HTML 5 Technologies for the Smart TV Experience
HTML5 - A platform for Smart TV

The 5th iteration of the HTML standard is now being deployed widely on Mobile, tablet, desktop and other internet connected devices. The purpose of the new standard is to provide a single mark-up language for the web, that would provide cross-device portability, tags that replace resource intensive “plug-ins” or APIs, easier methods of integrating compelling graphics and multimedia, and features that would enrich content.

HTML5 can also be used to build Smart TV environments that are powerful, that exhibit immersive rich graphics, that can span different devices, models, chipsets and geography’s and enable simpler coding - all at a lower development cost. HTML5 also offers the potential to powerfully augment the Smart TV experience to companion devices - smart phones, tablets, media streamers, set top boxes and game consoles – in new and exciting ways.

*This paper examines HTML5 and some of its associated technologies that will enable the immersive Smart TV experience*
HTML5 for the Smart TV

[isn’t target market for this paper CE????] Today’s cable operators are increasingly struggling to prevent television viewers from “cutting the cord” and turning to alternate media sources, where consumers are discovering content to be more interactive, more personal, constantly available and a great deal more engaging. According to global researcher comScore, 181 million U.S. consumers watched approximately 40 billion Internet videos in January 2012 alone. As technology continues to evolve, putting more connected devices such as smart phones and tablets into the hands of consumers, Internet video consumption has the potential to grow even more rapidly. Cable operators are therefore challenged to deliver a more engaging and personalized user experience on Smart TVs.

[ounds more operator than CE—opportunity you described to me is for immersive TV across de-

vices and even to new toys, etc] A new technology called HTML5 has the power to redefine the Smart TV user experience by offering a more streamlined content creation and delivery process, to enable innovative multimedia and graphics features, and provide unique advertising possibilities. Through a collection of features, technologies, and APIs, the HTML5 standard enables Web developers to more efficiently present rich multimedia content that can be deployed across any connected device, including Smart TVs, smart phones, and tablets.

Streamlined Content Creation and Delivery

HTML (Hyper-Text Markup Language) is a universal Web standard that renders information from the World Wide Web uniformly across various Web browsers, creating a consistent user experience across any connected device. As the fifth version of the standard, one of the many goals in developing the HTML5 standard was simplifying content creation and delivery. Before relying on browser technology to deliver multimedia content, developers had to author and support separate native applications for every operating system, screen size, device and environment. This process was extremely timely and cost-prohibitive, as it required developers to customize interfaces each time a new consumer electronics device hit the market to account for changes in screen size, screen resolution, as well as other factors such as the type of chipset being used.

HTML5 simplifies this process by standardizing how audio, video, and other technologies are directly rendered in a HTML5 browser, thereby abstracting the content from the hardware. This enables developers to create content and deploy it across a broad range of devices without knowing the physical characteristics of the device, or requiring additional “plug-in” software to present audio or video. Content can now be created once, hosted in the cloud, and delivered to a variety of connected devices, including tablets, smart phones, media streamers, and Smart TVs. Because HTML5 is universally being adopted by all of the industry’s popular Web browsers, including Micro-
soft Internet Explorer, Mozilla Firefox, Apple Safari and Google Chrome, content providers need not worry about the type of end-device, as the browser will perform all the heavy lifting and will render content in an optimal way for the consumer.

In next three sections, this article will examine several of the technologies that lead to streamlined content creation and delivery for Smart TVs.

Localized Storage

One of the drivers behind HTML5’s ability to streamline the content creation and delivery process is local storage. HTML5 allows content to be stored locally, via a thin client or local database within the connected TV, so that applications remain functional even when they are not connected to the Web or the communication path to the web is not optimal. Harnessing the power of local storage, content developers can now store large amounts of data on a local client with a simple API. This is advantageous for caching frequently used images or data, as it minimizes the number of times an app needs to make requests to the server, therefore increasing the performance of applications either at run time, or when the application is launched.

Web Sockets

Another HTML5 technology called Web Sockets further streamlines content delivery by enabling seamless two-way communication over a TCP socket. (See Figure 1.) Prior to Web Sockets, clients had to employ a technique called “long-polling”, in which the client sends a request to the server, and waits until the server responds with data. The issue with this method is that the server may not have any data to share and the client will continue to request data until it is received. Using the HTTP protocol to do this, requires a huge overhead and is detrimental to performance especially in low latency situations. With Web Sockets, the path stays open and when data becomes available at the server, it is pushed in real time without the client needing to continually send high overhead requests. Web Sockets provides a full communication channel between the TV and the server, which is ideal for delivering real-time, event-driven Web applications such as electronic programming guides, stock tickers, interactive content, real-time weather updates, and more. By removing the overhead pre-
viously required to deliver interactive and real-time data, Web Sockets dramatically reduces the complexity of real-time data transmission, providing content developers with a more efficient way of communicating with servers and enabling high performance real-time two-way data capabilities.

Standardized Audio and Video Coding

Another benefit of HTML5 is its ability to handle multimedia and graphical content in the browser without relying on proprietary plug-ins and APIs. Currently, there are a few standard methods for playing audio files on a Web page — using proprietary plug-ins and/or CODECs — for which there is no universal standard across all browsers. HTML5 offers a standard way that audio files can be embedded and played on any Web page through a new feature called the <audio> element. Once an audio file is invoked, the connected Web browser automatically launches an embedded audio player that may include controls such as play, pause, and volume control - simplifying what used to be a much more complex process. The <audio> element supports two main audio codecs, MP3 and Ogg.

