

Preparing for the IPTV Future

Understanding the new world of television ‘broadcasting’

IPTV, short for Internet Protocol Television, is a new method of delivering and viewing television programming using an IP network and high speed broadband access technology. More than simply a new distribution and playback method, IPTV is poised to create an entirely new mindset about the television experience. Whereas current terrestrial broadcast television is the same content sent continuously to all consumers’ homes, IPTV removes the fixed television schedule. Similar to how information on the Internet can be downloaded and viewed at any time, IPTV enables television programming to be available whenever each individual consumer demands it. In this way, each household can create their own custom content and viewing schedule.

The general method for delivering IPTV will be a closed distribution network provided by a service provider or content aggregator. While IP stands for Internet Protocol, it does not actually mean the television content is streaming over the Internet. IP is simply the same protocol that enables Internet access. IPTV requires high speed broadband to the consumer’s premises and specialized equipment, typically referred to as a set top box, to decode the IPTV content to a TV signal that can be viewed on a normal Television. While set top boxes today are typically separate, stand alone units, in the future, they may be integrated into other devices such as the television, digital video recorder (DVR) or even a PC. The closed network enables the service provider to deliver video programming that approaches traditional broadcast quality and reliability, something which is not feasible over the open Internet.

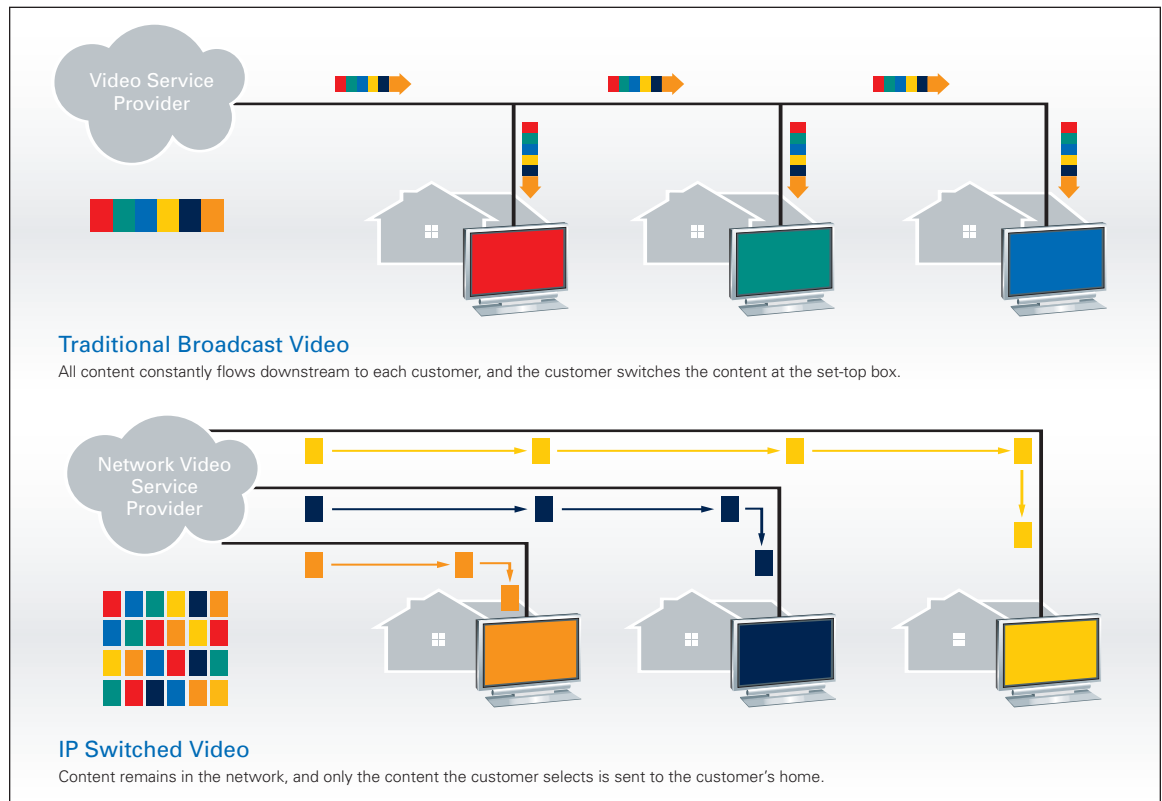


Figure 1. As opposed to traditional broadcast television where every home receives the same programming, IPTV allows each consumer to customize their viewing schedule.

