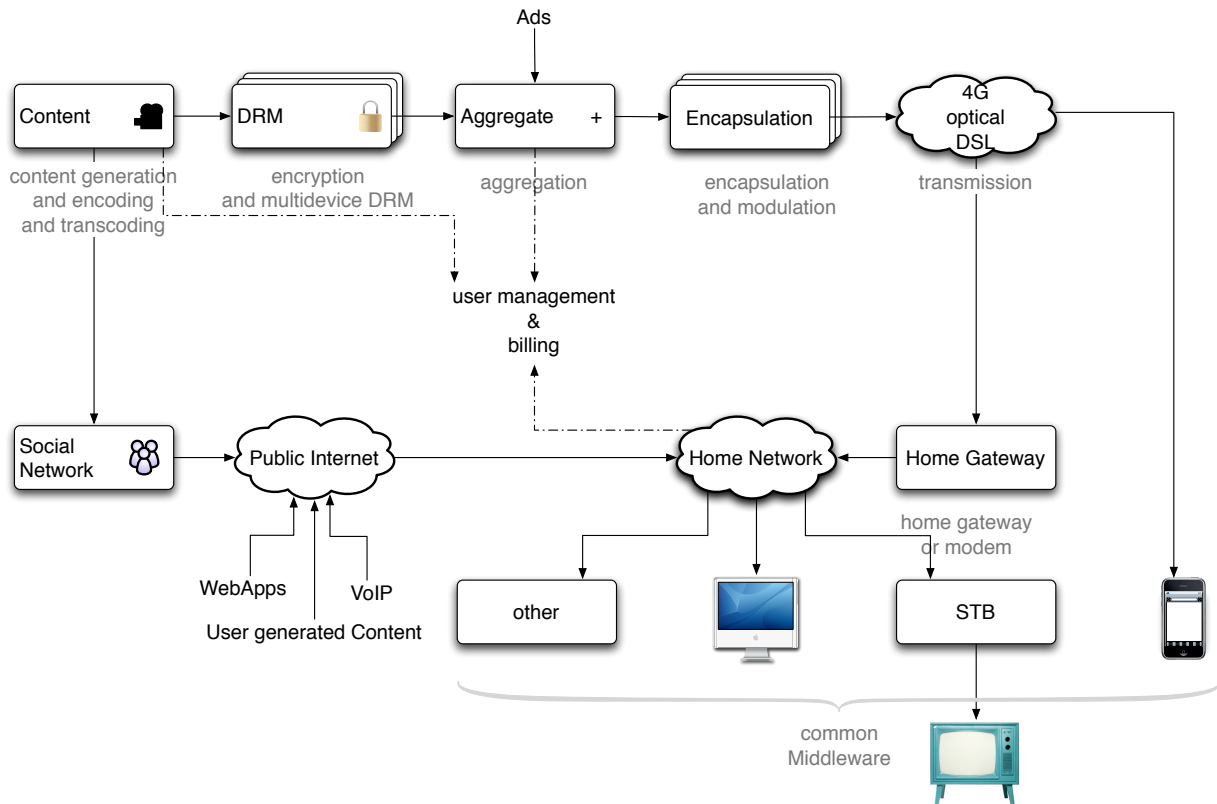


Figure 2. Future IPTV deployments.

as cell phone applications, Near-Field Communication (NFC) or fingerprint scanners as well as incorporating heritage from the gaming controllers.

#### V. MOBILITY IS ABOUT CONTENT AND PEOPLE, NOT JUST DEVICES

Until now, “Mobile TV” has mostly referred to a value added service provided via some cellular infrastructure to mobile devices. As some users have commented, the benefits for the consumer are often minimal and the content choices and quality limited. However, if one reflects on the semantics of “mobile television,” mobility takes a new meaning. In this new context, the content, the experiences and the users are mobile [9].

Mobile IPTV redefines Mobile TV as an IP-based TV service that shifts content across time, place and devices. One example of this mobility is “fluid TV”: start watching a show on a smartphone on the train, pick it up on a PC in the home office and move it to the main HD screen after dinner. The technology to achieve this is here already. In addition to traditional infrastructure, peer-to-peer (P2P), while widely discredited just a few years (or even months) ago, may also contribute to enabling a community-based mobile and socially enhanced TV experience. Peer to peer in the sense of “shared resources” provides direct (and legal), connectivity between network members using local storage like DVRs or network resources like network DVRs as well as shared bandwidth to enable the content to move.