HTML5 streamlines video content in the same way by also eliminating the need for loading a video player plug-in. Current websites that rely on plug-ins have the potential to encounter several issues: the plug-in must support the video format, the plug-in requires much larger computing resources, and the plug-in generally requires licensing and integration development.

HTML5’s <video> element introduces a simple and standard way of playing video files without the need for a plug-in, special coding, or licensing. The <video> element supports three main video codecs: MP4, WebM, and Ogg. Similar to the audio player, the video player includes attributes such as height and width, play, pause, and volume control.

Because of the new HTML5 audio and video tags, content will no longer require a plug-in to launch to play audio and video content, and as such memory can be better utilized for other processes. Additionally, content providers can expect nearly the identical experience on any connected device with very little customization.

Multimedia and Graphics Capabilities

Aside from streamlining content development and delivery, HTML5 introduces engaging graphics capabilities within the connected browser, including 3D animation. CSS 3D is a new technology within HTML5 that allows elements to be spatially transformed in two-dimensional space to appear as 3D elements. Utilizing CSS 3D, content developers can easily deliver more compelling animated content and applications without developing the animation in Flash or another type of animation plug-in. (See Figure 2.) CSS 3D is remarkably easy to use and
produces smooth animations, providing a more visually compelling television interface experience for Smart TV viewers.

HTML5 also supports WebGL, a cross-platform, royalty-free Web standard that enables content developers to produce visually stunning 3D animations closely resembling those, until recently, only available on more powerful game consoles. WebGL directly taps into the power of the processor for advanced computations required for complex animations. (See Figure 3.) The JavaScript-based API brings hardware-accelerated 3D graphics directly into the connected Web browser using HTML5’s Canvas element, eliminating the use of a proprietary plug-in. As a result, content developers can launch sophisticated animations with shading, smooth textures, and real-time responsiveness to user input.

Unique Advertising Opportunities - this section not relevant to CE

So far this article has explained how HTML5 browsers streamline content development and delivery, in addition to greatly enhancing the Smart TV user experience through sophisticated graphics and multimedia, but there’s another important advantage of HTML5 Web browsers: their ability to support personalized television content, including advertising.

An HTML5 browser gives content providers such as cable operators the ability to overlay interactive content derived from the Web on top of a traditional live broadcast as well as the ability to augment the experience on other IP-connected “companion” devices like tablets or smart phones. This makes television content significantly more engaging for the viewer and thus valuable to advertisers.
Through a unique new multithreaded feature, HTML5 browsers can simultaneously perform multiple operations at the same time thereby maximizing the available processing power of the device. This heightened performance is a vast improvement over standard Web browsers that are only designed to execute a single thread at a time. Multithreaded operation alleviates this by rendering video on the HTML5 browser using one thread, and then with another thread advertising can be presented alongside the video in real time without performance degradation. In the near future, with additional capabilities Smart TV Interfaces will have the capacity to identify the type of programming that viewers are watching and pull complementary content from the Web at the same time, thereby experiencing a much richer and personalized experience, while content providers and advertisers can maximize their revenue potential by delivering more targeted content. Multithreaded operation, therefore, is a win-win situation for television viewers, content providers, and advertisers.

For example, prior to HTML5, if a viewer was consuming graphically intense media on their Smart TV browser, they would need to wait for the content to finish before interacting with additional content. Multithreaded operation alleviates this by rendering video on the HTML5 browser using one thread, and then with another thread advertising can be presented alongside the video in real time without performance degradation. In the near future, with additional capabilities Smart TV Interfaces will have the capacity to identify the type of programming that viewers are watching and pull complementary content from the Web at the same time, thereby experiencing a much richer and personalized experience, while content providers and advertisers can maximize their revenue potential by delivering more targeted content. Multithreaded operation, therefore, is a win-win situation for television viewers, content providers, and advertisers.

Finally, an HTML5 browser on a Smart TV can be enabled to collect analytical data that gives content providers an insight into their subscribers’ television usage habits. Armed with this data, a cable operator could determine whether certain Web applications are being utilized, how they’re being used, and if viewers are as engaged as they could be – leading to tremendous user insight and an improved experience for the viewer.

**HTML5 Browsers: Optimizing the Future of Television**

Today’s television viewers expect a more personalized and compelling user experience, and if they cannot achieve that on Smart TVs, they are likely to turn to alternate sources like PCs, tablets, and smart phones, which deliver customized content via Web applications and the Internet.

The concept of using HTML technology for a TV interface is really quite new and many of the industry’s major connected device manufacturers are either slowly adopting HTML5 or completely embracing it. More cautious vendors are deploying hybrid user interfaces that rely on a combination of legacy native code and HTML5 elements. But the more aggressive trend is to deploy interfaces that are completely based on HTML5 – embracing a browser-based interface for the entire Smart TV experience. The next step hinges on content providers developing content and applications specifically for the Smart TV browser interface. Harnessing the power of HTML5, content providers can truly transform television viewing from a static experience to one that is personalized and rich with 3D graphics, real-time connectivity, targeted advertising and engages the consumer like never before.
Espial TV Browser accelerates the deployment of TV web browsing, interactive TV content and over-the-top web video to your customers. Espial TV Browser (formerly branded as the Espial Escape Browser) is an embedded web browser that is designed to support the challenging browsing requirements of Connected TV’s, STBs and internet devices. It is easily ported across devices and offers the latest and most advanced W3C web standards support. End-users will enjoy a compelling internet web browsing experience with Espial TV Browser, while manufacturers and developers can simply and quickly build customized user interfaces that deliver exciting, interactive applications and compelling content to consumers. It supports a range of end-user applications including web browsing, product menus, interactive advertising, email, chat, games and portal.

http://www.espial.com/products/evo_browser/