Different distribution methods to the home are emerging. Cable companies are adapting their current cable infrastructure to support IPTV, while traditional wireline telephone companies are making new investments in fiber to offer this service. In order to compete with the satellite TV broadcasters and offer pay-per-view and digital TV, cable communications companies began upgrading their one-way analog systems to two-way digital systems in the 1990’s. Many already offer video on demand and some are upgrading their set top boxes to offer DVR capabilities. Cable head ends will be upgraded to contain media servers which will stream IPTV content to consumers’ homes as requested.

Telephone companies have a larger hurdle as current copper wiring is not upgradeable to support the bandwidths needed for IPTV. Two major projects in the US include AT&T's Project Lightspeed and Verizon's FiOS Internet and TV service. Verizon is basing its FiOS service on a major infrastructure rollout to the home. Called Fiber-To-The-Premises (FTTP), it brings fiber optic cabling all the way to the consumer or small business' building. AT&T's Project Lightspeed contrasts with Verizon's by bringing fiber to the neighborhood and then delivering content over ADSL to the individual homes.

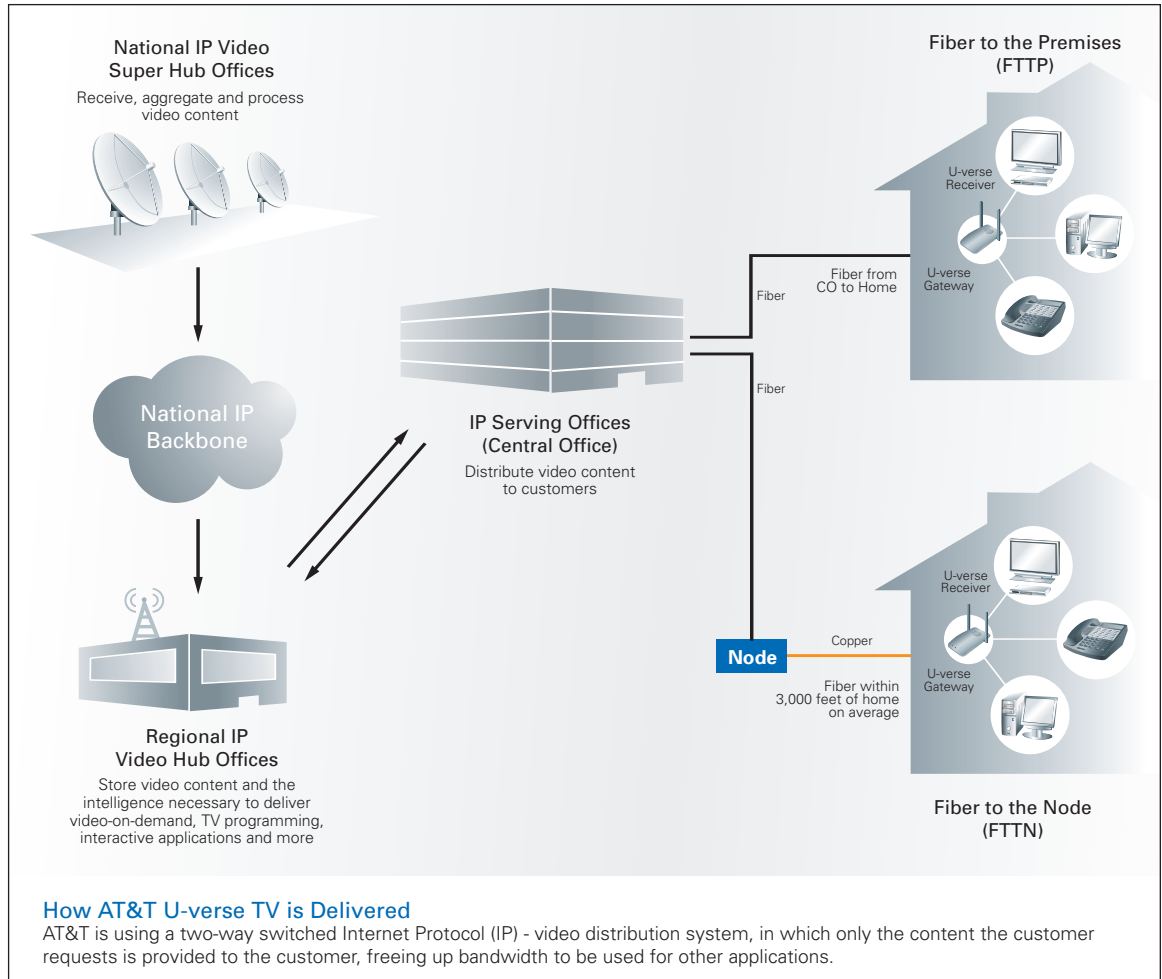


Figure 2. A simplified architecture of AT&T's Project Lightspeed.