This new “Mobile IPTV” business model is driven by the new family realities. The now obsolete and overused

ubiquitous computing model - 2 children, 1 dog and bungalow-owning mom-and-dad scenario - is being replaced by a much more dynamic family unit with elements around the world and people moving from place to place and interacting digitally. Nevertheless, TV is part of the shared family experience and will remain a part of its heritage.

#### VI. SOCIAL TV: THE GLOBAL LIVING ROOM

The social networking phenomenon and the ever-growing number of subscribers to services like Facebook users creates a tremendous opportunity for a paradigm shift for TV viewing. TV is rediscovered as “social”. The living room of the 1950s and 1960s is being replaced by the global living room of extended family and friends.

In “Convergence Culture” [6], an interesting statement is made about TV and social behavior:

“Different genres of entertainment provoke different degrees of kinds of social interactions.” Drama is watched alone (but discussed in groups), comedy is watched with family members and reality TV is shared with friends. And of course, demographics influence TV consumption. However, the common thread of all TV viewing is social interaction during or after the show.

“Social TV”, combining TV content with direct social and community interaction, is taking root in connected set-top boxes, web-ready TVs, and PCs as “interactive TV” or iTV. iTV provides essentially unbound applications developed by an operator or a third party. Some form of social networking tool, like Facebook and MySpace,

can define the group of friends. Friends and family, wherever they are, can exchange comments while watching the same show, suggest other shows and even start an on-screen video or voice call. Social TV becomes another element of personalization, one that combines the “me” with “my friends”. This capability is now available online, and more and more STB applications are being developed and deployed in trials. Social networks also provide a “virtual” operator platform that suggests which content the connected friends hence influencing their viewing behavior are watching. The Social TV experience can also be extended to the mobile realm with Twitter comments, suggestions of other shows to watch by SMS, updates to Facebook walls, etc. Innovation moves to the edge and the community becomes central to the TV world [7].

But for most people the immediacy and immersive aspects of TV and the lean back TV experience must remain. TV is still mostly a passive activity. Social TV makes watching TV less passive but still requires the overall viewing experience. “Facebook TV” [3] a MIT Media Lab student project enabled this by allowing a group of friend to record content on each other’s DVRs for future viewing and rating. Facebook TV was about time shifting, orchestrated via the social network.

Beyond interaction what is next for Social TV? How can current operators (IPTV and others alike), who fear the erosion of TV viewership lost to the Internet, provide the services that will keep viewers engaged?

Let us forget for one moment the question of content. What is a TV? It is a very nice screen that opens a window on the world. The widgets that tell you the weather can also tell you it is time to pay your bills, take your medication, renew a subscription, connect you with likely minded individuals, etc. When combined with recent developments in cell phone technologies for e-wallet or payments, the TV is also an entry into the retail world. For example in the US Amazon already has an agreement with TiVo for 1-click purchases. What is needed is to link web-based applications to the screen, something that Social TV technologies have already achieved. An interesting side effect is that the service and content providers, not the transport providers alone, now drive the design the offered applications. Those service providers that happen to be banks or insurance providers or retailers come with large customer bases, and can establish fruitful relations with the providers of the “pipes” and the broadcasters.

Social TV, when delivering IPTV services associated with a social network, can essentially bring more people to the web experience. Many non-PC users would appreciate getting more information from their extended social network: family, support networks, financial advisers, favorite retailers, etc. This means extending the concept of

social networking to social safety net and life experiences. Moreover, even the most tech savvy consumer would be interested, as it brings cross-generational communication to life.

## VII. CONCLUSION

The converging Internet technologies of television, publishing, wired and wireless telephony and World Wide Web, combined with widespread and affordable access to broadband, has enabled the deployment of innovative services, IPTV being one prominent example. OTT Internet Video is also gaining in popularity, and has prompted innovation on the application side: the development of a large number of web applications to enhance the TV user experience. When combined with IPTV, these hold the promise of increase of revenue for providers, traditional and new alike as they more and more shift the innovation to the edge [7].

So how do we get to the next generation of IPTV services? This paper has proposed that it requires invention and innovation. To get that any screen experience requires open protocols and interfaces as well as security for TV based transactions and privacy in a social environment. And of course performance, which is important for the user experience.

But the rapid growth in the consumption of Internet Video of all kinds shows the Future of IPTV is essentially soon. And it will be connected, mobile and of course social.

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