Major trends driving development of IPTV market

Fueling this new market are several major trends. First is the widespread adoption of broadband access. A recent Nielsen survey reveals that almost 70% of US households currently have broadband Internet access. The move from dial-up as a predominant method of Internet access to broadband is the key to enabling IPTV. Broadband Internet access is 'always on' and enables delivery of a much higher quality video broadcast that is comparable to what consumers have come to expect from traditional broadcasters.

Secondly, the Internet has become a familiar tool for consumers – empowering them to 'pull' customized content as they need it, instead of being 'pushed' content without regard for the time of day or its usefulness to them.

Last, but not least, is the competitive dynamic between traditional fixed telephone service providers and cable companies. Both wish to provide 'triple play' services; the ability to deliver a combined service offering of data, voice and video communications. As cable companies have entered the market with high speed Internet and voice services, telephone companies began losing subscribers. To counter this, they are investing billions of dollars to add IPTV capability to their data and voice offerings to slow the defection of their customers. The

stakes are high – entire companies may be made or lost on the ability to successfully provide these next generation networks.

Large market opportunity for IPTV

The confluence of the above trends bodes well for the growth and size of the IPTV market. According to In-Stat, the number of telephone company IPTV subscribers alone could reach 32 million worldwide by 2009. Other analysts predict service revenues of over \$7 billion by that time frame. This translates into hundreds of millions of dollars in consumer devices needed to receive, playback and store IPTV content – a ripe opportunity for consumer electronics makers.

Complex challenges face those developing IPTV solutions

Delivery of high quality video over narrow pipes

Successful IPTV delivery faces numerous technical challenges. Perhaps the most important one is the quality of the video signal. Consumers will not adopt IPTV unless video quality matches their current viewing experience. Advanced compression and decompression techniques are required to create a datastream that fits into the available bandwidth, but retains broadcast quality. This creates a sizable technical challenge. Currently, high quality video delivered by cable companies or direct satellite broadcasters employ MPEG2 compression. Using this type of a codec requires 2 to 3 Mbps of bandwidth for a standard definition TV broadcast, while a high definition broadcast requires 12 to 19 Mbps.

Because this high bandwidth is not feasible over the current distribution mediums, the ITU and MPEG standards bodies have jointly developed a new standard. The result is MPEG4 part 10, commonly known as H.264/AVC, which provides good video quality at bit rates that are substantially lower - up to 50% less - than what MPEG2 requires. While providing significantly reduced bandwidths, the standard can be implemented such that designs are practical and economical.

A second standard that is commonly used for IPTV delivery is Windows Media Video 9 or WMV9. Windows Media Video is a generic name for the set of video codec technologies developed by Microsoft and is part of the Windows Media framework. Originally developed as a proprietary codec, WMV version 9 was submitted to the Society of Motion Picture and Television Engineers (SMPTE) and is now considered a standard called VC-1. It provides video quality and bandwidth comparable to H.264/AVC, thus manufacturers must support both as there is not one clear market leader at this time.

Makers of HDTVs, HD set-top boxes, HD DVD players and other HD equipment need to cost-effectively produce products that not only support current HD video and audio compression standards as well as legacy SD standards, but more efficient next-generation technologies as well. In addition, the increased complexity of these evolving standards places a significantly greater processing load on the host system, making performance a critical issue, especially in environments requiring multiple decoders for multiple data streams.

Maintaining content security in a digital environment

Beyond delivery, a significant issue that service providers must address is how to protect the content. With the ability to rapidly post something to the Internet and have it downloaded and copied around the world in a matter of minutes, it is no wonder that content creators are nervous about providing their work in a digital medium. Conditional Access and Digital Rights Management (DRM) technology address these concerns.

DRM enables protection and secure delivery of content to a networked television, computer or portable media player. A key is sent with the media which both unlocks it and contains the rights and rules to use the media. As with codecs, multiple DRM standards are in play. Several DRM and content protection technologies have been proposed to secure high definition content, such as the Windows Media DRM (WMDRM) scheme for Network distributed content. For inside the home High Definition Multimedia Interface (HDMI) has emerged as the preferred interconnect technology, enabling more secure links among digital display devices.

In the end, it is likely that several technologies will be adopted. Whichever solutions are adopted, they must set the barrier high enough to thwart all but the most professional attackers without interfering with legitimate users' entertainment experience. Because it is impossible to foresee all methods of attack, robust content protection systems must be, by definition, reconfigurable and renewable.

As a result, consumer electronics manufacturers must create products capable of supporting a variety of content access and digital rights management systems, built upon key negotiation and numerous encryption standards such as AES, triple-DES, RC4 and others, and must provide the programmability necessary to support renewable security.

Enabling new applications without platform redesign

Beyond just simple television programming, IPTV will deliver a host of new applications. Integration with a digital video recorder to pause live action and record content is just the beginning. IPTV providers seeking to provide incentives for consumers to switch from their traditional broadcast providers will likely offer a variety of additional on-demand services, including email and web access, photo storage, on-screen caller-ID, videoconferencing, home monitoring and security and more. As with many technologies, the possibilities will only emerge after the product is in the hands of consumers.

Delivering a feature-rich, yet cost competitive product

As with all consumer products, price points will be vitally important. For many customers of cable companies, the expectation is already set that the set top box is 'free.' New services are expected to be an upgrade. Given this current market dynamic for broadcast television, companies may need to absorb the cost of the set top box in their service pricing, while retaining the ability to make a profit. This will put further pressure on the manufacturers of IPTV equipment to hold the lowest possible price, while surmounting all of the above challenges.

A powerful solution for IPTV Product Developers – DeCypher DHM8100 from Micronas

While manufacturers of IPTV products are compelled to support essentially the same core functionality – multiple new and legacy video and audio codecs, multiple security standards and networking etc. – product differentiation is paramount. And they must be able to deliver these products cost-effectively and quickly.

To achieve this, Micronas has developed a single-chip Multi-Format Decoder System on a Chip (SoC), transformable and customizable through software, which offers an excellent platform for creating highly integrated, cost-effective IPTV products.

The Micronas DeCypher DHM8100 streaming media processor is a highly integrated decoder System on a Chip. It is a network-ready, single-platform solution offering makers of IPTV products all the required video and audio decoding, advanced video and graphics processing, networking and security they need to cost-effectively create distinctive mass market IPTV products and bring them to market quickly.

All-in-one codec solution

The first such solution able to decode both H.264 high profile at level 4 and WMV9/VC-1 advanced profile at level 4, the DeCypher DHM8100's patent-pending technology decodes digital video and audio at its best. The DeCypher DHM8100 is capable of decoding H.264, VC-1, MPEG-4, and MPEG-2 HD streams. The latest version of the device will handle 1xHD stream simultaneously with 1xSD stream – or multiple SD streams. It is also ideal for IP networked Digital Televisions, set-top boxes, high definition DVD players, digital video recorders and other IPTV applications.

Powerful architecture for today and tomorrow's DRM solutions

Security and digital rights management for all current and future needs are provided through a dedicated programmable security processor. Support for basic cryptographic functions includes CSS descrambling, DES/3DES, AES, RC4, Microsoft WMDRM, a random number generator, and 3 x 256-bit one-time-programmable serial numbers.

Flexible platform enables varying deployment and application scenarios

Working with its software partners, Micronas is able to offer a robust software ecosystem that supports multiple operating systems, multiple middleware stacks, multiple network protocols, multiple application-level solutions (DVD recording, etc.), as well as various DRM and access control schemes.

Summary

IPTV is set for exponential growth. The combination of near ubiquitous broadband access, consumer familiarity with a 'pull medium' – the Internet - and competitive dynamics among today's service providers all point to a rapidly developing market. The window of opportunity to achieve early entry into this marketplace is short. Gaining an early foothold will help ensure continued success as this multi-billion dollar market develops.

Micronas enables IPTV product developers to take advantage of this opportunity now. The DeCypher DHM8100 is a single chip platform that:

- Provides fast time to market through its integration of all key technologies – decoding, Conditional Access and Digital Rights Management, and networking – in a single cost-effective chip
- Enables the broadest market opportunity by supporting all key standards
- Delivers flexibility to adjust to changing consumer needs through interfaces and key partnerships that enable new applications

With a single platform approach, new products can be easily tailored to each manufacturer's unique design requirements while supporting rapid time to market imperatives. A single platform configurable through specially developed software for creating IPTV, set-top box, HD DVD and other HDTV products, with all the I/O connectivity and networking functionality built in, as well as the programmability and power to host custom applications, offers greater flexibility to adapt to changing markets. At the same time, it significantly reduces engineering and manufacturing costs through greater simplicity. Consumer electronics manufacturers can capitalize on this new, growing market through partnership with Micronas.

About Micronas USA, Inc.

Micronas USA provides systems designers with high performance semiconductor solutions that enable innovations in the multimedia industry. The Santa Clara, CA based company delivers stable, scalable, and cost-effective products that allow its customers to achieve today's business goals while positioning for tomorrow's challenges in IPTV, Set-Top Boxes, Networked Digital TV and IP Surveillance. Micronas USA designs, develops and delivers a diverse portfolio of highly integrated real-time streaming audio/video encoder and decoder products targeted at the world's most significant digital communications markets. Now as a fully owned subsidiary of Micronas Semiconductor Holding AG, Micronas USA will expand its products' reach into the entertainment and communication environments.

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